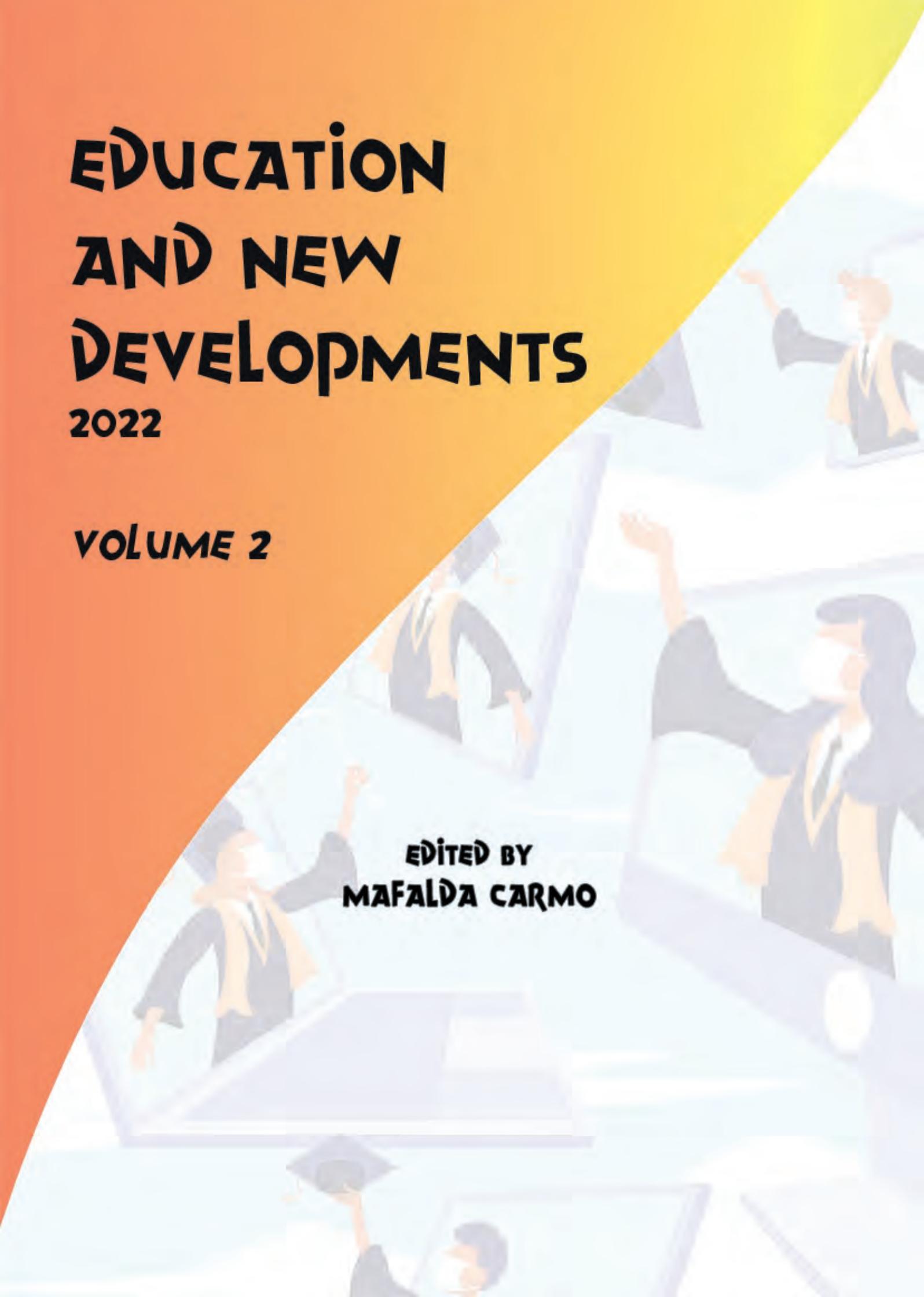


EDUCATION AND NEW DEVELOPMENTS 2022

VOLUME 2

**EDITED BY
MAFALDA CARMO**



Education and New Developments
2022

Volume 2

Edited by
Mafalda Carmo

Edited by Mafalda Carmo, World Institute for Advanced Research and Science (WIARS), Portugal

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FOREWORD

This book contains the full text of papers and posters presented at the International Conference on Education and New Developments (END 2022), organized by the World Institute for Advanced Research and Science (WIARS).

Education, in our contemporary world, is a right since we are born. Every experience has a formative effect on the constitution of the human being, in the way one thinks, feels and acts. One of the most important contributions resides in what and how we learn through the improvement of educational processes, both in formal and informal settings. The International Conference seeks to provide some answers and explore the processes, actions, challenges and outcomes of learning, teaching and human development. The goal is to offer a worldwide connection between teachers, students, researchers and lecturers, from a wide range of academic fields, interested in exploring and giving their contribution in educational issues. We take pride in having been able to connect and bring together academics, scholars, practitioners and others interested in a field that is fertile in new perspectives, ideas and knowledge.

We counted on an extensive variety of contributors and presenters, which can supplement our view of the human essence and behavior, showing the impact of their different personal, academic and cultural experiences. This is, certainly, one of the reasons we have many nationalities and cultures represented, inspiring multi-disciplinary collaborative links, fomenting intellectual encounter and development.

END 2022 received 790 submissions, from more than 45 different countries, reviewed by a double-blind process. Submissions were prepared to take form of Oral Presentations, Posters, Virtual Presentations and Workshops. The conference accepted for presentation 263 submissions (33% acceptance rate), from which, 233 submissions are published in full text in these volumes.

The conference also included:

- One Keynote presentation by Prof. Dr. Alan Singer (Ph.D., Department of Teaching, Learning and Technology, Hofstra University, Hempstead, NY, USA).
 - One Invited Talk by Prof. Dr. Elisa Bertolotti (Ph.D., Art & Design Department, University of Madeira; ID+ Research Unit; ITI/Larsys, Portugal) and Prof. Dr. Valentina Vezzani (Ph.D., Art & Design Department, University of Madeira; ID+ Research Unit; Paco Design Collaborative, Portugal).
- We would like to express our gratitude to our invitees.

This year we also counted on the support of "Madeira Promotion Bureau", contributing to the success of the event and providing a pleasant experience to all END 2022 participants. We would like to thank the "Madeira Promotion Bureau" for welcoming END 2022 to its beautiful island.

This conference addressed different categories inside the Education area and papers are expected to fit broadly into one of the named themes and sub-themes. To develop the conference program, we have chosen four main broad-ranging categories, which also covers different interest areas:

- In **TEACHERS AND STUDENTS**: Teachers and Staff training and education; Educational quality and standards; *Curriculum* and Pedagogy; Vocational education and Counselling; Ubiquitous and lifelong learning; Training programs and professional guidance; Teaching and learning relationship; Student affairs (learning, experiences and diversity; Extra-curricular activities; Assessment and measurements in Education.
- In **PROJECTS AND TRENDS**: Pedagogic innovations; Challenges and transformations in Education; Technology in teaching and learning; Distance Education and eLearning; Global and sustainable developments for Education; New learning and teaching models; Multicultural and (inter)cultural communications; Inclusive and Special Education; Rural and indigenous Education; Educational projects.
- In **TEACHING AND LEARNING**: Critical, Thinking; Educational foundations; Research and development methodologies; Early childhood and Primary Education; Secondary Education; Higher Education; Science and technology Education; Literacy, languages and Linguistics (TESL/TEFL); Health Education; Religious Education; Sports Education.

• In **ORGANIZATIONAL ISSUES**: Educational policy and leadership; Human Resources development; Educational environment; Business, Administration, and Management in Education; Economics in Education; Institutional accreditations and rankings; International Education and Exchange programs; Equity, social justice and social change; Ethics and values; Organizational learning and change, Corporate Education.

This is the Volume 2 of the book *Education and New Developments 2022* and it contains the results of the research and developments conducted by authors who focused on what they are passionate about: to promote growth in research methods intimately related to teaching, learning and applications in Education nowadays. It includes an extensive variety of contributors and presenters, who will extend our view in exploring and giving their contribution in educational issues, by sharing with us their different personal, academic and cultural experiences.

This second volume focus in the main areas of **PROJECTS AND TRENDS** and **ORGANIZATIONAL ISSUES**.

We would like to express thanks to all the authors and participants, the members of the academic scientific committee, and of course, to our organizing and administration team for making and putting this conference together.

Hoping to continue the collaboration in the future.

Respectfully,

Mafalda Carmo
World Institute for Advanced Research and Science (WIARS), Portugal
Conference and Program Chair

Madeira, Portugal, 18 - 20 June, 2022

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KEYNOTE LECTURE

“WELCOME TO THE ANTHROPOCENE: TEACHING CLIMATE HISTORY – THERE IS NO PLANET B”

Dr. Alan Singer

Ph.D., Department of Teaching, Learning and Technology, Hofstra University, Hempstead, NY (USA)

Abstract

As climate transformation continues unabated because of human action and inaction, 2021 was a year of climate extremes. Levels of methane in the atmosphere increased by the largest amount since measurements began. The Arctic and Antarctic ices sheets and northern permafrost continued to melt and there were record wildfires across the globe. Meanwhile the burden of climate change falls hardest on the least developed economies that have the smallest carbon footprint and while scientific evidence of human caused climate change and the prospects for a catastrophic near future is overwhelming, climate denial supported by powerful financial fuel corporations stalls international action. Welcome to the Anthropocene. Climate cycles, both long and short-term are natural consequences of geological history, but there is no question that recent changes since the start of the Industrial revolution are caused by human action. A study of past climate changes provides scientific evidence to explain current transformations. It is questionable whether a globalized capitalist system or technological innovations can effectively address climate change. The debate in classrooms and the political realm should not be whether climate change is happening or how much it places human civilization at risk but over how societies and individuals must respond to stabilize climate and reverse the most damaging impacts.

Keywords: *Climate change, environment, teaching, activism.*

Humanity has a collective choice to make and it will not be an easy decision-making process because some individuals, nations, and corporations are much more powerful than others and they benefit from the current situation, or at least they think that they do. They horde short-term profit and either ignore or minimize long-term consequences. We are living in a climate emergency that threatens the decline and perhaps the collapse of civilization as we know it and humanity must decide if we will abandon fossil fuels to avoid a climate catastrophe. One reason I am delivering this paper today is to recruit you as intellectuals, educators, and activists in your home countries who can influence people and policy. This is an international struggle for the future of mankind.

Welcome to the Anthropocene, a newly named geological epoch defined by human caused climate change. According to Swedish teenage climate activist Greta Thunberg and the Intergovernmental Panel on Climate Change (IPCC), in 2019, humanity was less than 12 years away from tipping points that could produce a climate catastrophe threatening large parts of the Earth and human civilization. It is now three years later. If Ms. Thunberg and the IPCC were correct in 2019, and the most recent IPCC climate report suggests that they were, human civilization in in the midst of a climate emergency and an irreversible climate catastrophe is today less than nine years away (Thunberg 2019; IPCC 2022).

Like Greta Thunberg, I am scared, and you all should be also. I am seventy-two years old and I will most likely not live to witness the worst impacts of climate change, but my partner and I have four grandchildren and we worry about their futures and the futures of all young people. I don't want the legacy of my generation to be the destruction of human civilization.

Portugal is exceedingly vulnerable to climate change because of exposure to extreme meteorological events sweeping across the Atlantic Ocean, rising sea levels, and its proximity to the Mediterranean basin that will be susceptible to prolonged droughts and an enormous reduction in humidity. According to some climate projections, metropolitan Lisbon, currently home to 3 million people and the Portuguese capital, may be a desert by the year 2100 (TPN/Lusa 2021; Rathi 2016).

The face-to-face component of this conference is taking place in the beautiful city of Funchal, located on the Portuguese Madeira Archipelago in the Atlantic off of the coast of West Africa. According to a 2004 study, annual precipitation in Madeira, with a population of about 250,000 people, will decrease

by up to 35% by the end of the 21st century, especially on the southern coast where Funchal is located, making it hotter and drier and causing serious water stress (Santos *et al* 2004).

In addition, a Senior Scientist at IPCC Working Group III warns that people on Madeira should anticipate that rising sea levels will “promote erosion of the entire coastal region and eventually landslides” and that “increasingly longer, drier summers” may also “increase the occurrence and risk associated with forest fires” (Pereira, 2020).

Madeira is not the only Portuguese site threatened by climate change. In Portugal the peak wildfire season usually starts in early July and continues until October. Prior to the 1980s, individual fires on the Portuguese mainland never destroyed more than 10,000 hectares or 100 square kilometers, about 40 square miles. In the first two decades of the 21st century, two wildfires burned over 20,000 hectares, 200 square kilometers, about 80 square miles. In 2017, a record year for wildfires in Portugal, half a million hectares of Portuguese eucalyptus and pine forests burned, 5,000 square kilometers, about 200 square miles, killing 121 people. During the 2020 wildfire season there were almost 10,000 individual wildfires destroying about 700 square kilometer or 270 square miles of forest (Faget 2020).

Uncontrolled wildfires are occurring across the globe caused by rising temperatures and shifts in rain patterns resulting from 250 years of burning fossil fuels during the Industrial Era. In 2017 and 2018 wildfires devastated areas in Portugal, Greece, California and British Columbia. In 2020, fires raged for months in Australia, Siberia, and in the Brazilian Pantanal, the world’s largest tropical wetland, and California had its worst fire season in recorded history with an area larger than the state of Connecticut enveloped in flames. Six of the twenty largest wildfires in modern California history occurred in 2020. On one day in September 2020, multiple mega-fires were burning more than three million acres of forest and millions of Californians were exposed to smoke and toxic air. The U.S. Pacific Northwest burned in 2020 and again in 2021. These fires were so intense they generated tornado strength winds and caused or contributed to rolling electrical blackouts during triple-digit heat waves, dangerous chemicals entering ground water and aqua-filters, and insurance companies canceling homeownership policies (Leonard 2022).

As climate transformation continued unabated because of human action and inaction, 2021 was a year of climate extremes. The IPCC’s sixth assessment report, released in March 2022, was written by over 250 scientists from almost seventy countries and spelled out how bad the approaching climate catastrophe will be. United Nations Secretary General António Guterres called it “an atlas of human suffering and a damning indictment of failed climate leadership.” According to the report, climate change is happening more rapidly than expected with increasingly devastating results (Guterres 2022).

The average global temperature has increased by 2° F since the start of the 19th century Industrial Revolution with the mass burning of fossil fuels. International cooperation is required to address the climate emergency, but the world remains divided into independent, sovereign, competing nation-states that emerged in the 18th and 19th centuries and cooperation, regulation, and reduced greenhouse gas emissions remain voluntary even after international climate conferences and agreements signed at Rio in 1992, Kyoto in 1997, and Paris in 2015. While some United States Presidents have agreed to abide by the guidelines, the U.S. has never formerly endorsed them, which would require a highly unlikely two-thirds vote of the U.S. Senate (IPCC 2022).

Key findings of the IPCC report include that in 2019 alone, storms, floods and extreme weather produced 13 million climate refugees in Asia and Africa; Millions of people are at risk of hunger and malnutrition as heat and drought kill crops and trees; Mosquitoes carrying diseases like malaria and dengue are spreading into new areas including in the United States; Half the world’s population faces severe water scarcity at some point during the year (Plumer and Zhong 2022).

Climate change affects different regions of the Earth differently. Warming in regions above the Arctic Circle in Siberia, Alaska, and Canada has increased twice as fast as in other areas of the planet. The temperature in the Eastern Siberia town of Verkhoyansk reached 38° C (100° F) in June 2020. It was the hottest Arctic Circle temperature ever recorded. Permafrost, permanently frozen ground in the Northern Hemisphere, contains vast amounts of carbon accumulated from dead plants and animals over the course of hundreds of thousands of years. Estimates suggest that permafrost could hold twice as much carbon as there currently is in the Earth’s atmosphere. Rotten organic material is exposed as permafrost thaws. A broad thaw caused by global warming would release the stored carbon into the atmosphere as carbon dioxide (CO₂) and methane (CH₄), another greenhouse gas. The release would trigger even greater planetary warming and more thawing. To understand the process, leave frozen chicken on the kitchen counter. You will soon have a puddle of water and eventually the chicken will start to smell as it decomposes. Warming leads to more warming until there is a tipping point with rapid and irreversible change. Ice sheets melt, ocean currents shift, coastal regions flood, the oceans release dissolved greenhouse gases, and civilization as we know it ends (Schädel 2020; BBC 2020).

Another region where climate change will have dire consequences is the Amazon Rainforest in equatorial South America. The Amazon River is almost 4,000 miles long and runs roughly along the equator eastward from the Andes Mountains to the Atlantic Ocean. Its immense tropical rainforest, containing about

half of the Earth's remaining rainforests, is 2.6 million square miles in size with 1.4 billion acres of dense forest and covers approximately 40% of the land area of South America. The rainforest extends into seven countries, Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname, and one European colony, French Guiana, although most of its acreage is in Brazil. Brazil is the fifth-largest country in the world, it's the seventh most populous, and it has the eighth-largest economy. Sixty-two percent of the country is forested and less than 10% is considered arable. Brazil's carbon footprint ranks the country thirteenth in the world for contributing CO₂ to the atmosphere, China, the United States, and India rank 1, 2, and 3. Economic expansion by Brazil continually puts it at loggerheads with global environmental concerns because it would come at the expense of the rainforest, which has been described as the "lungs of the planet" (Rice 2019; WWF; CIA; De Bolle 2019).

Because of its size and location, the Amazon Rainforest is home to about 25% of the Earth's biodiversity and plays important roles in several of the planet's natural cycles that influence climate. Its plants and trees annually absorb 2 billion tons of carbon dioxide, approximately 5% of CO₂ emissions. Nearly 100 billion tons of carbon is stored in the Amazon's trees, which equates to almost 400 billion tons of carbon dioxide that is kept out of the atmosphere.

The Amazon is gradually losing its ability to recover from droughts and land-use changes and scientists worry it is approaching a tipping point where it will be replaced by grassland. It has already shifted from a CO₂ sponge to a CO₂ emitter. Eventually an additional 90 billion tons of heat-trapping carbon dioxide would be emitted into the atmosphere. As water evaporates from the tropical rainforest, the Amazon Rainforest also acts as a giant cooling system moderating temperatures and providing rainfall in South America and sub-Saharan Africa (Rice, 2019). As the Amazon Rainforest is defoliated, much of the Earth's Southern Hemisphere will be dramatically impacted (Fountain 2022, A5; NOAA 2021).

In Southwest Asia, a major global conflict region, temperature is increasing at nearly twice the rate of the world overall and temperatures are rising at a faster rate. By 2100, average temperatures there are expected to increase by up to 4° C degrees, exacerbating water shortages, creating enormous health risks for the area's people, and further undermining regional stability (Haas and Drukman 2021).

Meanwhile nations and corporations act as if there was an unlimited amount of time to adjust. None the world's leading economies, I repeat none, including the entire G20, is meeting carbon reduction commitments they made in the 2015 Paris climate agreement.

This is after climate pledges by Russia, Iran and Saudi Arabia were deemed "critically insufficient," pledges by Australia, Brazil, Canada, China and India "highly insufficient," and pledges by the United States, the European Union, Germany and Japan were ranked "insufficient." The only country to meet its target for carbon reduction was the African nation of Gambia, which already had an infinitesimally small carbon footprint. At the same time, according to the United States National Oceanic and Atmospheric Administration, in 2021 levels of methane gas in the atmosphere increased by the largest amount since measurements began. While there is less methane in the atmosphere than there is carbon dioxide, as a green house gas methane has a greater impact on global warming (Milman 2021; Zhong 2022).

Major companies continue to be guilty of practices that will decimate the human environment. Microsoft claims to be committed to a "carbon negative" future, but between June 2020 and June 2021, its carbon emissions rose by over 20% because of the construction and operation of new data centers and the manufacture and use of its electronic devices. The semiconductor industry is also highly energy intensive, a typical factory has a carbon footprint equivalent to a small city. While all-electric cars emit far fewer greenhouse gases than either gas-fueled or hybrid cars, they still leave a carbon footprint. Because they draw from the local power grid, if electricity is generated by coal-fueled plants, they could even have a greater carbon footprint than a hybrid car. Bitcoin is the cryptocurrency that hopes to pioneer a cashless and possibly greener financial future. The problem is that the greenhouse gas emitted while generating the electricity needed to power Bitcoin computers is greater than the amount produced by New Zealand or Argentina. A Bitcoin transaction has a carbon footprint equivalent to over 700,000 credit card purchases (Ewing and Boudette, 2021, A1; Zafar, 2019; China Water Risk, 2013; Tabuchi and Plumer, 2021, B5; Sorkin, 2021: B1; Eavis 2022, B3; SCOTUS Blog 2022).

Friday, April 22, 2022 was Earth Day. As the impending climate catastrophe draws closer, Earth Day in the United States has gone mainstream, becoming a feel-good holiday stripped of serious messages, much like Mother's day. The White House issued a Presidential proclamation declaring "For the future of our planet, for our health, and for our children and grandchildren, we must act now. Let us stand united in this effort to save our planet and, in the process, strengthen our economy and grow more connected to each other and the world we share." The U.S. Commerce Department Office of Sustainable Energy and Environmental Programs posted Happy Earth Day greetings on its website and its newsletter included photographs from its 2022 Earth Day Photo Challenge (White House 2022; U.S. Department of Commerce 2022).

In recent years, corporate America jumped on the Earth Day bandwagon in embarrassingly small ways. Schick introduced a new sustainable razor for people experiencing "Greentimidation." SodaStream

started a campaign to save a million baby sea turtles. Uber riders in Miami, Los Angeles and Washington can win free, nature-inspired rides. The Wrangler Westward 626 Earth Day jeans are made from organic cotton and feature eco-friendly finishes. BMW North America ran an ad featuring an all-electric car. Samsonite recycled used luggage as coasters (Napolitano 2022; Houston 2022).

Disney has an annual Earth Day celebration at its Animal Kingdom theme park outside Orlando, Florida to “honor the magic of nature through family-friendly experiences and specialty offerings.” The Earth Day specialty items Disney was selling included “water bottles, tumblers, reusable bags, and a limited-edition trading pin featuring Te Fiti from *Moana* and a cuddly plush inspired by the species that call Disney’s Animal Kingdom theme park home” (Disney 2022).

From the banal to outrageous, in 2019 the petro-company Koch Industries posted a video for Earth Day on its Facebook page celebrating the fossil fuel company’s “pollution prevention practices” with the line “You love the Earth. So do we.” In 2021, ExxonMobil, one of the all-time leading polluters and a spreader of climate denial misinformation for decades, released a video celebrating its eco-friendliness with claims that its employees are “work[ing] tirelessly to reduce emissions and move towards a low-carbon future” (Taft 2022).

Climate denial plays on a general public misconception of what is meant by a scientific fact. In colloquial language, a “fact” must be 100% true and unchanging, something that basically never happens. For scientists, a fact is something that is overwhelmingly supported by the evidence that we have available, but scientists are always willing to change what they consider to be facts if new evidence appears. For scientists, human induced climate change is a fact. For climate deniers, unless there is 100% certainty, they dismiss the fact of human induced climate change and the impending climate catastrophe as mere opinion and as an excuse not to take immediate action (Singer 2022).

Even if the world’s nations and corporations finally make deep cuts in greenhouse gas emissions, the risk of extreme wildfires will continue to increase. Scientists project a 14% increase in extreme wildfires by 2030, 30% by 2050, and 50% by 2100. These fires, once rare, are burning longer, hotter, and more intensely, making firefighting and fire control virtually impossible. By 2100, we will witness extreme wildfires in Arctic tundra as plant material now trapped in permafrost melts and dries. Previously wet regions like tropical rainforests in Indonesia and the Amazon will be at greater risk (UNEP 2022).

One of the reasons that the world’s dominant economic powers have treated climate change so cavalierly is that the burden of climate change falls hardest on the least developed economies and people living in countries with the smallest carbon footprint. They are not responsible for global warming, but suffer its worst consequences. The average American produces about 17.6 tons of carbon dioxide a year, almost ten times the carbon footprint of the average person living in India, although India ranks right behind the United States as the world’s third largest CO₂ emitter. Globally, the average CO₂ emission per person is 4.79 tons. In Vietnam the per capita CO₂ footprint is 2.2, the Philippines 1.22, Yemen .94, Sri Lanka .88, Pakistan .87, Bangladesh .47, Nigeria .44, Kenya and Sudan .33, Mozambique .21, Tanzania .18, Madagascar .12, Chad .11, and Mali .09. Vietnam, the Philippines, Sri Lanka, Bangladesh, Nigeria, Madagascar, and Mozambique each face severe coastal flooding. Yemen, Pakistan, Kenya, Sudan, Tanzania, Chad, and Mali record temperatures and desertification (Dennis, Mooney, and Kaplan, 2020; Worldometer).

Lagos, one of the fastest growing cities in the world where the population is expected to reach 25 million by 2050, is at “extreme” risk. The city is located on the Gulf of Guinea and as sea levels rise there will be coastal erosion and potable drinking water will be contaminated by seawater. Haiti will also be impacted by rising sea levels and the salinification of water needed for agriculture. Haiti is also especially vulnerable to hurricanes that will grow in intensity as the oceans warm (Princewill 2021; Climatelinks).

Manila in the Philippines is another densely populated coastal city that is already susceptible to flooding and has ineffective drainage and sanitation systems. Virtually the entire Philippines archipelago is at risk of flooding and salinification. Small island nations like Kiribati, Vanuatu and Tuvalu located in the Pacific Ocean and the Maldives and the Solomon Islands in the Indian Ocean are in danger of completely disappearing as sea levels rise (Amnesty International UK; Thomas 2020).

As temperatures heat and water dries up, wars have ripped apart countries in the Sahel region of Africa and in Yemen on the Arabian Peninsula as desertification has increased competition for already limited water supplies. These include the Darfur conflict where water scarcity pitted herders against farmers after rainfall was between 30-75% below expected levels. Fighting in Mali, Burkina Faso, Niger, Nigeria, Ethiopia, and Somalia where droughts displace millions of people is often attributed religious differences, but the clashes are often rooted in underlying climate changes that pit people against each other in competition for diminishing resources. Of 20 countries located in the Sahel region, at least 12 have been plagued by ongoing warfare (Law 2019; Mulhern 2020).

Extreme heat also affects the poorest and most vulnerable populations in the United States, especially older Americans. A study published in March 2020 estimated that between 2010 and 2020 as many as 12,000 people died each year from heat-related ailments, 80% of who were older than age 60. In

Houston, Texas, where the average temperature rose by more than 3.5^o F between 1970 and 2020, sweat “pools” in the boots of Mexican-American day-laborers working outdoors in the hot and humid summer heat and many suffer from heat exhaustion. Because of what is known as the “urban heat island” phenomenon, Brownsville, Brooklyn, one of the poorest neighborhoods in New York City, has average daytime temperatures about 2^o F higher than the city average because there are few parks and trees and asphalt pavement absorbs and hold onto the heat (Shindell *et al* 2020; Mohajerani, Bakaric, and Jeffrey-Bailey 2017; Senguata 2020).

The world is already seeing climate vast migration within and between countries. Almost 8 million people from Southeast Asia have already trekked to the Middle East, Europe, and North America. Millions of Africans have abandoned Sahel farmland and migrated to coastal areas. Semiarid regions of Guatemala in Central America will grow more desert like as annual rainfall there declines by as much as 60% and the push north into the United States, El Norte, will grow larger and larger. It is estimated that by 2070, about 20% of the currently inhabitable regions of the Earth will no longer being habitable, impacting billions of people. Parts of China and India will become so hot that people will die just by going outside. As climate migration increases more affluent countries, facing their own climate issues, will erect higher barriers to keep out the desperate, denying entry because climate migrants are not considered refugees under current international law (Lustgarten 2020).

Climate cycles, both long and short-term are natural consequences of geological history, but there is no question that changes since the start of the Capitalist Industrial Revolution in the 18th century are caused by human action and unregulated economic activity. Capitalists argue that when market conditions are right, new technologies will emerge to slow or ever turn back climate change, allowing human civilization time to adjust. However, it is questionable whether a globalized capitalist system with competing nation-states and corporations or technological innovations can effectively address climate change (Singer 2022).

I am most familiar with politics in the United States where a bill proposed by President Joseph Biden to cut U.S. greenhouse gas emissions to half of 2005 levels by 2030 was blocked in the U.S. Senate by Republicans who were joined by Democrat Joe Manchin (W.Va.) whose family business invests in power plants that use “dirty” coal, coal that is highly polluting because it contains large amounts of impurities. Meanwhile, the rise in gas prices because of the Russian invasion of Ukraine led to calls for greater fossil fuel production, further jeopardizing the environment, and in April 2022, the U.S. Interior Department announced it would sell the rights for additional oil and gas drilling on public land (Silverman 2022; Davenport 2022).

Something I find even more threatening to the future of the environment and the Earth, the United States Supreme Court, which has a rightwing anti-regulatory anti-science majority, is considering a case, *West Virginia v. Environmental Protection Agency*, that will decide whether the national or federal Environmental Protection Agency even has the legal authority to regulate greenhouse gas emissions and limit the climate impact of coal companies (Joselow 2022).

But increased fossil fuel production and a shift to highly polluted fuel sources did not just happen in the United States. As China’s economy slumped from the double-whammy of COVID-19 restrictions and oil and natural gas delivery interruptions following the Russian invasion of Ukraine, it increased the use of coal in its electrical power plants and importing of coal, including from Russia, despite international calls for a boycott. Prior to these decisions, China already was responsible for the largest increase in carbon dioxide emissions in 2021 (Sengupta 2022).

The debate in classrooms and the political realm should not be whether climate change is happening or how much it places human civilization at risk but over how societies and individuals must respond to stabilize climate and reverse the most damaging impacts and it cannot be limited to just academic discussion. In the United States, teachers are expected to promote responsible civic action as part of preparation for life in a democratic society. I suspect there are similar curriculum expectations in most if the economically developed liberal world and I would like to hear from you about what is permitted in your countries (NCSS 2013).

The alternative to climate action in the classrooms and in the streets is the iconic scene in the last frame of the 1968 movie *Planet of the Apes* where the character played by Charlton Heston breaks down after realizing that the planet they have landed on, a planet where human civilization has perished, is the Earth.

In 1967, Reverend Martin Luther King, Jr. posed the question “where do we go from here?” to American civil rights activists. We need to ask and answer they question about today’s climate emergency (King 1967). Our first job as teachers and academics is to LEARN and where possible to conduct research. Our second job is to TEACH about the climate emergency to help spur activism. We have a responsibility to PROPOSE climate solutions and to LOBBY for new laws. But we already know there are powerful forces aligned against us so we must be willing to join PROTESTS our selves and through our actions

REFUSE to be complicit with those who are destroying human civilization, always remembering there is NO planet B.

If you would like to read more about the Anthropocene, the climate emergency, and the science behind the impending climate catastrophe, consider my recent book, *Teaching Climate History: There is NO Planet B* by Routledge Press. I am not going to focus on the Greenhouse Gas effect and the science of climate change during this presentation, but I will if you ask follow-up questions (Singer 2022).

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Biography

Dr. Alan Singer, Ph.D., is a social studies educator and historian in the Department of Teaching, Learning and Technology at Hofstra University, Long Island, New York. He is a former New York City high school teacher and regularly blogs on *Daily Kos* and other sites on educational and political issues. Dr. Singer is a graduate of the City College of New York and earned a Ph.D. in American history from Rutgers University. His most recent book is *Teaching Climate History: There is NO Planet B* (Routledge, 2022). In the book he traces the Earth's climate history looking at natural cycles and transitions to explain the science behind impact of human caused climate change during the Industrial Era and the threat of an impending climate catastrophe. Dr. Singer is also the author of is the author of *Education Flashpoints* (Routledge, 2014), *Teaching to Learn, Learning to Teach: A Handbook for Secondary School Teachers, 2nd edition* (Routledge, 2013), *Social Studies for Secondary Schools, 4th Edition* (Routledge, 2014), *Teaching Global History, 2nd Edition* (Routledge, 2020), *New York and Slavery, Time to Teach the Truth* (SUNY, 2008), and *New York's Grand Emancipation Jubilee* (SUNY, 2018). He is the co-author of *Supporting Civics Education with Student Activism* (Routledge, 2021).

INVITED TALK

LEARNING BY WALKING. EDUCATIONAL EXPERIENCES IN THE OUTDOORS TO DEVELOP A (DESIGN FOR) SUSTAINABILITY MINDSET

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Abstract

The island of Madeira is attracting an increasing number of tourists from all over the world who are drawn to it by the lush diversity of its natural subtropical landscapes and ecosystems. With the local economy focusing most of its investments on the tourism sector, the island's biodiversity is already being endangered due to the increasing pressure on the balance between the cohabitation of humans and other living species (Bertolotti & Vezzani, 2021). Islands like Madeira are vulnerable territories and, as such, require the application of new methods and tools to help them transition towards regenerative and distributive systems that would make local economic growth more sustainable and ethically just towards nature, communities and ecosystems.

This talk will share some of the learning experiences we have been developing since 2018 through several international design research actions on the island, and in our teaching at the BA in Design at the University of Madeira. These include a series of exercises structured to train the designer's ability to change perspective with a post-anthropocentric sensitivity (Braidotti, 2016; Puig Della Bellacasa, 2017; Escobar, 2018; Fuad-Luke, 2022). Living and working on a peripheral and island territory allows us to observe and reflect on the challenge of sustainability and sustainable development from a unique angle. From an island perspective it is easier to think about boundaries, and therefore to visualise the aspects of circularity, interrelation and interdependence (Borgnino, 2022). In the context of design education for sustainability we consider it to be fundamental to reflect on the complexity of interrelations that exist among different natural elements and ecosystems. For this reason, our methods are based on the idea of learning outdoors in contact with nature, and bringing together people from different disciplinary backgrounds to develop, through the action of walking, a shared consciousness about challenges to a specific landscape and its communities (human, plant and animal). Finally, the talk is an opportunity to reflect with the audience on some of the challenges we encounter as (design) educators trying to switch towards a more bio-inclusive approach that would allow future generations to contemplate and build a more sustainable and just world.

Biography

Elisa Bertolotti works with storytelling, the moving image, and communication design. With a PhD and postdoc from Politecnico di Milano, she is currently teaching at the University of Madeira, Portugal. She considers that listening, poetry, having fun and collaborative making, play a central role in her work. At this time, Elisa is experimenting with ways of changing points of view in design in a post anthropocentric perspective, through forms of collaboration with different disciplinary fields, and using walking and movement outdoors as ways of learning.

Valentina Vezzani has got a PhD in Design, and a MSc in Service Design. She is Assistant Professor in Design at University of Madeira and co-founder of Paco Design Collaborative. Her research and teaching interests are in the field of strategic design, service design, sustainable development, social innovation. She believes in collaboration and participation as fundamental tools to solve today's problems, and design as a creative approach to build communication bridges.

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ORAL PRESENTATIONS

ERASMUS PROJECT VIRSTEM INTERACTIVE TOOLS FOR EDUCATION

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Abstract

In a modern education, the use of modern technologies is dictated by the time requirement to provide all spheres of life with competent specialists.

This article provides an overview of the first year of the project work of an international team consisting of teachers and researchers, software developers and modelers - specialists in BIM environment from different countries of the Baltic region, which was devoted to finding opportunities to improve the efficiency of teaching technical disciplines, integrating modern technological disciplines and virtual and augmented reality solutions with using the best traditional teaching methods, developing new approaches in educational and methodological work.

To create a modern learning environment and support the independent work of students of construction specialties in an open online course "Basic Engineering Graphics", interactive teaching material with visualization and integration of BIM is used: simulators of digital objects, interactive exercises, and tests. The free online course is designed for undergraduate students of construction specialties, both full-time and part-time studies, as well as for the professional development of specialists.

Involving the student in an active educational process to gain new knowledge is a priority to ensure the effectiveness of independent distance learning.

The statistical data presented in the article provide interesting material for analyzing the effectiveness of teaching methods, demonstrate the need to change the approach to using traditional teaching methods, and integrate virtual technologies with the best traditional methods of technical teaching.

The use of interactive objects, feedback with recommendations for further progress cannot fully replace the teacher and mentor but helps the student to plan their learning and is a very effective preparation for the next stage of learning.

Keywords: *Interactive learning, visualization, virtual reality, BIM, engineering graphics.*

1. Introduction

Strategic international partnership in the field of education is very important for improving the quality, unification, and harmonization of education.

The digital age provides an opportunity to work in a national, European, and international environment. Transnational cooperation of educational institutions allows not only to find and discuss technological solutions and methods in education, but also to analyze the process and clarify the needs of the industry, taking into account the practical experience of each country of the partner organization.

The international project VirSTEM Virtual technology for use in STEM (Science, Technology, Engineering, Mathematics) was developed and is being implemented to create an open electronic course Basic Engineering Graphics for independent work of first-year students of construction and architectural specialties.

The project partners are teachers from technical universities in the Baltic region. The exchange of best educational methods and materials helps to improve the quality of education in the educational institution of each partner. The collaboration of teachers from different countries is a powerful generator of innovative ideas and the creation of original solutions needed to create an innovative online course with interactive learning material.

International success lies in the fact that each partner brings knowledge from the point of view of their national context, approaches and experience, which ensures not only the exchange of the best successful and proven teaching methods and practical training materials but also the generation of new innovative ideas that are not found in ordinary academic days (Ovtšarenko, 2020).

2. Background

Skilled training requirements to address today's building challenges such as environmental and climate change are determined by the industry's expectations for innovation and production, as the goal of civil engineering is to develop the basic infrastructure that society needs: assessment, planning, design, construction, operation, and infrastructure services.

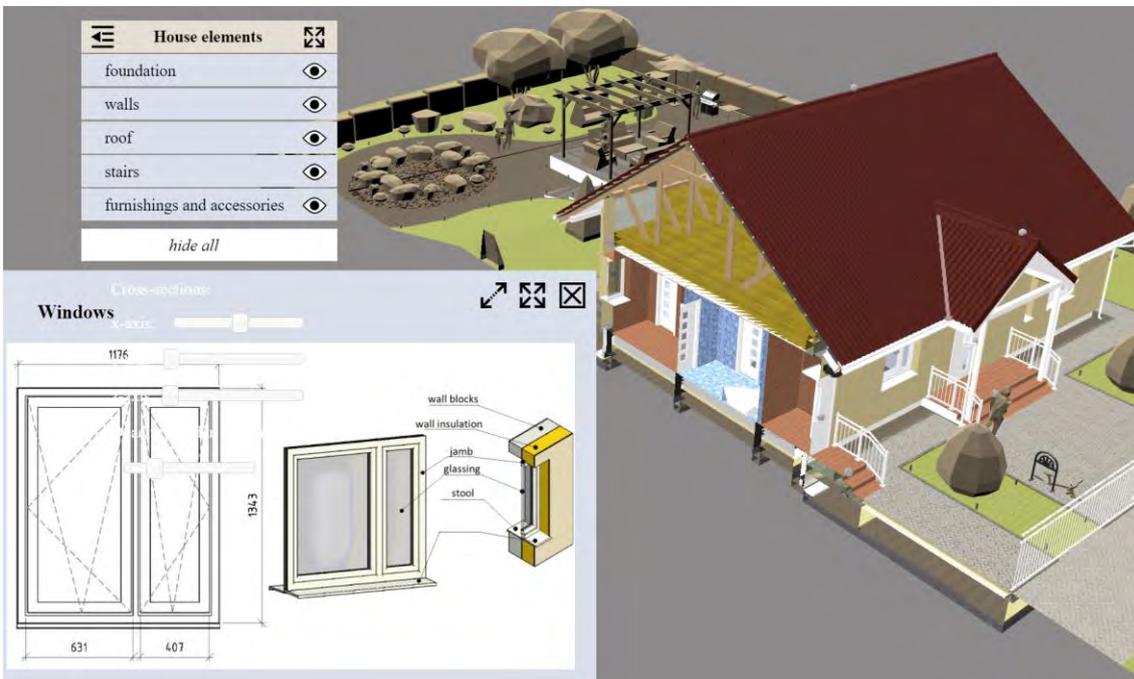
Spatial visualization skills are considered essential for various professions. Several studies have proven that 3D design software has a positive effect on students' spatial abilities. And also the BIM software supports 3D design (Pulido-Arcas, J.-A., 2021).

For students lacking field experience, visualizing the construction processes and thus making informed decisions is difficult.

Field trips, while valuable, are difficult to plan due to cost, safety, and time limitations. Creating 3D VR models and immersing students in that virtual world could provide an engaging and meaningful experience to both building science and architecture students (Salman, 2020).

The use of interactive objects in teaching allows the student to independently plan not only the time for classes, choose a place, but also independently evaluate the results achieved and choose the next step to consolidate the acquired knowledge and acquire new ones. Such an individual way of learning is very effective in providing the student with modern educational material using simulations, interactive tests, and feedback with recommendations. As part of the international project B, interactive educational materials are created, tested in the educational institutions of the project partners and improved in accordance with student feedback (Figure 1).

Figure 1. The house simulator in VirSTEM.



3. Objectives

The goal of the project VirSTEM - Virtual technology for use in STEM (Science, Technology, Engineering, Mathematics) is to create an international freely available educational resource - an online course "Basic Engineering Graphics" (3 ECTS) which innovatively integrates BIM (Building Information Modeling). The course will be designed for Bachelor-level engineering students of construction specialties, both daily and distance learners, as well as in-service training of specialists. Requirements of qualified preparation for solving today's construction problems, such as changes in the environment and

climate, due to industry expectations regarding innovation and production, since Civil Engineering goals are the development of the main infrastructure needed for society: the assessment, planning, design, construction, operation and maintenance of infrastructural works (Hjelseth, 2015).

Modern technologies that are developing in the construction industry are based heavily on BIM and require significant changes in the education of engineers. Monitoring of construction courses indicated lack of modern teaching materials with the integration of BIM objects and with interactive learning materials that would include 3D objects' simulators (Safiulina & all., 2020).

Moreover, considering the current global situation of physical distance, a new approach to the education of specialists is necessary, in which the leading role will be given to distance and independent learning using high-quality interactive learning materials.

The "Basic Engineering Graphics" course will consist of interactive learning material to get acquainted with BIM programs, to acquire practical skills in computer and engineering graphics, and modeling, and provide a better-fitted workforce for enterprises.

The course consists of related thematic modules, includes simulations of three-dimensional objects, short video guides, interactive exercises for students' study and practice, tests, and innovative intelligent rating system with feedback and certification.

The VirSTEM project is carried out by the team of five well-known higher education institutions that teach engineering in the countries around the Baltic Sea, TTK UAS Estonia, VGTU Lithuania, RTU Latvia, TAMK UAS, and Metropolia UAS Finland. These universities have long-term successful partnerships in the field of civil engineering in teaching construction specialties. Project teams consist of experienced teachers who are highly skilled experts in the field of BIM modeling with very valuable practical experience as well as good project management skills (Makuteniene & all, 2020).

4. Methods

The integration of BIM technology allows the use of a virtual environment for learning, which ensures increased involvement and motivation of students. The learning process can be described as "learning by doing", which is often difficult to implement in traditional lectures, and even more so in the student's self-study. In a virtual environment, it is possible to implement such tasks as navigation, selection, and manipulation of objects (Pulido-Arcas & all, 2021).

The use of educational material of the e-course in learning various STEM subjects enables linking of a piece of parametric information about the studied objects and provides a solid basis for engineering education. The online course is very efficient due to its simplicity, cost-effectiveness, and form of the game.

As described by scientists (Wong, Kwan, 2021) student readiness contributes to gains in game-based learning environments, informing the factors affecting the implementation of the game-based approach. Some gaming features are in the VirSTEM application together with theoretical parts and tests.

Mobile learning expands the scope of distance learning by providing access to quality content regardless of the time and place of training - so the course will reduce the need for teaching in the classroom (Martín-Gutiérrez, 2017).

Engineering thinking should ensure the use of acquired knowledge to solve practical problems that were or were not taken into account during student training. In other words, the engineer must be able to apply all the knowledge gained and find the optimal solution for a standard or non-standard task, which means processing the initial data about the object, creating and regulating the relationships between the parameters of the object or between objects, or between the object and the environment.

The innovation of the VirSTEM project is to introduce BIM technology already into the first-year subjects of bachelor level engineering studies. The project plans to create and use simulations of three-dimensional objects both for an interactive course in engineering graphics and for other basic engineering courses.

The simultaneous use of a three-dimensional model of an object in the study of basic technical subjects with BIM integration is innovative and will enhance interdisciplinary communication, ensure a better understanding of goals, and enable the use of objects for various purposes in various conditions. For interactive exercises on the web page of the e-course, the built-in three-dimensional objects Geogebra, Revit are used (Figure 2).

Figure 2. The integration of BIM into the subject of basic engineering graphics. Wall part of the house and model-interactive exercise.



1. Use the house part for measures getting:

the window height from the floor

the height of the window

the height from the floor to ceiling

the roof angle degree

2. Use the house wall layers for measures getting:

the height of the wall block

the wight of the wall block

the insulation thickness

3. Use the house floor and foundation layers for measures getting:

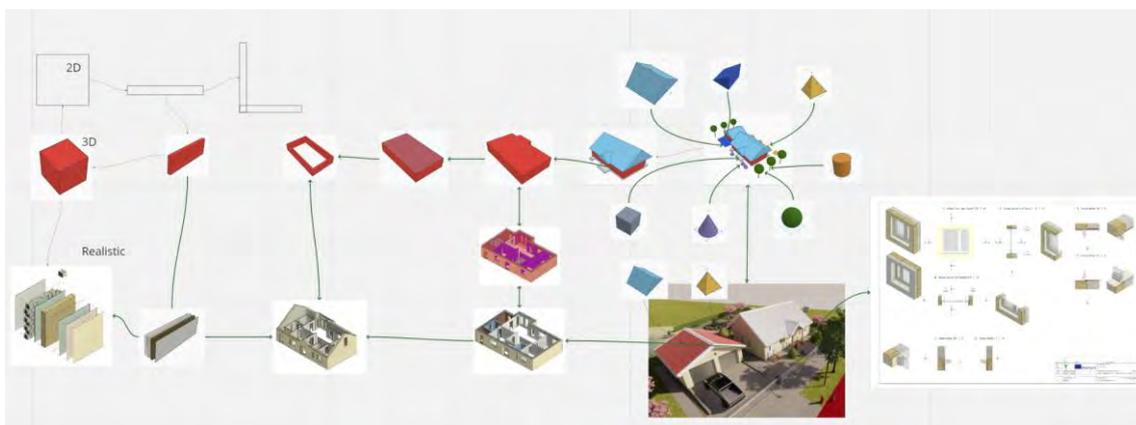
concrete layer thickness

Engineering thinking skills are acquired in an interactive playful way, providing a fundamental basis for target groups for future BIM technology use, for training to support creative thinking in everyday work, and for developing the potential for innovation.

The project partners are working to create a free online course "Basic Engineering Graphics" with BIM integration - 80 hours (3 ECTS) for bachelor students of construction/ architectural specialties self-work, with an interactive learning material, which includes simulations of three-dimensional objects, interactive exercises, and tests. This course goal is to eliminate the need for classroom teaching of the introductory part of the subject of Engineering Graphics and plans to be used for further training BIM programs use and the acquisition of practical skills for computer drawing and modeling.

The e-course consists of thematic modules, logically interconnected, providing a step-by-step study of the course of engineering graphics, the possibility to use objects and the contents of a specific module in the study of mathematics and physics to link, parameterize and clarify information of the same object (Figure 3).

Figure 3. The structure of integration of BIM into the subject of Basic Engineering Graphics.



Supported by basic technical parameters, information about the object is better absorbed by students, thus laying the fundamental knowledge of a future specialist.

In addition, at the choice of the teacher, it is possible to use thematic modules for blended learning, independent and classroom, for example, for continuing education courses.

5. Conclusions

The online course is planned as a prototype of a new concept of modern intellectual education. In his approach to learning, he will help:

- reduce the need for human and material resources for the acquisition of fundamental knowledge in basic technical subjects and the initial use of BIM,
- open the possibility of more in-depth teaching of special subjects at the next stages of the bachelor's degree,
- help enterprises speed up training/upskilling of workers in the workplace,
- to provide high-quality and innovative educational material for beginners in the construction professions and interested users of BIM, regardless of their level of education, material or physical fitness.

VirSTEM project activities use the most modern methodologies of information and communication technologies. Emphasis is placed on developing and improving virtual learning methods and evaluating learning outcomes. The project focuses on creating and promoting blended and flexible learning paths using groups and mobile learning, as well as providing opportunities for learner choice and creativity, support and feedback as the driving force behind his/her development.

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AN ANALYSIS OF STUDENT TEACHERS' E-READINESS FOR DIGITAL EDUCATION ENVIRONMENT IN COVID-19 TIMES

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Abstract

The COVID-19 pandemic and the hygienic measures of social distance brought impasses to education and its future. Face-to-face activities are suspended and this accelerated use of Information Communications Technology (ICT) in most environments including education. Based on these changes, teacher education and training at universities should prepare prospective teachers that are able to function within the digital and virtual classrooms. This paper investigates the level to which student teachers were exposed to Technological Pedagogical Content Knowledge (TPACK) needed by them to function within the digital & virtual classrooms during and post COVID-19 times. The paper analyses, Central University of Technology (CUT) final year Bachelor of Education student teachers' e-readiness to integrate ICT and present lessons in digital classrooms. A total of 60 student teachers were purposively selected to participate in this study. Data was collected using online questionnaires. A 5-point Likert scale questionnaire was used to collect data from student teachers. Subsequently, results revealed that student teachers are aware of the importance of ICT and e-learning in schools. However, they acknowledge that they have limitations, and they are not ready in implementing them in digital & virtual classrooms. The study concludes by offering several theoretical and practical recommendations for the e-readiness of student teachers in such environments.

Keywords: *e-Learning, e-readiness, information communications technology (ICT), teacher education.*

1. Introduction

The COVID-19 pandemic is one of the eight declared pandemics since the beginning of the 21st century. It is among the six pandemics that directly damage the respiratory system in human beings (Guillén, Cuellar & Alfaro, 2020). In preventing the spread of this pandemic, health authorities have recommended among other contagion prevention measures, social distancing, wearing of masks, and social confinement. As a result of these measures, COVID-19 has streamlined the obligatory use of Information Communications technology (ICT) in most fields and services including education (Guillén, Cuellar & Alfaro, 2020, Lake & Dusseault, 2020).

Face-to-face teaching was interrupted in schools around the world during 2019 to 2020 academic years due to this pandemic (Lake & Dusseault, 2020). Remote teaching and learning were then encouraged by most education authorities around the world. Faced with this need for change, schools are challenged by this new normal because most teachers are not properly trained for these forms of teaching (Guillén, Cuellar & Alfaro, 2020). This is because remote teaching and learning required teachers to be skilled in, among others, online teaching, blended teaching, e-learning, m-learning, the use of Learner Management Systems (LMS), Open Education Resources (OER), the use of the Internet, etc.

In addition to teachers' challenges, many working parents and parents, in general, are struggling to help in the education of their children (Department of Basic Education, 2018). This is because remote learning predominantly requires the assistance of parents at home. In essence, it requires a higher level of literacy and education from the side of parents, and this poses a challenge to illiterate parents, especially in third-world countries like South Africa.

Like many other countries, the South African government through the Department of Basic Education encourages the introduction of remote teaching and learning during this period of the pandemic. Schools were encouraged to use online teaching and learning, blended learning, e-learning, m-learning, and many ICT integrated strategies for teaching and learning. Noticing this global trend compelled teacher training institutions like universities to be serious in infusing the use of ICT in teacher training. The Central University of Technology (CUT) like most universities had to equip student teachers that are studying for the Bachelor of Education (B.Ed) degree with ICT integration skills.

The purpose of this empirical paper is to investigate the level to which student teachers at CUT are exposed to the integration of ICT in their teaching.

2. Methodology

To investigate the e-readiness of student teachers' ability to integrate ICT in their classrooms. This paper employed a qualitative research approach. The study used an online questionnaire administered through the university's LSM. A purposive sample of 60 student teachers, from a total population of about 600 student teachers that are in the 4th year of their B. Ed degree was used to identify participants in the study. a closed structured questionnaire was designed using a 5 Likert scale of agreements with the variables ranging from Strongly Agree (1); Agree (2); Neutral (3); Disagree (4) and Agree (5).

The structure of the questionnaire is framed around the Technological Pedagogical Content Knowledge (TPACK) model. This was done to identify the acquired and / lacking knowledge domains regarding ICT integration in the classroom. Seven themes were identified according to the TPACK framework, these are Content Knowledge (CK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK), Technological Knowledge (TK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), Technological Pedagogical Content Knowledge (TPACK).

3. Results & discussions

The aim of this paper was to investigate the e-readiness of student teachers in the integration of ICT for digital education in COVID-19 times. The structure of the questionnaire was in the form of the seven (7) knowledge domains of the TPACK framework. Four statements were put for each knowledge domain.

Table 1. Student teachers' Content Knowledge (CK).

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	I have adequate knowledge about my specialization teaching subject	32(53,3%)	28(46,7%)	0(0%)	0(0%)	0(0%)	60(100%)
2	I can use subject-specific strategies of thinking in my specialization teaching subject	32(19%)	28(41,6%)	0(0%)	0(0%)	0(0%)	60(100%)
3	I know the basic theories and concepts of my specialization teaching subject	17(28,3%)	31(51,7%)	12(20%)	0(0%)	0(0%)	60(100%)
4	I know the history and development of important theories in my specialization teaching subject	7(11,7%)	32(53,3%)	12(20%)	8(13,3%)	1(1,7%)	60(100%)

This domain refers to the outstanding knowledge of the subject matter that teachers must have to teach. A teacher must have a thorough understanding of the subject matter or content that they are going to teach. Content knowledge requires teachers to have an understanding and deep knowledge of the subject area they are teaching (Shulman, 1987; Mishra & Koehler, 2006; Koehler, Mishra & Cain, 2013). From the table above most of the respondents seemed to agree that they have been provided with adequate and required content knowledge to teach the subjects of their specialization.

Table 2. Student teachers' Pedagogical Knowledge (PK).

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	I can alter my teaching based upon what students understand or do not understand	24(40%)	29(48,3%)	7(11,7%)	0(0%)	0(0%)	60(100%)
2	I can adapt my teaching style to different learners	24(40%)	29(48,3%)	7(11,7%)	0(0%)	0(0%)	60(100%)
3	I can use a variety of teaching approaches in a classroom setting	24(40%)	29(48,3%)	7(11,7%)	0(0%)	0(0%)	60(100%)
4	I can assess student learning in multiple ways for different learners	16(4,9%)	31(8,5%)	11(3,5%)	2(53,5%)	0(0%)	60(100%)

Pedagogical knowledge refers to a deepened understanding of strategies, methods, and processes that teachers should employ in the teaching and learning of their respective subject specializations. It involves a thorough understanding of the aims and objectives of a subject, the educational purpose and values of the subject, the ability to plan activities that will make the learning of the subject easy and make the subject relevant and enjoyable to learners (Mishra & Koehler, 2006, 2008; Koehler, Mishra & Cain, 2013). Most respondents agree that they can handle differentiated pedagogies. However, they are slightly not in agreement when it comes to the administering of assessments in their classrooms.

Table 3. Student teachers' Pedagogical Content Knowledge (PCK).

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	I know how to select effective teaching approaches to guide student thinking and learning	32(53,3%)	28(46,7%)	0(0%)	0(0%)	0(0%)	60(100%)
2	I know how to develop appropriate tasks to promote students complex thinking	32(19%)	28(41,6%)	0(0%)	0(0%)	0(0%)	60(100%)
3	I know how to develop exercises with which students can consolidate their knowledge	17(28,3%)	31(51,7%)	12(20%)	0(0%)	0(0%)	60(100%)
4	I know how to evaluate student's performance in my teaching subject	7(11,7%)	32(53,3%)	12(20%)	8(13,3%)	1(1,7%)	60(100%)

PCK is about the knowledge and understanding of a subject matter taught, meaning the pedagogy of a specific subject. PCK relates to Shulman's (1986: 4) belief that "real teaching requires an understanding of both content and pedagogy". It does not require one to be just a content expert or just a pedagogy expert, but it requires teachers to have the expertise to match content with relevant pedagogy so that effective learning can take place (Mishra & Koehler, 2006). The indication is that student teachers are appropriately capacitated with the PCK.

Table 4. Student teachers' Technological Knowledge (TK).

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	I am aware of new technologies in education	13(21,7%)	14(23,3%)	22(36,7%)	9(15%)	2(3,3%)	60(100%)
2	I frequently latest technologies used in my subject specialization	13(21,7%)	14(23,3%)	22(36,7%)	9(15%)	2(3,3%)	60(100%)
3	I know about a lot of different technologies applied in education	9(15%)	13(21,7%)	21(35%)	12(20%)	5(8,3%)	60(100%)
4	I have the technical skills I need to use educational technology	9(15%)	13(21,7%)	22(36,7%)	12(20%)	4(6,6%)	60(100%)

The technological component of this framework was added to the original PCK framework of Shulman (1986) by Mishra & Koehler in 2006. They referred to this knowledge as the teachers' standard knowledge of technology, and the skills to operate technologies (Mishra & Koehler, 2006, 2008). TK requires a deep understanding and mastery of ICT so that they can access, process, and disseminate information (Graham, 2011). The technological knowledge is still a challenge to the respondents. Most of them are neutral with their knowledge of educational technologies while some indicated that they lack this kind of knowledge.

Table 5. Student teachers' Technological Pedagogical Knowledge (TPK).

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	I can choose appropriate technologies to enhance the teaching approaches for lessons	7(11,7%)	11(18,3%)	21(35%)	15(25%)	6(10%)	60(100%)
2	I can choose appropriate technologies that enhance students' learning	7(11,7%)	11(18,3%)	21(35%)	15(25%)	6(10%)	60(100%)
3	I can adapt the use of the technologies that I am learning about to different teaching activities	7(11,7%)	11(18,3%)	21(35%)	15(25%)	6(10%)	60(100%)
4	I can think critically about how to use educational technology in my classroom	7(11,7%)	11(18,3%)	21(35%)	15(25%)	6(10%)	60(100%)

TPK refers to the shared relationship between technology and pedagogy. It is defined as the teacher's knowledge and understanding of the use of technology devices that can advance the attainment of pedagogic goals (Koehler, Mishra & Cain, 2013). It is the teacher's ability to select the most suitable tools or applications based on their appropriateness for the specific pedagogical approach (Koehler, Mishra & Cain, 2013). TPK seems to be a challenge to the respondents because the majority of them are neutral about the statements and a number of them are in disagreement with the statements.

Table 6. Student teachers' Technological Content Knowledge (TCK).

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	I know how technological developments have changed the field of my subject	3(11,7%)	10(18,3%)	17(35%)	19(25%)	11(10%)	60(100%)
2	I can explain which technologies have been used in research in my field	3(11,7%)	10(18,3%)	17(35%)	19(25%)	11(10%)	60(100%)
3	I know which new technologies are currently being developed in the field of my subject	2(11,7%)	8(18,3%)	18(35%)	20(25%)	12(10%)	60(100%)
4	I know how to use technologies to participate in scientific discourse in my field	2(11,7%)	8(18,3%)	18(35%)	20(25%)	12(10%)	60(100%)

TCK refers to the teacher's knowledge of the interchangeable relationship between technology and content (Koehler, Mishra & Cain, 2013). It is simply the way content and technology influence and constrains one another (Mishra & Koehler, 2006, 2008). It characterizes the integration between what a teacher knows about applicable technological applications and about the topic of interest (MaKinster & Trautmann, 2014). The respondents have indicated that they lack the knowledge of the technological developments within their subjects.

Table 7. Student teachers' Technological Pedagogical Content Knowledge (TPACK).

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	I can use strategies that combine content, technologies, and teaching approaches that I learned about in my coursework in my classroom	3(11,7%)	10(18,3%)	17(35%)	19(25%)	11(10%)	60(100%)
2	I can choose technologies that enhance the content for a lesson	3(11,7%)	10(18,3%)	17(35%)	19(25%)	11(10%)	60(100%)
3	I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn	3(11,7%)	10(18,3%)	17(35%)	19(25%)	11(10%)	60(100%)
4	I can teach lessons that appropriately combine my teaching subject, technologies, and teaching approaches	3(11,7%)	10(18,3%)	17(35%)	19(25%)	11(10%)	60(100%)

Technological Pedagogical Content Knowledge (TPACK – pronounced “t-pack”) is at the center of the above-mentioned knowledge bases. It is the latest form of knowledge and understanding that goes beyond the basic components of content, pedagogy, and technology, of teaching and learning (Mishra & Koehler, 2008; Koehler, Mishra & Cain, 2013). It involves the knowledge of the interaction between content, pedagogy, and technology (Mishra & Koehler, 2008; Koehler, Mishra & Cain, 2013). Data presented indicate that most of the respondents are still experiencing challenges with TPACK.

4. Conclusion

Looking at the above discussions and analysis of the findings as based on the research questions, the research draws the following conclusions. It seems CUT not equipping student teachers with adequate ICT integration skills, as a result, student teachers might have to cope with the demands of the digital education environment in COVID -19 times.

As a result of this problem, this paper proposes that student teachers be afforded in-service training immediately after completing their teacher qualifications. In-service training should be largely based on TPK, TCK, and TPACK.

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EVALUATING STAKEHOLDER DESIGNED INTERDISCIPLINARY AND INTERSECTORAL DOCTORAL MODULES

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Abstract

Collaborative doctoral programmes assist the knowledge society in finding innovative ways to address sustainable development goals by asking creative questions and finding creative solutions. The aim of CHAMELEONS (Championing A Multi-Sectoral Education and Learning Experience to Open New Pathways for Doctoral Students, H2020-SwafS-2018-2020), is to develop interdisciplinary, inter-sectoral and international modules that broaden the skills of PhD graduates improving their employability in academic and non-academic environments. Through a co-design process 4 learning outcomes were developed which formed the foundation for 3 modules. Each module advanced the students' depth of knowledge and understanding. The 4 learning outcomes were as follows:

- Develop networking and communication skills;
- Understand user-centred design;
- Market research capacity and research skills; and
- Build an understanding of themselves and others.

Fifteen doctoral students from five European universities were recruited. This paper represents evaluation conducted on the first two modules which, due to COVID-19 restrictions, were delivered via Zoom. At the conclusion of each module the students were invited to complete a questionnaire consisting of sixteen questions, thirteen of which were on a five-point Likert Scale, and three of which were free text. The closed questions explored student perceptions of: programme objectives; programme delivery; opportunities to engage; satisfaction; and links between theory and practice. Students were asked to identify three aspects of the module which assisted their learning, three changes they would suggest to enhance their learning, and were offered the opportunity to provide additional comments.

Programme content: Students perceived that real-time assessment, reflective learning, engagement with course coordinators and the opportunity to engage with practical research tools (Photovoice, Ecosystem Mapping and Walk My ID) all enhanced their learning. They suggested more group activities, breakout groups (possibly themed), and real-life coffee breaks, to enable them to better network with their doctoral colleagues. There was a desire for more practical activities with some suggesting the development of career-pathway skills (Curriculum Vitae, Interviews).

Programme delivery: A theme that frequently appeared was the desire to have more physical face-to-face engagements in Module Three. The students understood the Covid-19 constraints but expressed a strong desire for meeting face-to-face. When given the opportunity to add freeform and unprompted comments, students almost without exception expressed their satisfaction with both modules, and their appreciation for them. Nevertheless, a number of participants reiterated their desire to undertake Module Three in person.

Programme outcomes: One student expressed an aspiration to be "more sure" of their skill set and marketability upon completion of Module Three complimenting the focus on practical learning in the programme content review.

Keywords: *Doctoral education, programme evaluation, stakeholder design, interdisciplinarity, intersectorality.*

1. Introduction

Chameleons is an EU H2020-SwafS Science with and for Society, Coordination and Support action (www.chameleonsproject.eu). The objective of this project is to develop new and innovative educational interventions to improve the learning experience offered by higher education with the intention of shaping more adaptable, entrepreneurial, and employable doctoral graduates, ready to meet

the challenges of the future¹. Ten years from now, jobs will be more knowledge and skills-intensive than ever before². Globalisation and technological advances indicate that there will be changes in sectoral structure and demand for new types of skills we are not even currently anticipating³.

The Chameleons project commenced in March 2020 just as the world was in the grip of a global pandemic and as Europe completely locked down. We saw the closure of all sectors of society including education. The original intention of Chameleons was to design and deliver three in-person modules for doctoral students in the field of Connected Health, from five educational institutions across Europe. However, the pandemic required Chameleons to move on-line. The modules were designed online through collaboration with stakeholders from industry, charitable organisations, recent doctoral graduates, academics, patients, educational technologists, and librarians.

Module 1 took place in April 2021, Module 2 in September 2021 and Module 3 in February 2022. As each module was completed the evaluation and feedback from the students informed the development of the next module. The iterative design process used in this project ensured that the module designs were informed by key stakeholders including those who had experienced the curriculum itself.

2. Methods

One week after each module was completed the students were invited to complete an anonymous questionnaire which consisted of sixteen questions. The questionnaire was hosted on Google forms. The questionnaire consisted of sixteen questions, comprising thirteen closed questions with a five-point scale Likert Scale, and three further open-ended questions. The use of the Likert Scale model for questions 1-13 aided in providing a quantitative evaluation of the module while the final three free text questions provided a qualitative insight into the participants' perceptions of the Chameleons modules.

Questions 1 and 2 asked students about the module objectives and whether they felt that they had achieved these objectives. Questions 3 to 5 related to the online context of module delivery and asked students whether they found the module to be inclusive and/or engaging both in terms of content and context. Question 6 asked students to reflect on whether they had benefitted from the module, with question 12 asking them to qualify this response. Question 7 asked for comment on whether the practical elements of the module had allowed them to link theory and practice. Question 8 and 9 enquired as to whether the assessment method had consolidated their learning and whether they saw this learning as relevant to their future career. Question 10 asked whether they would have enrolled in the module if they had had more prior information on its content, while question 11 asked how they now felt about enrolling having completed the module. Question 13 asked them if they intended to attend the next Chameleons module. Questions 14 and 15 were free text responses that asked students to identify three aspects of the module which assisted their learning and three changes they would suggest that would enhance their learning. Finally, question 16 offered students an opportunity to provide additional comments on the module in a free text format.

3. Findings

Fifteen doctoral students from across five European universities (University of Porto, Portugal; Oulu University, Finland; Aristotle University, Greece; Maynooth University Ireland; University College Dublin Ireland) were recruited to Chameleons. All students attended modules 1 and 2, both of which took place online over a one-week period in April 2021 and September 2021. The findings from the evaluation questionnaires for both modules are presented in the following sections.

Fourteen of the fifteen students responded with feedback from module 1 and 15 responded in relation to module 2. The students who participated in both modules perceived that the objectives were in the main clear/extremely clear (module 1 (M1) n=11, module 2 (M2) n=12) and the majority believed they had achieved these objectives. The students deemed that despite the modules being delivered remotely that they were inclusive/extremely inclusive (M1 n=10, M2 n=13) providing much opportunity for engagement (M1 n=11, M2 n=11). The majority believed they had benefitted from the use of breakout rooms (M1 11, M2 11), with many believing the practical elements of the modules assisted them in linking theory and practice (M1 n=12, M2 n=9).

3.1. Programme Content

Participants were asked what had most enhanced their learning. Students identified real time assessments and reflective learning as particularly helpful, as outlined by the following participant free text comments:

“Allocated time for working alone on the first day. Having 15-20 minutes to reflect on an exercise alone was really helpful in digesting what we learned.” (Module 1, Respondent 12)

“Reflective learning was quite useful, because after a long day we were urged to remember what we learned and think of scenarios that it would be helpful, thus developing a stronger connection with the learning material.” (Module 1, Respondent 13)

“Reflective diaries, self-assessment assignments, refresher quizzes.” (Module 2, Respondent 3) were important components of learning.

The participants identified that they took inspiration from engagement with course coordinators and potential employers from academia and industry

“I think that the most valuable aspect was that we had the opportunity to freely chat with the speakers and ask them questions.” (Module 1, Respondent 7)

“Opportunities to speak to people working in industry, with a blended academic/industry approach who spoke candidly” (Module 1, Respondent 3)

The opportunity to engage with practical tools such as the Photovoice research methodology was also highlighted as important:

“Photovoice- learning a practical skill that we can use personally or for our research.” (Module 1, Respondent 12)

In relation to module 2, participants highlighted the opportunity to engage in practical activities as important, namely Walk My ID, this is illustrated as follows:

“Walking my ID activity allowed me to reflect on my personal motivations, worthwhile exercise Checking in with the group again was a nice element for interaction and engagement with flow students during a time when interactions have been limited” (Module 2, Respondent 2).

3.2. Programme Delivery

There was a strong desire for more physical and face-to-face engagements. The participants acknowledged the complications of Covid-19 on having in-person sessions but expressed a strong interest in meeting face-to-face.

“I think mostly helpful for learning would be to get to meet everyone and collaborate face to face. Even though I think everything has worked well remotely.” (Module 2, Respondent 11)

“Despite being held online, the module was interactive enough to facilitate the learning.” (Module 2, Respondent 15)

“..... I would probably like is having more time for the breakout sessions because it would enable participants to be more engaged with each other. Notwithstanding that the level of engagement was fantastic, I felt that during the main sessions, we could not really engage with other participants. We could only use the chat box. I know that this is a problem related to the distance learning and the module organization was excellent. In a face-to-face module, engagement between participants would have been assured by the coffee breaks.” (Module 1, Respondent 7)

A number of module participants indicated the need for more breaks in the timetable: *“A little more space in the timetable or bite sized learning. Regular breaks for zoom sessions I find are really helpful” (Module 1, Respondent 3).* Echoing this sentiment, another participant commented *“The overall schedule was too intense with very short breaks. I had expected to catch up on my own PhD work/emails in the morning and evening but this wasn't always possible as I was so exhausted from looking at the screen. I also did not expect that I would need to stay on Zoom longer in the evening for group work.” (Module 1, Respondent 12)*

“Face to face for module 3 will be great, I think zoom fatigue very difficult to avoid towards the end of the week....” (Module 2, Respondent 2).

3.3. Programme Outcomes

One participant expressed an aspiration to be “more sure” of their skill set and marketability upon completion of Module Three, complimenting the focus on practical learning in the programme content review. They identified *“Building an understanding, research methods & design, marketing research capacity & skills” (Module 2, Respondent 11)* as important. This echoed a similar request in the review of the earlier Module 1 that suggested the need for *“more practical methodologies to build our career” (Module 1, Respondent 11).*

Another participant identified the need for *“more focus on how to communicate better my work, discuss the commercialization of research finding” (Module 2, Respondent 6).*

While another participant commented *“I used the module to take some concrete career planning steps, I am more active on linked in and twitter and arranged a site visit to a research centre and met some new contacts” (Module 2, Respondent 2)*

4. Discussion and Conclusions

Despite the need to pivot the delivery of Chameleons, from face to face to on-line, it is clear that the Chameleons doctoral students benefitted from engaging with the two modules already delivered. The iterative design process employed for these modules enabled the participant evaluation to inform the module design process swiftly and meaningfully. By default, the module designers also learned about online education delivery.

Participants valued the development of reflective skills (reflective writing, Walking my ID) and research methodologies (photovoice, ecosystem mapping). It is interesting to note that they highlighted the importance of 'protected' time within the module to develop these skills. Both modules were delivered over a five-day period with an intervening weekend. This proved to be important in order to give students an opportunity to reflect on their learning, to develop their skills (they undertook a photovoice project in module 1, and a Walking my ID project in module 2). However, the participants also stressed that engaging in online education is tiring and that regular breaks away from the screen are necessary.

It was clear that participants would have preferred a face-to-face engagement had the health situation permitted. The participants lost a number of elements of their education owing to the online environment. The 'hidden curriculum'⁵ which is not predetermined by educators is limited in the online context. Skills which are important for professional development such as networking, learning to make research links, disseminating your research, and socializing with peers were not available to the participants. The sense-making and sense-giving activities⁶ that take place in the informal spaces between the formal curriculum elements were more difficult to achieve in an online environment.

In relation to programme outcomes, this concept of enabling doctoral students to be "more sure" of their skill set and marketability was taken up in module 3. In order to build student confidence, while developing their skills, each student undertook 2 'mock' interviews. Each student was tasked with identifying three job opportunities. They were asked to apply, as part of the module task, for each of these jobs. The applications were submitted in advance of the module. The students were interviewed by a panel of 2 people who role played as interviewers for the companies/institutions represented in the job advertisements. The interviews were conducted in a close to authentic conditions as possible, mimicking a job interview. On completion of the interviews the interviewers gave the student feedback. This task offered students the opportunity to market themselves to potential employers through a variety of communication channels. The feedback served to support them in this endeavour. This real-world experiential learning enabled them to apply what they had learned during the two modules.

The careful evaluation of module 1 and 2 guided the development of module 3. Developing student informed modules for doctoral students ensures that we are developing engaging education which meets the needs of the next generation of doctoral graduates.

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EDUCATION FOR SUSTAINABLE DEVELOPMENT: A COMMON GOOD FOR BOTH NOW AND THE FUTURE

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Abstract

Altruistically speaking, humanity has now reached a point where it has recognised that it has a responsibility to achieve a development that is sustainable. This responsibility is outlined in the United Nations Sustainable Development Goals (SDGs). This notwithstanding, as an intrinsically selfish creature, humanity also has a need to fulfil its own needs. This concept is set out by Maslow. Education is undeniably a linch-pin in marrying these two concepts, aiming to meet the challenges and the needs of both today's and future generations. Whether and how these needs are met for any learner affects the learner's motivation to learn and the educator's motivation to teach. Moreover, during their time in education learners form habits of mind, beliefs, and principles that will stay with them throughout their lives. This is why it is so crucial to reflect on the type of education that best 'cultivates and guides the sustainable humanity' of the learners. This is the challenge facing today's Anthropocene society. Any approach must be based on the vision of a just and equitable future for the next generations on a stable and resilient planet. With this in mind, we describe the paradigm shift towards an education for sustainable development. Subsequently, one of the principle outcomes of this contribution is a series of eight features which could be used as a template for any realignment of education aiming to achieve sustainable development at the same time as fulfilling Maslow's needs. Finally, further research may build upon these conclusions so that researchers are spurred to examine the topic in more detail in future practical work.

Keywords: *Educational guidance, human needs, Maslow, transformation, sustainable development goals (SDGs).*

1. Introduction

Our world is continually progressing, and we must endeavour to re-adjust it towards a path that is sustainable. This entails a new way of doing things that improves our environment while at the same time ensuring justice, social equality and economic stability. This progress, however, is impossible without education, just as education is impossible without progress. Logically, therefore, the concept of sustainability is critical in any educational transformation. With this contribution we expand on the work of numerous writers in order to synthesise their perspectives and develop sensible approaches in this area. With this in mind, we, first, outline the necessity for a certain education in today's society and identify the unique challenges that education faces, such as alignment with the United Nations Sustainable Development Goals (SDGs), as well as Maslow's human needs. Subsequently, we synthesise eight features for an education for sustainable development check and guidance. This should aim to foster collaboration in the hope that education can continue to evolve supported by research.

2. Method

This contribution is based on a search of the literature for keywords like "education for sustainable development," "humanistic education," "human needs" and "paradigm shift." This was conducted using the following databases: Google Scholar, WorldwideScience.org, jurn and pedocs. "Characteristics," "definition", "inclusive", "challenges" and "transition research" were also used as keywords. We concentrated on articles that contained material relevant to a paradigm shift in favour of a humanistic education, with a particular emphasis on global sustainable development. We went on to

check the references provided by these search strings to see if there was any further content that might be relevant. Using the keyword search, specified above, the total search outcome was 9363 results of which 151 were considered important (see references; Quendler, Lamb, & Driouech, 2020). Moreover, the work by Papalia and Olds (1989), Berger (2000) as well as Bee and Boyd (2006) also provided food for thought. This contribution also draws from previous work by Quendler, Lamb and Driouech (2020). We present a summary of our findings from a thorough review of the literature in the following sections.

3. The multi-level paradigm shift

We live in a world of manifold, complex relationships within a knowledge society, and at a time where technological developments are continually imposing "game changes" with hitherto unimageable rapidity. Everything is in a constant state of flux leading to additional challenges coming up daily. As said, education plays a crucial role in addressing any challenges. Nevertheless, the former is itself also subject to a paradigm shift, as described below.

The paradigm shift toward viewing the world in less economic and more sustainable terms is challenging the traditional way we think about education. ESD (Education for Sustainable Development) has evolved as a paradigm for rethinking education today. Such an education attempts to refocus education in order to empower learners in their interchange of knowledge to build values, attitudes and skills that encourage them to act sustainably for both present and future generations. Actually, what is meant here is to teach learners to manage behaviour, i.e. their needs while respecting cultural diversity and the earth. (United Nations, 2017) Furthermore, whether and how these needs are met for any learner has an impact on both the learner's motivation to learn and the educator's motivation to teach. In this regard, it goes without saying that Maslow's hierarchy can be used to improve the quality of education (cf. SDG 4) through motivation. When all levels of Maslow's hierarchy of needs are met, learners show their full ability and eagerness for learning and acting in a sustainable way. Rethinking education in this sense entails reshaping it around components that actually put the learner at the heart of the system, i.e. humanistic-centred education. A vast number of authors have said and advised this (see Baillargeon, 2006; Marcotte, 2006; Maslow, 1987). On this track, we must think even further, prioritising the multi-dimensional development of the learner in a multi-dimensional world in order to make him or her an autonomous person. Such a person is capable of making fully conscious decisions for himself or herself (cf. Maslow, 1943, 1987), rather than focusing merely on becoming a functional citizen, well-integrated in the economic and political system of society within a given environment. Current knowledge of the requirements for the proper development and functioning of a human being makes it possible today to redefine approaches for rethinking our education systems. Based on the SDGs (United Nations, 2017) and Maslow's hierarchy of needs (Maslow, 1943, 1987) education and training programs should enable each learner to achieve greater fulfilment of his or her potential under an umbrella of sustainable development. They must be built around eight features in order to truly provide an inclusive education that is potentially available to all learners.

4. Paving the way to an ESD: An inclusive field of research

Accordingly, education that is based on and for the SDGs as well as human needs implies the need for deep changes in educational values, assumptions, policy, and practice. It goes hand in hand with the renewed global commitment envisaged in the Education 2030 agenda. This may represent an opportunity to rethink the need for ESD in order to address the challenges arising from the changing education and policy landscape. For that we have to consider multiple worldviews and alternative knowledge systems, as well as new frontiers in science and technology such as advances in neurosciences and developments in digital technology. Moreover, a broader perspective should be adopted by shifting the focus to human needs, imagination, and activity in a wide-scale system of transformation (cf. Quendler, Lamb, & Driouech, 2020). Experience tells us that such transformation covers eight features, for which further research for a successful, practical implementation needs to be undertaken.

(1) Essential: Is the fulfilment of needs part of a process of humanistic or human-centred education (Maslow, 1943, 1987)? Does education help a person to become the best human being possible according to his or her potential? How are the learner's needs fulfilled? How are the needs linked to sustainable development in an individual and collective sense? What is the role of needs in a transformative learning approach? (see Quendler, Lamb, & Driouech, 2020)

(2) Sustainable: Is sustainability integrated in any education system, both in terms of content and method? How are sustainability and the needs of the learners linked? Does sustainable digital modernisation take place? Is the emphasis on the potential of SDG innovations to catalyse transformations to more a sustainable learning of learners and working environments? (see Quendler, Lamb, & Driouech, 2020)

(3) Healthy: Does it embody and advocate healthy approaches to education (both learning and teaching), life, relationships, family and friends? Does education promote the biological, mental, moral and social well-being? (cf. Maslow, 1987)

(4) Tenable: Is it "ethically acceptable," as Sterling (2008) puts it, "working with honesty, justice, respect, and inclusivity"? Are there a range of educational realities in light of the many different political, cultural, social, environmental and economic contexts throughout the world? (see Morin, 2000)

(5) Feasible: Does it deploy, promote and teach using the current state of knowledge, technology and pedagogies in a way that is practicable? Are substantial changes in the social networks of learners and in the development of practices, routines, preferences, and interests of various social learning groups instigated? Is the 'how' of teaching and learning in the future already considered? (Quendler, Lamb, & Driouech, 2020)

(6) Viable: Is the education system financially viable, meshing with the market, fostering employability on the one hand, while maintaining academic integrity on the other? Is the system financially self-sustaining or are there dependencies? Are the latter above reproach? Is education defined as a never-ending process? (Quendler, Lamb, & Driouech, 2020)

(7) Effective: Is an individual capable of achieving, depending on their particular circumstances, the various combinations of what he or she can do or be (see Sen, 1992, p. 38–34)? Are capabilities conceived as temporary, changeable outcomes of evolving long-term co-evolutionary processes? (see Quendler, Lamb, & Driouech, 2020; Toner, 2011) Does education multiply the human being's ability to know and transform reality? Are learners capable of reasoning and evolving in their process of consciousness (cf. Maslow, 1987)?

(8) Common: Does everyone have access to quality education guaranteed by a minimum of infrastructure? How can we ensure that ESD is a common good but individualism is guaranteed? Is ESD as a common good a valuable complementary concept for the governance of education in a changing environment? How can the public interest and societal/collective development in contrast to an individualistic perspective be preserved?

5. Conclusion

This contribution aims to outline the theoretical and multifaceted foundations for a sustainable education as a common good for all people. This would ensure that all young people, both now and in the future, have access to a sustainable and inclusive education. We have shown that there are various concepts that can be used to approach the critical rethinking of our education. Such an approach is about the transmission of what mankind has learned about itself. At the same time, it is also about innovation, which means giving learners and educators the tools to push the boundaries of what is known and taught, to create new realities or generate new understanding from current ones. Such an approach is based on thoughts that emerge from the "zeitgeist" and is supported by literature. The practical implementation is still pending. Any practical finishing touches are welcome, running under the slogan "coming together is a beginning; keeping together is progress; working together is success" (Henry Ford).

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UNDERSTANDING STUDENTS' EXPERIENCES AFTER INCORPORATING INDIGENOUS PERSPECTIVES IN A POSTGRADUATE SCIENCE COMMUNICATION SUBJECT

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Abstract

Many Australian universities have recently incorporated Indigenous graduate attributes into their programs, and the University of Technology Sydney (UTS) is no exception. This project aimed to investigate students' perceptions and experiences of learning about Indigenous Knowledge systems and culture while developing science communication skills. Advanced Communication Skills in Science is a core subject in the Master of Science program at UTS. An existing assessment task, a three-minute thesis style oral presentation, was reworked to include the Indigenous Graduate Attribute (IGA) developed for the Faculty of Science. Students researched an aspect of Indigenous Science, an area of emerging interest for cultural and scientific understanding, and a mechanism for empowering Australia's diverse first nations peoples. They then presented their key message in three minutes using a single PowerPoint slide. This task allowed students to demonstrate an awareness and appreciation of multiple ways of developing understandings of nature while enhancing their ability to understand the role of science communication in the modern world. Students were surveyed at the beginning and end of the semester to establish their Indigenous Science conceptions and reflect on their experiences. Students demonstrated an outstanding ability to integrate appropriate Aboriginal and Torres Strait Islander knowledges, experience, and analysis into a key message. Most students reported greater familiarity with concepts such as Indigenous Science and provided richer definitions of what this means. When asked if understanding Aboriginal and Torres Strait Islander knowledges and cultural practices might impact their practice as a scientist, many felt their perspective had changed and that reflecting on their cultural values and beliefs had improved their cultural capability. Most students responded that this subject challenged (at least to a degree) some firmly held assumptions, ideas, and beliefs.

Keywords: *Graduate attributes, science communication, cultural competence, Indigenous science, tertiary education.*

1. Introduction

With the recent paradigm shift from unlimited growth and the dominance of Western capitalism to sustainable development, the importance of Indigenous Knowledge Systems (IKS) has gained international recognition. The beginnings are demonstrated in Article 8 of the *Convention on Biological Diversity* which followed the Rio de Janeiro Earth Summit in 1992. This urged us to 'respect, preserve and maintain knowledge, innovations and practices of Indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices' (UN, 1992). Similarly, the 1999 UNESCO and International Council for Science World Conference, *Science for the Twenty-first Century: A New Commitment* asserted that science and technology have been, and continue to be, enhanced by traditional and local knowledge systems. IKS are 'dynamic expressions of perceiving and understanding the world', and there is 'a need to preserve, protect, research and promote this cultural heritage and empirical knowledge' (World Conference on Science, 2000).

Mazzocchi (2006) has pointed out the difficulty in defining IKS. Terms such as traditional, Indigenous, folk, ecological, local, knowledge and science are used in various combinations. Indigenous Science can be considered a body of social, spiritual, and physical understandings of the relationships between living things and the environment, which have evolved by adaptive practices and been

transmitted through cultural practices by generations (Berkes et al., 2000). UNESCO defines Indigenous Knowledge as the ‘understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings’, which informs decision-making about aspects of day-to-day life and ‘encompasses language, systems of classification, resource use practices, social interactions, ritual and spirituality’ (UNESCO, 2017).

Currently, the United Nation’s Sustainable Development Goals (SDGs) do not explicitly refer to IKS. However, they call for urgent action to combat the impacts of climate change, protect and restore aquatic and terrestrial ecosystems and biodiversity, and use resources sustainably. The importance of the contributions of Indigenous peoples to such responses is highlighted (UN, n.d.).

Colonial settlers arrived in Australia in the late eighteenth century, bringing social and cultural disruption, land dispossession, violence, and racism. Over the last fifty years, however, the reconciliation process has made steady, if slow, progress (Reconciliation Australia, 2021). Most Australians believe that education about our shared past is critical, with 83% of the general community agreeing that it is essential that Indigenous histories and cultures are taught in educational institutions (Reconciliation Australia, 2021).

In the Australian higher education context, the peak industry body, Universities Australia, has developed a sector-wide initiative, *The UA Indigenous Strategy 2017-20*. This provides a plan to achieve common goals to advance Aboriginal and Torres Strait Islander participation and success in higher education while improving Indigenous cultural competency in Australian universities. Progress has been steadily made, with forty-nine per cent of the 39 member universities recently reporting they had Indigenous-specific graduate attributes; a further eight per cent had graduate attributes that covered global issues and included Indigenous people. (Universities Australia, 2021).

Introducing the concept of Australian Indigenous Knowledges into science education has two aims. The first aim is to increase awareness of Aboriginal and Torres Strait Islander culture and identity, for so long overlooked and marginalised by Australian mainstream culture. The second is to provide an alternative perspective on the environmental problems challenging Australians who face increasing impacts from bushfires, droughts, floods and diminishing biodiversity. Indigenous Knowledge can make a valuable contribution to the scientific approaches needed to tackle these issues (The Living Knowledge Project, 2008). Australia’s Indigenous Knowledge systems vary depending on local context, are complex and interdisciplinary and including Aboriginal or Torres Strait Islander knowledges and perspectives into our classes must be done mindfully. The Australian Council of the Deans of Science (2022) cautions that such knowledge must not be seen as a subset of Australia’s Western knowledge systems or as a novelty or add-on. Instead, Australia’s Indigenous Knowledge is an “important addition” to our curricular.

This project focuses on students’ learning experiences in the subject *Advanced Communication Skills in Science*, a core subject in the Master of Science program at the University of Technology Sydney. Content, learning activities and assessment relating to the UTS Science Indigenous Graduate Attribute (IGA) were added to the subject in 2021. The other graduate attributes developed in this subject relate to Research, Inquiry and Critical Thinking; Professional, Ethical and Social Responsibility; Reflection, Innovation, Creativity; and Communication. The IGA, *Aboriginal and Torres Strait Islander Knowledges and Connection with Country* states

‘As a professional scientist, you will work with people from various backgrounds and with different levels of scientific knowledge. An awareness and appreciation of multiple ways of developing understandings of the natural world, especially of Aboriginal and Torres Strait Islander Knowledges and people, will enhance your ability to understand the role of science communication in the modern world’ (UTS, 2022).

The IGA is detailed in two Course Intended Learning Outcomes assessed in this subject:

Analyse: Demonstrate an appreciation of historical and contemporary Aboriginal and Torres Strait Islander Knowledges relevant to professional scientists.

Evaluate: Integrate appropriate Aboriginal and Torres Strait Islander knowledges, as both experience and analysis, to inform professional practice (UTS, 2022).

In this paper we report on an initial study of students’ perceptions and experiences of learning about Aboriginal and Torres Strait Islander knowledge systems through an oral presentation in a postgraduate science communication subject.

2. Study design

2.1. Incorporating Indigenous Knowledges into the subject through an oral presentation

One of the assessment tasks in the subject required students to research an aspect of Indigenous Science and present it as a three-minute oral presentation supported by a single PowerPoint slide. The topics included a variety of examples of Indigenous Science related to food production and harvest,

medicines, and materials used for tools and weapons. The most successful presentations integrated the Indigenous and Western Science perspectives to represent contemporary Australian science. For example, tea tree oil is a volatile essential oil derived mainly from the Australian native plant *Melaleuca alternifolia* and has a long history of use by Aboriginal people, such as the Bundjalung people (of the north-eastern parts of New South Wales). The crushed leaves were inhaled to treat coughs and colds or applied on poulticed wounds. Wet leaves can also make an infusion to treat sore throats or skin ailments. Oral histories speak of healing lakes, where leaves had fallen and decayed over time. When analysed in 1923, the antiseptic properties were more than 11 times stronger than the widely used carbolic acid (phenol). It is now understood that the broad-spectrum activity of tea tree oil (antibacterial, antifungal, antiviral, and antiprotozoal) results, for example, in bacterial membrane rupture and damage to the functioning of fungal membranes. The active properties of *Melaleuca alternifolia* will attract further interest in the post-antibiotic era (Carson, Hammer, & Riley, 2006).

2.2. Investigating students' learning experiences

An online anonymous and voluntary questionnaire was administered to students at the beginning and end of semester 2 (2021). The questionnaire included Likert scale and open-ended questions (see section 3). Twenty students (five were international students) provided responses to both questionnaires that could be matched.

3. Evaluation of the students' responses

When asked if understanding Indigenous knowledges and cultural practices might impact their practice as a scientist, many students felt their perspectives had changed. Comparing baseline and follow-up paired responses (see Table 1), there was an overall shift to an agreement that understanding Indigenous knowledges and culture may impact students' practice as scientists. Eighty per cent of 'unsure' responses became 'agree', and 67% of those who had responded 'somewhat agree' strengthened their response to 'definitely agree'.

Students were also asked if reflecting on their cultural values and beliefs had helped improve their cultural capability to impact their professional practice. Initially, 5% of students strongly disagreed that this process would be of value. Twenty per cent were unsure. At the end of the semester, 95% of students agreed with this statement, with only one student reporting feeling unsure. In the follow-up questionnaire, students were asked if engaging with these concepts challenged (at least to a degree) some firmly held assumptions, ideas, and beliefs. Eighty per cent agreed that this was the case.

In the open-ended question, students were asked what they thought the terms 'Traditional Knowledge Systems', 'Indigenous Knowledge' and 'Indigenous Science' meant. Baseline answers referred to tradition, culture, and stories. Most students reported greater familiarity with the concepts by the end of the semester and provided richer definitions of what they mean. Table 2 details some of these paired responses.

The enthusiastic comments from students confirm the increased value of the oral presentation activity and that the Course Intended Learning Outcomes were achieved:

"Learning about since (sic) science is the modern way of thinking, it is definitely not the only way. We have to acknowledge and be open-minded about the other forms."

"My understanding surrounding traditional knowledge systems has grown significantly. I now understand just how much Indigenous Australians have contributed to our way of life and have a grown appreciation for the skills and tools they mastered so long ago. It is incredibly interesting to see how they discovered things in a time where they didn't have all the technology and tools available to us today."

"That it can be integrated with knowledge from western science, and that it can also stand alone as its own field. Also, that indigenous knowledge is useful particularly in ecosystem function and for the protection and conservation of species."

Table 1. Student questionnaire items and responses.

Item	Responses	Initial response (n = 20)	Final response (n = 20)
How familiar are you with concepts such as Traditional Knowledge Systems, Indigenous Knowledge, or Indigenous Science?	Not at all familiar	55%	5%
	Slightly familiar	25%	15%
	Somewhat familiar	15%	30%
	Moderately familiar	5%	45%
	Extremely familiar	0%	5%
Understanding Aboriginal and Torres Strait Islander knowledges and cultural practice may impact on my practice as a scientist, including science communication.	Definitely disagree	5%	0%
	Somewhat disagree or disagree with some reservation	0%	0%
	Somewhat agree or agree with some reservation	25%	30%
	Definitely agree	50%	65%
	Unsure	20%	5%
Reflecting on my own cultural values and beliefs will help me improve my cultural capability in my professional scientific practice.	Definitely disagree	5%	0%
	Somewhat disagree or disagree with some reservation	0%	0%
	Somewhat agree or agree with some reservation	25%	30%
	Definitely agree	50%	65%
	Unsure	20%	5%
This subject has challenged some of my firmly held assumptions, ideas, and beliefs.	Definitely disagree		0%
	Somewhat disagree or disagree with some reservation		10%
	Somewhat agree or agree with some reservation	n/a	50%
	Definitely agree		30%
	Unsure		10%

Table 2. Student conceptions of Traditional Knowledge Systems, Indigenous Knowledge, and Indigenous Science – selected quotes.

Baseline response	Follow-up response
<i>I think this knowledge can be cultural or past stories of the Indigenous.</i>	<i>These terms are all related to knowledge systems and scientific discoveries that have been made by the Indigenous people.</i>
<i>I think they may be connected with local culture.</i>	<i>These terms are the accumulated knowledge of indigenous people based on their experiences in their lives. This knowledge lays the foundation for the development of specific fields of science in the future.</i>
<i>Not sure</i>	<i>Traditional knowledge and indigenous knowledge and science are the same things. It is an expression of how the world was and is understood by indigenous individuals. They are cultural heritages. Whilst it is not called science, they have science in them.</i>

4. Conclusion

A long-standing oral communication assessment task was reworked to incorporate the UTS Science Indigenous Graduate Attribute. Students were able to research Aboriginal and Torres Strait Islander scientific knowledges and communicate it into a key message. Investigating students' awareness of Australian Indigenous Knowledges showed clear shifts in perspectives and increased appreciation of Indigenous Science. Students reported that some firmly held assumptions, ideas, and beliefs had been challenged, strengthening their cultural capability. This has positive implications for their professional practice. Based on this initial success, we encourage the integration of Indigenous Science perspectives into university curricula.

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We recognise the people of the Eora nation as the Traditional Owners and holders of knowledge for the place on which the UTS campus stands. We respect the elders, past and present, and their role in passing on this knowledge to emerging elders. We thank Professor Chris Matthews (Associate Dean (Indigenous Leadership and Engagement) Faculty of Science, University of Technology Sydney, for his assistance with the development of the measuring instrument and incorporation of the IGA into this subject. The survey was conducted with UTS Human ethics approval (UTS ETH21-6315).

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COVID-19: LEADING IN CHALLENGING CIRCUMSTANCES – CHALLENGES FOR SCHOOL LEADERS

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Abstract

Principals are leading in challenging circumstances since the country went in to COVID-19 lockdown. The combination of confusing government decisions and advise, compounded by the lack of district decision making has left many principals to make key decisions on a daily basis and many times not sure if they will have the backing of departmental officials. Principals had to keep schools open, whilst simultaneously creating an online machine, keeping in touch with the most vulnerable learners and families. School leaders are uniquely positioned to have the respect and personal relationships to guide families to support their children at home during these unprecedented challenges. For rural school leaders it is harder, as rural schools serve families across a cast geographic area without high-speed internet. How do rural school leaders lead educators and their schools doing their best in unchartered waters where teachers moving instruction online, distributing food and technology?

Using a qualitative research approach, this study aimed to determine the challenges faced by rural school leaders in leading their schools during COVID-19. Five schools in the Nelspruit areas were selected through purposeful sampling. Data collected was organised logically into workable units to facilitate coding. Data was categorised in themes, the findings revealed COVID-19 has had an impact on the principal's leadership as principals were challenged to decisions relating to feeding learners, organising protective clothing, finances, and online learning.

Keywords: *COVID-19, leadership, technology, principals, schools.*

1. Introduction

Since the COVID-19 lockdown and the strict regulations implemented by the National Command Council to control the spread of the virus in South Africa, academic institutions, like schools and universities, were almost immediately challenged in their ways of leading, organising and implementing the curriculum in a remote fashion. Teachers were challenged to teach and to work remotely. To avoid that there was total curriculum collapse, schools had to find and explore ways to improve all their academic operations to best improve their operations online by introducing online based technology and pedagogy. This was to ensure that learners had access to learning materials while they are at home. The challenge was that schools had to navigate issues, and to ask questions such as “are we ready for the technology – online challenges?” On top of changing to an online mode, schools had to manage declining cash flows from learners and state subsidies and support. Add to this, that many parents have lost their jobs and were unable to contribute to school fees, the challenges faced by school leaders just became a bigger challenge, especially in our country's schools.

2. Problem statement

COVID-19 has resulted in increased demands on school leaders. In March 2020, COVID-19 slammed the door firmly on all aspects of everyday life. It interrupted the economies of many countries across the globe, and it disrupted schooling too, indeed shaking the very fabric of education (Hargreaves & Fullan, 2020). It has challenged and redefined learning as a remote activity limiting millions of learners to online teacher support and as Zhao (2020) points out “Virtually all schools have been paused and teaching had to be significantly re-organised. In most countries, including South Africa, getting learners back to school was an issue and governments had heated debates to decide when and how learners will return to schools. Suddenly, schools were faced with challenges of social distancing, always wearing of masks, intensive cleaning and the organisation of all movement in and around the school. What the long-term

impact and consequences of opening schools might prove to be, it is clear that the mental health of school leaders, teachers, learners and other stakeholders has the potential to become a greater problem than the pandemic itself. In the time of turmoil (Azorin, 2020) where quick solutions are required in a fast-changing world, the priority must be on the well-being of school leaders, teachers, learners and other stakeholders.

3. Rationale

Previously known as “the life cycle theory of leadership”, the situational leadership model was a concept introduced by Paul Hersey and Ken Blanchard in *Management of Organisational Behaviour*. They argued that there is not just one leadership style that works for all conditions or situations. The situational theory includes four leadership styles (direct, support, delegate, coach) that are adoptive to the employee’s range of development behaviour. Successful school leaders have the ability to look at situations with different perspectives, especially in times of the COVID-19 pandemic and the challenges school leaders are facing. They assess the situation and behaviour of the team members, after which they determine the type of leadership approach to use to get the best results. The situational leadership theory and situational leadership model work to ensure organisation (school) success. Situational leadership can counter uncertainty and can counter volatility. Using Situational leadership, school leaders can control all possible outcomes and adapt your style to those you lead.

4. Methodology

A qualitative research approach served this research best in view of the empirical inquiry launched to investigate a particular phenomenon such as challenges by school leaders during COVID-19 (Niewenhuis, 2013). Inductive inquiry is emphasised during qualitative studies (McMillan & Schumacher, 2010) and thus interpretivist study gathered detailed particulars and then synthesised the data inductively in order to develop a deeper understanding of the problem.

The most frequently referenced practices are listed in Table 1.

Table 1. Most Frequently cited challenges during COVID-19 by school leaders.

	Challenges	Citations
1.	Financial Sustainability	49
2.	Leadership Challenges	43
3.	Digital Challenges	41
4.	Safety of Learners and Poverty	40
5.	Curriculum Challenges	34
6.	False Sense of Community	28
	TOTAL	235

5. Recommendation

An undeniable human right, education is the bedrock of just, equal and inclusive societies and a key driver of sustainable development. Strengthening the resilience of education systems enables countries to respond to the immediately challenges of safely re-opening schools and positions them to cope better with future crises.

The role of school leaders must be clearly defined in crisis response. School leaders have a sense of responsibility to support their communities. The Department of Education must set clear guidelines on what is expected of school leaders as well as providing support and resources required to perform their roles. School leaders have voices and must be heard as they play an important part in the COVID-19 crisis. School leaders should use their distributive leadership skills to task and inspire their teams to address all COVID-19 concerns, School leaders should be connected in peer groups so that they can rapidly share best practices, and to motivate and coordinate activities to ensure leaders, staff and communities are connected to plans made by education officials.

School Governing Bodies must prioritise spending for the remainder of the school year and new budget for 2021. Schools need to find ways to overcome pressure on the school budget. Donors and communities should protect education assistance and frontload their existing commitments to help finance

the COVID-19 response. This is an opportunity to join hands with local communities and businesses to donate surplus stock to schools to distribute to families in need. Budgeting must focus on what is the urgent needs of the school and all luxuries like tours, functions even too many extra-curricular activities, need to be considered when planning the budget for 2021. School must seek and identify additional and alternative revenue streams.

School leaders are tasked to quickly create a safe and healthy learning space for learners and staff. Leaders must look after the mental health and well-being challenges among teachers and learners who may suffer from anxiety, depression, isolation or malnutrition. School leaders need to be trained to identify the symptoms. Additionally strong school leaders know the needs of their communities well and can help effectively marshal the available resources to those who need them.

School leaders must be trained to become techno-savvy and well informed. School leaders need to be discerning about the digital products on the market they choose and need to strike a balance between technology and pedagogy in their respective schools (Hargreaves, 2020).

6. Conclusion

A new chapter is being written about school leadership in disruptive times. In normal times, normal context, school leadership operated with well-known parameters with clear patterns to a school year, clear lives of accountability rules governing examinations and sport days. COVID-19 has changed all of that and unpredictability and uncertainty are now watchwords to those leading our schools. A new leadership has emerged, which has no leadership, no preparation and benchmarks. There is no blueprint to assist school leaders through the current challenges of COVID-19. Leading in disruptive times, will challenge school leaders to navigate a different course and to create a new pathway through the COVID-19 disruption. School leaders on this journey are defined by their determination, their hope and their belief that whatever happens, whatever the cost and whatever the scale of the challenge, they will continue to put the best interest of the learner first.

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ON THE IMPORTANCE OF TELECOLLABORATION FOR THE DEVELOPMENT OF STUDENTS' INTERCULTURAL COMMUNICATIVE COMPETENCE

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Abstract

Although the idea of performing collaborative tasks by language students from geographically distant countries dates back to the end of the 20th century (Warschauer, 1996), its benefits were reconsidered once again after the Covid-19 pandemic lockdowns had halted students' mobility and abated their enthusiasm for worldwide discoveries. The latter constraints reduced the number of natural opportunities for students to develop their intercultural communicative competence. To bridge the developmental gap, the attention was shifted toward the application of technologies engaging them in semi-authentic communication (O'Dowd, 2013), consequently, one of the modes of telecollaboration was chosen. The study focuses on the analysis of the outcomes of the telecollaboration project run by the teachers of the four universities: Vilnius University (Lithuania), the University of Latvia (Latvia), Los Lagos University (Chile), and the University of Austral (Chile). All the three stages (*before*, *during*, and *after* interaction) of the project are reviewed with a particular focus given on 64 students' attitudinal reflections obtained via a designed questionnaire. The study also presents the analysis of the students' feedback on the project in general, the challenges they were exposed to, and their personal achievements, including the development of intercultural communicative competence.

Keywords: *Telecollaboration project, challenges, discoveries, intercultural communicative competence.*

1. Introduction

The Covid-19 pandemic has brought many challenges to foreign language teaching and intercultural education, making rethink all the pedagogical means that were offered before the outbreak of the disease. The established online culture learning, based on the principles of intercultural approaches and exploitation of the interactive features of ICT provided rich opportunities for telecollaboration (O'Dowd et al., 2006), which appeared a very favourable substitute for developing students' intercultural communicative competence (ICC). The universities' support in retraining teachers' competences made them active users of contemporary teaching tools and approaches.

The idea to run a telecollaboration project among Vilnius University (Lithuania), the University of Latvia (Latvia), Los Lagos University (Chile) and the University of Austral (Chile) originated from the online course for university educators within the Utrecht Network run by R. O'Dowd. A two-week course familiarized its participants with virtual exchange as a pedagogical activity for engaging students in authentic intercultural collaborative projects with international partners. The project resulted in a partnership agreement between the educators from the Universities of Vilnius and Latvia. In reply to the Partner search announcement, professors from Los Lagos University and the University of Austral joined the team ready for telecollaboration.

This paper overviews scholars' insights into the potential of telecollaboration to develop students' ICC. It also explores the project participants' reflections on the project in general, its challenges and benefits for their personal growth and enhancement of ICC.

2. Telecollaboration as a way to enhance students' intercultural communicative competence

The concept of 'telecollaboration' in this paper is used interchangeably with a 'virtual exchange' and is interpreted in line with O'Dowd's insights referring "...to the sustained engagements of groups of learners in online intercultural interaction and collaboration projects with partners from other cultural contexts or geographical locations as an integral part of their educational programmes." (2020). The definition sheds light on the importance of two key aspects: telecollaboration and development of students' ICC online.

According to the typology of a Virtual Exchange (VE) presented by the Stevens Initiative (NAFSA, 2020), the models employed in educational contexts can be asynchronous and synchronous, course-based, project-based, and curricular or cocurricular. Further to the model chosen, the importance of intentional facilitation and integration of authentic tasks to conduct either classroom-based or peer-to-peer conversations is stressed. The presence of the four key components – preparation, facilitation, collaboration, and reflection signifies the designers' careful thought of helping students prepare, work together, and debrief after the project. The complexity of activities (Helm & Guth, 2016) leads to another important factor – the teachers' and facilitators' appropriate qualification, making their students aware of how to interact online, engage with multiple modes for communication (Gutiérrez et al., 2021). Belz (2003) marks the importance of the teacher's role more than ever before since it is them to be the first to tackle the challenges of the electronic medium. O'Dowd (2007) identifies the four major roles of the teacher in telecollaborative projects: organizer, intercultural partner, model and coach, source and resource. Later, the scholar et al. (2020) expand the list with the fifth role of a pedagogical mentor in VE. The teacher is seen not only as a facilitator, but also as an active participant of the project, establishing successful learning opportunities for their students (Schenker, 2013). Although quite many teachers are described as passive consumers of digital media in their daily lives, the application of technologies in teaching contexts evokes mixed feelings in them, ranging from hatred to love (Tella, 1996). They still require professional training in understanding how these technologies can be used in formal educational contexts, how to gain expertise and overcome initial barriers (Reinders et al., 2013). In contrast, the same cannot be said about their students, the most active and technologically progressive group, who are just in need of the right mindset and skills to navigate the world's challenges (Stevens Initiative, 2020).

Although many models of ICC were designed under the premise of mobility which naturally exposes learners to cultural otherness, the shift toward collaborative learning on the social Web in education (Thomas et al., 2013) made the development of the target competence also possible. If we refer to the model by Deardorff (2009), the component of attitudes facilitates ICC via "effective and appropriate behaviour and communication" (Deardorff, 2009) through respect, openness, and curiosity. From the scholar's standpoint, motivation is enhanced by the influence of knowledge and skills. The mentioned components facilitate empathy, ethnorelativity, and adaptability. The starting point leading toward success of a VE is the teachers' team willing to share good will, ready to adapt and compromise, and open to difference. Müller-Hartmann, O'Dowd et al (n.d.) assume that regular communication between the partner teachers is the key to successful coordination of a VE. Since the latter targets at enhancement of students' ICC teachers are expected to encourage their students fully to employ their linguistic repertoires, facilitate understanding and successful communication by 'creating bridges' and helping their partners to 'construct or convey meaning' within a language or from one language to another (CoE, 2018, as cited in Gutiérrez et al., 2021). The intercultural aspects are to be addressed with the focus on the learners' attitudes such as openness and curiosity allowing them to observe, identify, and interpret cultural similarities and differences, or their colleagues' perspectives and worldviews. Gutiérrez et al. (2021) draw attention to the importance of the adaptability factor, both linguistic and telecollaborative. The first one refers to the context and its participants' skills to improve their communication through the volume of their voices, pace of speaking, choice of register and terminology. The second indicates the communicators' ability to adjust to the dynamics of the group in many aspects of intercultural communication, including scheduling a meeting, group work division and its completion, etc. Researchers acknowledge the possibility to develop ICC virtually with nearly the same array of competence components, as mentioned by Deardorff, though through carefully pre-planned activities. Nevertheless, telecollaboration has received some critical remarks regarding either exaggerated or oversimplified intercultural learning outcomes (O'Dowd, 2013), obliviousness to the medium of the internet as a possible source of frustrations (Kramsch & Thorne, 2002), naïve expectations about students' competences to develop in a natural way (Lawrence & Spector-Cohen, 2018) or organisational ignorance to consider a VE as an integrated part of study programmes and syllabi at university level (O'Dowd, 2014). Despite some possible negative aspects, a thoughtful design, careful preparation, active facilitation, teacher and student regular communication, and constant reflection on the process dynamics can lead to a desirable goal in a Virtual Exchange.

3. Methodological framework of the telecollaboration project

The telecollaboration project involved 64 students from Vilnius University (VU), the University of Latvia (UL), Los Lagos University (ULAGOS) and the University of Austral (UACH) and lasted for ten weeks.

3.1. The Participants

Vilnius University: 18 students, attendees of the elective course on Intercultural Communication: 7 students of Linguistics (VU) and 11 international students of Humanities from Italy, Japan, France, Ukraine, Germany and South Korea.

University of Latvia: 15 students of foreign languages, attendees of the elective course on Intercultural Communication, offered by the Department of English Studies.

Los Lagos University: 15 students studying English at the Centre for Integrated Training.

University of Austral: 16 students of medicine, psychology, biosciences, visual arts, music, forestry, engineering, architecture, law, united for the VE by the request of the university administration.

3.2. Before the project

‘Getting to know your Partner Teacher’ phase encompassed 3 months of regular meetings on a weekly basis. Cultural and institutional contexts were explored, teaching and research experiences described, subject syllabi analysed and student enrolment strategies discussed. Consequently, sketches of a telecollaboration project syllabus emerged accompanied by fruitful discussions and team members’ flexibility towards an assorted list of topics and tasks.

The syllabus comprised the topics typical of Intercultural Communication. It aimed at developing not only students’ positive awareness of cultural otherness but encouraged them to address ‘discomforting’ themes as well. Apart from the subject topics, students were expected to introduce their country’s educational system, universities, academic calendars, prevailing types of assessment, and to present the topics on their likes. The completion of a portfolio invited them to reflect upon their personal development in both language and intercultural learning. Each topic was intertwined with a weekly team task: to create a comparative infographic, record a podcast, make a presentation or a video, write an essay, design a poster, etc. For each session, some prompt questions to guide students’ conversations were provided.

3.3. During the project

The project launch was joined by the administration, teachers and students of the universities. The participants were introduced to the project idea, its aim and syllabus. The students were divided into teams of four; sixteen teams in total. English was chosen as a medium of communication.

In order to provide students with weekly tasks and learning materials, VU MS Teams platform was employed. It enabled the teachers to manage the course, communicate with the students, check the outcomes. It offered space for the students to meet and do the tasks requiring audio or video recording.

The subject class comprised at least two parts: before a new topic, team outcomes were reviewed, challenges identified, possible solutions offered, guidance to a new task given. To develop students’ ICC supporting material on the target vocabulary or intercultural theme was shared.

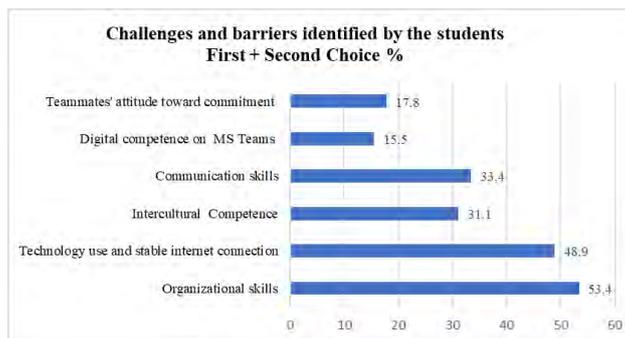
3.4. After the project

By the end of the project, an online questionnaire was designed. It contained closed and open-ended questions inviting students to evaluate their experience in the VE, identify the biggest challenges and barriers confronted, name personal achievements and provide suggestions to the future projects. Despite the fact that just 45 respondents out of 64 expressed their standpoints (which is the limitation of this case survey), their portfolios and questionnaire answers allow us to investigate the VE through various angles. In this paper, we concentrate on the students’ general satisfaction, challenges they had to deal with and achievements they gained in telecollaboration.

4. Results and discussion

With reference to the general evaluation, the project was given 4.29 points on the 5-point scale. All the 45 respondents confirmed that telecollaboration should remain part of the institutional practice. The feedback contains just a few remarks advising the teachers to make teams smaller and choose partners from similar time zones. Even though the project involved representatives from at least nine countries of the world, a VE, as a mode of learning, was new for all of them. The joint activities made the students engaged and feel the nature of the VE. The participants’ sense of curiosity, their wish to pose challenges were the key drivers for the success of the project.

Figure 1. Telecollaboration challenges and barriers identified by the students.



Telecollaboration challenges identified by the students (see Fig. 1) fall into the following sequence: more than half (53.4%) of the respondents admitted that their poor organizational skills proved to be an obstacle to a smooth flow of the project. The second barrier hindering their successful interactions was technology and stable internet connection: 48.9% of the respondents maintained that they quite often were exposed to the internet interferences. VU MS Teams platform was described as 'not helpful' by 22% of the respondents. The project participants were mainly language students, yet their replies indicate a need for the development of their communication skills (33.4%) and intercultural competence (31.1%). The latter cases were grounded by fear and shyness to speak in public, defend their opinion or debate. Teammates' attitude towards commitment was also mentioned as a barrier by 17.8% of the respondents. Looking from the cross-cultural perspective, the project participants were given an opportunity to meet people whose orientation toward time and work differed. According to Lewis (2002), communication between highly organized planners, linear-active people (in our case, Latvians, partially Lithuanians) and loquacious, multi-active people such as Chileans, could be prone to misunderstandings. Consequently, the attribution of cultural qualities to the respondents' personal characteristics demonstrates the need of their ICC enhancement. The students' digital competence was indicated as the least important barrier (by 15.5% of respondents), which confirms them to be excellent navigators of the digital world.

Students' personal achievements fall into five major groups: personal friendships were mentioned as the greatest benefit of the VE by the students from ULAGOS, UACH and UL. The opportunity to enhance English language skills, revise the vocabulary, improve pronunciation, reduce the fear to communicate became the second achievement of importance. The third priority was given to intercultural discoveries, which helped them to expand their worldviews, identify cultural similarities and differences, grasp the complexity of the subject, which marks their advance in ICC development. Participation in the VE contributed to the development of students' psychological abilities: they have become more organized, confident, patient, and helpful: *"the project helped me overcome my shyness and gain confidence in my communication skills. I was leading the team calls! I've discovered myself anew!"* (FR-2). The application of digital competence to the project tasks was substantially appreciated by the VU students: *"Now I know how to create a shared Google document, infographic, poster and how to use CANVA."* (LT-5). It is worth mentioning that VU team members paid much attention to their personal gains, sometimes leaving their teammates' contribution aside. This could be related to Hofstede's Culture taxonomy, implying that a higher level of individualism might hinder collaborative work. It does not deny the students' appreciation for the project though, in intercultural learning, it reminds its organizers that culturally ingrained thinking patterns do exist. The list of the project participants' personal achievements provided much evidence on their advance in linguistic and intercultural competences with nearly all the components as described by Deardorff (2009). A shift from shyness and uncertainty towards positive emotions demonstrated students' psychological well-being. Their enhanced digital competence boosted their satisfaction and kept them engaged throughout the project stages.

5. Conclusions

The findings of this study can be understood as a contribution to the field of intercultural and academic exchanges at personal and university levels. We attempted to review theoretical insights into the opportunities offered by a VE and provide a procedural account of the key steps that involved the design, implementation, and final assessment of the telecollaboration project among 4 universities. These findings provide a potential mechanism for a concrete implementation and later enhancement of the procedures involved in academic exchange practices in other universities. The present results confirm that telecollaboration is a highly valued practice among participants, as it expands academic and personal

horizons by tackling psychological challenges and transferable skills for the professional life, such as: intercultural awareness and interpersonal communication, teamwork, adaptability, proactiveness. Thus, results provide a basis for the implementation of further telecollaboration practices as a constant activity within higher education in and after COVID-19 pandemic.

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ACCELERATED VIRTUALIZATION OF HIGHER EDUCATION IN TIMES OF PANDEMIC: THE CASE OF AN ECUADORIAN UNIVERSITY

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Abstract

The purpose of the paper is to present and discuss the impact, challenges, and opportunities that the COVID-19 pandemic and related lockdowns have caused to the teaching and learning model of an Ecuadorian Higher Education Institution: the Universidad Andina Simón Bolívar (UASB). The discussion will be led from the perspective of various educational actors and different levels of decision-making.

At the beginning of 2020, the COVID-19 pandemic that confined a large part of the world's population to their homes and paralyzed activity in practically all areas of human action, forced a rethinking of education at all levels. In addition, the massive closure of schools and universities led to the deployment of distance learning modalities through a variety of formats and online platforms, replacing traditional educational processes.

Experts have called *emergency remote teaching* for this sudden and unforeseen shift of face-to-face classes to virtual modalities. This name comes to highlight that the solutions adopted in a very short period, in many cases, could not be based on well-founded models of e-learning and a well-planned learning process. Still, rather traditional practices were transferred from face-to-face education to online platforms, maintaining their conventional forms in terms of methodologies, teacher and student roles, typologies of activities, evaluation models, and so on.

The work presents the case study of the successful transformation process of a Higher Education institution based on a face-to-face model to a remote model to continue providing training to its students despite the disruption caused by the confinement derived from the health crisis of COVID-19.

The analysis of the data collected through a variety of methods that included interviews with faculty, the analysis of institutional documents, and a student survey highlights the complexity and adequacy of the strategies implemented by the educational community to make the transition from an emergency remote teaching to a quality online learning ecosystem.

Keywords: COVID-19 pandemic, higher education, emergency remote teaching, effective online learning.

1. Introduction

The COVID-19 pandemic has shaken the foundations of education around the world. Educational institutions at all levels have been compelled to adopt emergency solutions, migrating from face-to-face settings to online platforms, which the experts call *emergency remote teaching* (Hodges, Moore, Lockee, Trust and Bond, 2020). *Emergency*, because it arises as an immediate response to an unexpected lockdown situation, with a remedial character. *Remote*, as opposed to face-to-face, although not necessarily identifiable with e-learning. *Teaching*, as it focuses primarily on instruction rather than learning. In this sense, in contrast to e-learning experiences designed from the ground up as a robust online educational ecosystem, emergency remote teaching is a provisional shift of traditional education to an alternate delivery mode to continue providing access to instruction by transferring face-to-face practices to online settings. It is essential to know how to differentiate these two concepts not to continue perpetuating the myth that online learning has lower quality than face-to-face education when unsatisfactory results are found when assessing the implemented experiences.

The research generated on online and distance learning that has been carried out for years has shown that the quality and effectiveness of online learning results from a systematic process of design, planning, and development, grounded in well-founded theories, models, and standards (Hodges & others,

2020; Means, Toyama, Murphy, and Bakia, 2013). Swan (2003) suggests that effective online learning in higher education should provide:

- Clear goals and expectations for learners.
- Multiple representations of course content.
- Frequent opportunities for active learning.
- Frequent and constructive feedback.
- Flexibility and choice in satisfying course objectives.
- Instructor guidance and support.

In turn, Means, Bakia, and Murphy (2014) highlights the complexity of the design and decision-making process in online learning through nine dimensions: modality, pacing, student-instructor ratio, pedagogy, instructor role online, student role online, online communication synchrony, the role of online assessments, and source of feedback.

This paper takes some of these aspects and dimensions as a reference to analyze the process followed by the Universidad Andina Simón Bolívar (UASB), a fully face-to-face university when the pandemic broke out, to implement a quality and effective online learning ecosystem, passing through an emergency remote teaching.

2. Objectives

The specific objectives of the study were:

- To analyze the emergency remote teaching solutions implemented in higher education due to the lockdown imposed by the COVID-19 pandemic.
- To describe the impact, challenges, and opportunities caused by the pandemic in the online learning strategies of a higher education institution from the perspective of various educational actors and different levels of decision-making.
- To assess the adequacy of the solutions implemented considering pedagogical and technological factors related to the quality and effectiveness of online learning in higher education.

3. Context

The UASB was established by the Andean Parliament in 1985 and is part of the Andean Integration System. In addition to its status as an autonomous academic institution, it enjoys the status of a public international law body. It has headquarters in the city of Sucre, national headquarters in Quito, local headquarters in La Paz and Santa Cruz, and offices in Bogotá and Lima.

The University conducts research, teaching, and services for the generation and transmission of scientific and technological knowledge. Its academic focus is postgraduate education, offering master's degrees, doctoral programs, and specialized studies diplomas. The University has the largest offer of postgraduate programs in Ecuador, especially international doctoral programs, with extensive international cooperation and exchange of professors and students from the Andean Subregion, Latin America, North America, and Europe.

The UASB Ecuador Headquarters (UASB-E), where this case study is situated, was founded in 1992. Currently, it is the center for advanced studies with the broadest range of scholarship programs and financial support in the country. Nine academic areas operate at the Ecuador Headquarters: Environment and sustainability, Cultural Studies, Law, History, Health, Education, Social and Global Studies, Communication, and Management. In addition, 14 postgraduate degrees, 27 professional master's degrees, 7 research master's degrees, 7 doctoral programs, and two postdoctoral programs are offered.

When the pandemic broke out, this offer of programs was fully face-to-face. Not even blended programs with some degree of virtualization existed.

Although the University already had a Virtual Education Management Department (UGEV), its activity had been limited to supporting the development of some sporadic MOOCs and assisting academic staff in the use of the virtual education environment that supported face-to-face activity as a repository of resources or in the development of specific activities.

Next, we will see that this offer has undergone important changes due to the COVID-19 pandemic.

4. Design

This study has been developed through a case study method. Three techniques were used to collect data: interviews with academic staff, institutional documentary analysis, a synchronous online focus group, and a student survey.

The objective of the interviews was to identify the opportunities and obstacles faced in the virtualization process of the university programs due to the need derived from the pandemic from the key actors' point of view in the decision-making process. Three key actors were interviewed: the General Academic Director of the University, the director of the Virtual Education Management Department, and the director of the Faculty of Education.

The synchronous online focus group that involved two professors and two students from the Faculty of Education helped to delve into various aspects of the lived experience of teaching and studying remotely, such as the skills they have had to develop, the advantages and disadvantages of virtual education, among others. The focus group was developed through a videoconference channel and recorded for later analysis.

The documentary analysis focused on the documents that set the guidelines and regulations for emergency remote teaching when the pandemic broke out and on the subsequent proposal of a pedagogical model for online learning in the new normality.

The questionnaire was applied to a sample of 166 students from three master's programs in the Faculty of Education. A total of 129 students (78% of the sample) voluntarily answered the questionnaire.

The following provides an analysis of some of the results achieved by applying the described methods.

5. Results

5.1. First moment: Emergency remote teaching

When the pandemic broke out in the 2020 academic year, the UASB-E had 1,295 students with whom the University undertakes to continue all educational activities remotely, according to the possibilities of each teacher, either using videoconference tools, virtual classrooms, email, telephone communications, or requesting the delivery of final papers. These remedial solutions involved a good number of decisions and actions related to technological infrastructure, training, and support for academic staff and students, administrative management, etc., in a very short time.

The director of the Virtual Education Management Department (UGEV) points out that most teachers had no experience in virtual teaching, nor had they previously used the virtual learning environment in their classes. In this sense, the first challenge was to address instrumental skills related to using the Moodle platform and other tools and programs necessary for virtual education. The second included the techno-pedagogical dimension of using the tools for teaching purposes. For example, those who chose to continue their classes synchronously were taught to use Zoom to make their presentations or keynote talks and divide the group creating small rooms to generate collaborative dynamics. At the same time, those who opted for an asynchronous model had to be taught the possibilities of communication and dynamization of the joint activity offered by Moodle.

The concern for the continuity of a model as similar as possible to the face-to-face model was evident, as well as the desire for a prompt return to face-to-face activities. This period was also characterized by the massive adoption of the synchronous model based on videoconferencing, although other models were also explored, including the asynchronous collaborative model. The academic community was clear on the idea that a shift was not being made to online education - since it is a complex process that involves specific instructional planning, the preparation of visual resources, and requires digital skills for teachers and students, among other fields - but to an emergence remote teaching.

The advance of the pandemic made the academic community aware that its activity would continue to be carried out virtually during the following academic year and that, therefore, it was necessary to launch actions to digitize the processes that would facilitate its operation as an online university. These actions include conceptualizing a techno-pedagogical ecosystem for online learning, as we will see next.

5.2. Second moment: A techno-pedagogical ecosystem for online learning

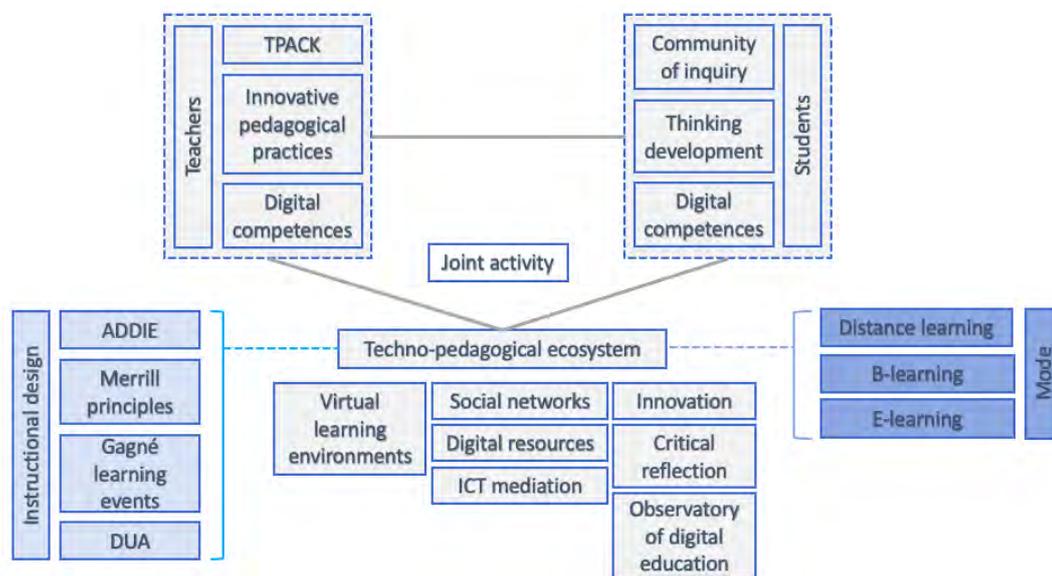
In the 2021 academic year, the number of students in the UASB-E had increased to 3,504. The virtual modality had allowed the participation of students from all the provinces of the country: 68% of the students who answered the questionnaire stated that they could not currently carry out their studies if they were taught fully face-to-face.

This period is marked by a fluid debate and collaboration between academic and management staff. According to the Faculty of Education Director, there was a great concern among the academic staff about the quality of the programs transferred to online environments. In his words, "*Traditionally, virtual education has been considered lower quality. We did not manage to define a single model for planning online teaching. Still, we managed to determine what our possibilities were, with the help of colleagues in the area who had expertise in virtual education*".

As a result of this institutional process of reflection, design and planning emerged *Andina Virtual*, a techno-pedagogical ecosystem for online education that aims to be a reference model in Ecuador and the Andean region. This ecosystem is built based on the following axes:

- A virtual education management unit that led a careful design, planning, and implementation process of the most appropriate model to respond to the University's mission in collaboration with the educational community.
- Creating a techno-pedagogical ecosystem of services, resources, networks, and digital learning environments that interact with each other to guarantee quality and inclusive education in diverse non-face-to-face modes, promoting a new ecology of learning.
- The collaborative instructional design of a specific syllabus for the subjects of the different programs to be taught in different non-face-to-face teaching modalities.
- The continuous training and personalized support for academic staff and students.
- A pedagogical model focused on defining clear goals and expectations for learners, student learning activity, collaborative and active learning, multiple representations of course content, and support and feedback.

Figure 1. The UASB's techno-pedagogical ecosystem. Source: UGEV.



6. Conclusions

When we close this paper, two years have passed since the pandemic broke into our lives to leave traces on an entire generation, many of them yet to be known. The academic offer of the UASB continues to be carried out in a virtual model due to the sanitary conditions that still affect many Latin American countries. When asked if they consider that online education has the same quality as face-to-face, 70% of the students surveyed said yes. Also, 91% affirm that they would again carry out online studies. These results show the enormous transformative potential of online education and endorse the adequacy of the transition to virtuality implemented by the UASB.

Regarding the main obstacles and difficulties that students have encountered when facing virtual education, the most recurrent answer is time management. The students expose the complexity of coordinating work, studies, and family obligations. They also emphasize that the virtual modality has increased the tasks they must carry out and the materials they must consult for it. Collaborative work is especially a concern for students who, coming from completely face-to-face experiences and with little digital competence, do not conceive of asynchronous collaboration and have difficulties coordinating synchronous meetings with classmates. The quality of the internet connection is also a major obstacle. Connections are unstable, and power outages sometimes occur, making it difficult to keep synchronous sessions. Despite this, the synchronous model continues to be the most attractive for many students, who miss interacting with the teacher, solving doubts in real-time, socializing with classmates, and joint reflection. The students also underline among the negative aspects of virtual education the lack of interaction with classmates, human warmth, not getting to know each other better, in short, the social and emotional dimension of face-to-face. Furthermore, the development of synchronous activities has also

caused boredom with the screens, reinforcing in some cases a romantic vision of face-to-face learning that, after two years, is distant. Thus, the students miss masterclasses, direct dialogue, and face-to-face accompaniment of the teacher, pointing out that in virtuality, for this reason, the objective of the learning activities is sometimes lost.

As for the positive aspects of studying in the virtual modality, the students highlight several, especially the flexibility. The flexibility allows them to live outside the city and still access a prestigious university. In addition, they can connect from anywhere to the virtual campus and synchronous class sessions, organize their time and follow their own learning pace. Furthermore, students point out they have acquired new skills such as virtual collaborative work, self-regulation, communication, time management, planning, and autonomous learning, which they would have never acquired in face-to-face education. These students, who are also teachers, highlight how they have learned the use of tools in their learning process that they have later been able to apply in their teaching. In conclusion, they have developed new ways of teaching and learning.

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IMPLEMENTING PSYCHOSOCIAL SUPPORT FOR CHILDREN AFFECTED BY THE BEIRUT BLAST: PROVIDING A SAFE PLACE IN THE MIDDLE OF CRISIS

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Abstract

The Beirut blast on August 4, 2020 has left a large impact on the well-being of children. This paper is a preliminary presentation of a larger explorative case study investigating the experiences of psychosocial counsellors providing psychosocial support through non-formal education for affected children after the blast. Longitudinal fieldwork consisting of digital and face-to-face in-depth interviews, visual materials and focus group discussions have been conducted. This paper describes how psychosocial support implemented by counsellors can provide a safe place for children in light of the aftermath of the Beirut blast and the ongoing crises in Lebanon. The supporting factors include a physically safe space, tools provided to the children to reduce their stress levels and increase their well-being, and a professional team providing a child-friendly and respectful place.

Keywords: *Education in emergencies, psychosocial intervention, traumatic stress, well-being, Beirut blast.*

1. Introduction

This research takes place in Lebanon, a country that has been suffering for the past years from a number of overlying crises, including the ongoing refugee crisis, an economic crisis and the recent COVID-19 pandemic (Abouzeid et al., 2020; UNHCR, 2020; United Nations, 2021). Farran (2021) found severe mental health-related consequences due to these ongoing crises in Lebanon. On August 4, 2020, a substantial amount of ammonium nitrate exploded in the port of Beirut. This explosion killed more than 200 people, injured over 6,000 and left 300,000 homeless (Cheaito & Al-Hajj, 2020). Many refugee families were among the victims of the explosion, and it has been argued that the children of these families who survived past conflict and crises will be especially prone to longer-lasting consequences of a new potentially traumatizing event (UNICEF, 2020). These children are expected to struggle with psychosocial consequences of the blast, which might have further increased existing stress levels or caused a re-traumatization. Considering that even minor and non-extreme events can cause traumatic reactions, it is likely that already traumatized children will be more severely affected by a new traumatic event such as the explosion in Beirut. According to Ghumman et al. (2016), refugees are more vulnerable to developing posttraumatic stress disorder (PTSD) due to the various impacts and consequences of a crisis and conflicts they endure.

In this setting, traumatic stress is likely to be experienced by a large number of children, both due to their refugee background or the overlying crises in Lebanon (Khamis, 2019). However, access to psychotherapy can be very limited in times of conflict and crisis, as many psychiatric hospitals and clinics are closed, and the number of people in need is extending the possibilities of individual support in a mass-trauma situation (Silove et al., 2017). This implies that interventions should provide support at the collective level, not at the individual level. Psychosocial support is an umbrella term for interventions that can be preventative, curative or focused on promoting well-being (Global Education Monitoring Report, 2019). Hobfoll et al. (2007) established an evidence-based recommendation to implement psychosocial support in a mass-trauma setting. They found five principles that need to be promoted to create a successful intervention: sense of safety, calming, sense of self-efficacy, connectedness, and finally, instilling hope. The last principle focuses on the possibility of a better future and the relevance of providing resources for the people facing crises and conflicts. Such large-scale interventions, especially when implemented as school-based support, have proven successful in humanitarian crises (El-Khodary & Samara, 2020; Hovenga, 2021; Schultz et al., 2016). In response to such increased stress levels, schools

can create a secure base for students and provide social support for affected students (Morton & Berardi, 2018). However, in the case of Lebanon, schools have been widely closed since the economic crisis reached its first peak in 2019 and have remained closed due to the COVID-19 pandemic, leaving the children alone at home (Save the Children, 2020). The Norwegian Refugee Council (NRC) responded to this emergency situation by setting up two informal learning centres to implement psychosocial support for children affected by the explosion. The present paper forms part of a case study and will present the implementation of a psychosocial support intervention through non-formal education in an emergency setting. This paper aims to focus on a descriptive presentation of the existing data material and answer the following research question: *How is psychosocial support organized in order to provide a safe place for the children and educators in the middle of a humanitarian crisis in Lebanon?*

1.1. Setting of the study

The NRC opened two child-friendly facilities in the most severely affected areas of Beirut from September 2020 for a period of one year. In each of the two centres, two psychosocial counsellors and one education officer were hired. These professionals were trained in the “Better Learning Program” (BLP) and delivered this intervention to approximately 160 children per month for eight cycles. In total, 1,200 children received support through the BLP after the Beirut blast. The programme provided psychoeducation and tools to understand stress and reduce stress reactions (Norwegian Refugee Council, 2019). It was delivered through two group sessions per week for the duration of four weeks. Each group consisted of six to eight children. The counsellors conducted a pre- and post-test with each child to evaluate the effects of the intervention. The centres were open from September 2020 to September 2021.

2. Methods

Using an explorative approach, longitudinal fieldwork commenced in February 2021. Data were collected using a qualitative approach in two-stage fieldwork. The COVID-19 pandemic meant that physical fieldwork was impossible for many researchers before September 2021 (e.g. Andrejuk, 2020; Howlett, 2021). Therefore, the initial part of the data collection was conducted through online qualitative fieldwork. The further data collection consisted of in-depth interviews, participant observations and focus group discussions, all conducted in person. A qualitative approach was chosen to explore the perceptions and experiences of the experts working in the field (Creswell & Poth, 2018). The aim of the data collection was to gain a detailed and rich understanding of their work, following the concept of qualitative research from Ritchie et al. (2013). Through interviews, a researcher can gain insights into a participant’s individual perspectives and experiences of a psychosocial intervention (Brinkmann & Kvale, 2015). Over seven months, qualitative in-depth interviews with the education team working in the non-formal education centres were conducted. The participants consisted of four psychosocial counsellors and two education officers who had either completed or had almost completed a master’s degree in clinical psychology. There were one male and five female participants, and all were Lebanese and living in Beirut at the time of the explosion.

The initial stage of the data collection was conducted through 46 in-depth interviews with the six presented key informants. For a period of eight months between February 2021 and September 2021, the interviews were conducted in intervals of approximately three to four weeks, all remotely over Zoom. The interviews were semi-structured, based on a thematic interview guide, with an average length of 45 minutes. Interview topics included the impact of the explosion, the perceived need for psychosocial support, the practical implementation of the intervention, perceptions of the children and parents, and finally, the perceived impact of the intervention and areas for consolidation and improvement. Throughout the period of the online fieldwork, visual materials, including drawings of the children, photographs and videos, were shared to further the understanding of the field.

The second stage included qualitative face-to-face fieldwork in Beirut, Lebanon, over two weeks in September 2021. The data collected included five in-depth interviews and one focus group discussion with the education team. Further data were based on participant observation in the centres. The in-depth interviews focused on the educators’ professional and personal change throughout the one-year period of implementing PSS to affected children.

3. Organization and implementation of psychosocial support

3.1. Set-up of the education centres

In the initial days following the explosion, the NRC focused on responding to the emergency situation by providing shelter, water, sanitation and hygiene interventions, in addition to emergency cash and legal assistance. However, a small survey conducted over the phone with families in Beirut indicated that the threatening impact on children's well-being and mental health was an urgent issue. Thus, the NRC decided to set up two non-formal education centres in Beirut to deliver psychosocial support for affected children. To create physically safe centres, the selection of locations had the following requirements:

1. Safe neighbourhood with secure access and parking spaces
2. Proper building, not an emergency tent
3. No visible destruction by the blast around the centres
4. Sufficient space for eight students and one counsellor (due to COVID-19)
5. Elevator/accessibility for all children

Concurrently with the selection of locations, the education team conducted the first outreach to recruit children for the first cycle. This was conducted using a door-to-door approach where the team interacted with neighbourhood communities to find homes of families with children. Through speaking with the families, there was revealed to be a considerable need for PSS. Prior to starting the first cycle at the end of September, the education team held a waiting list for the following three cycles. Parents reported increased stress levels and nightmares among their children since the Beirut blast. The main concern raised by the families was the fear of the COVID-19 pandemic as schools remained closed and most physical activities were cancelled. However, the educators ensured the maintenance of strict regulations, and most parents were comfortable with their children attending the programme.

Before the implementation began, the education team received capacity building training through the BLP. This was conducted by the NRC's regional BLP capacity building manager in a three-day course. The training was described as practical and hands-on, featuring learning theories, psychoeducation and tools and techniques to support children in regulating their emotions and stress levels. The counsellors reported the training to be both helpful for their implementation of the BLP, and also for recovering from their own stressful experiences of the Beirut blast.

3.2. Implementing psychosocial support

By the end of September 2020, the first cycle of the BLP began with 120 students. The implementation happened over two sessions per week for a period of four weeks. During this period, the students participated in group sessions with eight children in which they learned about psychoeducation and tools and techniques relating to the following four topics: stress and stressful reactions, regulating stress, body and mind connection, and ridding oneself of unwanted thoughts. Each session used a specific routine with an introductory song to create a feeling of cohesion and a sense of safety in the group setting. After the song ended, there were relaxation and breathing exercises to help create habits of tools and techniques for the children to carry on with after the programme ended. The children were divided into two age groups: 6 to 9 years and 10 to 14 years old.

During the first session, students were invited to share stressful events they had experienced. Besides the explosion, they mainly mentioned everyday life stressors such as exams, fighting with siblings, storms, illnesses and fear of the dark. During the second session, the "safe place" visualization technique was introduced where the children were asked to imagine a space where they feel safe and well. Almost all the children thought about places related to nature, their homes and their families. In the third week, the children described learning about the mind-body connection as eye-opening as it explained to them the normalcy of their reactions to stressful situations. In the final week, the children learned to distinguish between their thoughts and reality, and to prevent their unwanted thoughts from taking them in a downward spiral. Typical unwanted thoughts included the following: "nobody loves me", "there will be another explosion", "I am ugly", "there will be another war", "I will be killed with a knife tomorrow", and "a car will run me over". At the end of the BLP, the counsellors reported that the children attained a set of tools and techniques to understand and regulate their stress reactions and increase their well-being.

The majority of the participating children in this programme were Syrian refugees who either moved as young children to Lebanon or were born in there as the children of Syrian parents. Although the programme was open to all children affected by the explosion, the education team in the centres described difficulties in reaching out to the Lebanese families. Stated reasons for this included racism among Lebanese families towards refugees and the nature of the NRC normally providing support for refugees.

The education team reported signs of severe poverty among many of the children, such as damaged and dirty clothing, lack of food and drinking water, insufficient money for transport to the centres, and lack of hygiene materials to protect themselves from COVID-19. They also recognized that many of the children were understimulated due to a lack of schooling materials at home. For example, many had difficulty with drawing and writing, even in the higher age group.

3.3. Perceptions on the impact of the intervention

The impact of the PSS programme was described on two levels: on the children, and on the counsellors themselves. The education team reported a significant visible change in the children's behaviour from the beginning of the programme to the final session. Furthermore, the children opened up and became less shy, participated more and formed relationships with the other students. Their initial behavioural issues improved significantly, and they became quieter, politer and more autonomous. They rapidly adapted to the rules of the centres and respected the programme, the other children and the counsellors. The counsellors also reported delighted parents contacting them to report a positive change in their children's behaviour and attitude at home.

The counsellors also reported an impact of the programme on themselves. They witnessed their own healing process through the provision of PSS to the children. Both feelings of empathy with the children and reflection of their own stressful reactions and experiences in the children's encounters with the explosion and the crisis in Lebanon provided them with support for their personal well-being.

4. Summary of experiences

Children attending the PSS programmes were able to regain a feeling of safety in the midst of the crisis in Lebanon, through different factors. As the Beirut blast had a significant effect on the children's physical safety, the presence of a safe building where they were provided with support was an important factor in them feeling safe. The BLP provided the children with tools and techniques to reduce their physical and mental stress reactions and improve their well-being. The child-friendly and respectful nature of the setting provided them with a platform to share their worries and regain a feeling of control over their situation. The trained mental health personnel were another supportive factor in this process. With the schools in Lebanon being closed since October 2019, the impact of this PSS programme might have been amplified as it provided support for children who were otherwise isolated at home. It provided them with contact with adults with a professional background and a social support network through the other participating children.

5. The way forward and implications

This paper was based on a preliminary descriptive overview of the dataset collected from the NRC's education centres in Beirut. Further analysis of the qualitative and quantitative data will provide deeper insights and additional academic contributions. The project will pay close attention to the implementation of psychosocial support and the counsellors' perceptions of the children, their parents and themselves. There will be a focus on the counsellors' professional development, their perceptions of needed support and their processes of organizing and developing the centres. The project will use a mixed methods approach. Quantitative data based on pre- and post-tests of the children attending BLP will be analyzed to gain an understanding of their stress levels, well-being and school functioning, in addition to the impact of the programme on these factors.

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MANAGERS' STRATEGIES FOR INCLUSIVE IMPLEMENTATION IN TECHNICAL VOCATIONAL AND TRAINING COLLEGES IN SOUTH AFRICA

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Abstract

Limited access to people with disabilities in institutions of higher learning is unfortunately a common trend in South Africa. The purpose of this paper was to explore strategies to implement in Technical Vocational Education and Training (TVET) colleges in order to promote inclusive education effectively; that is, to create smooth access for students with disabilities. Research that explored strategies regarding the implementation of inclusive education in TVET colleges had not been previously conducted in South Africa. Hence, this paper's contribution focused on strategies for the implementation of inclusive education through the lens of students with disabilities. It also fits into the human pedagogy model that advocates accommodation of students as they are. This research was underpinned by a qualitative approach utilising the Interpretive Phenomenological Design. Data was gathered through document analysis and in-depth interviews involving twelve managers from four TVET Colleges in the Eastern Cape Province of South Africa. The findings indicated that although the managers understood the need for the implementation of inclusivity in colleges, very little was done to support students with disabilities. College management did not take ownership for driving, managing, and implementing their strategic plan. The findings also revealed the following: a lack of support structures, absence of the Disability Services Units, lack of partnerships with schools, no control over strategic planning, no evidence of policies on inclusion, lack of funds, and delays in providing services that support students with disabilities. It was recommended that managers implement strategies to create support structures, Disability Services Units, partnerships with similar schools, a strategic management plan, inclusion policies, and fundraising schemes to promote access to students with disabilities in colleges.

Keywords: *Access, disability, human pedagogy model, implementation strategies, inclusive education.*

1. Introduction

It is common among people with disabilities to assume that access to higher education learning opportunities is difficult to achieve. However, the implementation of inclusive education in HEIs (Higher Education Institutions) ensures that all learners are included in the education system, regardless of their disabilities (Pienaar & Raymond, 2013). The White Paper on Rights of People with Disabilities (2015) states that most disabled youths between the ages of 20-24 were not attending any tertiary education institution (Department of Social Development, 2015). Subsequently, all the relevant legislative frameworks in South Africa emphasized the importance of the inclusion of individuals with disability in the education system.

Technical and Vocational Education and Training (TVET) college leadership shoulder a huge responsibility and obligation to generate strategies that accommodate the diversity of students in a variety of educational programmes (Coco, 2011). One of leadership's obligations is to manage the access of students with disabilities, and to provide guarantees that inclusive education is properly implemented and monitored (Naidoo, 2010). The TVET colleges are positioned academically between the schools and universities since they have pre-matric and post-matric programmes (Balkrishen, 2016). Unlike universities that have autonomy to implement their policies, colleges are governed (Kraak, Paterson, & Boka, 2016) in terms of the White Paper for Post School Education and Training which was developed by the Department of Higher Education and Training (DHET) and ratified by the Cabinet (DHET, 2013). This promoted a post-school system (TVET and HEIs) that recognized the right to access an educational institution regardless of race, age, and disability.

Although there were attempts in some colleges to address the problem associated with disability and inclusivity, these were not sufficient to address the needs of these students (Delubom, 2017). We advocate that it is crucial that all stakeholders in the TVET sector embrace innovative ways of thinking in order to execute innovative strategies to implement inclusive education successfully. This would signal Government's commitment to education in general, and in particular to the post-secondary educational needs of people with disabilities (DHET, 2013).

Globally, many countries have reviewed and adjusted special education policies to accommodate inclusive education (Muyungu, 2015). Research studies conducted internationally exposed the inefficiencies in current scenarios, especially those pertaining to strategic planning and legislation concerning the implementation of inclusive education (Khron-Nydal, 2008; Saidu, 2017). In South Africa, White Paper 6 (2001) provided a blueprint for inclusive education to become entrenched in our education system. This was aimed to address the imbalances of the past that excluded children of colour with disabilities from the education system (Department of Basic Education, 2016). This investigative enquiry is necessary to understand how TVET colleges strategize to accommodate inclusivity and diversity despite their position of being in the middle of school and university systems. Hence, this paper aimed to explore TVET college managers' strategies concerning entrenching and improving inclusive education implementation policies.

2. Methods

This study was based on a qualitative research approach which was the most suitable approach because it was directed towards the in-depth perspectives of participants which considered their personal and subjective narratives concerning the phenomenon under study (Du Plooy-Cilliers, Davis, & Bezuidenhout, 2015) which in this case was the management of inclusive education. Additionally, the qualitative method was appropriate since it analyses feelings, attitudes, perceptions and views. This study's aim was to dissect managers' strategies on improving the implementation policies and their enactments regarding inclusive education in the TVET colleges. A phenomenological research design was adopted since it was necessary to understand participants' perceptions of inclusive education, their understanding of challenging situations, as well as their lived experiences (Waters, 2017).

3. Findings and Discussion

The findings revealed that although participants were unanimously in favour of the implementation of inclusion in all colleges, there was not much that was done to support this vision. There were strategies that the participants advocated that were related to support structures, Disability Services Unit, partnership with schools, strategic planning management, development of policies, and fundraising drives.

3.1. Support structures

The data generated from interviews and the document analysis reflected that there was an absence of internal structures to support mainstream students with disabilities in the colleges. The participants mentioned that the Higher Health, a national student support agency, deployed officials who provided 'disability' support. It was evident that some managers had knowledge of the Higher and Further Education Disability Services Association (HEDSA); however, they were not clear about its functions. Also, the managers admitted that colleges did not intentionally neglect the inclusion and support of students with disabilities, rather they did not have strategies in place to guide them (managers) to effectively implement inclusive education. These remarks illustrate the lack of planning from the college managers who are the decision-makers, and who shoulder the responsibility to design visionary initiatives to effectively implement inclusion of students with disabilities (Chiwandire, 2020). The idea of the formation of a forum for students with disability is an indication of managers' intention to improve this situation. This indicates that some managers have an idea of what was needed to be done as they wanted to hear the disabled students' views by acknowledging the slogan, 'nothing for us, without us' (Charlton, 2000). However, having this idea is not enough - it needs to be translated into action. It was apparent that there was no planning or guidelines that were followed, instead there were ad hoc attempts regarding inclusion.

3.2. Disability Services Unit

Managers mentioned that it would be beneficial if colleges could have fully-fledged units that facilitate inclusion of students with disabilities. The managers' responses illustrate the perception that the Department of Higher Education and Training (DHET) does little to support colleges to establish the units. Disability Services Units are needed to facilitate inclusion and integration of students with disabilities. As long as the institutions are not fully transformed, the need for such units will remain. The establishment of disability units involves massive funding from Government and other stakeholders (e.g. the private sector) as there is a need for recruiting specialized personnel and the building of disability infrastructures. Since colleges do not have autonomy (Mothapo, 2019), their funding is allocated mainly for certain programmes (DHET, 2016). Moreover, they do not take their own decisions, rather they work in collaboration with the Department of Basic Education [DBE] (Kraak et al., 2016).

3.3. Partnerships with schools

The findings indicated that managers saw the need to establish partnerships with schools so that they share their best practices. Additionally, colleges should be informed of the programmes that they could offer, especially those which would accommodate all students regardless of their disabilities. Moreover, it is necessary for the colleges to be responsive to community needs.

It is evident that colleges cannot work in isolation, but in collaboration as they are public institutions that should serve the needs of the community. However, it is necessary to dissect and understand the Department of Basic Education's (DBE's) policy on inclusion in terms of the alignment of programmes that are offered in colleges to those offered in Technical and Vocational Education (TVET) schools and vice versa. This will establish the different streams - not all students from schools will take the academic stream as some will prefer skills-based subjects because of their learning disabilities. Without partnerships with schools, colleges may miss the advantage of gaining incisive and valuable information to promote inclusion.

3.4. Strategic Planning Management

Some managers recognized that they were the custodians of strategic planning, but others who were campus-based shifted their responsibility to the managers at central office. One manager indicated that if strategic planning is a document that is written to guide the department, then this reveals that the problem stems from within the institutions. Managers understood that one of the strategies they should develop was to manage, review, and evaluate their planning processes. This illustrates that when there is a strategy in place, it would be easier to monitor progress being made (if any) where all role-players would be accountable. Based on the above findings, it is apparent that there was a lack of responsibility and accountability on the part of the strategic management team. Hence, it is imperative that managers acknowledge that they are responsible for the execution of strategic planning, and not to shift the blame onto others.

3.5. Training and development of lecturers

The training and development of lecturers concerning inclusive education was included as one of the significant strategies that could drive inclusive education implementation. Managers realized that lecturers were key people who deal with students daily and therefore they should be capacitated to create inclusive classrooms. The findings illustrate the lack of responsibility on the part of managers. Since lecturers are core personnel at colleges, managers have the responsibility to recognize their professional development needs as this is provided for in the DBE's budget (Kraak et al., 2016).

3.6. Development of policies

It emerged from the findings that there is an urgent need to develop and revise policies that guide the process of inclusive education. These policies should address matters related to infrastructure, fundraising, admission, and ongoing support of students with disabilities. Managers understood the significance of policies on the implementation of inclusive education. They also were informed about the challenges that may lead to ineffective implementation. There seems to be gaps and anomalies in terms of guidelines in colleges resulting in not executing the mandate of the college in terms of the implementation of inclusive education. This can also be due to the lack of interpretation of policies and guidelines on the implementation of inclusive education, in addition to the lack of resources.

3.7. Fundraising drive

Fundraising initiatives were identified as a strategy that could assist colleges to enhance inclusive education. All participants acknowledge that colleges were not treated as autonomous as universities, thus the use of funds was restricted. Managers' responses illustrated the need for solid fundraising plans. Colleges have the right to adopt initiatives to raise additional funds. These findings demonstrated a lack of vision and initiative from college management when it comes to raising funds. Even if the colleges depend on the Department (DHET) for funds, they have the principals who are the accounting officers to consult to raise further funds, especially for inclusive education. Hence, principals are supposed to envision the future needs of the college, and to take the initiative to boost funding for colleges. In the process of document analysis, it was revealed that capacitating teaching staff towards fundraising initiatives was part of the set of strategic objectives. Although policies that were approved in 2019 were listed, none spoke to inclusive education in terms of support structures for students with disabilities and the establishment of a Disability Services Unit.

4. Conclusion

Technical and Vocational Education and Training (TVET) managers generally agreed that inclusive education is predominantly a need that has to be astutely managed at all colleges to promote access to students with disabilities. Findings revealed that there was insufficient support for students with disabilities, and the lack of the implementation of strategies to increase access concerning inclusive education. This paper suggests strategies for the formation of support structures, partnerships with schools, the establishment of Disability Services Units, development and reviewing of policies, fundraising drives, and effective management and monitoring of strategic planning processes to enhance inclusive education implementation. From a Department (DHET) perspective, this research assists in providing insights into how to strategize and manage the implementation of inclusion in TVET colleges. Since TVET colleges are institutions that are mandated to accommodate the diversity of students, managers who view colleges as not having autonomy, should circumvent this barrier by being innovative in their responsibility as custodians of strategic management in colleges. The strategy of establishing the Disability Services Units can be viewed as an example to measure the success regarding the access of students with disabilities in colleges. Future research should assess the experiences of students with disabilities in TVET colleges which should give an indication of the effectiveness of the Disability Services Units. This research study contributes to current literature by suggesting an integrated strategy to implement inclusive education in TVET colleges.

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BUILDING ACADEMIC INTEGRITY THROUGH ONLINE ASSESSMENT APPS

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Abstract

The Covid-19 pandemic of the last two years is having an immense effect on teaching and learning in higher education. The rapid shift to online assignments and examinations in response to the pandemic and the consequent lockdown forced higher education institutions to become innovative with regard to online assessment. Furthermore, academic integrity during online examinations is a crucial concern since it affects the quality and trustworthiness of examination systems in higher education. In our experiences and according to course reports by lecturers at the largest distance education university in South Africa (Unisa), students handled online assessment in varied ways, which ranged from honesty to students being guilty of copy-and-paste and students assisting other students or phoning somebody for assistance. The two main research questions were: what is involved in academically dishonest behaviours in online courses, and can digital technologies such as online invigilator applications contribute towards academic integrity? The purpose of this exploratory case study was to analyse the types of challenges experienced by Baccalaureus Educationis (BEd) and Postgraduate Certificate in Education (PGCE) students during fully online examinations. We want to propose guidelines for instructors and administrators in their decision-making process regarding online evaluations and encourage future studies that will form the foundation of evidence-based practices. The study further focused on a new app referred to as the Invigilator Application (IA). This app was compulsory for students to use during their online assessment, and our interest is to discover how the IA may contribute towards academic integrity. The findings are reported in terms of the cheating behaviour that occur in different components of course assessments and are discussed in terms of personal motivation theory and broader social and community pressures.

Keywords: *Cheating behaviour, ethics, higher education, online examinations, invigilator apps, teacher education.*

1. Introduction

The Covid pandemic caused major shifts in higher education, including changes in the organisation of programme design and delivery (Neuwirth, Jovic & Mukherji, 2021), increased online models of delivery, and different practices of curriculum assessments and examinations (Motala & Menon, 2020). These changes have all been enhanced by developments of the technology era which, by design, are bringing new opportunities and challenges, increasing forms of interactions and collaboration, increasing academic success and productivity, and making cheating much easier for the unethical student (Plowman, 2000). Older conventions such as cut-and-paste, computer writing, editing, grammar suggestions and so forth are still in use, while newer features are emerging, such as AutoSummary (electronic summaries), unlimited educational opportunities, and access to global electronic communities (Plowman, 2000).

The shift to online components in blended forms of teaching and learning resulted in increased student dishonesty and breaking down of academic integrity (Verhoef & Coetser, 2021). Increases in cheating behaviour in online settings have been recorded in studies internationally. In Germany, for example, shifts from on-site to online education programmes in the Covid era were found to cause more cheating among students in online than in on-site exams (Janke, Rudert, Petersen, Fritz & Daumiller, 2021). The effects on other measures of academic dishonesty were negligible. Janke et al. (2021) concluded that negative consequences for integrity are associated with the application of ad hoc online testing.

According to Blum (2011), administrators in higher education fail with programmes to prevent plagiarism – mainly because of the vagueness with regard to what is meant by academic integrity as moral quality. There is a need for alternatives to top-down plagiarism prevention methods such as honour codes and rule enforcement (Blum 2011). With reference to plagiarism by students, Blum (2011) argued that the challenge is one of education and not ethics – that institutions treat plagiarism as morally wrong or as a crime – and that both approaches cannot be universally successful. Institutional responses to focus on morality result in honour codes appealing to students “to do the right thing” – with the assumption that, with social pressure, students will indeed do what is right.

The trend of increased academic dishonesty is a reflection on weakened / poor integrity amongst students. For universities to consider how to respond to – and reverse – this trend, perspectives on what integrity entails need to be explored, especially given the imperatives in South African higher education of social and cognitive justice and the decolonisation of education.

The focus of this inquiry is on students’ cheating in formal examination settings. We consider what is involved in academically dishonest behaviours in online courses. Moreover, we explore the possibility that digital technologies such as online invigilator applications can contribute towards academic integrity.

2. Concepts of academic honesty, ethics and integrity

It was John Dewey (1916/1966 (Dewey, 1903; 1966) who argued for the need for access to information and freer interactions as key to democratic education. New ways of communication and changing social interactions are relevant in the electronic era, increasing in forms, modalities and frequency, and as such affecting education practices and systems.

Academic dishonesty may be understood both on personal and social levels. On a personal level Murdock and Anderman (2006) define dishonesty as a motivational issue – students choose to be dishonest when their behaviours are in line with the purpose, ability and costs of cheating.

The likelihood of cheating is shaped by personal intelligence, peer pressure, social comparison, classroom goal structures, personal abilities, efforts, teachers’ pedagogical skills, grading standards, personal morality, surveillance, honour codes, peers getting away with teaching, and fair testing practices. For Murdock and Anderman (2006) academic cheating is by nature a motivational issue, understood in terms of theories of achievement motivation. In practice, cheating is associated with some level of motivation by extrinsic reasons (i.e., to perform better), comparing self with others (i.e., to avoid appearing incompetent), or social-cognitive (i.e., cheating because of not feeling successful in performing a task). Students are less likely to cheat when the cost for doing so is too high (Murdock & Anderman, 2006).

Motivation theory perspectives consider student cheating primarily as an individualised activity, drawing on Western-oriented research traditions (Le Grange, 2004). Pratt and Gladue (2022) argue strongly that the calls for decolonisation and indigenising of the academy imply that a re-definition of academic integrity is needed. Referring to Canadian universities, they argue that more inclusive and wholistic definitions are needed, moving away from current neoliberal and commercialised perspectives which inevitably look at integrity as forms of misconduct. They argue that views of integrity need to reflect indigenous perspectives of holism and interconnectedness.

In this vein, Eaton (2022) argues for the need for academic integrity networks and organisations which would develop strategies for equity and diversity. These would be more inclusive and reduce the overrepresentation in reporting of segments of the student population such as international students and students of colour.

3. Open Distance e-Learning and the Invigilator App

The study was conducted at the University of South Africa. Unisa moved from correspondence university to distance education and in 2013, the Unisa Council adopted a new Open Distance e-Learning model (known as ODeL), which meant that Unisa would become an online university. The Directorate provides students with widened opportunities for accessing ICTs through contracting establishments within communities that have adequately functioning ICT infrastructure, such as computer facilities – these are referred to as Digital Access Centres. These facilities should have stable internet facilities, and include, but are not limited to, printers, photocopiers, and so forth. The target group for such Digital Access Centres are students who reside in very remote rural areas, which are not within easy reach of Unisa’s regional centres (Unisa, 2021b).

Like universities internationally, Unisa remains resolute in its zero-tolerance stance against cheating and plagiarism in online examinations (Unisa, 2021a). The Invigilator App was implemented to

ensure the integrity of online examinations as part of the University's academic integrity policy. The IA tested various functions such as a microphone test, etc. The Invigilator is a cell phone-based tool that allows for non-venue-based assessments to be written in a more controlled and monitored environment.

4. Methodology

The two main research questions are: what is involved in academically dishonest behaviours in the online course, and can digital technologies such as online invigilator applications contribute towards academic integrity?

The study was designed as exploratory since the use of the Invigilator App started last year (2021). A qualitative document analysis and an audio recording analysis were done. Ethical clearance for this inquiry was formally obtained through the Ethics Committee of the university.

Baccalaureus Educationis (BEd) and Postgraduate Certificate in Education (PGCE) students were involved as participants from the AI platform. This app recorded the following functions: Selfies, Microphone, Extra Photos, Script Photos, Out of App Time and GPS Data. For the sake of this investigation, we analysed the microphone recordings of 10 intervals of 55 seconds over three hours, and students had to keep the app activated for the duration of the examination.

5. Findings

A total of 11 133 students wrote an online examination in November 2021. From these students, 615 failed the microphone test. After further investigation, 121 were flagged on the Invigilator App, failing the microphone test because of helping each other or working in groups, or assisting other students or being assisted by parents. Students who have been identified through this invigilation tool have been referred to the Disciplinary Office. These students received 0% for their examination and had to register again for the specific module. They also received a final written warning.

During the 10 intervals of 55 seconds recorded over three hours, the trend throughout was that the 55 seconds were primarily used for talking. Patterns of writing and talking were identified. The number of recordings ranged from 3 to 10, where empty recordings indicate students busy writing or keeping quiet.

We analysed the sample of 121 students by listening to the sound recordings and identified five main patterns or types of verbal interactions.

Table 1. Summary of main findings.

Type of behaviour	% of students
Students speaking to one another (shared memory stick)	1 (0,84%)
Students working in groups (more than two)	2 (1.65%)
Students phoning other students for assistance	2 (1.65%)
Students' parents reading from textbook	3 (2.48%)
Students working in pairs	113 (93,38%)
TOTAL	121

The three female students referred to in Table 1 shared a memory stick containing answers to questions [one group]. Two groups of students (more than three in a group) worked together by sharing answers. Two students phoned a friend (another student) for assistance and three students' parents read to them from the textbook. The main trend identified (applicable to 113 students or 93%) was students working in pairs by talking and assisting each other.

Audio recordings showed how students spoke to one another and shared and discussed answers per question. Talking during the 50 seconds-recordings were focused on correct answers. Empty recordings seem to indicate that students were busy writing or were keeping quiet.

6. Discussion

The main finding of this study was that academic dishonesty in a formal online examination took various forms, and that the use of an invigilator app highlighted the relative weighting of the forms.

With regard to considerations of how institutions may respond to the trend of weakened integrity, Blum (2011), referring to student plagiarism, suggests that it is a problem of education and not ethics where plagiarism is treated as breaking the rules and as morally wrong or as a crime. The focus on

morality results in honour codes – assuming that social pressure will encourage students to refrain from cheating. In reality, though, such codes are followed reluctantly by students (Blum, 2011).

In the light of the findings of this study, we concur with responses from universities internationally. While the use of an app exposes students in intimate ways, responding to student cheating assumed to be more about building ethical practices, and institutional culture.

Policy articulation of academic integrity needs to be rethought, given calls for decolonisation. As has been argued by Lindstrom (2022), referring to the challenges of academic integrity in Canada, rethinking would need to consider indigenous perspectives of academic integrity, contrasted with Western understandings. This perspective assumes a relational epistemology which is rooted in accountability and responsive to the social climate of reconciliation. This should be seen as part of decolonising pedagogies beyond established ways of knowledge transmission, and it represents a shift in accountability of scholars to approaches which reflect indigenous relational epistemologies.

Lindstrom (2022) advances our understanding of integrity from indigenous knowledge perspectives, noting the limitations of Eurocentric, fragmented views of integrity as institution based, and excluding culturally defined roots and indigenous ways of conceptualising integrity as informed by varied knowledge systems. Lindstrom's (2022) position is that integrity is an element of knowledge systems – one of the “ontological pillars that upholds honesty, transparency and truth-telling within a relationally oriented epistemology” (Lindstrom, 2022:143). From this perspective, academic integrity also comprises indigenous values and knowledge. It is about exploring integrity as social accountability, informed by relational epistemologies (Lindstrom, 2022).

Within an indigenous paradigm, integrity is best conceptualised through an oral system of knowledge – and transmitted via elders' teachings. These teachings contain moral and ethical guidelines for living a good life in relation to self and living in the natural world (Lindstrom, 2022:132). As Lindstrom (2022:148) explained: “Indigenous perspectives may be understood through a critical and deepened exploration of the traditional purposes of learning both prior to Western colonial influences and enduring practices that remain as relevant pedagogies”.

Although Unisa has implemented forceful "Invigilation or proctoring systems" – digitally designed to authenticate and safeguard the integrity of online examinations – we suggest making use of our Digital Access Centres (DACs) for examinations where students can do online examinations on their laptops or computers from the centres, and where invigilation can take place in the form of a person present. These Digital Access Centres (DACs) cater for students in remote and rural areas where access to most forms of resources is a challenge. Challenges include connectedness, collaboration and co-creation.

7. Conclusion

Academic integrity in the “new normal” of online assessments requires rethinking. We need to get creative with regard to the types of assessment, since students have access to their study material. In the light of a shift towards a more personalised learner experience, lecturers of the future must be prepared to be data collectors, as well as analysts, planners, collaborators, curriculum experts, problem solvers and researchers.

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EXPLORATION OF PRE-SERVICE ENGLISH FIRST ADDITIONAL LANGUAGE STUDENTS' TECHNOLOGICAL READINESS TO TEACH DURING TEACHING PRACTICE

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Abstract

The outbreak of pandemics, such as Covid 19 and the need to learn “21st century skills” has resulted in universities intensifying the adoption and use of information and communication technology (ICT) in the training of pre-service teachers. Each teaching subject that pre-service teachers specialise in requires ICT skills relevant to the content of that subject. This paper focuses on English First Additional Language (ENGFAL) pre-service teachers' readiness to teach using ICT. This group of students specialise in a Bachelor of Education Degree at Further Education and Training level. A qualitative approach was used to gather data from final year ENGFAL students who will be on teaching practice (TP) in the middle of the year. Two focus group interviews comprising of five students each, were used to collect data from the ENGFAL pre-service teachers at a developing university in South Africa. This study was informed by the Technological Pedagogical Content Knowledge framework (TPACK). Data were analysed using a thematic approach. Key themes that emanated from this study were that most students were confident that they could teach ENGFAL using the traditional methods of teaching. The students revealed that ENGFAL has many aspects derived from the Language and Literature components of the subject and that sometimes confused them. However, only a few were confident that they could select appropriate ICT with the most affordances to achieve lesson objectives. Therefore, the majority of the ENGFAL pre-service teachers had limited TPACK. Another important issue that also emanated from this study was that the participants felt that they would have learnt better on how to use ICT to teach if they had done that in a physical classroom. They did not get adequate time to practice teaching using ICT in the physical classroom due to the Covid19 lockdown. Researchers of this study concluded that more practice, teacher, and peer support is needed for pre-service teachers to master ICT use in teaching ENGFAL.

Keywords: *Information and communication technology, English First Additional Language, Pre-service teachers, Technological and Pedagogical Content Knowledge.*

1. Introduction

The use of ICT to teach English is not new. ICT such as tape recorder, radios and videos have been used to teach language for decades (Lai Wah & Hashim 2021). Advantages of using ICT when teaching English have been posited in literature. For instance, Yüksel & Kavano (2011) argued that adopting English language websites, presentation software, watching videos, electronic dictionaries, and computer-assisted language, among other things, improved English language proficiency. The internet enables learners to access a wide range of information, and that exposes students to a wide range of materials for interpretation of language and contexts (Sidupa, Luke & Kurniawan, 2018). Research conducted by Romaña (2015, p.146) at the language institute of Universidad Distrital Francisco José de Caldas, Bogotá, Colombia, revealed that “the reading of their peers' writings helped to boost learners' mastery of vocabulary, spelling, and sentence structure”. Romaña further found out that the use of Skype conference call can enhance speaking skills.

English teachers are expected to have adequate digital skills, since they must incorporate ICT in their teaching, and prepare learners for the information society. ICT has potential for promoting language learning and has therefore become a major component of teacher education programmes in nations like China, Hong Kong, and the United States of America (Hsu, 2016). This study is therefore informed by TPACK framework by Mishra and Koehler (2006). TPACK is an interrelation of teacher content knowledge, pedagogical knowledge, and technology knowledge, as well as the contextual factors (Harris

& Hofer 2011). TPACK clarifies “pre-service language intentional use of technology for educational purposes in their own teaching” (Liu, Lin & Zhang, 2017). Prior research revealed that pre-service teachers’ levels of TPACK determined the degree of ICT integration in future classrooms (Hsu & Lin 2020). Liu et al argued that language teachers confidently use ICT in general but are unconfident to design technology supported lesson plans. Therefore, language teacher training programmes should emphasise how ICT should be integrated with lesson objectives, content, methodology, learner activities and assessments. The practical use of ICT has been shown to assist pre-service teachers to become confident about designing lesson plans integrating technology (Tai, 2015).

However, some thinkers such as Abunowara (2016) postulate that the use of ICT is usually disregarded in teacher training programmes. This view is true in the researchers of this study’ context, where pre-service teachers were rarely taught how to use technology during micro-teaching before the 2020 lockdown. We rarely incorporated technology when training our students, even though some authors are of the view that chalk and board are insufficient to teach English effectively (Nomass, 2013). Our pre-service teachers were not exposed to various ICT that can be used to teach English. We only commenced training our pre-service teachers to incorporate technology in their lesson plans during the Covid 19 hard lockdown. It is against this backdrop that we decided to explore ENGFAL pre-service teachers’ readiness to teach using technology during teaching practice. We were keen to conduct this research to improve learning and teaching of pre-service teachers. We also wanted to find out the strategies that can be employed to address the student teachers’ concerns in ICT use for teaching ENGFAL.

2. Research methodology

We followed a qualitative design approach in this study. This approach allowed us, the researchers of this study, to build an understanding of the topic and unpack meanings that our students ascribe to the topic under study. The main objective of this study was to explore ENGFAL pre-service teachers’ readiness to teach using technology. We used open-ended focus group discussions to collect data from the participants. Burns (2010) states that focus group discussions allow ideas and thoughts to be triggered by each group member. One participant’s sharing in a group setting may prompt others to talk. An open-ended focus group allows participants to discuss issues in their own language, vividly describe their experiences in detail, bringing out important themes, with examples (Leavy, 2017).

2.1. Context and participants

The research took place at a developing university in the Eastern Cape Province of South Africa. South Africa is a multi-lingual nation. There are eleven official languages in South Africa and English is one of them (Republic of South Africa: Department of Arts and Culture, 2003). At our institution, we train ENGFAL teachers, who will teach learners whose mother-tongue is not English, but a first additional language. The researchers of this study both teach ENGFAL pre-service teachers and micro teaching is one of the major components of the programme. Micro-teaching prepares the student teachers for teaching practice, which is also known as school-based evaluation (SBE) in our context. The ten participants in the study were all final year ENGFAL pre-service teachers. We purposively selected five female and five male students. Each group comprised of five students of a mixed gender. The participants have similar dimensions of differences. Most of them were from the same speech community, IsiXhosa, except two who spoke IsiZulu.

3. Findings

Focus Group A Participant A said that:

I can type my lesson plans and use PowerPoint presentation to display my notes. PowerPoint is easy because we use that for presentations in class. We use an overhead projector to display our presentations, so I can do the same when teaching at school. My worry is that, if I am going to teach at a school with interactive whiteboards, then I won’t know what to do. I have never practised using the whiteboard. Our classrooms do not even have the interactive whiteboard. I think that I can try my best to include technology in my teaching, but I still need support in terms of choosing the technology and how to use it.

In an opposing view, Focus Group B Participant E had this to say:

I think that when I go for SBE, I will be able to teach using ICT. I remember that I should choose technology that has many advantages and can help me achieve my lesson objectives. It requires a lot of time to prepare for the lesson and I hope that I will not be allocated many classes to teach.

Closely related to Focus Group B Participant E’s views, was Participant C from Focus Group A, who said that:

I think that I can now teach with technology, ma'am. What I have learnt in class and from my friends will assist me during SBE I am lucky because my older sister helps me to plan my lessons at home. She is teaching at a private school where they have access to technology. I always consulted her before micro-teaching and that is why my lessons were good. Ma'am, I think that you should continue supporting us with ideas on which technology to use when we are at schools because it confuses sometimes. Remember not all of us are confident to teach using technology, so we still need your support during SBE.

Some participants from both Focus Groups A and B concurred that they were not ready to teach using technology.

Participant B from Focus Group A stated that:

I am ready to teach if I will teach using the chalkboard and textbooks. Ma'am, I am not yet ready to teach with technology. English FAL has many components and that confuses me when I want to plan teaching with technology. There is Literature and Language, all that require me to think about the technology to use. It is very difficult when it comes to Language, I must teach things like comprehension, parts of speech, and summary writing. I won't know how to select appropriate technology for all the language components.

Concurring with Participant B from Focus Group A was Participant D from Focus Group B who said that:

Imagine ma'am, I need to teach verbs, poems, essay writing and other components of ENG FAL. It is so difficult to think of the technology to teach different aspects of FAL. If I am asked to teach without using technology, I can easily do it because when I was a high school learner, I was taught ENGFAL without technology. Yes, we have been introduced to online micro-teaching but it's complicated. I only focused on a particular aspect during micro-teaching, I never practised everything. I watched my classmates teach online but, hey, it is not that simple. I felt comfortable when I practised teaching in a physical classroom, so I think that I will do well if I teach in the classroom during SBE.

Participant C from Focus Group B revealed another issue and said:

I feel that we did not have enough time to practice teaching using technology. Most of the time we were learning online and doing our micro-teaching online. That made it difficult for us to really learn how use technology. It would have been better in a physical classroom. To be honest with you, I am not confident to teach with technology. I have mastered the content and am sure that I can now teach at school but not teaching with technology. I need more practice ma'am if I am to confidently teach using technology during SBE. Language has a lot of aspects and Literature is something else, so more time is needed for us to master teaching using technology.

4. Discussion and conclusions

With regards to ENGFAL pre-service teachers' readiness to teach using technology, themes that emanated from the focus group discussions included, inadequate digital skills, lack of confidence, the need for more support, comfort in traditional methods of teaching, limited time to practice teaching English using ICT, preference for physical contact to online micro-teaching.

Considering the findings obtained from the focus group discussions, most ENGFAL pre-service teachers were not ready to teach using technology. Reasons cited were limited skills and lack of confidence. Our students had limited skills because they were only exposed to various technology to teach ENGFAL during the hard lockdown. Otherwise, we used to basically train them for physical contact teaching and learning. These findings support research findings obtained by (Nomass, 2013) who argued that we rarely incorporate ICT when training preservice teachers. We can safely state that our students' inadequacy was a result of little to no exposure at all on how to integrate ICT in teaching ENGFAL before the hard lockdown. These findings further support Abunowara (2016) who argued that the use of technology is usually disregarded in teacher training programmes. Hence, most of our students revealed that they were more comfortable teaching using the traditional methods of chalk and board. This is because we, the lecturers, disregarded the use of ICT in training ENGFAL preservice teachers, not knowing that there would be a sudden shift from traditional methods to online learning and teaching due to the Covid-19 pandemic.

This study was informed by TPACK, and it emanated from our findings that students most students had content knowledge. They preferred practising teaching using the chalk and board to ICT. A few had fair TPACK levels, such students were confident to select ICT and knew how the selected technology would assist them in achieving lesson objectives. Students who had little TPACK knowledge were comfortable using ICT such as projectors and PowerPoint presentations but feared using, for instance, an interactive whiteboard due to lack of practical exposure to the ICT. This is in line with (Hsu & Lin 2020) who argued that pre-service teachers' levels of TPACK determined the degree of ICT integration in future classrooms (Hsu & Lin 2020).

Deriving from findings of this study, we decided that we should start training our English student teachers to incorporate ICT at first year so that they master using technology in their lessons. Our current students will be on teaching practice in the middle of the year and are not ready to integrate ICT in their lesson plans. We, therefore, decided to continue supporting them during teaching practice by constantly visiting them at schools and assisting them to design technology supported lesson plans.

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PERCEPTION OF ONLINE MACHINE TRANSLATORS BY NON-NATIVE STUDENTS OF ENGLISH PHILOLOGY AND FUTURE TEACHERS OF ENGLISH

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Abstract

For centuries, print dictionaries were the primary assisting tool for those who needed to find the meaning of an unknown word or translate something from or to a target language. These days, various technological solutions are available, many of them online and free of charge. Online machine translators (OMTs) are used as dictionaries to look up individual words or translate texts of various lengths. OMTs have changed the situation in foreign language education, too.

The paper aims to discover how OMTs are perceived and used by non-native speaking university students of English in teacher-training and philology programmes and identify possible differences. First, the paper summarizes the main directions in the ever-growing research on perceiving OMTs in foreign language education. Second, it presents partial results of the online survey conducted among future teachers of English and students of English philology (English language and culture). The results proved that both groups of respondents use a wide range of OMTs, with Google Translate being the most popular. In general, respondents showed positive attitudes towards OMTs and were satisfied with their outcomes; however, teacher trainees were more critical when the quality of translations was considered and they were more aware of the need for post-editing. Future teachers of English also showed more reserve for using OMTs as means of FL learning (learning new vocabulary, pronunciation, grammar, reading, writing, translating). Only a tiny part of respondents (all future teachers) saw OMTs as a threat to effective foreign language learning. The results proved a more “conservative” perception of OMTs by future teachers of English (which may explain why some practising teachers ban using OMTs in their classrooms, fearing that their students could become dependent on them). Students of English philology (English language and culture) manifested less critical attitudes towards OMT in all observed categories. They focused more on speed and comfort than the quality of translation. This result points to the need to instruct students on using OMTs properly (including post-editing) to get the best possible translating and learning outcomes.

The paper presents partial results of the research project KEGA 019TTU-04/2021 Integrating new digital tools into philological research and education sponsored by the Slovak Ministry of Education, Science, Research, and Sport.

Keywords: *Online machine translation, translating apps, foreign language learning, non-native speaking students of English.*

1. Introduction

The paper presents partial results of the project KEGA 019TTU-04/2021 Introduction of new digital tools into teaching and research within transdisciplinary philological study programmes sponsored by the Slovak Ministry of Education, Science, Research and Sport. It aims to test various possibilities of modernization and improvement of the quality of higher education of students of philological study programmes (both teaching and non-teaching) through the introduction of the latest digital technologies (corpora, chatbots, computer-assisted translation tools and intelligent and writing assistants) into philological (both linguistic and literary) research and education, as well as innovations in organizational forms of education (the use of intelligent tutoring systems and multimedia platforms for both full-time and external distance learning). In many aspects, the paper builds upon previously published project results (Godiš, 2021a, 2021b; Hitková, 2021; Hriňák, 2021; Liashuk, 2021a, 2021b; Pokrivčák, 2021; Pokrivčaková, 2022a; Vančová, 2021a, 2021b).

In the group of digital tools tested, special attention was paid to those tools that students are used to, as they use them routinely in their lives outside of education. Such tools undoubtedly include online machine translators (OMTs).

For centuries, print dictionaries were the primary assisting tool for those who needed to find the meaning of an unknown word or translate something from or to a target language. These days, numerous online machine translators have been developed and are offered for free and open use. Generally, they provide friendly-user interfaces and useful functions, for which they are usually well-received by both teachers and students of foreign languages in their daily lives. It means that both teachers and students would already have the necessary digital skills required to use these applications and would therefore be more motivated to use them in educational contexts. Effective use of OMTs could also soften formal and informal learning boundaries.

Online machine translators (OMTs) are used as dictionaries to look up individual words or translate texts of various lengths. OMTs have changed the situation in foreign language education, too.

The topic of integrating OMTs in foreign language education has inspired a growing number of researchers (Anderson, 2013; Case, 2015; Clifford, Merschel, & Munné, 2013; García, 2010; García & Pena, 2011; Jolley & Maimone Lee, 2019; Niño, 2009, 2020; Pokrivcakova, 2022b). A significant group of researchers focused on the possible benefits and drawbacks of using OMTs in the foreign language classroom. Based on a previously presented overview (Pokrivčáková, 2022a), these research studies proved that students of any age and study orientation use OMTs on a regular basis. OMTs are used either as a dictionary for looking up individual words or as translators for translating texts. Students usually reach for OMTs' assistance when learning new vocabulary, completing reading comprehension exercises, and writing assignments. Language students typically have a positive attitude towards using OMTs in their classrooms, and they are equally aware of possible inaccurate translations and other OMTs' limitations. Teachers are usually more sceptical about OMTs, and some of them ban using OMTs in their classrooms, seeing OMTs as tools of cheating or fearing that the students could become too dependent on them (Case, 2015; Gaspari & Somers, 2007; Groves, K. Mundt, 2015; Korošec, 2012; McCarthy, 2004; Somers, Gaspari, & Niño, 2006).

The aim of the paper is to present the partial results of the research study on how OMTs are perceived and used by non-native speaking university students of English in teacher-training and philology programmes. The results of the study will be used to design how to instruct students on using OMTs properly (including post-editing) to get the best possible translating and learning outcomes.

2. Objectives

The paper aims to discover how automatic translators (e.g. Google Translate) are perceived and used by non-native speaking university students of English in teacher-training and philology programmes and identify possible differences.

3. Methods

The paper publishes partial results of a researcher-conducted survey carried out between September and November 2021 (fall semester 2021/22) at four universities in V4 countries (Slovakia, the Czech Republic, Poland, and Hungary). For the purposes of this paper, only the data collected from bachelor students studying at the universities which provide both primary/secondary English teacher-training and English philology study programmes were selected. The basic sample included 197 University of Trnava students (Slovakia) and 204 students of Kazimierz Pulaski University of Technology and Humanities in Radom (Poland). The basic sample thus consisted of 397 responses in total, of which 267 responses were obtained from the students of Bachelor study programmes for future teachers of English (both primary and secondary) and 130 responses were provided by students of English philology.

All respondents were non-native speakers of English. Their participation was voluntary, and the researcher could not identify participants or track their contact data (e-mails). The structure of the sample is indicated in Tab. 1. In this paper, students at both universities were treated as a single sample. Differences were studied only between the responses given by future teachers and future philologists.

Table 1. Structure of the respondents' group.

Study programme	Teacher-training	Philology	N
University			
University of Trnava, SK	141	52	193
Kazimierz Pulaski University of Technology and Humanities In Radom, PL	126	78	204
Total	267	130	397

The research instrument (a questionnaire) was anonymous and delivered online (GoogleForms application) in English. The questionnaire consisted of 18 items divided into three parts. The first part (4 items) collected identification data (country, level of study, study programme, when the respondent started learning English). The second part (6 items) intended to collect data about respondents' experiences and preferences using various dictionaries with a special focus on online translators and translating apps. The items in this part of the questionnaire were semi-closed (closed with an extra option giving the respondent the chance to add their personal responses). The third part of the questionnaire mapped the respondents' opinions about the effects of using online translators and translating apps in their study of English via the block of 8 Likert-type statements using rating scales with 5 points (1 - strongly agree, 2 – agree, 3 - not sure, 4 – disagree, 5 - strongly disagree). The collected data were processed by basic statistical methods.

4. Results

First, the respondents were asked which types of dictionaries or translating tools they preferred during their university study. Nearly all students (96.47%) opted for online dictionaries or apps. Only seven students preferred print dictionaries. At present, none of the respondents uses CD-ROMS anymore—the data point to an unambiguous shift of students' preferences toward online translating tools.

In the subsequent item, respondents were asked specifically about their experience with translation apps. Students could freely name apps they use for their studies. Nearly all students stated they usually seek the help of (96.06%) Google Translate. Far fewer respondents, but still more than a half of them (52.99%) use the online Oxford dictionary. 102 students (27.89%) mentioned Dictionary.com. More than a quarter of respondents preferred the “national” translators, designed specifically for translating from or to Slovak (slovník.sk) or Polish (diti.pl). The list of other translating apps included 27 items, many of them mentioned by just one respondent.

Table 2. The scope of used machine translators.

Options		%
Google Translate	381	95.97
Oxford Learner's Dictionary	182	45.59
Dictionary.com	87	21.91
Slovník.sk / diki.pl	84	21.15
Dictionary Cambridge	41	10.33
Microsoft Translator	32	8.16

In the following item, respondents were asked to express how satisfied they were with translation apps. In the item with the structure of Likert-scale, students could express the level of their agreement on the 5-point scale: VS = very satisfied, RS = rather satisfied, N = neutral, US = unsatisfied, VFU = very unsatisfied. The absolute numbers of students' responses are given in Tab.3. The respondents' satisfaction with OMT's services was weakening with the length of the translated texts. When considering the translation of longer texts (consisting of more-paragraph), only 12 students (3.02%) were very satisfied. In general, respondents showed positive attitudes towards OMTs and were more satisfied with their outcomes than not (index of satisfaction = 2.0, index of neutrality = 1.32; index of unsatisfaction = 1.42). When comparing students' answers in teacher-training programs and philology, teacher trainees were more critical towards OMTs when the quality of translations was considered (index of satisfaction = 1.78, index of neutrality = 1.45; index of unsatisfaction = 1.48).

Table 3. Satisfaction with the results of machine translation (both groups).

Aspect of MT	VS	RS	N	US	VU
translation of single words	232	146	16	2	1
translation of phrases	136	111	132	15	3
translation of sentences	29	97	145	102	24
translation of paragraphs	21	63	109	145	59
translation of longer texts	12	47	123	153	62
total	430	364	525	417	149
Index of satisfaction	1.08	0.92	1.32	1.05	0.37

The last part of the questionnaire included 8 Likert-scale statements (1 - I can learn new vocabulary quickly when using machine translators. 2 - Using machine translators blocks my learning of new vocabulary because I do not need to remember anything. 3 - Machine translators help me when learning correct English pronunciation. 4 - I am usually too lazy to search for the correct pronunciation of English words when using machine translators. 5 - Machine translators are helpful when learning English grammar. 6 - When using machine translators, I do not need to learn English grammar. 7 - Translators help me learn how to translate. 8 - Anything translated by a machine translator needs to be post-edited.) Students could express the level of their agreement on the 5-point scale: SA = strongly agree, A = agree, N = neutral, D = disagree, SD = strongly disagree. Similarly to previously published results (Pokrivcakova, 2022a), the collected responses showed that both future teachers of English and students of English philology consider OMTs as useful tools for their foreign language study, especially when learning vocabulary, pronunciation and when training translating skills. Respondents disagreed with the statement that machine translators would block their learning of new vocabulary or grammar. The primarily neutral attitude was shown when asked about the need of post-editing. When comparing two respondent groups (future teachers versus students of philology), the former group were more critical, they were aware of the need for post-editing and they also manifested more reserve for using OMTs as means of FL learning. Only 7 respondents (all future teachers) saw OMTs as a threat to effective foreign language learning. (Due to the limited space, detailed results cannot be provided in this paper. They will be published in a final project publication.)

5. Discussion

The results of the presented comparison of responses provided by the students of teacher-training program and philology were not surprising. The general popularity of OMTs among students was observed in numerous studies (Anderson, 2013; Case, 2015; Clifford, Merschel, & Munné, 2013; García, 2010; García & Pena, 2011; Jolley & Maimone Lee, 2019; Niño, 2009, 2020; Pokrivcakova, 2022b). The fact that OMTs are used by most students and the dominance of Google Translate among other OMTs was also reported by Alhaisoni & Alhaysony (2017), Groves and Mundt (2015), Kumar (2012), Tsai (2019) and others. The new aspect discovered in this study was a more conservative attitude toward OMTs displayed by future teachers when compared to philology students. Students of English philology (English language and culture) manifested less critical attitudes towards OMTs in all observed categories. They focused more on speed and comfort than the quality of translation. This result points to the need to instruct students on using OMTs properly (including post-editing) to get the best possible translating and learning outcomes.

6. Conclusions

The purpose of the paper – to identify and compare the opinions and attitudes of university students in English teacher training and philology programs have been fulfilled. The results showed that students of both groups use the OMTs similarly, but their perspectives and attitudes differ. Future non-native teachers of English are more reserved toward using OMTs as tools of foreign language education aids. The matter calls for more research attention as well as the fact that most students feel the lack of any instruction how to work with OMTs effectively.

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ASSESSING CHILDREN AT RISK IN UAE: PILOT USE OF THE MBC ARABIC VERSION IN PRIMARY SCHOOL SETTINGS

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Abstract

Children's emotional, behavioral and developmental problems can be properly identified and assessed based on observations from their teachers and parents. The Motor Behavior Checklist (MBC; Efstratopoulou, Janssen, Simons, 2012a) was designed to assist classroom teachers and Physical Education (PE) teachers in assessing their students' motor-related behaviors. The instrument has already been successfully translated and culturally adapted into six languages and used in a number of research studies internationally. The present study aimed to apply the newly developed Arabic version of the MBC checklist at mainstream Schools in UAE and assess the motor behavioral problems in typical school-aged children. A sample of 294 children aged 6-12 years were assessed by their teachers in school settings using the 59 items checklist for children analyzing data on the 7 clusters (rules breaking, attention, hyperactivity, low energy, stereotyped behavior, social interaction, self-regulation). Findings indicated that boys were scoring higher on the Attention, Hyperactivity, and social problems scales. Gender differences and the possible effects of behavioral challenges are also explored and discussed in the study. Early assessment and Behavioral management strategies are recommended by the authors.

Keywords: *Children, teachers, assessment, physical educators, behavioral problems.*

1. Introduction

Neurodevelopmental disorders (NDD) constitute a group of disorders that commonly emerge during childhood or adolescence and usually affect behaviors that are significant for normal interactions, ranging from school to social occasions (American Psychiatric Association, 2013). NDD include Intellectual Disability Communication Disorders, Autism Spectrum Disorder (ASD), Attention-Deficit/Hyperactivity Disorder (ADHD), Specific Learning Disorder (SLD) and Motor Disorders. Signs of NDD manifest early in development, often before school entry age, affecting the child's personal, academic and social functioning and the range may vary from very specific limitations of learning or control of executive functions to global impairments of intelligence or social skills (APA, 2013).

1.1. Teachers and parents' involvement in the assessment process

Researchers have recognized the importance of parents' and teachers' roles in obtaining a more holistic and valid assessment of children's emotional and behavioral functioning. Especially, as regards the evaluation of EBP encountered by children with ADHD (e.g. inattention, lack of concentration, impulsivity, hyperactivity, learning problems, etc.), teachers and parents are often considered as the principal agents of the assessment process (Gardon, 2012). More specifically, with the use of several assessment scales, they are asked to rate their students/children's behaviors across a variety of settings (e.g. home, school, athletic activities, play, etc.) in common, everyday circumstances (Paiano, Teixeira, Cantiere, Efstratopoulou & Carreiro, 2019).

The majority of school-based behavioral assessment tools are structured for use by school psychologists and/or counselors, often use mental health terminologies, are time-consuming, and are not intended for use by teachers or physical educators in school settings. Rating scales are quite useful for rating symptoms that may be unnoticeable in novel and controlled environments, such as those encountered in clinic-based patient examinations (DuPaul & Stoner, 2014; Power, 1992).

Attention deficit hyperactivity disorder (ADHD) is a severe neurodevelopmental disorder that is frequently diagnosed in childhood and lasts into adolescence and adulthood. ADHD interferes with growth and performance, negatively impacting an individual's social, scholastic, or vocational activities (ADHD Institute, 2021; APA, 2013). Inattention and hyperactivity-impulsivity are the two primary domains of ADHD, and they can have a significant and long-term impact on one's life (APA, 2013). ADHD sequences

include limited social relationships, risky behaviors, academic failure, and job loss (Magnus, et al., 2020). Moreover, children with ADHD are more apt to have health problems, and accidents (Fleming et al, 2017), and less likely to engage in healthy lifestyle activities (Holton & Nigg, 2020).

1.2. Factors influencing student behavior rating

Some factors can affect teachers' rating of problematic behaviors beyond behavior symptoms themselves. Characteristics of students are one instance of these factors. Students' gender, age, race, and ethnicity may influence informants' ratings. In the same vein, instructors' characteristics such as years of experience and gender might have an impact on their ratings (DuPaul et al., 2014).

Research from Arab countries and the Gulf Cooperation Council, indicates that more boys than girls scored above the cutoff for ADHD symptoms. Bener et al. (2006), for example, used the Conners Teacher Rating Scale to rate students ages 6 to 12 and found that more boys than girls scored above the cutoff for ADHD symptoms (14.1%) versus (4.4). According to Miller et al (1999), there are higher rates of conduct disorder, attention deficit hyperactivity disorder, and post-traumatic stress disorder (PTSD) in Palestinian children and adolescents from the age of 6 to 16 who live in the Gaza Strip. In Al Ain, UAE, Eapen et al. (1998; 2004;2001) used screening measures completed by parents and school physicians, as well as interviews with a child psychiatrist, to explore emotional and behavioral disorders in children ages 6 to 15. According to the findings, 23.9% of children were reported to have a mental health condition by a parent or school health professional. Boys were reported to have greater issues than girls. Eapen et al. (2004) found that the most common psychiatric diagnoses in the study sample were anxiety and depression, with females outnumbering males in terms of mental illnesses. Finally, Eapen et al. (2009) evaluated ADHD prevalence in the UAE using questionnaires from parents and teachers, which revealed 4.1 % and 3.4% respectively.

Finally, according to Efstratopoulou et al. (2012a), PE teachers classified children in the ADHD group as having more severe problems on the Hyperactivity/Impulsivity and Lack of Attention scales, children in the CD group as having more severe problems on Rules Breaking items, and children in the AS group as having more severe problems on both Stereotyped Behaviors and Lack of Social Interaction items.

The present study aimed to apply the newly developed Arabic version of the MBC checklist at mainstream Schools in UAE and assess the motor behavioral problems in typical school-aged children by their teachers and their Physical Educators (PE) in school settings.

2. Method

2.1. The Motor Behaviour Checklist (MBC)

The Motor Behavior Checklist (MBC; Efstratopoulou, Janssen, Simons, 2012) is a practical, easy to administer, useful, and valid measure for observing motor behavior of children aged between 6 to 12 years, and for screening and assessing children with EBP problems and possible underlying disorders (e.g. Motor-development problems, Autism Spectrum disorders, ADHD, Learning Difficulties, etc.) in the school environment. Its first version was standardized in the British primary school-age population (initially including 150 items). In its final version, it includes 59 items describing observable 'problematic' behaviours and the instrument can provide separate scores for each of the seven factors and total externalizing/internalizing behavior scores.

Finally, administration and completion of the MBC checklist do not require verbal skills on the child's part and can provide a detailed individual profile on different areas of the child's development (e.g. social skills, self-regulation, aggressiveness, hyperactivity, etc.), while assessing deviant behaviors in school settings (Efstratopoulou et al., 2015). Previous studies on the evaluation of the psychometric properties of MBC for children have revealed that the MBC is a content-homogeneous instrument, with high temporal stability and high interrater agreement that can provide useful and reliable ratings on behavioral and emotional problems in children, especially when used by PE teachers in school settings (Efstratopoulou et al., 2012a; 2012b; 2015). Up to date, the Motor Behavior Checklist (MBC; Efstratopoulou, Janssen, Simons, 2012a) has already been translated into six languages (Greek, Arabic Polish, Urdu, Czech, Chinese, Brazilian/Portuguese) and has been used in several studies (Efstratopoulou, 2021; Paiano et al., 2019; Wood & Efstratopoulou, 2020; Efstratopoulou, Dunn, Augustyniak, & Andrzejewska, 2017).

2.2. Sample

The sample consisted of 294 children. Of the participants, 203 were boys and 90 girls with a male to female ratio of 81:36. The age of the children varied from six to twelve, with an age mean of (MN= 8.0) and SD= Among these children, 65% (N=...) had no official diagnoses, whereas 35% (N=..) was diagnosed with Autism, ADHD, or other disorders. This shows that the sample was broadly representative of children of different ages and with varying diagnoses in the UAE.

3. Results

The study examined gender differences in Externalising and Internalizing Behaviour in children in UAE using the Arabic Version of the Motor Behaviour Checklist (MBC) for children. Findings indicated that there was a difference in the mean scores due to gender regarding the scales of the following problem: rules, low energy, stereotyped behaviors, and social problems. However, this difference increases in total attention, self-regulation, and especially hyperactivities as males tend to have higher mean scores than females. In Table 1 the analysis of the scores indicates that male students exhibited higher scores than females in both the total externalizing scale (49.91 versus 37.43) and internalizing scale (37.84 versus, 30.98) with a greater difference in externalizing scales (12.48 versus 6.86).

Table 1. Scores on MBC problems scale by gender.

	Gender	N	MN	SD
Rules	Boys	203	8.49	6.60
	Girls	90	6.14	5.85
Attention	Boys	203	24.21	13.12
	Girls	90	17.76	13.12
Hyperactivity	Boys	203	17.15	10.39
	Girls	90	13.47	10.64
Low energy	Boys	203	4.24	3.57
	Girls	90	3.79	3.97
Stereotyped	Boys	203	3.60	2.53
	Girls	90	2.62	2.41
Social	Boys	203	12.22	8.22
	Girls	90	10.32	8.84
Self-regulation	Boys	203	17.06	9.27
	Girls	90	14.08	10.03
Total Internalizing	Boys	203	37.84	21.54
	Girls	90	30.98	23.52
Total externalizing	Boys	203	49.91	27.42
	Girls	90	37.43	28.09

In addition, children with ASD scored high in externalizing total score, as expected, with a mean score of M=65 and SD=20 and total internalizing problem score with a mean score of M=53 and SD=15 (Table 2).

Likewise, children with ADHD scored even more elevated in total externalizing problems with a mean score of M=61 and internalizing problems M=44. Children with other disorders scored with a mean of M=51 in externalizing problems and M=47 in internalizing problems. On the other hand, typical children have a lower score as the mean is M=39 and SD=27 in externalizing problems and M=28 and SD=21 in internalizing problems.

4. Discussion

Gender remained a significant predictor of internalizing and externalizing problems in children (Lau et al., 2021). This study's findings reveal gender differences in internalizing and externalizing problems in children aged from two to eighteen in UAE. Males were found to have a higher score and there was a difference in internalizing and externalizing problems between males and females in all clusters. However, this variation increases total attention, stereotyping, rule-breaking, and hyperactivities.

The results of this study correspond with those of (Bener et al., 2006;; Eapen et al., 1998; Eapen et al., 2001; Eapen et al., 2009; Salmanian et al., 2017) in that the severity of ADHD symptoms is more likely to be found in boys than in girls. In the same way, the results correspond with Hassan et al. (2019) in asserting that the gender gap between boys and girls with ASD and the gender differences between males and females has widened to be 5:1. However, the findings of this study do not agree with Taylor et al. (2012) in terms of internalizing ASD symptoms related to gender. According to Taylor et al. (2012)'s research, there is no difference between girls and boys with ASD; even more, adolescent girls with ASD were shown to be much more impaired than boys.

According to the study's findings, in the UAE, males are more likely than girls to suffer from behavioral, developmental, and emotional problems. They have more external behavior challenges with inattention, hyper activities, inattention, and rule-breaking. Moreover, males are also more apt to have internal behavioral difficulties of ASD (stereotyped behavior, lack of social interaction, lack of self-regulation, and low energy).

Table 2. Scores on MBC problems scale with t-value.

	<i>F</i>	<i>Sig</i>	<i>t-value</i>	<i>DF</i>	<i>P-value (two sided)</i>
<i>Rules</i>	2.310	.130	2.90	291	.004
			3.04	191.03	.003
<i>Attention</i>	.170	.680	3.86	291	<.001
			3.84	168.47	<.001
<i>Hyper</i>	.151	.698	2.78	291	.006
			2.65	167.00	.007
<i>Low energy</i>	.969	.326	.97	291	.335
			.93	155.51	.355
<i>Stereotyped</i>	.000	.984	3.11	291	.002
			3.17	187.06	.002
<i>Social</i>	.442	.506	1.78	291	.076
			1.73	159.92	.085
<i>Self-regulation</i>	.719	.397	2.48	291	.014
				159.00	.017

Thus, school-based screening and identification of these disorders in male children are urgently required. The male should be targeted to more services and intervention programs for developing behavior management, self-regulation, and social interactions. On the other hand, the results show that children with ASD have a higher mean than children with ADHD, other disorders, and typical children. In addition, children with no diagnoses have a lower mean in externalizing and internalizing problems than children diagnosed with ASD, ADHD, and other problems. This finding is consistent with the findings of Efstratopoulou et al. (2012) implying the importance of the screening process for these disorders in the UAE region. The Arabic version of the MBC can be used in referring and diagnosing children with these disorders in UAE. Early assessments are highly recommended especially for male children by the researchers to identify children at risk of developmental, behavioral, and emotional disorders. It is also recommended that behavioral management strategies should be infused into students' programs early as possible to help them learn to manage their behavior. Public awareness of these disorders is required as well as using adapted culturally standardized identifying instruments for early identifications like MBC. Training courses should also be devoted to improving professionals' ability for identifying and diagnosing children with behavioral, developmental, emotional, and academic difficulties in schools.

5. Limitation and future research

Limitations of this study are related to using a single instrument and with only teachers as solo informants of these symptoms in UAE which restrict the study's results generalizations. The sample size is relatively small and does not represent the whole UAE's seven emirates therefore, the results should be used with caution. Further research, could include also collecting data from parents' reports to support and compare teachers' reports on students; behaviour. Samples that include adolescents can also be valuable as individuals with older age are found to suffer from more internalizing and externalizing problems than children due to academic demands and their increased social expectations (Lau et al., 2021). Further research studies are recommended with a larger sample size and different variables such as; students' age, and parents' education level to examine these variable effects which may present valuable suggestions and recommendations.

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A HYBRID INTERNATIONAL CO-TEACHING MODEL: CASE STUDY FOR BIOMEDICAL ENGINEERING DEGREE

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Abstract

Degrees in Biomedical Engineering are increasingly present among the international offer. The study plans of each of them allow to provide a certain specialization towards the different sub-areas within biomedical engineering through electives: orthopedics, microbiology, robotics, biosensors or artificial intelligence applied to clinical data. The fact of including 4 subjects of artificial intelligence is another of the particularities and/or differential elements of the curriculum. The University of Deusto offers a new degree in Biomedical Engineering of 240 ECTS where all the subjects of the "Bio" subject are taught in English, and include "master class" among other teaching methodologies. The teaching modality is hybrid, with a module of 24 ECTS dedicated to state-of-the-art frameworks in bioengineering that is entirely taught virtually and where international experts in each subject participate as online teachers. This is what we call "international co-teaching" which allows students to have a more realistic view of the use of technologies for biomedical applications but in an international framework. These teaching modules will follow a methodology that will combine synchronous videoconference sessions by international experts with an asynchronous methodology that includes the use of gamified activities for both content presentation and evaluation. Moreover, the teaching modules will be designed and developed according to a number of learning cycles that promote the development of the independent and meaningful learning of students and promotes the development of their knowledge, skills, attitudes, competences and values. Each learning cycle has five stages: experiential context, reflective observation, conceptualisation, active experimentation and assessment. These stages facilitate students' active construction of the learning content and the meaningful integration of that knowledge that will allow subsequent recovery, application and transfer.

Keywords: *Hybrid teaching, gamified learning, biomedical engineering, international co-teaching.*

1. Introduction

The Degree in Biomedical Engineering aims to train specialists in the application of new technologies in different fields of medicine. Graduates of this degree will join the labor market in response to the demand for professionals who accelerate technological innovation in the field of health to improve people's lives: minimally invasive surgery, telemedicine, 3D printing prostheses, nanotechnology, biosensors and advanced analysis of biomedical signals with the most appropriate artificial intelligence techniques to create predictive models to offer personalized medicine.

From the point of view of international trends, the best engineering schools in the USA offer studies related to biomedical engineering, bioengineering or biotechnology, with Massachusetts Institute of Technology (MIT), Stanford University, the Berkeley campus of the University of California or John Hopkins University standing out. The "US bureau of labor statistics" shows an increase of 23.1% in job offers for biomedical engineers for the period 2014-24. In Canada, the University of Waterloo or the Quebec region's commitment to engineering applied to health stand out. In Europe, ETH Zurich, Imperial College of London or DELFT Institute of Technology occupy the top rankings in these studies. The latter promotes these studies by claiming that 100% of students are placed within a maximum period of six months.

The "European Economic and Social Committee", already stated in 2015 (Lozia Edgardo M., Jarré Dirk, (2015) that the sectors of biomedical engineering and the medical and care services industry - including research and development - are among the fastest growing industrial areas, both in terms of turnover and employment. By biomedical engineering we mean the bridge between the methods of engineering, medicine and biology for diagnostic and therapeutic measures in the field of healthcare,

including, among others, biological and biopharmaceutical products, pharmaceutical drugs, various types of devices for analysis or chemical or biological processing, as well as the development of medical equipment and technologies for the cure, treatment and prevention of diseases. The combination of research and development, industrial engineering and production, and medical and care services is particularly important. Furthermore, they indicated that the establishment of a single European market combining biomedical engineering with the medical and health care services industry - in combination with information and communications technology and telemedicine - would have enormous advantages for European society, its citizens and the economic development of the European Union, especially in terms of saving resources and promoting entrepreneurial opportunities and initiatives, reducing regional disparities, overcoming national blockages in health policies, alleviating social protection systems, coordinating Research and Development (R&D) in health and care, boosting innovation, raising Europe's position in global competition, pursuing the 2020 objectives, implementing fundamental rights more effectively, establishing quality principles, promoting mobility in the labor market, etc.

In terms of the economic rationale and future of biomedical engineering, according to Michigan Tech (Michigan Technological University, 2022), medical diagnostics are tripling in market value every year, and revolutionary advances in medical imaging and medical diagnostics are changing the way medicine is practiced. New medical devices, emerging from the research laboratories of biomedical engineers around the world, have completely altered the way physicians treat disease and trauma, extending the quality and length of human life. Ultimately, the future of biomedical engineering is tied as much to the problems and obstacles we discover as it is to advances and achievements in fields such as chemistry, materials science, and biology. As in most other fields, interdisciplinarity means that innovation originates from many directions at the same time and this allows economic returns from the exploitation by companies of such services and products.

The growing demand for professionals also highlights the shortage of such professionals. One of the main reasons for this is the limited supply of training in this field. Currently, there are 19 degrees with similar characteristics offered in Spain, according to the Spanish Society of Biomedical Engineering.

It is to be expected that the demand for a specific degree with these characteristics will be high. The official degrees that have so far served to cover the biomedical engineer profile have been mainly computer engineers, electronic engineers and telecommunications engineers.

3. Methods

3.1. General context of the pedagogical framework, Deusto strategy

Spanish universities offer study programs in three cycles of study, bachelor's, master's, and doctorate degrees according to Bologna Process (Elias, 2011). Bachelor's degree is the first cycle and its main aim is the general education of students in one or more disciplines, aimed at preparing for the exercise of professional activities. The study plan or curriculum is divided into various modules that contain different types of subjects: core, obligatory, elective subjects or final project. These have a concrete syllabus with specific objectives, which must be reached within a specific period called semester and an academic year has two semesters. Each subject has been allocated a number of ECTS Credits (European Union's Credit Transfer and Accumulation System) (European Commission, 2017) which measure the total workload required to complete the subject, including the time spent on theoretical and practical classes, the time dedicated to studying and preparing and carrying out assessments. In ECTS, 60 credits represent the workload of a year of study; normally 30 credits are given for a semester. An ECTS credit is equivalent to 25 working hours. At the University of Deusto, the student work distribution for bachelor's degree programs is typically based on 6 ECTS subjects, which means 150 working hours.

In this context, the University of Deusto offers a new bachelor's degree in Biomedical Engineering, which takes four years to complete, with a total of 240 ECTS credits (60 credits per year). Unlike other existing degrees, this degree combines online and face-to-face learning modality and in online subjects is used "international co-teaching" (Svobodová, Z., 2020), where several international experts in each subject participate as online teachers. This degree contains a module of 24 ECTS credits with four 6 ECTS credits subjects focused on state-of-the-art frameworks in bioengineering distributed in different semesters.

3.2. Pedagogical techniques

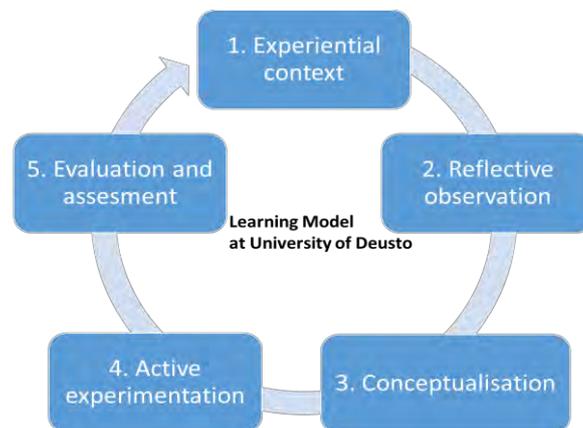
The University of Deusto has developed its own pedagogical framework, known as "MAUD" by its abbreviation in Spanish (University of Deusto's learning model) (Universidad de Deusto, 2001). It was developed by the university itself with the University of Gröningen (Holland) within the framework of the Tuning Project (Tuning Educational Structures in Europe, 2003). The pedagogical framework has served as a guide for many other universities, both nationally and internationally. From 2003 to the present day,

the University of Deusto has advised more than 70 Spanish universities, and more than 100 universities from countries around the world.

MAUD is based in autonomous and meaningful learning and centred in students' skills and competences development as advocated in the European Higher Education Area (Bezanilla, Garcia & Poblete, 2019) (Bezanilla, Arranz & Aguilar, 2014). MAUD aims to develop student's ability to think for themselves and to be autonomous and free-thinking individuals.

Inspired by the model of Kolb (Kolb, 1999) and "Ignatian pedagogy" (Gil, 1999), MAUD defines a structured learning cycle organized in five stages, as shown in Figure 1.

Figure 1. University of Deusto's Learning Model.



Experiential context stage aims to motivate students through their experience and context to come close to the idea of topic or issue under study. This phase requires contextualizing different methodologies and strategies, working on future expectations of students and common perceptions, and linking to other contexts and experiences.

Reflective observation stage consists of opening students' eyes to perceive the reality that surrounds us and to question, through reflection, the considerations of what this observation really means. The main objective is to achieve meaningful learning.

Conceptualisation stage includes acquiring knowledge about theoretical concepts in the subject area in the greatest depth possible. In this stage, students develop comprehensive competences, analytical-synthetic, critical and lateral thinking, enabling integrated and meaningful learning.

In the fourth learning stage, active experimentation seeks to apply the concepts, theories and models for problem solving or to design or implement a model or strategy. It is an appropriate stage for collaborative work, learning to cooperate and develop social and interpersonal skills.

In the last stage, the learning evaluation is carried out from three perspectives. In the personal perspective, students reflect on their own learning experience (self-assessment). In the formative perspective, students receive feedback as a key element for their progress. Finally, in the summative perspective, each student's work performance is evaluated.

3.3 Proposed syllabus and methodology

3.3.1 Details about the syllabus. The curriculum of the Bachelor's Degree in Biomedical Engineering is structured in seven modules, as described below:

- **Module 1. Basic training.** 60 ECTS credits (FB). Module aimed at the acquisition by the student of the basic training competences.

- **Module 2. Biomedical Engineering.** 84 ECTS credits (OB). Module aimed at the acquisition by the student of the competences related to the technologies necessary for the design and development of biomedical products and services, as well as their application on biological, physiological and cellular systems, the competences of which will also be acquired in this module.

- **Module 3. Data Science and Artificial Intelligence.** 24 ECTS credits (OB). Module aimed at the acquisition of skills related to technologies that allow the representation of knowledge in a computable way, as well as the subsequent inference (reasoning) in order to perform or optimize a process automatically.

- **Module 4. Industrial Technologies.** 12 ECTS credits (OB). Module aimed at the acquisition of competences related to technologies related to electronics and prototyping and mechanics.

- **Module 5. Ethical, human and personal options training.** 18 ECTS credits (OB). This module is compulsory in all the degrees of the University of Deusto.
- **Module 6. Elective training.** 30 ECTS credits (OP). This module consists of two electives and the student must select one of the two: 30 ECTS credits to be chosen en bloc by means of an international stay in the fourth year or 30 ECTS credits to be chosen in optional subjects in the fourth year to complete their professional profile, one of them being an internship in a company.
- **Module 7. Final Degree Project.** 12 ECTS credits (FDP). The student develops in the last semester a project in the subject "Final Degree Project".

3.3.2 Proposed methodology: hybrid Learning Model with international co-teaching

The class delivery model is hybrid, combining face-to-face classes with faculty from the team contracted to work on the Spanish campus, with online classes in which professors from other countries will participate in the category of international co-teaching online (both synchronous and asynchronous way) (Aldabas, R. A, 2018). The following is a summary of the credits that will be taught virtually:

- 24 ECTS credits of the subject Frameworks in Bioengineering will be taught in virtual mode (Chizhik, E. W., et al, 2020). This subject belongs to the Biomedical Engineering module which is formed by 2 face-to-face subjects (Biomedicine and Biomedical Technologies) where students will work the competences that require the use of hardware, microscopes, instrumentation and equipment...etc. through face-to-face practices in the laboratory, and a virtual subject called Frameworks in Bioengineering, where the technological tools that students will work with will be remote access software (Del Val, et al, 2010).

- 6 of the 18 ECTS credits of the subject Ethical, human and personal options training will be taught in virtual mode.

In total, 30 ECTS credits will be taught in this modality, which will represent 12.5% of virtual credits of the entire degree (Brendle, J., 2017). The teacher of each subject, following the learning model of the University of Deusto and the teaching methodology already defined, must select the appropriate strategy and activities for the teaching of his subject in the virtual modality.

The tools offered from the virtual learning platform, own of the ALUD platform, and other complementary technologies to which it also gives access as the videoconferencing tool, simulation software, processing and modeling, remote laboratories, the mural tool for collaboration between students and the anti-plagiarism system among others, enable the development of the following training activities: Videoconference classes, consultation, viewing and reading of didactic material, debate through the course forum, individual activities and exercises of application and immediate feedback, individual/group activities, practical software simulation exercises, individual or group tutorials and international expert lectures "Master Class" on a specific subject.

4. Discussion and Conclusions

When designing a degree program, it is important to take into account the study of the impact on the ecosystem where the studies will be taught (Barron, T., et al, 2021). In our case, this involves taking into account companies in the bio and technology fields, hospitals, patient associations, students and their families. This 360-degree study, carried out through face-to-face or telephone interviews, has allowed us to identify important elements in the design of the degree:

- The differentiation with traditional degrees through the international dimension given to this degree has been very attractive to potential students.

- Companies value positively the return of talent from abroad of students who will spend the fourth year abroad, through the Erasmus+ semester, to which is added a semester of online classes that will allow them to continue abroad.

- Families see a promising future for their children with a long international stay (one year).

Limitations are posed at the economic level, given the cost that may be involved for families with average economies to finance international stays. The Erasmus grants are a small incentive, but we are aware that it will not sufficiently cover the required cost.

Looking to the future, annual reviews of the impact and perception of the regional ecosystem that nurtures students of this degree at the University of Deusto will be included, in order to guarantee an adequate offer for the situation. Additionally, an offer of double degrees will be proposed where each student, over 5 years, can obtain two graduate degrees in industrial engineering plus biomedical engineering

Acknowledgments

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STUDENTS' EXPERIENCES ON DISTANCE LEARNING DURING THE PANDEMIC

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Abstract

The ongoing COVID-19 pandemic has changed how we study at all levels of education. The students have had to embrace distance learning methods not by choice but as a necessity for their studies and this comes with its own challenges. In this paper, we observe students' perceptions based on a survey conducted on 133 students in late 2021. The results show that students' perceptions of online learning during the pandemic are mixed, and while others prefer working online, some are having serious difficulties. The detailed results are presented in the paper along with our interpretation and discussion about the further implications.

Keywords: *Online learning, remote learning, COVID-19, pandemic, student perception.*

1. Introduction

The past two years have transformed higher education from hybrid and contact learning to distance learning. As the pandemic doesn't seem to subside soon, we have begun to become accustomed to teaching somewhere between hybrid and distance learning. New recommendations and guidelines have been reinforced. (Toquero, 2020) The new "normal" of learning is here to stay. But all of this is not without its own challenges. The need to adapt quickly has highlighted the deficiencies of distance learning. The lack of distance learning infrastructure, inexperience of teachers, situations at home, solidarity of students and many more have been identified since the pandemic began. (Ali, 2020)

Not only is it a tremendous undertaking for all educational institutes on all levels, it also is a new world for the students in it. Distance learning has shown to have come with a wide array of problems that can negatively affect the students' development in higher education learning. Practical example of this as stated in Coman et al (2020) study is that the students can now opt out of engaging in learning, critical thinking, or expression as it is easier not to do these things in a distance learning environment. In another example higher education students are seen more vulnerable to developing mental disorders during the pandemic. (Deng et al, 2021) In the study it was stated that the rate of depression in the higher education population went up nearly 18% (12.9% to 30.6%) compared to pre-pandemic.

While students, especially young adults in the population, are by default more comfortable with communicating through instant messaging and other social platforms, they still have their expectations of student life in higher education set in pre-pandemic times. Some of the students might have just only begun their studies in higher education only to be thrust into a world unlike their expectations. And when presented with the new distance learning curriculum for their studies, they will unsurprisingly be confused, feel lost and even neglected. Not to mention that some studies and curricula during this pandemic had to have been conducted with a mix of strict, hastily concocted contact learning combined with distance learning as some forms of education still require physical interaction, facilities, and equipment. (Peloso, 2020) Similar deductions could be found in the comprehensive global review done by the University of Ljubljana on the effects of pandemic and distance learning in higher education. (Aristovnik et al. 2020)

Hence, it is very understandable that the students might display some worrying signs during their studies and in this study, we survey the higher education students on their experiences on the new normal and how they are coping with change.

2. Methodology

To find out about the students' experiences on distance learning we conducted a qualitative survey that included both multichoice and open answers led by basic information questions that were used to categorize some of the results.

First and foremost, we determined it important to include a few informative basic questions about the students that could help us deduce more about the survey. Two of these were the age group and field of study. The age group was used to not only identify the most common age group our participants belonged to but also gauge for possible deviations among them.

The field of study was considered important because the university surveyed had a four-way split faculty between technology, healthcare, business and maritime, of which we expected to see some deviation as well. Now, it is to be noted that the survey used the official Finnish field of education terminology which can leave some interpretation for the choices. (UNESCO, 2022)

The subject questions of this study focused on four key points. Learning during the pandemic versus learning pre-pandemic, digital skills and distance studies, study guidance in distance learning and learning tools and systems in distance learning.

The first one questions the student's opinion on whether pre-pandemic learning or distance learning is preferred, and reasons as to why on either given answer. This question was surveyed only from students that had experienced pre-pandemic studies so first year students of the current academic year were not considered in this answer. The digital skills and study guidance questions were only multiple choice but were deemed nevertheless important to survey as both are important factors. The multiple-choice questions of learning tools and systems are specific to the university the survey was conducted in.

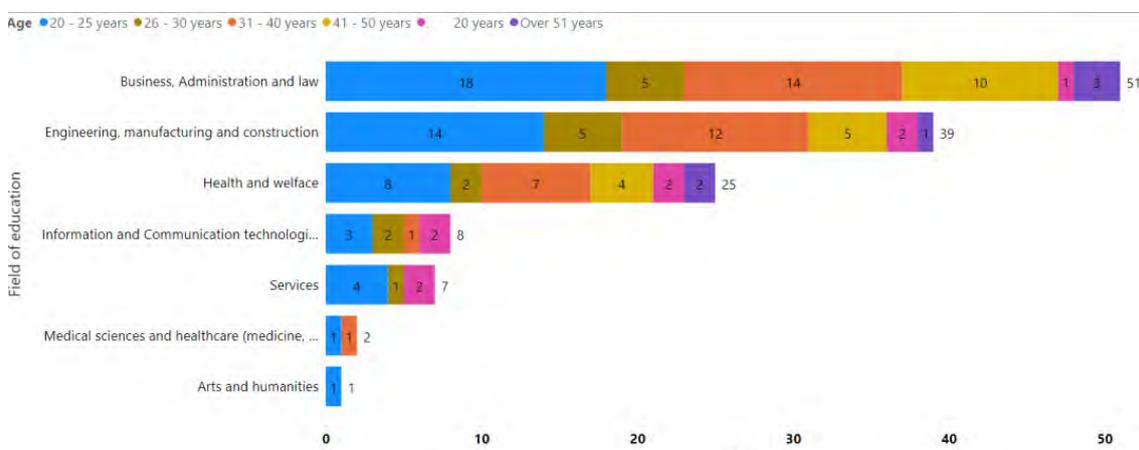
The university surveyed uses the globally common Moodle as their learning management system and nationally known study management system Peppi, both of which provide some tools and feedback to students on their studies. A follow-up open answer question on what kind of tools would help with their studies was asked. This is something we had surveyed before prior to the pandemic in our previous studies on learning analytics (Nevaranta et al, 2020) and could be used as reference to see if something had changed from pre-pandemic.

3. Results

There was a total of 133 answers on the survey (n=133). The fields of study were distributed quite evenly with the number of faculties' students in the university. Most students were from the Business, Administration, and law field of study (51). Other fields of study were also well presented in the survey. Only one response from the field of Arts and humanities, so any conclusions about that field can't be done.

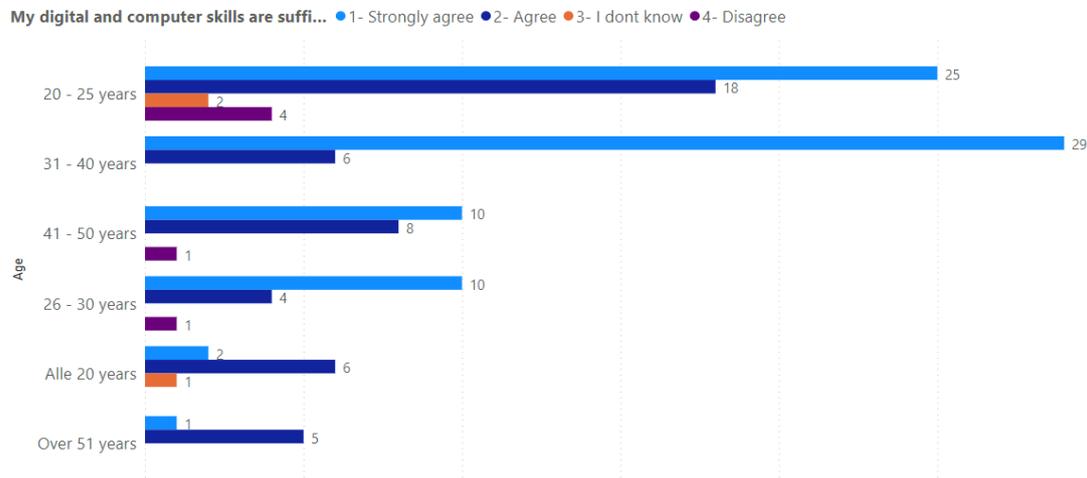
Of the students that participated in the survey, the most common age group was 20 - 25 years as expected, but also a large group of age 31-40 years was expected because of online degree programs offered by the university. All age groups from under 20 to over 50 were represented (Figure 1).

Figure 1. Students' online degree programs and ages.



In our study it was first asked if students find their digital skill to be sufficient to advance their studies. In the fields of Services 14 %, Health and welfare 16% and Business just 1 % didn't agree with the question. The most negative answer was given by Health and welfare students; 24% of students either disagreed or didn't know whether their digital skills were sufficient. In information and communication technology all students agreed as was expected. Of the age groups the most confident in their digital skills was the 31–40-year group. Surprisingly the under 20 group was almost as positive (Figure 2).

Figure 2. Sufficiency of students digital and computer skills by age groups.



In the question about distance and online learning being harder than contact learning 49% of students agreed or strongly agreed that studying was harder, 10 % could not say and 40% disagreed (Figure 3). This also makes it visible that some students are more familiar with distance and online education, are more self-organizing and like to study by themselves.

Figure 3. Difficulty of distance and online learning vs. contact learning.

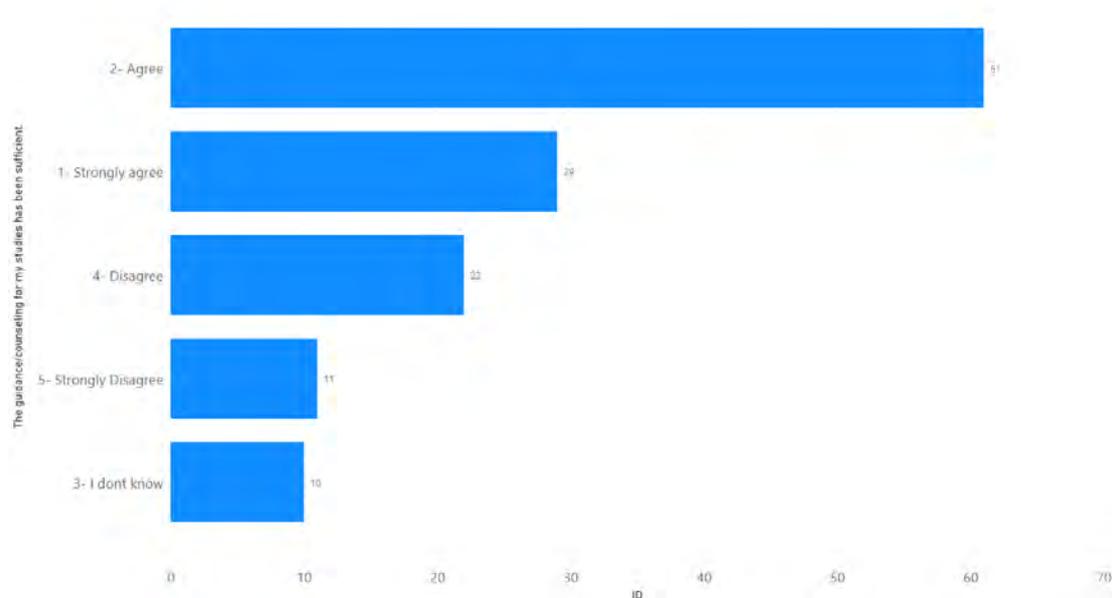


Services students (80%) found it most difficult to study online while Business, administration and law students found this less difficult (33%). This may result also from the fact that online degrees are in the Business, administration and law field of studies and students already have skills to study online. In open answers students pointed out that they may have lack of motivation or skills to self-direct in their studies. They may also have some distracting factors in their daily life. Also because of the sudden transformation to distance and online education, the courses were not planned for online realization and some teachers did not have sufficient online teaching skills (pedagogical and technical). On the other hand, some students said that it was easier because you didn't have to spend time traveling to the campus

and to some students it is more comfortable to study at home because of the social stress in the classroom and in the campus.

The multi-choice question on study guidance in distance learning had the least favorable reception. While still positive overall there was a substantial amount of deviation and in total almost 25% of students declared they had not gotten enough study guidance during distance learning, but nevertheless 68% of students were satisfied with the guidance (Figure 4).

Figure 4. Sufficiency of study guidance and counselling in distance learning.



Biggest groups of satisfied students were in Health and welfare and the most unsatisfied group in the field of Services. Most satisfied students were in the age group of under 20 years (89%), 20 - 25 years (67%) and 31-40 years (68%). Most unsatisfied were at the age groups of 26-30 years (33 %) and over 51 years (34%).

The learning management system Moodle comes pre-packed with a time-management tool for students that is called Completion Progress. This tool shows students their current progress in a course and their overall progress in their dashboard with a color-coded bar. (Moodle, 2022) The study management system Peppi also comes pre-packed with a progression graph in the student's desktop that shows similar progression statistics as Moodle's tool. The visual presentation of their activity gives the students a more engaging learning experience. Most satisfied with the Moodle Progress bar were the Services students (100%) and the ICT students (88%), and with Peppi were Information and communication technology students (100%) and Health and welfare students (84%).

In the surveys multiform questions, the students deemed these tools to be generally useful but reflecting on the follow-up question about what they would like to see more we could determine that they hope to have more mobile apps to catch more information about realizations and timetables. Also, an easier to use way to find courses and realizations was needed. Some students claimed that they want less information systems and more connections between different systems.

4. Discussion

From the results we could determine a few things. The digital skills of students are generally on a good level and systems used in their studies served their purpose equally as well. It is possible, that the situation could have been at least partially different, as it is likely, that after one year of remote learning all students had gained the necessary skills regardless of whether they had them before.

Most of the students felt that the systems used (such as Moodle and Peppi) were useful. There were some differences depending on the field of study, but regardless of that, most students found learning analytics provided by the systems useful. This seems to be in line with our previous studies (see Nevaranta et al. 2020).

In general, students' opinions about remote learning seem to be quite diverse. While 49% of students agreed with remote learning being harder (or more difficult) than learning in classroom, 40% disagreed with the statement. Based on the division, it seems that while not always feasible, institutes should provide possibility for remote learning, when possible, without making it mandatory. Some kind of hybrid model could be the most satisfactory for all students but can be difficult to arrange.

There were some limitations to this study. Since the students could give open answers to topics that could be considered hard to answer without context that would guide them towards a bias, additional insight or a longer study would have been helpful in the analysis of the results. The survey group was similar to our previous studies in size and distribution which provided a base for cross-referencing between similar surveyed themes between them. Regardless, it seems like two years after the start of the pandemic we have already gotten used to distance learning and can now recognize the weaknesses of it.

5. Conclusions

The study on the effects of the pandemic on different education levels and groups is still ongoing as is the pandemic. The new normal will be hybrid learning after either the pandemic subsides or is ignored as now that it has been shown that distance learning is viable and even the most reasonable solution in some scenarios. Hybrid learning with the lessons learned from distance learning will open the world to a new more flexible way of learning in higher education that further makes use of the technology and digital tools made during the distance learning. However, this may not always be easy to arrange.

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THE CHALLENGES OF TEACHING METHODOLOGIES, POST-COVID; HYBRID VS. HI-FLEX MODELS

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Abstract

COVID-19 has changed the world in so many ways, including how health, science, and politics interface; how global finances are influenced by a pandemic; and how education is delivered. Many challenges were faced when traditional brick-and-mortar colleges and universities shifted abruptly from face-to-face teaching delivery methods to online teaching. Some of those challenges were based on social inequities, including access to laptops and to internet service, as well as access to childcare or eldercare services. As instructors from these institutions have been returning to the classroom, a fresh round of challenges are being faced, including an unwillingness of many students to return to campus, and a student demand for online access, even for face-to-face courses. The motivation for this paper came from my experiences as department head, fielding ongoing questions from full time and adjunct faculty as well as students about the benefits of hybrid vs. hi-flex teaching models. My objective was to explore the research in order to provide a more definitive response, and to smooth the class modality/scheduling process. A literature review was conducted, as were interviews with online education experts. The benefits and drawbacks of hybrid vs. hi-flex teaching methods have been defined and articulated.

Keywords: *Hybrid, face-to-face, hi-flex, teaching methodologies.*

Glossary of Terms

Asynchronous Online: Classes are delivered 100% online with no required scheduled meeting times.

Face to face: Classes are delivered in-person at scheduled times, either on-campus or at other physical locations. Also referred to as *in-class*.

Hi-flex: A face-to-face course that can also be attended virtually; ideally, students can hear and see each other, the instructor, and the instructional content using technology.

Hybrid: Classes are delivered face-to-face some weeks, and online (either synchronous or asynchronous) other weeks.

Synchronous Online: Classes are delivered 100% online at scheduled times through live virtual meeting technology.

1. Introduction

On a weekday evening in February, a faculty member made her way from work, through rush hour traffic, to campus. She paid for parking and fought the bitterly cold wind to enter the classroom. There, she was greeted by an empty classroom. Every one of her students had elected to attend class remotely that evening because of the cold, and she found herself in the awkward position of teaching her face-to-face class online from the empty classroom. This scenario is becoming more common as instructors struggle to teach in a format that best meets the changing needs and demands of students. We first abruptly changed our teaching methods from on-campus/face-to-face, to online in mid-March, 2020, due to the pandemic. Now we are returning to the classroom – kind of.

2. Objectives

There has been a paradigm shift in the availability of virtual learning which has affected all teaching methodologies, including in-person classes. As a department chair, I found myself fielding a lot of questions from full-time and part-time faculty, as well as students, about the best way to teach classes;

should in-person courses have a virtual option, how many on-campus meetings is preferable, etc. The objective of this research was to gain a clearer understanding of the efficacy of in-person, online, hybrid, and hi-flex classes. A recent study, for example, found that while 72% of undergraduate students preferred returning to the classroom post pandemic, most of them wanted the classes to still offer some online learning components (Bebbington, 2020). It should not be overlooked that nearly 30% of students in this study did *not* want to return to the classroom. It is in this rapidly changing environment that we explore the challenges, benefits, and recommendations accompanying various teaching methodologies.

3. Methods

The research for this paper was conducted through a mix of a literature review and interviewing faculty members and personnel from Metropolitan State University of Denver's Center for Teaching, Learning, and Design. These individuals are responsible for providing training and support for all online teaching, as well instructional design and teaching methodology. The information gathered was synthesized with the goal of articulating the problems and challenges, as well as providing possible solutions and suggestions for the inherent issues brought on by changes in teaching methodologies.

4. Discussion

Teaching a hi-flex course, where students can attend either in the classroom or remotely, offers students the flexibility of participating in the way that is most convenient for them. Some students appreciate not having to fight traffic, pay to park, lug their backpacks to campus and arrange for childcare, and find the remote option alluring. Other students prefer the energy and intimacy of the in-class learning environment. Some instructors referred to this as a 'flipped classroom', where students do some of the work at home, such as reading, online quizzes, watching videos and video-recorded lectures, and then participate in hands-on learning in the classroom (Screencastify, 2021). To teach using a hi-flex methodology effectively, however, instructors need access to the appropriate technology, training, and support (Bebbington, 2020). Some instructors have access to classrooms with an interactive platform with a visual-monitoring system that follows the instructor as they move around the classroom, and has adequate audio systems so that virtual learners and face-to-face learners can all hear both the instructor and each other (Raes et al., 2019). For universities with more limited budgets, it may be appropriate to provide adequate technology in several classrooms and then schedule those rooms only for classes using the hi-flex model.

Some instructors have attempted to meet the new demands of students by offering a face-to-face class with a virtual (online synchronous) component. For example, let's say you offer an Intro class on Tuesday night at 5:00. You meet online synchronous on specific evenings during the semester, and on campus for others (a hybrid delivery method). Some research suggests that this flexible delivery method may help to increase recruitment, as barriers to attendance are eliminated for students via the virtual option (Raes, 2019). This use of technology also prepares students for the use of same in their future work environment. The challenge comes when students ask for exceptions. For example, perhaps on one of your face-to-face (on campus) evenings, you get an email from a student saying they have been exposed to COVID and would like to attend the class virtually. You send them a link and connect audio/visual so they can 'attend' remotely. The next time you have class face-to-face you have several more requests—students are feeling sick, or are home with their children and have no childcare, or are caring for an immuno-compromised parent and feel uncomfortable attending class. They each get a link.

What are the consequences of diluting instruction in this manner? Some experts report that mixed methods classrooms (those with some learners attending in the classroom and others attending virtually) creates an environment that is less interactive, and encourages a more passive learning style. While this option is 'better than nothing', experts argue that when these teaching methods are mixed without the necessary support referenced in Bebbington, 2020, everyone suffers (Griswold & Loats, 2022, Personal Interview). In these instances, faculty must focus not only on teaching, but ensuring that the wifi works in the classroom, that online students can hear the lecture and see the instructional materials, and they must monitor questions and comments in the Chatbox. The in-class students can have a degraded experience when the instructor has to repeat their questions to the virtual learners (who couldn't hear), and breaking the class into small groups for discussion or projects can become a logistical nightmare. Additionally, students attending virtually often report feeling excluded, and students in the classroom may feel neglected when their instructor is distracted by trying to solve problems with technology (Raes, 2019).

Some studies indicate that some of these challenges may be overcome by having a person (such as a graduate level Teaching Assistant, or TA) dedicated to focusing on the technology portion of the class. For example, they might monitor polls, online quizzes, and the chatbox, as well as problem solve technological issues. They might also assist with transitions such as starting videos and assigning virtual learners to breakout rooms. This second person can also be on the lookout for any virtual students who may have a question, to ensure no students are being neglected. Having a TA with knowledge of the class material is of extra benefit, as they may be able to answer questions or engage the virtual groups in the subject matter, but this is not a requirement. Having a second person in the classroom is preferred by both students and faculty (Barnes et al., 2021).

There are other potential solutions. Offering a course in multiple sections, some offered exclusively online (whether synchronous or asynchronous) and others exclusively face-to-face may help to solve this dilemma. For lower-enrolled programs that do not offer multiple sections, offering the face-to-face version only in fall semester, for example, and a spring semester online (of the same class) may be a solution. These courses can utilize the same online learning platform (on Canvas or Blackboard, for example) for minimal work for the faculty member (Griswold & Loats, 2022, Personal Interview). Instructors may choose to blend their teaching by using a mixture of physical (paper) and online textbooks as well as electronic resources and teaching platforms accessible through the use of QR codes (Hua & Liu, 2021).

When teaching online, whether as a 100% online course or as part of a hybrid teaching model, it is recommended the instructors establish an online presence. This can be accomplished by posting your contact information, a photo, and some information to help students get to know the instructor as a person. It is helpful to have a video posted, welcoming students to the class and introducing them to what they will be learning over the term. Additionally, instructors may want to send out an email (and the syllabus, if possible), before the class starts so students feel welcomed and have an idea of what the expectations are of them. It is recommended that instructors actively participate in online chats and discussion forums, as this encourages student participation and models appropriate online behavior (Alverno College, n.d.). Some teachers post an article or guidelines about online etiquette so that students are informed upfront about the behavior expected of them in the online learning environment.

5. Conclusions

Regardless of whether you teach online, face-to-face, hybrid, or hi-flex, it is important to be intentional in the ways in which we engage students. Some studies indicate that it is less successful when instructors teach a non-traditional course (hiflex) using traditional teaching methods, and recommend offering small stakes assignments and active engagement in learning materials (Linne, 2021). Having a mix of learning methods such as watching a video or recorded lecture and then posting a blog, taking a brief quiz, or sharing a discussion post, can keep students interested and engaged in the material. Having students give an individual or group presentation (whether virtually or in person) on a topic of their choosing, selected from a list of options the instructor offered, can enhance passion for the subject. Inviting guest speakers is a great way to bring real-life to the course material, whether they are presenting in-person, virtually, or are video-recorded. Learning games are a hit and can be modified to work in a virtual or in-class scenario, and can be a fun, interactive way to review material or serve as a review for an upcoming exam.

While the learning environment continues to evolve, it is imperative that instructors remain engaged and intentional. There are challenges and benefits to each of the various modes of instruction, perhaps the most important element is the level of confidence and competency demonstrated by the instructor.

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FACILITATION TECHNIQUES AND TOOLS FOR ONLINE PROJECT-BASED LEARNING WITH PRIMARY SCHOOL STUDENTS

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Abstract

Current trends indicate that more schooling will take place online, including project-based learning (PBL). This shift opens new possibilities for interactions and collaborations among students, allowing for glocalization of learning and connectivism across international classrooms. The last two years have shown that many well-established techniques/tools for facilitating PBL in physical classrooms are not simply transferable to the online space. Thus, techniques/tools for online facilitation need to be explored, adapted, and newly developed, whilst considering existing pedagogical principles. We conducted three case studies lasting approximately 3 months each, in which primary school students (Grade 5-7) from Namibia, Malaysia, and Finland collaborated in online sessions. Throughout these studies we focused extensively on the facilitation process, exploring different techniques/tools with a trial-and-error approach. We were guided by our own experiences in facilitating and teaching within physical classrooms, and continuously reflected on the adaptation to online settings, whilst consulting theoretically-proposed and empirically-supported suggestions from various fields. For each case study, we video recorded the planning of the sessions, the sessions themselves, and the reflection afterwards. In addition to analyzing these videos, we also drew upon focus group interviews that were conducted with students at the end of the studies. Based on this data, we present facilitation techniques/tools, including the structuring of sessions (e.g., the importance of icebreakers, variety in activities, and navigation of digital tools), as well as aspects relevant to the climate (e.g., student-student interactions, facilitator-student interactions, autonomy, role distributions, and language). With the presentation we offer researchers and educators practical techniques/tools, as well as important aspects to consider when facilitating primary school students in online project-based endeavors.

Keywords: *Facilitation, project-based learning, online, primary school.*

1. Introduction

With more schooling taking place online, including project-based learning (PBL) which has a unique ability to increase students' motivation (Hira et al., 2021), effort should be invested into establishing appropriate facilitation techniques and tools. This includes exploring which can simply be transferred or adapted from those used in physical classrooms, but also identifying which no longer work and developing new techniques and tools. Although a few scholars have started looking at online facilitation strategies in higher education (Martin et al., 2018; Thomas & Thorpe, 2019), they differ from approaches in primary education, which is the focus of our research. Furthermore, we maintain that facilitation techniques and tools for online PBL should in part be driven by established pedagogical practices that are embedded in educational theories and empirical studies.

2. Method

Starting in 2020 we embarked on a larger research project, with the aim to explore how students from around the globe may work together in collaborative online learning environments. We focused on numerous aspects, including the required technology, transcultural perspectives, pedagogical approaches, and facilitation techniques within the ongoing case studies. These are embedded within an overall shift to

transform schools into connected knowledge hubs, whereby student-centered learning is central, with students collaboratively constructing new knowledge. The project team now consists of a group of multi-disciplinary researchers from Namibia, Finland, Malaysia, and Germany. We conducted three case studies in which primary school students (Grade 5-7) collaborated on projects lasting approximately 3 months. The students in Finland and Namibia were chosen from schools which had long-term partnerships with the local universities, and in Malaysia a new school was contacted about starting a collaboration; teachers selected which students would take part in the case studies. The students from each country knew each other (being from the same class or extra-curricular activity), but did not yet know the students from the other countries. Within each case study, we iteratively held planning meetings, conducted the sessions, and held a reflection meeting, which were all video recorded. For the current paper we focus extensively on the facilitation process, reporting on different techniques/tools that we applied in the case studies with a trial-and-error approach. We were guided by our own experiences in facilitating and teaching within physical classrooms; we continuously reflected on the adaptation to online settings, whilst consulting theoretically-proposed and empirically-supported suggestions from various fields. In addition to analyzing video recordings, we also drew upon focus group interviews conducted at the end of each case study, and reflection diaries that were completed after some sessions.

2.1. Case study 1

The aim of the first case study was to facilitate the online co-creation of an interactive map between ten primary school students situated in Namibia and Finland (Rötkönen et al., 2021). Over nine sessions, the students (with the help of a developer) created a prototype that allows students to learn and exchange information about their countries within the context of a team-based game. For the sessions we utilized Skype, Microsoft Whiteboard, and an online VR environment. The sessions were facilitated by members of the research team, which included one online facilitator situated in Germany, two facilitators situated in Namibia, and one facilitator situated in Finland. The students in Namibia and Finland knew the facilitators present in their country.

2.2. Case study 2

The aim of the second case study was to facilitate the co-creation of an online platform that allows students to share local perspectives on global challenges (e.g., climate change, cyberbullying; Winschiers-Theophilus et al. 2022). Much focus went into exploring preferred modes of communication, as well as identifying challenges and solutions, in order to design an integrative platform. Six primary school students from Namibia, Finland, and Malaysia collaborated in the six online sessions. Furthermore, they were involved in four separate sessions with their schoolmates ($n_{\text{Namibia}} = 24$, $n_{\text{Finland}} = 16$, and $n_{\text{Malaysia}} = 23$); in Namibia and Finland these took place in a physical classroom, and in Malaysia these were held online. We also held an online closing session, to which all the students were invited. For the sessions we used Skype, Jamboard, and Miro. The facilitators were the same as in case study 1, with two new facilitators situated in Malaysia joining. The students in Malaysia did not know the facilitators joining from their country, and because they joined online (from home) the facilitators were not physically present with them in a room.

2.3. Case study 3

The aim of the third case study was to facilitate the co-creation of an online space in which students from different countries can interact and work together (e.g., on projects). Working with a group of developers, an individualized and multi-functional online space station was created (Zaman et al., 2022). Six primary school students from Namibia, Finland, and Malaysia collaborated online in five sessions, and were also involved in four separate sessions with their schoolmates ($n_{\text{Namibia}} = 24$, $n_{\text{Finland}} = 14$, and $n_{\text{Malaysia}} = 23$). For the sessions we used Ohay and Miro. The facilitators were the same as in case study 2. The students in Namibia and Finland again joined from school, whilst those in Malaysia joined from home.

3. Results and discussion

3.1. Icebreakers

Throughout the case studies, we began to realize the importance of beginning each session with an icebreaker that is specifically tailored to the technology and activities entailed therein. Successful icebreakers included (1) playing *Pictionary* to get acquainted with Microsoft Whiteboard, Jamboard, and Miro, (2) playing *Simon Says* to get acquainted with communication cards (i.e., pictorial cards that include short messages, e.g., I want to say something, I can't hear you), (3) playing *Charades* to reflect on body language, (4) playing *Musical Chairs* to reflect on virtual space, and (5) completing the *Alternative*

Uses Task to encourage creative thinking. The icebreakers thus served as an alternative to providing students with a training of the technology and the methods before the sessions. Furthermore, we believe they contributed towards a positive climate, as they fostered communication between the students and were perceived by the students as being fun. In the interviews and reflection diaries, students often noted that the icebreakers were what they liked most about the sessions (e.g., “the warm up was fun”, study 2).

3.2. Online Navigation

Having a plethora of applications in which we had to “switch” within sessions was quite cumbersome. Even in the later studies in which only one platform was utilized, students opted to communicate via video and microphone, using the chat function, sending fleeting emojis, or drawing and writing on a shared board. The online facilitator thus had to stay on high alert to all forms of communication, ensuring that no students suggestions went under; this also meant reading out loud the written communications, to keep the other students who may not have noticed the chat message informed about their fellow students' responses. Although this requires effort, we believe that keeping all forms of communication open is important, as previous studies have indicated that the use of text chat and social media within online learning environments allows more quiet students to be heard (Nowell, 2014), and that offering students multiple ways to contact instructors is an important facilitation technique in online courses (Martin et al., 2018). Furthermore, the students joining the sessions from home often had their videos/microphones off; to ensure that they remained involved and offered contributions, these students were continuously prompted to respond on the chat. Difficulties related to technical failures were addressed amongst the facilitators, but also with the students themselves. For instance, we observed that when students did not audibly hear what was being said, they did not indicate this to the talking student or the facilitator. We thus dedicated sessions to exploring options to overcome this challenge. The students suggested writing messages in chat, using expressive emojis, as well as showing visual communication cards. Making notes during the sessions in Study 3, the facilitators were able to ask the technical developers to create new functionalities and items that would ease the facilitation; for example a virtual microphone which could be passed on (similar to a talking stick), and a laser pointer that students could use to draw attention to something on the screen (as their cursors were not visible).

3.3. Student-Student Interactions

In the first study we had ten students in total, with each set joining the sessions with a single video camera and microphone. Throughout the study we realized that the size did not allow each student to contribute equally, and that the students did not thoroughly get to know each other (e.g., not knowing each other's names halfway through the study). In the second and third study we opted for six students. In the third study each joined the sessions with their own camera (even when being located at the same place), which eased the facilitation process immensely. In the closing session the Namibian and Finnish students joined as a group from one camera, with the Malaysian students noting that they would have also preferred this. All our case studies included getting to know each other activities, in which students shared information about hobbies, favorite foods, etc. At the start of case study 2, we planned to have the students who were in the online sessions facilitate the sessions with their schoolmates; their tasks were to report back what had happened, to repeat some of the activities with their schoolmates, and to gather new ideas and information. However, we soon realized that the students struggled with this peer facilitation, and moved to a format of co-facilitating. Guided by principles of classroom climate (Wang & Degol, 2016), we continuously aimed to create a safe and respectful environment by encouraging positive interactions amongst the students. Although this occurred somewhat naturally, it was good to hear the students confirm in the interviews that they were able to have quality interactions, e.g., “They were really nice people and it was really really nice to get to know new people and work with them” (study 2), “I think they have interesting ideas” (study 3). The only critical experience was during the closing session of study 3, in which individual students laughed and made unfiltered comments during the presentations. We are unsure whether this was due to these students not knowing the etiquette of the online sessions, or because they did not have a physical facilitator present (which we strongly recommend).

3.4. Autonomy

The students and their ideas and opinions were central in all three studies; hence, we provided students with ample choices and opportunities to provide suggestions in order to enhance their feelings of autonomy and ownership (Ames, 1992). Despite this we also came to realize that most activities required the presence and guidance of a facilitator; in an attempt to minimize the role/contribution of the facilitator, we included one activity per study for the students to complete by themselves. From the view of the facilitators, we thought that this did not work well; for instance, students did not begin spontaneous communication and in most cases one student took the lead, and without major input from the others

made decisions. The students reported in the interviews the need for a facilitator, but at the same time maintained that unfacilitated activities were needed and would work; “It would have gone all mixed if there was no facilitator...so giving us the instructions and we do it ourselves”, “If needed you should take the control yourself and start the conversation if there is no one else to do it and it will go on when the conversation starts ... the other will come along...You have to start it”. Hence, it seems that the students did not perceive the unfacilitated activities as uneasy as the facilitators did. Especially in study 3 we spent much time exploring students’ autonomy, by exploring their suggestions for facilitating and structuring the online space. Similar to the setting of classroom rules, students were tasked with creating their own guidelines for online interactions (e.g., give everyone a chance to talk, no spamming, and don’t erase other people’s work). Furthermore, we spent one entire session enquiring about students’ preferences for the spatial setup and facilitation techniques, such as where the facilitator and student video frames should be placed, method for choosing order of presentation, and structuring Q & A. Directly asking the students (receiving feedback) and utilizing feasible suggestions was also useful for the facilitator.

3.5. Role distributions

Throughout the studies we also noticed that students differentially contributed during the sessions; with some being more open and proactive, whilst others were more quiet and reserved. Although the power imbalance between facilitators and students is often noted, the naturally occurring power imbalances between students is not addressed enough (Van Mechelen et al., 2015). In order to address these in our studies, we opted for unofficial role distributions based on observed talents and mode of communication. For instance, one student who was talented in drawing (i.e., named drawing as one of her hobbies, and did a meticulous job early in the first sessions) was tasked with drawing the oral suggestions provided by the more outspoken students. In the third study, one student showed great promise in technical skills; he thus received a private lesson on developing in the online platform Ohay, and in one of the sessions was tasked with immediate implementation of students’ suggestions (e.g., size and location of video frames).

3.6. Facilitator-student relationships

Similar to how student-teacher relationships are vital in physical classrooms, so is the relationship between students and facilitators in online PBL. Although we acknowledge that the amount of time for each case study is not merely enough to truly establish a strong relationship, we continuously aimed for this. Exchanges between the facilitators were useful, as those who knew the students better could provide insights that could inform facilitation. For instance, knowing that one student requires more time to formulate answers, guided the facilitator to not pick this student first. Furthermore, the online facilitator also provided personal information (e.g., favorite animal); in later sessions the students would then also direct questions at the facilitator (e.g., what food is eaten in Germany?). The facilitator ended each session by informing the students that she valued their contributions.

3.7. Language

English is the language of instruction in both the Namibian and the Malaysian schools. In the second and third study, we specifically chose students in Finland who had a good grasp of English, which led to the online facilitator not always realizing that they were still challenged by the language aspect. The Finnish facilitator had to keep reminding the group about this. When asking the Finnish students in the interviews, they noted that they did not mind the sessions being in English and that they enjoyed having an opportunity to practice their English. Nonetheless, when asked about general challenges they mentioned their lack of vocabulary and issues with correct pronunciation, but noted how they managed well despite this, “It was really difficult because English had to be really good, to understand what they say, and you had to know what to say if you didn’t know what something means – what the word is in English so you get panic. But it went well...” (study 2), “If there were some words you didn’t understand then you asked or tried in a similar way or like use gestures to understand” (study 3). The Finnish facilitator continuously supported the students during the sessions, providing them with translations and answering their questions. Furthermore, they were given the option to complete the interviews and the diaries in their preferred language.

3.8. Structuring sessions

As the complexity of the projects increased, the students started noting in their diary that they were getting confused. This prompted us to begin each session with a verbal reminder of the overall aim of the project and a description of the activities that will be completed within the sessions including the reasoning or desired outcomes of these. Thus, simple strategies for effective lesson planning utilized in physical classroom settings, such as sharing learning objectives and explaining specific learning

activities, remain essential for online PBL. Within the sessions it was important for the facilitator to reiterate instructions and help students navigate through the different platforms or spaces; the students positively commented on this in the interview, “there was Naska giving advice like all the time, so like what the next activity is and next we go to another room in that app, and it was nice to together with all” (study 3). Another frequent facilitation technique involved summarizing students’ responses; we found this form of paraphrasing quite useful, as it offered clarity for the facilitator and the other students (i.e., repetition for understanding and clearing of misunderstandings), as well as providing the student with feedback that what they are communicating is being heard and taken into consideration. To provide a balance and encourage different interactions, group sizes were varied for different activities. When students were actively completing tasks but were not communicating with each other, the facilitator narrated their actions to encourage the students to consider what the others were doing. Due to the logistics of bringing children from three different countries together, we opted to have each session last 60 minutes, and although having short breaks some students noted that this was too long.

4. Conclusion

Similar to teaching in physical classrooms (Stahnke & Blömeke, 2021), the online facilitation of students partaking in PBL requires practice. We highlight that some strategies are directly transferable from physical classrooms whilst others require reimagining. With this summary we hope to offer researchers and educators practical ideas and solutions for the online facilitation of PBL.

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THE LEGAL BACKGROUND AND ACCEPTANCE OF LEARNING COMMUNITIES BASED ON INTERNATIONAL COMPARISON

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Abstract

After 2011 a new alternative educational form appeared on the palette of Hungarian public education: learning communities that provide alternative education for schoolchildren who take part in alternative or mainstream education as private pupils. The learning communities are not schools in the traditional way, but we can simplify it as home-schooling in a more organized way. The conditions of learning communities and regulations in connection with the fulfilment of compulsory education vary in different countries and there is a difference in private pupils' legal relationship in regard to how permissive or restrictive the status of being a private pupil is. The learning community as an alternative way of education has appeared in more European countries and even beyond Europe, this research discusses three European countries – Austria, Hungary and Romania – the way they regulate the fulfilment of compulsory education and their regulations in how they permit being a private pupil, as well as the attitude of educational governance towards this new form of alternative education.

Keywords: *Public education, alternative education, learning communities.*

1. Introduction

After 2011 a new alternative educational form appeared on the palette of Hungarian public education: learning communities that provide alternative education for schoolchildren who take part in alternative or mainstream education as private pupils. The learning communities are not schools in the traditional way, but we can simplify it as home-schooling in a more organized way. (Dobos, 2019; Langerné Buchwald, 2019). The conditions of learning communities and regulations in connection with the fulfilment of compulsory education vary in different countries (Petrie, 2001) and there is a difference in private pupils' legal relationship in regard to how permissive or restrictive the status of being a private pupil is (Langerné Buchwald, 2019). The learning community as an alternative way of education has appeared in more European countries and even beyond Europe, therefore, in the framework of the present research, we sought to find out to what extent learning communities are widespread in three neighbouring European countries - Hungary, Austria and Romania - and what is the attitude of the educational administration in these countries towards this new form of alternative education.

2. Methods

On one hand, the fulfilment of compulsory education and the legal background behind the permission of being a private pupil were investigated: the National Public Education Act (2011) in Hungary, the Compulsory Education Act (1985) in Austria and the National Education Act (2013) in Romania. On the other hand, the literature and the articles on the subject were analysed.

In the course of the research, we investigated how three European countries - Austria, Hungary and Romania - regulate the fulfilment of compulsory school attendance and the authorisation of home schooling as a condition for the existence of learning communities, and how educational management approaches this new alternative form of education. We also sought to find out what motivates parents to send their children to a learning community instead of a formal school.

3. Results

In the analysis of the legal documents defining compulsory education and the status of home-schooling status, it became necessary to broaden the scope of the legislation included in the study, as different laws and regulations govern the way compulsory education can be fulfilled in each country. In addition, when exploring the literature on the topic, it became apparent that very little literature deals specifically with learning communities. This is because, on the one hand, they are a relatively new

phenomenon and, on the other hand, they are a 'grey area' for educational management, monitoring and research, since they are not formal schools, are not subject to state management and control, there are no official records on the number of learning communities and, consequently, they are not readily available for educational research.

3.1. Homeschooling vs. learning communities

The definition of learning communities can be based on the concept of home learning, which has several names in the literature. The terms home-schooling, home-based education (Webb, 1989), atypical education (Beck, 2002) or family schooling (Berényi, 2002) refer to the same alternative form of learning and teaching: a form of education where the child does not attend formal schooling - public or private - but studies at home (Basham, 2001). Home education can be provided entirely by the parent, but it is common for some specific subjects (e.g. foreign languages) to be taught by a private tutor (Nágel, 2012).

Learning communities can be seen as an organised form of home schooling. Their basis is the same, children do not attend public or private schools, but learning communities differ from home schooling in several ways. The first difference is in the size of the learning community, which is made up of children from at least two families. This implies the next difference, which is the most criticised aspect of home learning: children in a learning community have more peer social contact, whereas in home learning they only have contact with their own family. In addition, home learning takes place in the family home, whereas in the majority of learning communities, organised learning takes place outside the home, so that children have the experience of 'going to school'. Closely related to this is the fact that in the case of family learning, parents teach their own children, so the teacher-student relationship is secondary, whereas in the case of learning communities there is no parent-child relationship between children and the teachers who teach them. The parent who teaches the child is not necessarily a qualified teacher, whereas in a learning community there are typically qualified teachers. Learning communities are organised, which is not necessarily the case in home education and is more flexible. Another common feature is that they are not traditionally schools, but self-sustaining democratic communities, run solely by financial contributions from families and sponsors, and independent from the state in both financial and legal terms. In all cases, the pupils in these learning communities are private pupils in formal schools (Langerné Buchwald, 2019).

3.2. Hungary

After 2011, the government in power in Hungary started a strong centralisation of education policy, which led many families to choose alternative education for their children instead of the mainstream public school. However, the number of officially operating alternative schools in Hungary is relatively low, and enrolment in alternative schools is difficult due to continuous over-enrolment, which has led to the emergence of the learning community as a new form of alternative education in Hungarian public education and a significant increase in the number of children with private school status (Hajdu et al., 2019). According to the data registered by the National Network of Private and Home-schooling Communities (2019), there were 22 learning communities in Hungary in 2019, but estimates put the number at around 100.

From the point of view of its permissive and restrictive nature, the legal regulation of private student status in Hungary can be divided into two distinct periods, the point of departure being the amendment to the Public Education Act of 2011, which will enter into force in September 2020 and will affect compulsory schooling and private student status. The national law on public education, which will be in force before 2020, extends the definition of compulsory education to compulsory participation in institutional education and training, which, if it is "not detrimental to the pupil's development and the successful continuation and completion of his or her studies", may be fulfilled not only by attending school but also, at the request of the parent, by private schooling. However, the amendment to this law, which has been in force since September 2020, has significantly restricted the possibility of fulfilling compulsory schooling, stating that "compulsory schooling may be fulfilled by attending school", which may be derogated from only by applying for an individual work schedule for a limited period of time in justified cases (Government Decree 196/2019 (VIII.1.)). Thanks to this restrictive amendment, the number of learning communities in Hungary has drastically decreased, but their existence has not completely disappeared.

The government's approach to learning communities can also be divided into two phases. While the number of pupils with private school status at the request of their parents, and hence the number of learning communities, was low, their existence was accepted. However, the significant increase in their numbers has encouraged the government to prevent the proliferation and reduce the number of learning communities operating in a grey area beyond its control, and to return teachers and children in learning communities to state-controlled public education institutions.

3.3. Austria

In Austria, the number of home-schoolers and learning communities increased during the coronavirus epidemic: the number of children with home-schooling status tripled - from 2,100 to 7,500 - and more learning communities were established across the country (Zahl der Schulabmeldung steigt, 2021). This is due to protests against the strict measures against the coronavirus epidemic, such as compulsory mask wearing and testing at school, and fears of an epidemic, which have led many Austrian families to choose home schooling for their children, but instead of teaching their children at home, they have sent their children to a substitute school (Mehrere illegale Privatschulen in Österreich entdeckt, 2021).

Home education in Austria has been enshrined as a basic right of citizenship in the Austrian constitution (Staatsgrundgesetz über die allgemeinen Rechte der Staatsbürger, 1867) since the time of the Austro-Hungarian Monarchy. On the other hand, compulsory schooling can be fulfilled by attending home schooling or private schools without public law, with the permission of the education authority, by pupils having to take an annual external examination in public schools with public law (Schulpflichtgesetz, 1985). However, the Austrian legislature has dealt with the situation of the learning communities separately since their inception, and it has been decided that home education may be transferred to a private school providing an education equivalent to that of a public school or a school with public law, and that, according to a precedent-setting decision of the competent Austrian educational authorities, learning communities do not meet this criterion. (Erkenntnis des Bundesverwaltungsgerichts Republik Österreich, 2021) Home schooling is therefore still legal in Austria, but its organised implementation and placement in learning communities is illegal.

3.4. Romania

In Romania, unlike the previous two countries, the number of home-schooled children in public education is low at around 500, but in recent years more and more families have opted for home education. No information on the functioning of learning communities was found. There are no precise figures on the number of children who choose home education, as home education is subject to strict conditions for authorisation and therefore the statistics on officially registered home schooling do not reflect the full reality. Some parents therefore enrol their children in Hungarian or American schools, where they are allowed to study abroad as opposed to home schooling, and then complete their compulsory education as private students. The reasons behind the decision to home school are dissatisfaction with Romanian public education on the one hand, and the possibility of personalised education on the other (Kiss & Körössi, 2016)

The Romanian National Education Law strictly regulates the conditions for home education and only allows it in very justified cases. According to the law, public education must be organised in the form of a timetabled or reduced timetabled education. The only exceptions to this are children with special educational needs and children who are immobile for medical reasons, whose education at home or in a health institution is organised by the education inspectorate on the basis of a methodology developed by the Ministry of Education (National Education Act, 2013). In this case, the child is enrolled in the nearest school of his/her place of residence and is taught at home by a teacher appointed by the school, based on the curriculum or personalised teaching materials (Kiss & Körössi, 2016). However, all Romanian citizens can participate in alternative forms of education in Romanian, the language of national minorities or the world language without restrictions (National Education Law, 2013), and the qualifications awarded by them are recognised by the Romanian education system (Kiss & Körössi, 2016).

Although home schooling is not currently widespread in Romania, the demand for it has led the National Association for Home Education to repeatedly submit a draft to Parliament for a law amendment to allow all families to choose home education.

4. Conclusion

The results of the research showed that the acceptance of home schooling and learning communities in the grey zone differs from country to country along the dimensions of permissive-restrictive-prohibitive. In Hungary the fulfilment of compulsory education and the regulation of the legal background of being a private pupil have changed, instead of previously permissive laws, they are now significantly more restrictive. However, the operation of learning communities is legal, despite restrictive measures aimed at reducing the number of private students and learning communities. In Austria, a private student status is attainable, the choice of home education is a fundamental right, but the learning communities, that consist of private students, are considered to be illegal schools, their operation is against the law. In Romania the permission private student status is strictly limited, so the

rate of private students is low, but one can fulfil the compulsory education by attending school abroad, and thanks to this the number of private pupils has increased recently, and efforts have also begun to relax legislation on home education.

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IRDI - METHODOLOGY: AN EDUCATIONAL PROGRAM FOR CHILDREN MENTAL HEALTH PROMOTION IN NURSERIES

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Abstract

In an attempt to propose educational programs that can improve mental health of children since early childhood, a group of researchers created, in first place, the IRDI protocol, validated as a tool to predict psychic risk to child development in general. The IRDI protocol includes 31 indicators focusing on the baby-caregiver relationship in the first 18 months of life, based on the premise that the foundations for mental health are established in this period and are dependent upon the bodily, affective and symbolic relations of the caregiver-baby dyad. Then, as a continuation of the IRDI validation, new research was proposed: the “IRDI Methodology – a psychoanalysis-based intervention with nursery educators” sought to assess the IRDI as a tool for accompanying and promoting mental health in child education institutions, and also aiming to prevent further problems such as school exclusion due to mental disruptions. The methodology consisted of a follow up of 364 children distributed in 26 nurseries in São Paulo through IRDI indicators during 9 months at the nursery. Absent IRDIs were an indication of possible obstacles to a child’s psychic constitution. When some of the mental health indicators were absent, the researcher worked along with the nursery caregiver in order to turn the indicators into present indicators. This paper presents the validation of the IRDI Methodology, which was based on the comparison of the rate of “turned present indicators” with AP3 results, a tool for assessment of mental health problems at the age of three. As a result, the children who had “turned present indicators” showed significantly more positive mental health indicators at the age of three at AP3 than those who didn’t. It was verified that the on-the-job accompanying of nursery caregivers had a preventative effect on the possibility of children displaying both developmental problems and obstacles to their psychic constitution.

Keywords: *Child education, prevention, mental health, nursery caregiver, child development.*

1. Introduction

Many existing early childhood education institutions still carry, in Brazil and in the world, the marks of their historical connection with Social Assistance and understand their mission as being mainly that of benevolence. Although early childhood education is thought of as an educational tool, it is not thought that its role as a promoting mental health tool has a great weight in a child's life (Pesaro, Kupfer & Davini, 2020).

Babies are still seen as beings with an almost non-existent mental life. In addition, few efforts have been made to train early childhood education teachers to promote psychic development (Oliveira, 2007), although great progress has already been made in terms of training early childhood education teachers to attend to the development of children. intellectual, motor and even affective.

In the present work, a distinction is being made between affective development and psychic development. The latter is understood as “the dimension of development responsible for the installation of subjectivity, on which bonds of desire, directed towards their fellow human beings, are supported. These bonds are built very early and dictate the direction of the child's relationships over the course of their existence (Kupfer et al., 2012). The psychic development must be articulated with people who ensure the fulfilment of the paternal and maternal functions in their symbolic meanings.

Some research has shown that early interventions based on psychoanalysis can avoid long periods of suffering and treatment (Laznik, 2000). An early childhood professional who is knowledgeable about a baby's subjective life can become an invaluable mental health promotion agent. Much research

demonstrates that psychic care for infants reduces the incidence of mental disorders both in childhood and adulthood (Mota et al., 2015).

Thus, care at the daycare centre can also make subjective marks. They are marks important enough to reorient and inflect the direction of a child's destiny. In this way, the actions aimed at clarifying and training early childhood professionals regarding development, especially on the subjectivity of babies, gain special interest.

2. Objectives

The problem that arose in the research presented here was to investigate ways to lead early childhood education teachers to become assistants in the promotion of children's mental health, based on psychoanalysis, from early childhood.

The aim of the research was then to test a methodology for training and in-service monitoring of early childhood teachers based on the IRDI instrument, seeking to investigate whether the use of this methodology in early childhood education contributes to reducing the incidence of ulterior psychic developmental problems, and also aiming to prevent further problems such as school exclusion due to mental disruptions.

The IRDI methodology is currently defined as a procedure for monitoring psychic development carried out by psychoanalysts in early childhood education institutions through clinical indicators with value for early prediction of developmental problems (Kupfer et al., 2009).

3. Research instruments: IRDI and AP3

Table 1. The IRDI protocol adapted for nurseries.

Age in months:	Indicators:
0 to 4 incomplete months:	<ol style="list-style-type: none"> 1. When the child cries or screams, the teacher knows what the child wants. 2. The teacher talks to the child in a style that is particularly addressed to the child (<i>motherese</i>). 3. The child responds to <i>motherese</i>. 4. The teacher proposes something to the child and waits for their response. 5. Teacher and child exchange eye contact.
4 to 8 incomplete months:	<ol style="list-style-type: none"> 6. The child responds to nursery routines 7. The child uses different signs to express different needs. 8. The child demands the teacher's attention and waits some time for her response. 9. The teacher talks to the child using short sentences to address him/her. 10. The child responds (sound, vocals) when the teacher or somebody else addresses them. 11. The child actively seeks contact with the teacher's eyes. 12. The teacher supports the child's initiatives without stopping their efforts. 13. The child asks for help from others without remaining passive.
8 to 12 incomplete months:	<ol style="list-style-type: none"> 14. The teacher understands that some demands from the child may be a way to call her attention. 15. During body care, the child actively attempts to play loving games with the teacher. 16. The child shows that they like or dislike something. 17. Teacher and child share a private language. 18. The child feels ill at ease with unknown people. 19. The child has favorite objects. 20. The child makes playful movements and faces. 21. The child seeks the adult's look of approval. 22. The child accepts semi-solid and varied foods.
12 to 18 months:	<ol style="list-style-type: none"> 23. The teacher alternates between collective moments and moments dedicated exclusively to the child. 24. The child endures the teacher's brief absences well while reacting to longer absences. 25. The teacher offers toys as alternatives to the child's interests in the teacher's body. 26. The teacher no longer feels compelled to meet all of the child's demands. 27. The child looks curiously at things that interest the teacher. 28. The child likes to play with objects used by the teacher. 29. The teacher starts to ask the child to say what they want, not being satisfied with gestures only. 30. The teacher establishes small behavior rules for the child. 31. The child differentiates between objects belonging to teacher and to them.

The second instrument applied in this research is called AP3 – Psychoanalytical follow-up of children aged three. This is a tool composed of axes chosen and organized according to the basic formative operations of the child's psyche. It was based on four categories, to cover what one expects to

find in the psychic functioning of a three-year-old child. The AP3 was built using the following analytical axes: Play and fantasy; The body and its image; Manifestation regarding rules and position before the law; Speech and positioning in language” (Kupfer & Bernardino, 2009).

The AP3 makes a record of whether or not the psychic constitution of the child assessed is progressing or at risk. Through the table of clinical symptoms that refer to the theoretical axes mentioned above, one can identify whether a child is displaying developmental difficulties and/or whether there are risks to the constitution of subjectivity. Thus, the expected clinical outcomes, when using the AP3, are: 1. Developmental problems and/or 2. Risks in the establishment of the subjective constitution, or, according to more recent terminology, structural obstacles in the subjective constitution. The latter are made evident by the presence of conclusive clinical symptoms related to problems in the constitution of the psyche, and point to an evolution toward serious childhood psychopathologies.

At the time of the research, AP3 was still not validated, which it is now, after new research carried on between 2017 and 2019. For more details, see Kupfer and Bernardino (2022).

4. Methods

The methodology consisted of a follow up of 364 children distributed in 26 nurseries in Sao Paulo through IRDI indicators during 9 months at the nursery. This research was carried out by the following steps: 1. Training of 20 psychoanalyst professionals on the bases of the IRDI instrument; 2. Presentation of the IRDI to 40 teachers. During the course of the research, the researchers filled in the IRDIs protocols for the monitored babies, noting the presence or absence of each indicator, in each band, and had biweekly conversations with the teachers based on the markings made.

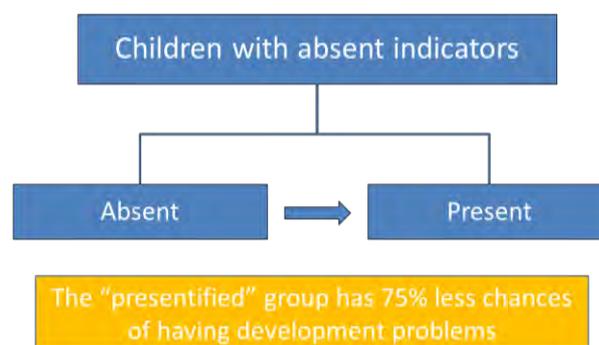
Absent IRDIs were an indication of possible obstacles to child’s psychic constitution. When some of the mental health indicators were absent, the researcher worked along with the nursery caregiver in order to turn the indicators into present indicators. There were no “classes” on how to care for babies, but the researchers who performed the IRDI methodology frequently discussed it with the nursery teams in relation to the babies and their indicators. Thus, the teachers were instructed to pay attention to cases where the indicators were absent, and the indicators would then frequently become present in subsequent IRDI assessments. For some children, however, some indicators never came present, due possibly to situations out of the reach of the nursery.

After three years, the children were submitted to an AP3 evaluation. A comparison of the rate of “turned present indicators” with AP3 results of the children was then made in order to assess how much the transformation of the indicators into “present” had an impact on babies’ mental health at three years.

5. Results

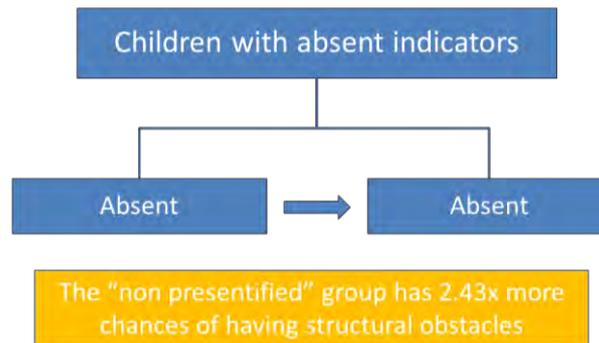
It was observed that the children who had “turned present indicators” or “presentified” indicators showed significantly more positive mental health indicators at the age of three at AP3 than those who did not. Considering the two AP3 clinical outcomes (development problems and structural obstacles), children who initially had absent indicators and then presented them after the intervention with the teacher were 75% less likely to have developmental problems compared to babies who showed absent indicators which did not become present (Figure 1).

Figure 1. Comparison between children with absent indicators and present indicators in clinical outcome 1.



Nonetheless, children who did not have their indicators “turned present” were 2.43 times more likely to have structural obstacles (Figure 2).

Figure 2. Comparison between children with absent indicators in clinical outcome 2.



These results are especially concerned with the axes 1 and 3 of the AP3 instrument – “Play and Fantasy” and “Manifestation regarding rules and position before the law”. It means that the children who had their indicators “made present” in the second wave were especially successful in these domains.

6. Discussion

The results here presented allow us to state that training educators on the job is effective for changing their relationship with children. Thus, we can argue that nursery educators can be mental health promotion agents. In addition, we can also state that in early infancy, the Child Education environment is favorable for detecting child development risks pertaining to the psychic sphere (Kupfer, Bernardino, Pesaro & Mariotto, 2015).

The constitution of play and fantasy is an important organizer of the baby’s and toddler’s relationship with his inner and outer world. This research result allows us to propose that an effect of on-the-job training for teachers must be more focused on actions that include playful and pleasurable activities, so as to promote enriching play and the use of fantasy in daily nursery life, thus providing children in their care with greater psychic resources for their intrapsychic and interpersonal relations.

The results confirm the importance of axis 1 – Play and fantasy –, this time to the whole of the child’s development, which leads us to believe that the constitution of this psychic organizer is central to all the child’s areas of evolution. Ever since the first psychoanalytic texts, many theorists have spoken of the connection between play, fantasy and the possibilities that these resources offer children for dealing with the separation between the I and the Other (Winnicott, 1971), transforming difficult experiences into pleasurable ones (Freud, 1909/1980), allowing them, in their condition as children, to have control of the world that surrounds them (Freud, 1909/1980; Winnicott, 1971), and having access to representations (Klein, 1930/1981); in short, for making their passage between their internal world and external reality (Lebovici & Mazet, 1986). These research findings allow us to confirm these clinical and theoretical hypotheses, and also highlight the importance of play and fantasy in child education settings, aspects that are devalued in the growing trend of “pedagogization” of infancy.

In addition, the finding concerning axis 3 (“manifestation regarding rules and position before the law”) is coherent both with the results of the Multicentered Research on Clinical Indicators, the original IRDI research, and psychoanalytic theory. In the IRDI validation results, the indicators relating to paternal function showed themselves to be important for detecting obstacles to the constitution of subjectivity. The AP3 protocol sought to recover these indicators (which in the IRDI referred to the capacity of the agent of maternal function to transmit rules and regulations to the baby) in the child at the age of 3. And in the study this paper refers to, it was precisely in the axis relative to rules and regulations – in children whose IRDI indicators were not made present – the significant difficulties were found. Like those of the original IRDI research, these results confirm theoretical psychoanalytic hypotheses (Freud, 1920/1980; Lacan, 1999) on the paternal function as central to psychic organization. As a result of its nodal function in the three aspects (symbolization of absence, response to real dimension of castration anxiety and imaginary containment for the body), the paternal function offers psychic stability to the child.

However, the monitoring of babies and their teachers by means of the IRDI methodology can still be improved so as to increase the effectiveness of interventions regarding language and the constitution of the baby’s body image, because the difference between results on IRDI follow-up and on AP3 results in these axes was not significant.

Finally, it can be observed that the IRDI methodology in daycare centres offers somehow resistance to the tendency of medicalization of education, which expects the teacher to set diagnosis of the children under their care. In this methodology, an effort is made in the direction of taking away the

burden of diagnosis from the teacher, who experiments a relief when the researchers are besides them, telling them they can only follow the growing up of the babies and there is no intention of setting early diagnosis that would determine, in a bad way, their future.

Besides, the IRDI methodology values the teacher's subjective educational act, telling him that he is more than a diaper changer.

The IRDI methodology tries to reintroduces the look for the subject in the educational field, a look that has been excluded from current scientific practices. With this, we will be trying to guarantee that a baby becomes a subject of desire.

Yet no doubt remains as to the urgency of looking at subjectivity in nurseries in order to prevent serious childhood psychopathologies in time. A methodology that includes monitoring babies' psychic development can be a powerful antidote against the erasure of the subject in today's world. Although its main objective is not to eliminate suffering or the appearance of very serious psychic problems, the IRDI monitoring can contribute towards reducing them, and, what is more important, it can help the children monitored to be able to situate themselves in the field of language so that they can convey their suffering or their joy in their own way.

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A CASE OF AN ASSESSMENT MODULE IN DISTANCE EDUCATION AT THE UNIVERSITY OF PRETORIA

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Abstract

The purpose of the study was to thoroughly investigate the experiences of all role players in a Distance Education module. This study wanted to shed light on how the organisation of a specific Distance Education module, namely Assessment Approaches, could be improved. The study looked at the students' experiences of the pedagogy (like the contact sessions) and the staff involved (the organisation and management of the module), the students' and tutors' experiences of the technology used and the content and assessment of the module. The methodology followed was a descriptive and explorative qualitative case study, using semi-structured interviews and online questionnaires. Semi-structured interviews were held with the current, and previous instructional designer of Distance Education, as well as the academic supporter of the assessment module. Questionnaires in Google Form format were sent to the tutors of the module as well as the students. Responses were obtained from three tutors and 22 students. Findings concluded that students chose the Distance Education qualification as a result of Covid-19 for their personal and professional development. The Distance Education administration is working effectively and is very helpful to the students, but strategies to increase student participation are needed. The contact sessions are effective but need to be done more often. The learning management system, Blackboard, is easy to use and user-friendly. Students specifically make use of the discussion board to communicate with each other and lecturers. They also find the contact sessions organised on Blackboard Collaborate useful and use the recordings of the sessions if they cannot attend virtually. They experience the assessment module as very relevant to their teaching practice. They would like to learn more about different subject-related applications. They believe the assessment activities for the module are well planned and they benefit specifically from the elementary statistical procedures.

Keywords: *Assessment content, Blackboard LMS, distance education, pedagogy, technology.*

1. Introduction

For a number of years, the University of Pretoria has been offering a variety of distance education programmes. Currently, the Unit for Distance Education (DE) in the Faculty of Education specialises in the Bed Hons in Computer Integrated Education, Learning Support, Education Management, Law and Policy, and the undergraduate Advanced Diploma in School Leadership and Management (SLM) and Advanced Diploma in Visual Impairment Studies. The API733 (an assessment module) is part of the graduate qualifications of all these specialisations. The role players in all modules are the DE administration, the academic supporter, tutors, lecturers and the students.

2. Background

All the content is digital and uploaded on the Blackboard Learning Management system using a common template for all modules. There is no dispatch of printed material to students. Content is derived from varied resources instead of one textbook. Large classes are split into groups of 50 students or less and a tutor is appointed to oversee teaching and learning activities. Formerly face-to-face contact sessions were used in about six different venues across the country. Contact sessions play an important role in the pedagogy at UDE. During contact sessions, the academic staff gives lectures, facilitate activities and offer study support. Issues that came up during the marking process are discussed. Students have an opportunity to interact with the lectures and their fellow students. Since the start of Covid-19 these contact sessions have been online, facilitated in Blackboard Collaborate. There are two mandatory orientation sessions for tutors twice a year and at least three contact sessions for students before

assignments. Each module also conducts in-between contact sessions as needed. Discussion boards are used for academic discussions. All assessments are conducted online and no students physically sit any written exams.

3. Rationale of the research

The purpose of this study was to thoroughly investigate the teaching and learning experiences of all role players in a distance education assessment module at the University of Pretoria. The reason for this was mainly to determine if the use of technology, pedagogy and content of this module can be improved.

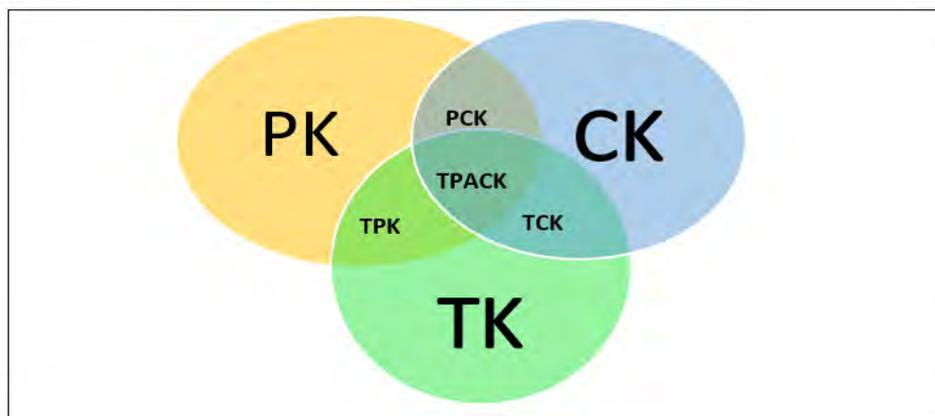
4. Research question

What are the teaching and learning experiences of the different role players in the API733 module in the DE programme of the University of Pretoria?

5. Theoretical framework: Technological Pedagogical and Content Knowledge framework (TPACK)

The TPACK model is based on Shulman's (1986) explanation of Pedagogical Content Knowledge (PCK). Shulman's model explains how educators' PCK work together to produce effective learning and teaching (Shulman, 1986). TPACK extended these two main elements to create three main elements for effective teaching and learning: content, pedagogy and technology (Graham, 2011; Koehler & Mishra, 2009).

Figure 1. The TPACK model (Mishra & Koehler, 2006).



This study used an adaptation and extension of the TPACK framework by concentrating on:

- The content of a distance education (DE) assessment module
- The role players in this module, namely the lecturer, academic supporter, tutors and students;
- The pedagogy used by the lecturer, academic supporter and tutors in the assessment module;
- The technology used by the tutors and students, namely the affordances of Blackboard.

6. Methodology

6.1. Methodological paradigm

Qualitative research involves collecting and analysing how “humans arrange themselves in their settings” and “how inhabitants of these settings make sense of their surroundings” (Maree, 2020). During the proposed study, a qualitative methodology was used to acquire new knowledge. The study undertook a qualitative approach because it dealt with words and meanings to understand the participant's ideas, beliefs, opinions and experiences. The data was analysed to gain insights into the students, tutors and academic supporter's views of an assessment module. The benefit of the ideas and experiences is the potential improvement of the content, pedagogy and use of technology in a DE assessment module.

6.2. Research design

Case study research is a method that allows the in-depth analysis of a complex phenomenon in a real-life situation or problem (Coimbra & Martins, 2013). A descriptive case study was conducted during this investigation. Descriptive case studies often attempt to describe a particular situation or case that happened in real-life in a lot of detail. It usually includes a description of the people or groups that are involved in a given situation, as well as additional facts of the situation/case at hand that enables readers to understand the problem and the causes better (Adolphus, 2020).

6.3. Sampling

Maree (2020) defines convenience sampling as a method used by researchers to select samples for research data because they are quickly and conveniently available, but it does not necessarily result in a representative sample. The sampling for this study was convenient, because all the participants are available on Blackboard; signed up for a specific module of the lecturer in question. Maree (2020) describes purposive sampling as a method used to select samples with a specific objective in mind. All participants had something to do with a specific online assessment module, namely the academic supporter, tutors and the students registered for the module. A semi-structured interview was held with the academic supporter and three tutors. Twenty-two students filled in a Google Form survey.

6.4. Data collection strategies

Kabir (2016) describes data collection as the systematic process of gathering information from relevant sources to answer research questions, test hypotheses and achieve the research project's objectives. There are various methods for data collection. In this research study I used semi-structured interviews and a Google Forms survey.

Nieuwenhuis (2020) defines semi-structured interviews as a line of open-ended, probing questions that the researcher develops before the interview. He explains that the researcher asks a list of open-ended questions and further probes and clarifies without getting side-tracked by trivial aspects. I also used a survey that is defined as a research tool that collects "information from a sample of individuals through their responses to a question" (Check, 2011). This is due to wanting to use a wide range of responses to a specific question to reach a conclusion. The self-created survey also allowed me to get the experiences and answers for these questions without needing to interview every participant in my research. The research collection tool that I used was Google Forms, which allowed me to provide the survey online, therefore allowing me to provide the forms without the need to give physical copies of the surveys and it allowed me to see the responses online.

6.5. Data analysis

According to Maree (2020), content analysis is the most commonly accepted data analysis strategy for descriptive qualitative studies. A broad definition of content analysis is any systematic method used to interpret specified aspects of messages objectively. It is a valuable technique that allows the researcher to discover and describe people, places, actions, places, context and events. Thematic analysis is a data analysis method for identifying, scrutinising, organising and reporting themes (patterns) 'emerging' in the data (Braun & Clarke, 2006). Braun and Clarke (2006) argue that thematic analysis is a valuable method for analysing the perspectives of different research participants, identifying similarities and differences, and generating insights that the researcher did not anticipate.

7. Results and findings

7.1 About blackboard

The University of Pretoria Blackboard version is called ClickUp. Lecturers have a variety of course documents to provide to students. Such documents include the syllabus, handouts, projects and assignments. By providing these documents in a central location, students learn quickly to go to Blackboard to get everything they need. Most tutors and students find the Blackboard LMS easy to use and user friendly. It can be difficult to navigate for new students, especially those who are not tech savvy. The utilization of the LMS depends solely on the efficiency of the user. It is much simpler to use with sufficient and efficient training.

Blackboard has many features that help academics to stay organized and help students engage with content. Tools such as announcements help to communicate with students quickly, whilst the grade center provides grades in electronic format. Students prefer to see grades immediately. This electronic access reduces the number of enquiries - phone calls and emails - from students wanting to know a grade on a specific assignment or their overall grade in the course. The discussion board helps students to engage with content and becomes a community of practice. The integration of Turnitin into the LMS

helps lecturers and students guard against plagiarism. Blackboard Collaborate is the tool that is used to conduct online classes and meetings. It is easy to use and content can be shared via pdfs and PowerPoints. Participants can assume different roles, like participant, guest or moderator. Even groups over 250 can be accommodated on the platform.

Some suggestions for improvement from students are that the university should come up with strategies to increase student participation, for example a merit / reward system in the form of marks. ClickUp pages could be presented as an online study guide. It is irritating to download documents and store them offline. There should be links to hypertext on ClickUp pages. There should be a main page for each module with sub-pages listed in the left margin for each unit and text inside those sub-pages, instead of links to pdfs, Word docs, etcetera. There should be a downloadable pdf of documents at the top of the page for those who want to work offline. Some students also complain that messages that you start on the Discussion board are discarded if you go out of ClickUp. Provision should be made for Drafts.

7.2. Pedagogy and contact sessions

Students have a lecturer, academic supporter and tutor that run the module. The academic supporter is mainly in charge to conduct the contact sessions. In API733 contact sessions are done in the beginning of the module and before every assignment. In between students can use the discussion board or emails that are answered as soon as possible. According to students, instruction and training on the setting of assessment can be improved. Students have to do more discussions that count for marks. They must be able to defend their position. Owing to Covid-19 there are limitations that cannot be overruled, like network challenges and limited data.

to tutors and students physical contact sessions were great. It allowed for more students to participate and seek understanding before handing in assessments. Currently, fewer students participate because of the digital approach being used. Contact sessions should be compulsory to attend and done on a monthly basis. In the past it was mostly based on content. Students prefer that videos should be used. It is good that contact sessions are recorded. Contact sessions should be conducted at an earlier date in advance of the assignment date. Many students experience network challenges. Some students prefer to communicate with tutors through emails.

7.3. API733 module

Certain opinions feel that this module is one of the most imperative modules in the education fraternity. According to tutors and students it should be offered across specialisations. It offers students a critical insight and understanding of assessment and how to properly conduct it. Every educator needs this knowledge. Development of activities using Bloom's taxonomy, learning about principles and purposes of assessment are appreciated. One student said: "It is very relevant to my teaching practice. With the little development I received as a young teacher, I learnt a lot about assessment that is applicable to my work. It improved me as a teacher".

This module can be improved through sparking meaningful discussions and encouraging students to ask open-ended questions. Content on blended learning can be added. It can be added on how to deal with assessment of learners with barriers, and how to revise content before a learner is assessed. Many students do not know how to create online assessments. Marks should be added for discussions and research related activities. The module can focus more on setting quality assessments. There is too much focus on digital educational games without providing support to actually use these in class. More than 80% of schools do not have computer systems for learners and games are not incorporated in daily classwork. Monitoring and moderation are not covered as well as systemic assessment.

8. Conclusion

In this study the technology, pedagogy and content of an assessment module in Distance Education at the University of Pretoria were investigated. The main findings are that the Blackboard LMS is easy to use and useful. The pedagogy is mainly handled through contact sessions, discussions and putting up content on the LMS. The content of the module is seen as very important in the arsenal of teachers. The suggestions of the students as discussed above will be used to improve the module.

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SUPPORTING ACADEMIC ENGAGEMENT THROUGH IMMERSIVE TECHNOLOGIES

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Abstract

Academic engagement refers to the overall quality of students' involvement with schooling, including their activities and goals, as well as their connections with peers and educators. Much research has examined the facilitation and support of students' academic engagement within physical classroom settings. However, the field of education has been experiencing a shift from the status quo modus operandi of face-to-face instruction to online synchronous/asynchronous instruction, which has impacted students' engagement. This change has increased the demand to develop and adapt digital technologies that can support the engagement of students throughout online learning processes and their adjustment to the new educational norm. Fundamental research on the development and implementation of immersive technologies could provide a way forward, however we maintain that the development of such technologies needs to be guided by current pedagogical and psychological theories. Hence, in this paper, first we examine empirically substantiated frameworks of engagement and identify aspects that require consideration when developing new immersive technologies. Then, we present a succinct review of the technology-enhanced learning environments literature to determine how engagement has (or has not) been supported through immersive technologies, i.e., virtual reality (VR), augmented reality (AR), and 3D volumetric video. Finally, having embarked on the development of our in-house technology, an immersive 3D video prototype, we present the technology setup alongside the co-creation process that we are implementing to guide its development. Based on pedagogical and psychological research, we highlight several vital factors substantiating students' engagement, including the significance of the teacher's role and the importance of teacher-student and student-student interactions. These factors serve to guide our qualitative data collection during co-creation sessions to uncover students' and teachers' new perspectives of engagement in relation to the affordances that immersive technologies should offer. Our work presents insights to educators, technology designers and researchers about important educational frameworks and considerations directing our development of immersive technologies in support of academic engagement.

Keywords: *Academic engagement, immersive technologies, students, teachers, technology development.*

1. Introduction

Students' academic engagement and suitable strategies to promote it have been well-researched in face-to face classroom settings (Skinner, Furrer, Marchand & Kindermann, 2008). Numerous theories and frameworks are found in the literature informing pedagogical practices (Matos, Reeve, Herrera & Claux, 2018), with much focus on positive influential factors, such as classroom structure, teacher support, teacher-student relationships, constructive feedback, peer relationships, and task characteristics (Fredricks, Blumenfeld & Paris 2004). However, with the accelerated need of online synchronous/asynchronous education delivery, new types of interactions supported by technology need to be established. Many online learning environments have focused on supporting learning performance and management, rather than embracing pedagogical principles (Alqurashi, 2016). Concepts of engagement, social presence and immersion have mostly been associated with gamification approaches rather than learning technologies (Antonaci, Klemke, Lataster, Kreijns & Specht, 2019). We maintain that catching up with the new educational norm, digital technologies and technology-enhanced learning (TEL) environments need to adapt and develop in order to support pedagogical learning processes including the

different constructs of engagement. We maintain that immersive technologies offer a wider range of affordances for engaging students in learning activities e.g., full-bodied immersive/interactive experiences beyond text and videos. We further postulate that even though emerging immersive technologies, such as 3D live video streaming (e.g., holograms), are at an early technical stage for wide adoption, it is of utmost importance to involve stakeholders from different fields in the conceptualisation of those technologies. Through the means of co-creation, it is possible for us to discover TEL-native ways of learning, avoiding the bias of only extending pre-existing teaching methods using new technology, and rather utilising what the new technology can offer for supporting engagement, learning and teaching. We have therefore assembled a multi-disciplinary team, consisting of educational technologists, educational psychologists, software engineers and human-computer and child-computer interaction designers to advance 3D live streaming technologies from a technical and a pedagogical perspective using co-design methodologies.

In this paper, we present a theoretical background on engagement as guiding pedagogical construct to inform the development of immersive technologies in educational contexts. We further provide an overview of related work on engagement in TEL. We then outline our current and future work on developing “beyond the imaginable technologies for sustaining remote life”¹, striving to propose a promising approach to TEL, towards supporting academic engagement in different forms.

2. Theoretical Framework

2.1. Academic Engagement – Definition, Models and Associations

Academic engagement is a complex and multifaceted construct and has been well investigated from the perspectives of education and psychology, with most authors agreeing that it can be differentiated into cognitive, behavioural, emotional, and agentic engagement, all of which have a direct impact on students’ academic success and well-being at all levels of education (Fredricks et al. 2004; Reeve, 2013; Skinner et al. 2008). According to Fredricks et al. 2004, cognitive engagement refers to students’ psychological investment devoted to learning and the usage of self-regulation and learning strategies, whereas behavioural engagement is displayed through rule compliance in the classroom as well as active participation in learning activities and other school related activities. Fredricks et al. 2004 also indicate that emotional or affective engagement refers to students’ affective states or reactions in the classroom. Agentic engagement, on the other hand, is seen as students’ proactive and constructive contribution towards the conditions and content of learning activities and instruction (Reeve & Tseng, 2011; Reeve, 2013).

As engagement is a prominent educational construct, multiple frameworks and models have been developed to understand how it works. Skinner et al. 2008 present the *Self-System Model of Motivational Development*, explaining the contextual and individual differences through which engagement is fostered in K12 classrooms. In the model, actions result from the interplay of the context and self (e.g., behaviours and emotions), which in turn results in outcomes (e.g., learning and achievement). This model showcases the complexity of internal dynamics (e.g., behaviour and emotions) and external dynamics (e.g., contextual factors such as classroom relationships) of engagement. In the same vein, considering the key psychological role that emotions play in learning and development, Pekrun & Linnenbrink-Garcia, 2012 put forward a model in which engagement is seen as a mediator between students’ emotions and their achievements. In addition, Reeve (2013) proposes a model of student’s engagement based on Self-Determination Theory (SDT) constructs, called *student-teacher dialectical framework*. The model shows the interplay between the learning environment (e.g., relationships, classroom affordances, etc.) and the quality of the student’s motivation (e.g., intrinsic motivation, psychological needs, personal goals, etc.), as moderated by the quality of teacher motivating styles towards the student.

With several factors contributing to students’ engagement, we focus on:

Teacher’s role. Teacher’s support, both academic and interpersonal, has an influence on behavioural, cognitive, emotional and agentic engagement (Fredricks et al., 2004; Cohen, Moed, Shoshani, Roth & Kanat-Maymon, 2020). Engagement is fostered when teachers create respectful and socially supportive learning environments, encourage understanding, and support autonomy; hence, teachers need to focus on both social and intellectual dimensions (Fredricks et al., 2004, Cohen et al., 2020). Moreover, research shows that teachers’ effective feedback (i.e., clear descriptions, suggestions for improvement, assistance in reflection) is positively associated with behavioural engagement (Monteiro, Carvalho & Santos, 2021) and emotional engagement (Tvedt, Bru & Idsoe, 2021).

Peer interactions. Perceptions of relatedness with classroom peers, including a general sense of getting along with each other, receiving respect, and not getting teased, is positively associated with

¹BIT: TIP <https://sites.utu.fi/bittip/>

behavioural engagement (Mikami, Ruzek, Hafen, Gregory & Allen, 2017). Students who are more accepted by peers show fewer steeper declines in behavioural engagement in late primary school (De Laet, Colpin, Vervoort, Doumen, Van Leeuwen, Goossens & Verschueren, 2015). Furthermore, interview studies showed that primary school students felt high emotional engagement when collaborating on tasks with peers (Parsons, Malloy, Parsons, Peters-Burton & Burrowbridge, 2018), and secondary school students named relationships with peers as one of the most important factors influencing their engagement (Yusof, Oei & Ang, 2017).

From this, the engagement construct as investigated and discussed in the face-to-face classroom environments' literature could be seen from the perspective of the role of interpersonal relationships among students and between students and teachers (this is also in accordance with the social cognitive theory of Bandura, 2005, which indicates that we learn through "social modeling"). Therefore, when developing immersive digital technologies or TEL environments for online/blended learning we must consider how these technologies could support relationships (e.g., supporting social presence (Rötkönen, Suero Montero, Pope & Sutinen, 2021)) that afford the reproduction of complex contextual and interpersonal dynamics, which could foster the evolution of engagement as if it were in the classroom.

2.2. Engagement within Technology-enhanced Learning Environments

Research on technology-enhanced learning (TEL) environments' implementation in K12 education reports, for instance, that collaborative technologies such as Google Docs, Google Classroom and Edmodo are positively linked to engagement (Bond, 2020). A game-based immersive AR environment for first language vocabulary learning has been reported to improve cognitive engagement in 2nd graders (Wen, 2021), where cognitive engagement was analysed in terms of the interactive, constructive, active, or passive (ICAP) framework (Chi & Wiley, 2014). Research also shows that technologies that support freedom of movement could foster higher levels of engagement in/during learning activities, including flexible classroom environments that can be transformed according to the specific needs of the learning activity to promote engagement (Ozkan Bekiroglu, Ramsay & Robert, 2021). Dunleavy, Dede & Mitchell, 2009, for instance, on their study about the affordances and limitations of AR in education report that the interactive and situated narrative alongside the collaborative problem-solving affordances of the AR simulation were highly engaging for students, though an added cognitive burden was also reported in terms of the management of the technology for teaching and learning. On the other hand, the use of immersive virtual reality (VR) in K12 education is relatively limited, with Freina & Ott, 2015 reporting matters of safety regulations as one likely reason for the slow uptake (i.e., the equipment such as 3D goggles is recommended to be used by 13-year-olds and older). Nevertheless, affordances of immersive VR technologies such as easy customisation for specific group of students, simulation of real-life interactions with people, objects and places, and virtual simulation of time in which long periods can pass by quickly, to name a few, makes the use of this immersive technology very appealing in educational environments (Beck, 2019). Yet, considerations in terms of how such immersive technologies should support pedagogical processes and constructs, such as engagement, is still under-researched and not well-understood.

3. Immersive 3D Video Prototype

Figure 1. Left) immersive 3D video prototype schematic. Right) Setup implementation with students ©2022 BIT: TIP.



*For anonymity, students' faces have been blurred

Our live sensory immersive 3D video prototype (Figure 1) has been created to support the rapid demand of high-fidelity distance learning in order to overcome the limitations of current video conference solutions (e.g., 2D images, limited full body interactions, etc.). Though research exists on immersive

virtual learning environments, there is still a need to further research on the development, implementation and educational affordances of immersive volumetric video technology as it is in its infancy (Pope et al. 2020). Nevertheless, immersive 3D video is now possible from a hardware perspective and involves capturing spatial position in addition to colour information so that when an immersive virtual reality (VR) or AR headset is worn it is possible to move around and experience a real remote place and people. This also opens the door to additional affordances, for example mixing real and virtual interactive elements in new ways. With 2D and 3D display screens, e.g., on desktop computers and tablets, the digital and digitised elements can be ubiquitously involved even without a headset. Our prototype consists of a set of stereo or active depth cameras, such as the Intel LiDAR L515, arranged around the edges of a room. The cameras are calibrated and fused together to produce a set of depth maps for the scene, mapping each pixel to a spatial location. These depth maps are then encoded into a regular colour video format such as HEVC using a colour mapping. At the remote end, arbitrary viewpoints can then be rendered from these depth maps in real-time using novel algorithms being developed by our research group. The results are being displayed on a web-based desktop application, and in a Microsoft HoloLens 2 to create the immersive AR experience where people appear as holograms. The key challenge is to minimise latency whilst maintaining a stable image given the high level of noise from the cameras.

4. Co-creating New Perspectives of Engagement

We maintain that the development of immersive technologies needs to be guided by current pedagogical and psychological theories in order to facilitate its sustainable integration and uptake in the educational arena. Furthermore, it is important that students' and teachers' perspectives of engagement are taken into account, as they will be the key end-users of the technology when deployed in educational contexts. Instead of focusing merely on present theories, therefore, it is important to gain new insights into how students and teachers conceptualise engagement in TEL environments and to identify what factors are important to them in such spaces.

To accomplish this, we propose the collection of data via multiple methods of co-creation, including interviews, role-playing scenarios and the creative constructions of classroom spaces and agents. To inform the technology development, we opt to focus on behavioural, emotional, and agentic engagement, as we maintain that these forms are the ones most likely to provide ideas for new affordances, as well as being the ones most easy for students and teachers to reflect on and conceptualise. During already implemented co-creation sessions using a role-play strategy, for instance, we examined what aspects of teacher-student relationship, teacher's feedback (e.g., in the form of rewards and praise), autonomy support, and group work were most important for supporting the students' engagement on a given task, as well as the role that the physical classroom space and technology played (e.g., in accordance with the known factors that contribute to engagement). This process was facilitated by physical prompts (e.g., Lego, glasses, cardboard spaces) as well as by our early immersive 3D video prototype. The collected data, thus, will inform the next phase of development, during which suitable affordances will be extracted, i.e., examining which new identified factors can be transferred into the technology and/or how these may be reimagined within the technology. This process will follow a systematic content analysis approach involving the multidisciplinary team.

5. Future Outlooks

Our ongoing multi-disciplinary research on advancing immersive 3D live streaming technologies within educational contexts opens new methodological, theoretical and technical perspectives of TEL, by considering established pedagogical theories and constructs, such as engagement, as well as by involving students and teachers in the development through co-creation. In this paper we have challenged the view that technologies are merely tools serving to enhance face-to face learning. We continue to strive toward developing novel TEL-native learning paradigms built on well-established pedagogical constructs and embracing new affordances provided by emerging technologies that allow for new ways of learning.

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EVALUATION OF CONTINUOUS STUDENT FEEDBACK ON A LARGE COMPUTER SCIENCE COURSE

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Abstract

In this article, we present a computer science course with 460 participants, where special interest was directed towards student feedback and two-way communication. The 7-week course was organized as an online course with automatically assessed exercises. Each week, the students answered a short survey about their learning experience, course difficulty level, and time spent on course activities. They were also asked to answer three open questions about what they had learned, what remains unclear and how would they improve the content. Quantitative and qualitative feedback data were analyzed for all seven weeks. In addition, we analyzed the student performance by observing the final grades obtained from the course. Based on the results, it seems that there is a positive correlation between engagement and final grades. Moreover, dynamically modifying the course on the fly based on continuous feedback seems to be a beneficial mechanism. Surprisingly, the teaching staff did not find it too laborious either. Finally, we provide experiences and suggestions for other educators for utilizing continuous feedback effectively.

Keywords: *Feedback, difficulty level, students' perceptions, programming.*

1. Introduction

Facilitating two-way communication in larger courses is difficult. Still, it is important to provide the students with a functional feedback channel to improve results, motivation, and learning experience (see e.g. Leckey et al. 2001). Based on this, we designed a feedback mechanism for a large computer science course (N=460) and utilized the feedback dynamically during the course.

In this paper, we analyze the feedback and its effects by observing

1. The changes in feedback during the course,
2. The changes in perceived workload during the course,
3. The correlation between feedback and course performance,
4. The correlation between perceived time spent and course performance,
5. The functionality of support mechanisms during the course, and
6. Students' perceptions about the feedback and support.

The paper is structured as follows: first, we present related scientific work shortly, then the course and the feedback collection are described. After this, we present the data collection and our results. Finally, limitations of the study and conclusions with some ideas for future work are presented.

2. Related work

According to e.g. Richardson (2005), student feedback is generally seen as a highly useful mechanism, but there are still a number of reasons why it is not collected. Rowley (2003) lists several factors that should be considered when a feedback mechanism is designed, including encouraging students to reflect on their learning and providing students with an opportunity to express their level of satisfaction. However, as Watson (2003) states, collecting feedback is not enough - it is also important to take action according to feedback and to inform students about the action taken.

There are several examples about utilizing feedback successfully to improve course design. Mandouit (2018) presents a study where results "supported student feedback as a valuable improvement tool, and powerful stimulus for teacher reflection" and where feedback identified areas for professional learning. Similarly, Flodén (2017) states that student feedback "has a large impact on [university teachers'] teaching and helps improve courses. Brew (2008) presents a study where students "provided

constructive criticism that proved useful in the evaluation and revision process". Finally, Gaertner (2014) states that students' perceptions of teaching are valid, and may (and should) lead to changes in classroom.

There are also conflicting results. For example, Kember et al. (2002) found out, that the feedback collection did not improve the quality of teaching as perceived by students. According to the authors, a possible reason for this was that the feedback was not used effectively. Moreover, the standard questionnaire used in all 25 departments may not have been flexible enough for collecting the data. Alderman et al. (2012) also state, that while feedback is generally used and valued, questionnaires often lack validity and data is used inappropriately.

3. Course description and the feedback mechanism

The course researched in this study was a computer science course called Introduction to Programming. In addition to computer science majors, there were participants from a diverse selection of majors, including for example mathematics, physics, economy, and political sciences. The course was designed to be an introductory course with no previous knowledge of programming required. Due to covid-19 restrictions, the course was organized fully online. All exercises were automatically assessed using an online learning tool called ViLLE (Laakso et al. 2018) (known as Eduten outside Finland).

Course was divided into 7 modules (see Section 4 for details). Action research is often mentioned in relation to student feedback (see e.g. Hand et al. 2001), which is natural, as action research is dependable on continuous data. Based on similar principles, at the end of each module of the course, students were asked to answer a short survey. To keep the weekly survey as short as possible, each survey consisted of only three open questions (focusing on principles listed by e.g. Rowley 2003):

1. What did you learn this week?
2. What things remain unclear after this week?
3. How would you improve this session

In addition, the students were asked to evaluate how much time they spend on the exercises during the current week and how difficult they found the content (on a Likert scale of 1 to 7).

The results of the survey were analyzed before the next lecture. The teaching staff reacted to the feedback by 1) dynamically modifying the contents of the lectures and by 2) briefly covering the questions that were mentioned the most often in the feedback at the beginning of the lecture. The difficulty level and the time spent on doing the exercises were also discussed before the actual lecture started.

4. Data and analysis

The data was collected from the course Introduction to Programming offered at the University of Turku during the fall semester of 2021. The programming language used was Python. The course was given remotely to 460 students, of whom 358 received a passing grade.

The course structure is as follows: The first week introduced variables and the selection statement. In the second week, the students were taught repetition, i.e. for- and while loops. In the third week, students learned about functions and return values. The next two weeks focused on lists, dictionaries, and other data structures. During week six, students encountered file and error handling. The final week before the exam focused on the import-statement and some of the advanced features of Python, such as slicing and list comprehensions.

The data used in this study consists of grades given to the students and weekly feedback collected after each of the seven weeks of the course. The eighth week was the exam. The feedback questionnaire asked the following questions related to this study: How difficult was this week (Likert scale 1-7; 1 being extremely easy and 7 extremely hard), How much time do you estimate having spent on this week's exercises (categorical responses from less than 2 h, to over 20 h). We also asked students to reflect on what they learned that week and additionally, for improvement ideas and constructive criticism to further improve the course in the following years.

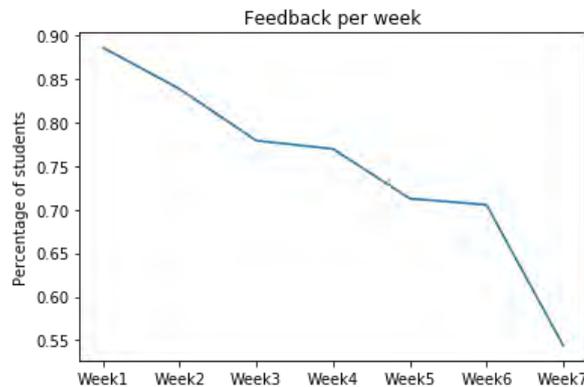
The grade distribution for the course is described in table 1. The grade distribution is undeniably non-normal, as proven by the Shapiro-Wilks test for normality ($W=0.7528$, $p<.0001$). The course exam was highly polarizing, as most students either received the highest grade or failed.

Table 1. The grade distribution on the course.

Grade	Students	Percentage (%)
5 (Best)	215	42.74
4	66	13.12
3	38	7.55
2	25	4.97
1	14	2.78
0 (Fail)	145	28.83

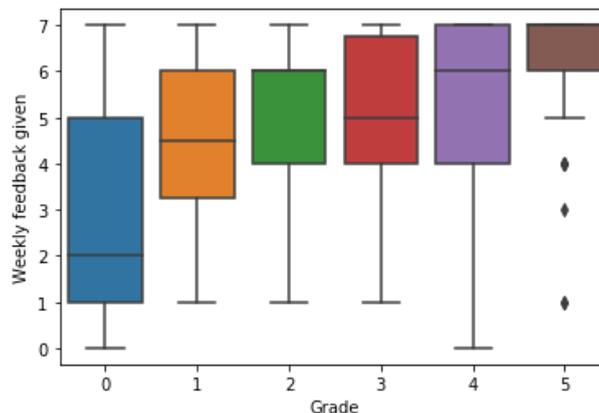
Every week students were given on average 20 small python programming assignments. The feedback questionnaire was given as the last assignment. Students received a negligible bonus on their exam scores for answering the questionnaire. As seems to be typical, the number of feedback responses dropped radically as the course went on (e.g. Barrett et al. 2018). In the first week, we received responses from 92.87% of students, but only 57.72% gave feedback the last week (Figure 1).

Figure 1. The percentage of students giving end-of-week feedback over the course.



The drop in feedback rates sparked the question: are there patterns in how students gave feedback and how did actively giving feedback reflect in the final grade. We noticed four general types of feedback givers: 1) Constant, who gave feedback every week 2) Stoppers, who actively gave feedback every week, until stopping at some point 3) Spotty, who gave feedback every now and again, with no particular pattern and 4) Disengaged, who did not give any feedback. The groups' mean grades were 4.49, 2.77, 2.71, and 0.32 respectively. We found a statistically significant difference between these groups (Kruskal-Wallis test, $W=99.649$, $p<.0001$). The difference was noticeable even without grouping the students (Figure 2). As grades were not normally distributed, we computed the correlation between these variables using Spearman's rank correlation coefficient and found a strong correlation ($r=0.653$, $p<.0001$).

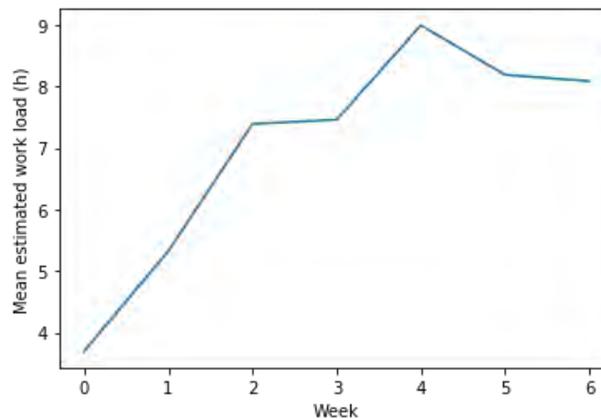
Figure 2. A Boxplot of the number of feedback for each grade.



Our questionnaire also contained a question about the perceived workload. We found a small, but significant correlation between the students' self-estimated workloads and the grades they received (Spearman's rank correlation coefficient, $r=0.343$, $p<.0001$). This means that the more students felt they worked on the course, the better their grade was.

We also had set out to find out how the perceived workload changed during the course. We found the perceived workload rose steadily, reached a high point at week 4, and then started to decrease (Figure 3). Week four focused on data structures, which either was too hard for the students or right at the point when other courses' workloads started to ramp up and students stopped putting in as much effort.

Figure 3. Students' weekly self-estimated workload in hours.



Students' perceptions about the constant feedback were mainly positive. Still, some students probably found the mechanism exhausting as seen in the decreasing number of students who answered the survey each week. In the course feedback, several students mentioned the reacting to feedback as a positive aspect:

"The lecturer listened to the students and made changes to course materials according to feedback during the course"

"I especially liked that the [student] feedback was discussed and things were revised based on the feedback".

The average grade given to the course by students ($N=58$) was 4.21 on a Likert scale of 1 to 5 (5 being the best), which indicates that the course was successful and students appreciated it as well. The experiences of the course staff were also positive: it seems that analyzing the feedback did not take too much time weekly, even though the course was rather large. On average, the course staff estimated that 1 to 3 hours were spent each week reading the feedback and modifying the material or preparing new examples according to feedback.

5. Limitations and future work

Naturally, there are some limitations in the study. First, we did not control for previous programming knowledge. However, it seems unlikely that all 215 students who received the best grade already had prior programming knowledge. Second, student background (major, age, gender, and so on) could have an effect on the results. Finally, we do not have a control group - it could be beneficial to compare the results to a similar course without the dynamic and constant feedback mechanism. These are all factors we are planning to include in our future studies about the subject.

6. Conclusions

In this study, we analyzed continuous feedback in a large computer science course. We found a significant positive correlation between engagement in the programming course and grades. Students who participated actively in the feedback process also gained better grades. Moreover, there was a positive correlation between students' perceived workload and their final grades. According to course feedback,

the students seemed to appreciate the continuous feedback and the teaching staff's reactions to it. As it also seems that the feedback cycle does not take more than three hours per course week, we can recommend a similar mechanism to be used in other courses as well. Still, some kind of "reward" for answering the weekly survey should be utilized; gamification may also play an important role here.

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IDENTIFYING THE PH.D. STUDENTS' NEEDS FOR CAREER ENHANCEMENT SKILLS

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Abstract

In the past few years, it has been seen that an increasing number of Ph.D. graduates are following a career outside academia. CHAMELEONS¹ project has undertaken the role of identifying and fulfilling the needs of Ph.D. students for following a career in the industry in digital health. This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 873105. The overall aim of CHAMELEONS is to firstly identify a range of modules and secondly co-design and deliver three interdisciplinary, inter-sectoral, and international modules which will broaden the skills of 15 Ph.D. students/Post-Doctoral Fellows to improve their employability in both academic and non-academic environments. CHAMELEONS' consortium offered the opportunity to the Ph.D. students participating in the project to attend some modules in fellow universities and outside their Ph.D. program. This work presents the choices of the students. Students were called to identify one to three modules based on their needs and interests. To that end, and towards identifying the quantitative and qualitative characteristics of the selected courses, a questionnaire was developed. The questionnaire was implemented as part of an online google classroom resource where information about the available courses for selection was made available. The questionnaire answers were completely anonymous. The questionnaire attempts to attain information regarding these courses at two levels: (i) background and skills that the students recognized as underdeveloped and the tools they used to identify them, (ii) preferences of students in terms of interest, reasons, and motivation of selection and the skills (provided by the European classification of Skills, Competences, and Occupations - ESCO²) they aim to acquire through these courses. 13 students replied to this questionnaire, all coming from diverse backgrounds (health-related or health technology-related) and the majority used a self-awareness/self-assessment tool to identify the skills that they need to improve and make their decision. Moreover, students selected courses that do not actually improve a hard skill needed for their research, but soft skills in the business and career management direction, focusing mostly on creativity, innovation, and communication. Finally, students are willing to attain what can be considered necessary for building a successful career in every sector. To conclude, our study suggests that Ph.D. students have a need to develop skills beyond their basic scientific education. These skills are related to the perspective of developing a successful career plan and being competitive in the occupational arena.

Keywords: *PhD courses, extra-curricular activities, career enhancement.*

1. Introduction

As life expectancy has grown through the last decades, a need for more efficient healthcare systems has risen to support the increasing number of patients' care needs. Introducing state-of-the-art technology in healthcare has become essential in healthcare delivery. This intersection of disciplines is known as Connected Health (CH) (Caulfield et al., 2013). CH can relate to a wide spectrum of disciplines, which introduces the need to overcome disciplinary barriers and achieve inter-disciplinary interaction (Chouvarda et al., 2019). To achieve this, inter-disciplinary educational methods need to be introduced, (Mountford et al., 2018). CHAMELEONS project focuses on training 15 PhD students, through: (i) identifying and making available and (ii) co-design and deliver interdisciplinary, inter-sectoral, and international modules to improve their skills and employability, in a wide range of sectors, including academia, industry and entrepreneurship.

¹<https://www.chameleonsproject.eu/>

²https://esco.ec.europa.eu/en/classification/skill_main#overlayspin

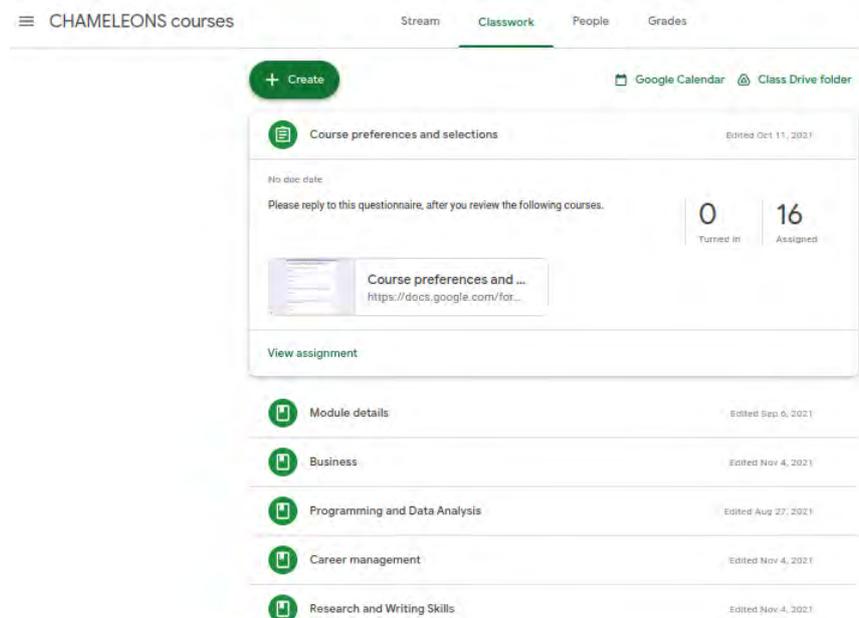
During the project’s lifetime two surveys were undertaken across the consortium to gain the views of those who take interdisciplinary, inter-sectoral and international modules (young researchers) and those who design and implement such courses (Program Directors or equivalent) (Kosvyra et.al, 2021). The results of these surveys identified the impact of these courses on future career challenges, determine gaps and use this information to develop innovative educational interventions. These surveys also produced a list of modules that both groups considered helpful for the students’ career opportunities. This list of courses was made available to the students participating in the CHAMELEONS consortium as PhD modules that broaden student perspectives beyond academia. Students were called to choose one to three modules based on their needs and interest, that they were willing to attend. To that end, and to identify the characteristics of the selected courses and the motivation of the students, a questionnaire was developed aiming to identify how students recognize their needs and how they address them.

2. Design & implementation

The questionnaire presented in this article was developed to attain information about the students, their needs, and preferences at two levels. In the first level, it attempts to obtain more general information about the background of each student, the skills that the students recognized as underdeveloped and the tools they used to identify them. Moreover, students were asked which of the modules that they become available to them, they found interesting/useful for their career development during the first screening and considered them as potential candidates for attending. The second level of questions aims to attain information about the specific preferences of students for the courses made available to them, meaning how many and which courses they decided to attend. Moreover, students were asked for information about these specific courses in terms of interest, reasons, and motivation of selection and the skills they aim to acquire by these courses. With respect to the skills, students were called to identify them from a list of skills provided by the European classification of Skills, Competences and Occupation (ESCO).

The questionnaire was implemented as part of Google Classroom that was built to provide the courses information to the students in a condensed and detailed way. The classroom contains four categories of courses, as depicted in Figure 2, and the survey was added in the format of a Google Form on top of this list. This way the students could review the list and, in parallel, answer the questionnaire. The answers were completely anonymous and no personal information was requested by the students.

Figure 1. Implementation of the survey in Google Classroom.



3. Results

The results presented in this work are divided into two categories, (i) the attributes of the courses and (ii) the survey results.

The results of the first category were acquired through the consortiums' procedures to gather and present the courses to the students and focus on their properties and popularity. Table 1 depicts the selected courses' titles, the duration of the course, the university that delivers each course, the number of students that selected it and the delivery mean. It is worth mentioning that the courses are available through the 5 universities participating in the CHAMELEONS project, namely Aristotle University of Thessaloniki (AUTH) in Greece, University College Dublin (UCD) and Maynooth University (MU) in Ireland, University of Porto (UP) in Portugal and University of Oulu (OULU) in Finland. This information was made available to the students prior to their investigation along with the content details.

Table 1. Overview of the Selected Courses.

Course	Length	Location	Popularity	Accessibility
Creative Thinking & innovation	1 week	UCD	6	Face-to-face
Communication for Impact	1 week	UCD	2	Face-to-face
Social Entrepreneurship	8 h	MU	1	Face-to-face
Design your Purposeful Life	1 week	UCD	1	Face-to-face
Basics in eHealth	5 weeks	OULU	1	online
Computational medical research	6 weeks	AUTH	1	online
Scientific Writing and Publication	81 h	UP	1	Blended
Data mining	6 weeks	AUTH	1	online
Entrepreneurship: application and mindset	1 week	UCD	1	Blended
Exploring Intellectual Property	1 week	UCD	1	online

Among the 15 students from universities across Europe that are participating in the CHAMELEONS project, only 10 decided to attend courses. One student chose not to attend a course but used this opportunity for a short-term placement in another university to perform part of his/her research. As concerns the four that opted out, the reasons were mostly the limited time to offer in an activity outside their PhD program and the fact that they already have fulfilled the number of ECTS required to complete their studies. For the rest of them, 2 students selected 3 courses, 2 more students selected 2 courses, while 6 students decided to attend 1 course.

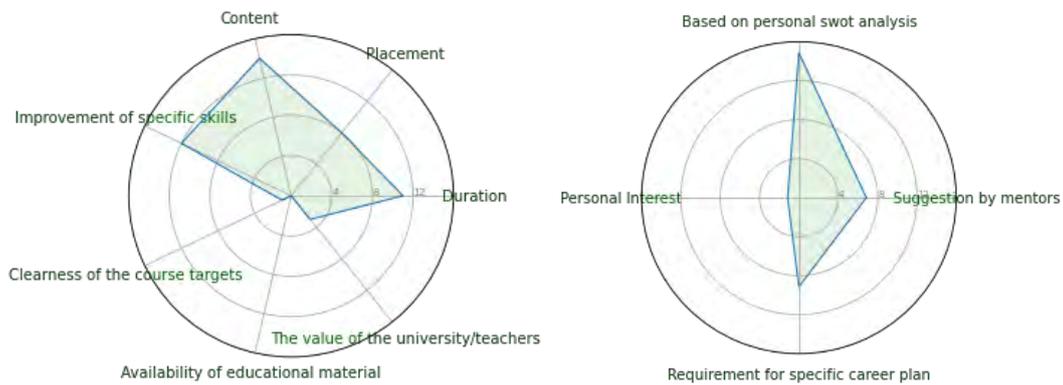
The questionnaire was answered by 13 students coming from diverse backgrounds. Specifically, 7 of them come from a technical/engineering background, 2 of them from the Business field, 3 of them from Education (Physical/Health) and 1 from a Healthcare background. 12 students used one or more swot analysis tools to identify their underdeveloped skills before they made their decision on the course that they will attend. Most students used MyIDP tool³, while other choices were a SWOT Analysis, use of the PhD competencies model, Career Goal Setting Tool, and Career Development Toolkit for Researchers.

The underdeveloped skills identified belong to a wide range of skills, including mostly communication and creativity/innovation skills, and many others as business, presenting, research, teaching, time & project management, teamwork, data analysis and interpretation, and academic publishing skills. The courses from the Career Management and Business categories were identified by the students as the most interesting. The most popular course was 'Creative Thinking and Innovation', followed by 'Communication for Impact,' 'Creative Thinking & Problem Solving' and 'Design Thinking for Innovation' as it is inferred by figure 3(a).

The 10 courses that were selected, already presented in Table 1, are counted for the analysis as 16 individual selections representing all the students' preferences. With regards to their categorization, 9 of them belong to the Business category, while 5 are in Career Management and 2 in Programming and Data Analysis. The most voted reason for selecting a course was the content of the course voted by 14 participants, followed by the specific skills' improvement -12 participants-, the course duration -11 participants- and the placement -8 participants-, while attributes like the value of the institution, the clearness of the objective and the available material appeared less important. 13 students selected the specific courses based on their swot analysis, 8 of them because specific skills were required for their career plan, while for 6 of them it was suggested by their mentoring panel. Only one student considered personal interests as a motive. Figure 2 summarizes the students' motivation and reasons for selecting specific courses.

³<https://myidp.sciencecareers.org/>

Figure 2. Comprehensive view of student's reasoning for their choices.



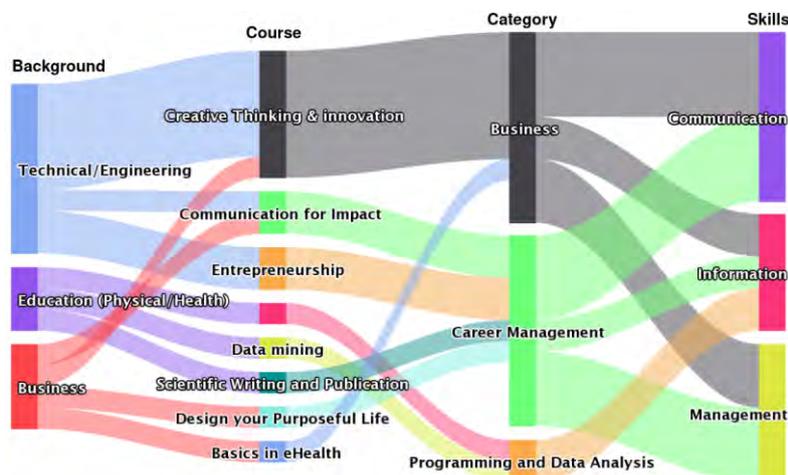
The specific skills that students aim to improve by the courses that they selected belong to 3 categories, 31 in Communication, 22 in Information and 26 in Management skills, while no student considered that the selected course will improve Computer Use related skills. Although 2 courses in Programming and Data analysis were selected, students aim to achieve Information Management and computer skills. Figure 3(b) shows these skills in detail, capturing which of them were the most popular. It seems that students are heading towards two directions, one is more practical and focused on developing plans to solve problems and create new products, while the other is more personalized including skills as processing and presenting information or making decisions. Figure 3 depicts a comparison of what courses students found interesting and what they aim to achieve by attending them.

Figure 3. (a) Popularity of the available courses, (b) Popularity of skills that students intend to acquire.



Figure 4 presents a comprehensive view about which course each student selected and from which category, in relation to their background and the skills they aim to acquire from attending the course. It is noticeable that students from a technical background are moving towards enhancing their business skills, while some of them, along with the students from a business background, are focusing on career management.

Figure 4. Comprehensive view of student's choices and expectations.



4. Discussion

Taking into consideration students' responses, most of them considered it essential to use a self-awareness/self-assessment tool to identify the skills that they need to improve and help them make their selection towards this direction. This fact proves that students are aware that they need to improve some skills that are not included in the narrow curriculum of a Ph.D. program and are willing to investigate their deficiencies and take actions to improve their competence in these fields.

It is important also that students seem to look up to the future, since they selected courses that do not actually improve a hard skill needed for their current research, but soft skills in the business and career management direction, focusing mostly on creativity, innovation, and communication. Only students coming from an educational background were interested in developing a more practical skill from the Programming and Data Analysis category. It is worth mentioning that students from Business background were mostly interested in career management opportunities, while students with a technical background focused mainly on the business field.

Moreover, students are willing to attain skills such as designing systems and products, developing objectives, strategies, and decision making, and processing information, skills that are needed for building a successful career in every sector. Students need to develop a multitude of skills providing knowledge on a variety of fields and learn to overcome the cognitive, normative, and regulatory barriers so they can be a part of the CH system (Leniston & Mountford, 2021).

To conclude, PhD students in the wider domain of CH Technologies (Chouvarda et al., 2015), appear to have a need for developing skills beyond their basic scientific education. These skills are related mostly to creative and innovative thinking to create new products and provide solutions to the public. These choices are made based on the perspective of developing a successful career plan and being competitive in the occupational arena, taking also into account that Digital Health requires innovative and robust solutions. This study offers evidence and insights that can form the basis for the enrichment of future PhD programs in Europe.

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DIGITAL CAPITAL AND SAFETY IN SOCIALIZATION PROCESS. AN ITALIAN CASE STUDY

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Abstract

The process of digital acceleration, which in the last few years of the pandemic crisis has affected formal socialization contexts such as schools and families, has led to a critical reflection on the new responsibilities and skills of the digital citizen, in order to preserve his autonomy in the management of virtual dynamics while respecting certain ethical principles at the basis of navigation. These principles underpin the implementation of a digital culture in which the use of devices is guided by a sense of responsibility and respect for otherness. The new digital skills of the citizen go beyond specific access techniques and focus mainly on conscious digital behaviour at the basis of safeguarding various forms of individual and social well-being. Through the illustration of the main results of a national survey promoted by Sapienza University of Rome in 2020, the paper intends to provide a reflection on the degree of diffusion of digital awareness among Italian adolescents and on the impact of school and family digital capital in the development and implementation of such skills.

Keywords: *Digital safety, social capital, digital capital, socialization, children.*

1. Introduction

In social sciences, "digital capital" means both internal and intangible resources (such as digital skills) and external and material resources (such as technologies), available within a specific social space, such as school or family, used by individuals to achieve specific goals (Ragnedda, 2018; Ragnedda, Ruiu, Addeo, 2019; Cortoni, 2020).

From a microsocioal perspective, digital capital recalls both the behaviors of individuals, who use different devices, and their digital skills (Paino and Renzulli, 2012; Pitzalis et al., 2016; Magaadda in De Feo, Pitzalis, 2014). In this sense, one can attribute a specific dimension of digital capital to the human capital of the actors involved, recalling their innate, cultural and cognitive characteristics (the so-called internal and fundamental capabilities of Nussbaum, 2010) that individuals mobilize when they act digitally and that contribute to define the type and level of people's digital skills. Moving on to a macrosocioal perspective, digital capital expresses both the technological infrastructure and investments in digital education, to improve its production and distribution system.

To define, instead, the concept of safety, in accordance with the *European Framework for Developing and Understanding Digital Competence in Europe* (DIGCOMP) (Kluzer, Rissola, 2015), it refers to a specific area of digital competence redirecting both to the ability of citizens to protect their privacy and reputation online, threaten the individual's physical, psychological, social and emotional well-being and harm the environment. The main safety descriptors identified by the European Commission are four: 1. Protecting devices, 2. Protecting personal data and privacy, 3. Protecting health and well-being 4. Protecting the environment (Vuorikari et al., 2016; Redecker, 2017).

The reflection on these concepts has acquired, in recent years, a central role in the international sociological scientific debate especially if related to the structural and sociocultural transformations induced by the advent of the so-called "platform society" (van Dijck et Alii, 2018). This term refers to the central role played by digital platforms in directing processes of production, marketing and use of tangible and intangible assets, with inevitable effects on the dynamics of socialization, on the processes of building individual and social identities, as well as on the construction of social, communicative and participatory relations of citizens (Van Dijck, 2013). In the current infrastructure ecosystem, data represent the trading and socio-economic bargaining goods, that is all that information, generated by the actions and interactions of users in the Network, encoded and stored by the digital system through algorithms (datafication). The result is a process of commodification of culture (Canevacci, 2001) produced from below, whose surplus value is often made available to other economic subjects, with the often unaware consent of the same user (commodification).

The health emergency linked to COVID-19 has induced many changes in the management of work, relational, social, economic and, above all, educational dynamics through digital devices such as strategies to contain the pandemic and social distancing. During the lockdown, in the short term, the digital platforms have helped face the emergency becoming the main space (virtual) of interaction, socialization and communication of citizens, as well as the management of public and private functions of companies, contributing to ensure continuity in the dynamics of production and work. In the medium term, however, they have highlighted a series of limitations related to datafication and commodification. A fundamental contribution to the discussion is given by the *accountability* of the citizen who, in exercising the rights of data protection within the new system of the cultural industry, generated by the *platform society*, has introduced the issue of *digital safety* into the contemporary debate. *Digital safety* is digital competence in terms of user awareness, that the citizen, especially children, must possess to understand the datafication, personalization and commodification of information shared between institutions and citizens online (Van Dijck et alii, 2018). Hence, some research questions are these: What is the digital safety degree of minors and what is the impact of the digital capital in the maturation of digital soft skills (Cortoni, Lo Presti, 2018).

2. Research design

A useful and relevant sociological reflection can be started from some scholarly contributions showing how the learning process of a minor is influenced by at least three main determinants that differentiate scholastic success: 1. social background; 2. school variables and 3. individual aspirations and orientations (Cherkaoui, 1979). The acquisition of digital skills for young people, such as safety, is related to the incidence of social, cultural, family and school capital on the stimulation of learning and the implementation of skills of children (Coleman, 1966; Bourdieu, 1979; Gambetta, 1990; Cherkaoui, 1979).

The CENSIS report, “La digital life degli Italiani” (2021), on the digitalization of Italians confirms the directly proportional relationship that unites the sociocultural capital of the family and the school with the use of digital technologies. It is possible to assume that the fragility of the digital capital of teachers and parents could be reflected onto young people, particularly with regard to the implementation of digital soft skills, such as safety, which cannot be acquired through the use of media. Socialization agencies can make a contribution, both materially and culturally, to provide minors with stimuli to the discovery of the technological world and especially to accompany them in the exploration by directing them to a critical reading of media content and a different fruitive awareness. Specifically, the school could intervene to reduce socio-cultural inequalities by favouring compensatory and supportive pedagogies, where cultural and material resources are lacking (Cherkaoui, 1979).

Reflecting from a microsocial perspective, it is possible to observe how the influence of family and school is reflected in the component of subjective motivation, which is at the basis of media use. In fact, the lack of digital soft skills in teachers and parents often risks compromising the communicative effectiveness in the teacher/student (or child/parent) relationship, indirectly implementing demotivation, disinterest and boredom on students (Capogna et alii, 2018). The emotional involvement and the marked sensibility towards the potential of digital media contribute to define the individual attitude, more or less proactive, when offered interactive services, influencing their perception and individual investment in terms of commitment and attention (these are further subjective variables that develop independently of the incidence of family and school, hinged in the *habitus* of Bourdieu).

In 2020, the Osservatorio Mediamonitor Minori of the University of Rome “La Sapienza” conducted a national quantitative survey on the dissemination of the competence of digital safety in a sample of 2708 Italian teenagers, from 37 upper secondary schools and their families¹. Specifically, the survey focused on various social and cultural aspects by observing and analyzing, with a quantitative approach, digital and social capital:

1. the schools involved, as per ownership of technological infrastructure, digital education services and investment, with possible repercussions on teaching methodologies in teacher classes;
2. adolescents, as per daily media behaviour and digital competence, with reference to the DIGCOMP safety area.
3. families, as per impact on the development of the safety of adolescents interviewed.

The survey was carried out from March to December 2020 through the online administration of 3 questionnaires (one for each target involved). In this essay, our focus will be mainly on the impact of school digital capital in the development of the safety area of digital competence of the sample of teenagers involved in the investigation.

¹The sampling plan was factorial and typological and took two variables into account: a) the region of origin; b) the type of institution (high school or technical/vocational school).

3. Discussion of main outcomes

To answer the research questions posed in the first paragraph on the degree of dissemination of safety among Italian adolescents interviewed and the impact of school-related digital capital, we will start from the analysis of the digital school capital of the schools involved in the sample. The latter, in a macrosocial perspective, has been built after taking into account two main dimensions specific to schools of all levels: the technological infrastructure² and the experimental training³. Therefore, through the construction of a typological index, we found 4 types of digital school capital:

1. the schools' typically highly limited digital capital with little investment in digital education and technology skills;
2. high digital capital of schools with a strong investment in both technological and methodological-cultural dimensions;
3. infrastructural technological capital prevailing in schools with an imbalance on the infrastructural technological side;
4. experimental training capital in schools with an imbalance on the educational and experimental side.

Schools with a high digital capital certainly employ technologies as a support for the smooth running of the school's activities. Specifically, the most widely available media for almost all subjects are IWB, tablets and PCs.

But how do these infrastructural investments, together with the educational investments of the school, contribute to changing the routine activities of its main actors? Starting from the international framework of DigCompEdu⁴ (2017) on digital competences for educators, as a useful tool for reading and analyzing the process of translation of the two dimensions of digital capital in school educational practices of teachers, one can say that schools with high digital capital integrate these technologies for the improvement of some educational activities such as: the implementation of communication and exchange of experiences and materials between colleagues in the perspective of technological innovation with greater continuity than schools with other types of digital capital (teaching and learning area); for individual professional updating (professional engagement area); for updating and implementing materials and resources already available and present in the school context (digital resources area); for classroom teaching innovation with students (teaching and learning area), for the implementation of the interaction between students even outside the school context (professional engagement area), for the investment on the implementation of the digital skills of their students (facilitating learners' digital competence area) and finally to respond to specific issues (e.g. SLD) and differentiate student learning processes (empowering learners area).

In contrast, schools with unbalanced digital capital towards digital teacher training and experimentation seem to invest the most frequently acquired know-how in innovative strategies to manage collaboration between student workgroups (teaching and learning area); in the search for digital resources area); in the design of tests and in the management of the data of student evaluations (e.g. through summary databases) and in the elaboration of judgements starting from predefined specific evaluation headings (assessment area). Finally, schools with a digital capital focused on the technological dimension of infrastructure seem to prefer activities oriented to external communication with families, other schools and students (professional engagement area); the exchange of materials and experiences between colleagues (teaching and learning area); as well as in the updating of resources already available and present in the school context (digital resources area).

Secondly, to understand the level of safety among adolescents, we have created 4 indices corresponding to each descriptor:

1. the device's protection index, which takes into account the variables of their habit of protecting their devices through access codes and antivirus systems, emphasizing the ways and the frequency with which they update the password, as well as the degree of password sharing with friends and relatives.
2. the data and privacy protection index, obtained by investigating both the way in which the terms and conditions of use are accepted, the degree of sharing of personal data and the type of activity carried out.

²In order to define the infrastructural technological dimension of the digital capital of schools, the following information was taken into account: the n. of laboratories present in the facility, the n. of workstations in the laboratory and the type of Internet connection.

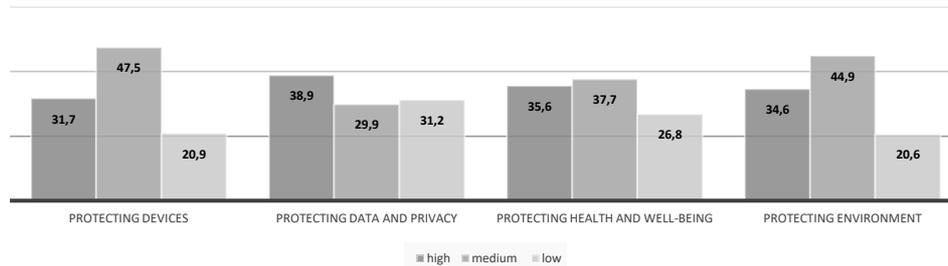
³In order to define the experimental training dimension of digital capital, a typological index has been constructed, as a result of the combination of two indices, one linked to training on digitalisation, and one related to projects of digital experimentation.

⁴DIGCOMPEDU summarizes the professional life of teachers into 6 main areas of competence: 1. Professional engagement; 2. Digital resources; 3. Teaching and learning; 4, assessment; 5. Empowering learners; 6. Facilitating learner's digital competence.

3. the individual health and well-being protection index derived from specific physical, social, emotional or cognitive reactions encountered during or after the use of the media.

4. the environmental protection index on how technologies are disposed of and the characteristics considered important during the purchase and use of a device.

Graph.1. Safety indexes of Italian students involved in the survey (val.%).



When analysing the data, the lower values of safety are mainly manifested in data and privacy protection and the protection of individual well-being. Specifically, 31.2% of students seem to have a low data and privacy protection index. This figure is more widespread among students who come from families with a low cultural capital and are professional institute seniors in the regions of southern Italy. While 26.8% of students have a low awareness of individual well-being. They also have a low family cultural capital and attend the first classes of technical professional institutes in the North Italy. Compared to the other two digital safety descriptors, only about 21% of respondents have a low safety level: as per device protection, such students have a low family cultural capital and are high school freshmen in the North Italy; in the second case on environmental protection, students with a low level of safety possess a medium-high cultural capital and are professional institute freshmen in the North Italy. We cross-referenced the data of the school digital capital with the safety indices of the students, in order to verify the impact of schools on the development of this *digital soft skill*. The low index on data and privacy protection, together with that on device protection, are more widespread in schools with limited digital capital, or in those schools with a little investment in digital education and infrastructure.

On the other hand, schools with digital capital directed towards training and experimentation seem to be positively making an impact especially on the development of a high safety with respect to environmental protection and the protection of the individual well-being of students (cf. table 1).

Table 1. The influence of digital capital on student safety.

Safety indices for students		Digital capital of school				Total
		Highly limited digital capital	Predominantly infrastructural technological capital	Predominantly experimental training capital	High digital capital	
Protecting the environment	high	33,9%	34,3%	38,2%	29,7%	35%
	medium	44,4%	44,8%	46,1%	45,4%	45,2%
	low	21,7%	21%	15,7%	24,9%	19,9%
total		100%	100%	100%	100%	100%
Protecting personal data and privacy	low	35,7%	32,5%	25,9%	28,1%	30,9%
	medium	29,3%	31,9%	29,3%	29,3%	30,1%
	high	35%	35,5%	44,8%	42,6%	38,9%
total		100%	100%	100%	100%	100%
Protecting devices	high	30,2%	31,8%	33,3%	32,1%	31,9%
	medium	48,4%	46,3%	47,9%	47,8%	47,5%
	low	21,4%	21,9%	18,8%	20,1%	20,6%
total		100%	100%	100%	100%	100%
Protecting health and well-being	high	34,1%	34,4%	39,5%	30,5%	35,5%
	medium	39,8%	38,6%	36,1%	37,3%	38,1%
	low	26,2%	27%	24,4,8%	32,1%	26,4%
total		100%	100%	100%	100%	100%

4. Conclusion

After the analysis of the research data, two main theoretical considerations emerge in response to the research questions illustrated in the first paragraph of this essay.

The first one concerns the digital capital of schools: schools with a high digital capital and with strong investments in training and experimentation in the digital field, are more oriented towards the inclusion of technologies both in the school and in teaching and learning practices in terms of methodological innovation. Also, the implementation of resources for improving teaching performance and stimulating student learning generates the inclusion of Digital Education, not only instrumentally but also methodologically. The exclusive investment on the technological dimension of digital capital, without a focus on the cultural capital of digital resources, is functional only to improve communication processes towards the external context, as well as updating resources for school management. This information is reflected in the development of the safety of school actors, including students. In particular, schools with low investments in digital capital contribute less to the development of safety, especially relating to data, privacy and device protection. The results of the research also show how the educational component linked to the literacy of school actors in the field of digital capital in schools is a fundamental aspect to invest in the future for the implementation of these skills in students.

This investment process becomes strategic and compensatory especially knowing that a low safety index is often linked to a family context with an equally low socio-cultural capital as well as, mainly, the attendance of technical professional institutes. For this reason, the competence of digital safety is considered a *digital soft skill* or a competence that cannot be learned by citizens through media experience, but through a path of digital literacy in educational contexts such as school; this aspect, however, is still poorly structured in the Italian government system towards secondary schools.

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CREPS AND THE STREBER-APP AN INTERACTIVE METHOD FOR COMPETENCE-ORIENTED ASSESSMENT AND ITS DIGITAL IMPLEMENTATION

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Abstract

Competence orientation and individualization are paradigms that are becoming increasingly important in modern education. However, especially in courses with many participants the implementation of competence-oriented teaching and assessing quickly exceeds the limits of the lecturer's time resources. Peer evaluation is generally suitable for giving students individual and comprehensive feedback, at least if the quality of the feedback is high enough. Unfortunately, sometimes it's hard to motivate students to give high-quality feedback.

The CREPS (Create, Review, Enhance, Practice and Score) method was created by the authors in early 2020. It offers an organizational framework that can be used regardless of the size of the student group without significantly increasing the effort for the lecturers. The focus is placed on the skills of self-evaluation and peer assessment, which are both important for competence orientation. The basic idea includes an iterating process in which students generate and enhance test questions based on the given learning content that are assessed and evaluated by their colleagues for quality, correctness, and complexity level. In addition, the best questions are selected for further practicing. Students are rewarded with points for each step in this process; highly appreciated work (good questions and valued feedback) will result in higher scores.

This method and the Streber-App, a mobile application supporting the method, were originally developed for a media technology related university course and since then have been used in six courses in 2020, 2021 and 2022. To evaluate the method CREPS and the supporting app as well as to find out the students' views on and experiences with both method and application, more than 500 students were invited to participate in a quantitative survey.

This paper presents the method CREPS, its underlying didactic considerations, the implementation with the mobile app and the most interesting results from the survey. The participants reflected these concepts and their acceptance in the learning setting. The students' feedback on the use of the method, the support by the lecturers and the concrete implementation using our app, allows us to draw conclusions about the functioning of the previous application and possible improvement for further use.

The self-assessment of the students on their individual learning success gives an indication of the benefits of the method in the university environment.

Keywords: *CREPS, didactic method, competence-oriented assessments, peer evaluation, mobile learning.*

1. Introduction

Nowadays the goals and methods of teaching and learning have been changed dramatically. While the pure transfer of knowledge more and more takes a back seat the student's ability to acquire knowledge themselves is gaining momentum. Self- and external reflection as well as competence-oriented assessments are concepts that are expected to be part of every teaching concept for every university course.

Yet in recent years new developments have not only posed major challenges for the education system but also provided opportunities previously not been considered possible. These possibilities were opened up by rapid technical progress but also by far-reaching user acceptance. Numerous digitalization initiatives in education experienced a major boost, which can now be used to further enhance modern teaching and learning.

The educational method *CREPS* and our implementation, the *Streber App*, were developed to implement innovative teaching, learning and examination scenarios in an environment of competence-oriented work. The method and especially the *Streber App* focus on large groups of students. Peer evaluation and assessment (Nicol 2014) is used to promote learning impulses and formative performance assessment (Stern 2010). In terms of the constructive alignment (Biggs 2011), the method for achieving competence-oriented learning goals was also used in the context of summative performance assessment for finding the student's grades for the lectures. A more detailed discussion of the underlying pedagogical theories can be found (Schmiedl 2020), where the concept of *CREPS* was introduced for the first time.

Since its first use in Spring 2020 feedback from the students has been gathered to optimize the *Streber app* and the underlying method. As of April 2022, a total of 6 university courses at the UAS St. Pölten have been organized using the method and app not only as the dominant teaching and learning method but also for finding the student's grades. 460 participating students created 8,937 questions and a total of 83,031 peer reviews/ratings, 17,359 of which including also verbal feedback.

2. Research questions

In this paper we focus on the student's learning success and their motivation as well as on the applicability of the method in university courses and the usability of the *Streber app*. The following set of research questions was used to guide the accompanying scientific considerations:

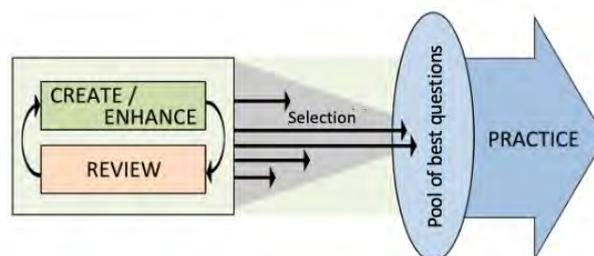
- How do students rate the learning process using the *CREPS* method compared to previous more traditional methods of learning/teaching/grading in comparable courses and how do they evaluate their personal learning success using the *Streber App*?
- How do students evaluate the peer assessment components in the concept of the *CREPS* method and in the *Streber app*?
- Do the students consider the *CREPS* method and the *Streber App* to be suitable means to be used in tertiary education? What are options for improvement?

The main research method used to evaluate these questions was the quantitative evaluation of a written survey (standardized questionnaire). Some of the findings were compared or supplemented with usage statistics based on the application's log files. These findings will be used for future enhancements of *CREPS* and the *Streber App*.

3. The *CREPS* method

CREPS is an acronym for the terms *create*, *review*, *enhance*, *practice* and *score* and describes a method for learning and testing that enables competence-oriented knowledge acquisition and testing even in large learning groups. Course content is normally split into several modules. Each module combines two phases of the *CREPS* method as shown in figure 1:

Figure 1. The *CREPS* method for one topic.



The *CRE*-phase includes three activities:

- Students *create* questions (including answer options) for a multiple-choice test on the subject matter of the current topic. Each of these questions consists of the question text, several answer options and an optional explanatory text explaining the correct answer.
- Each question is *reviewed* and rated for quality and understandability in a double-blind peer review by several other students (peer review).
- These reviews are presented to the original author who may then *enhance* / revise his question. Optionally authors may also respond to reviews or vote for the most helpful review they got.

The *CRE* phase can be carried out in several iterations, and this improves the quality of the questions.

After the CRE phase is over, the best questions are selected based on the student's average rating. The lecturer will normally not influence this selection of the best questions although quality-improving measures are an option. In the *Practice* phase the students can learn by continuously practicing these questions.

For every task in the method – creating questions, reviewing, practicing but also for achievements (question was selected for the pool of best questions, review was voted to be the most helpful review by the question's author) students get points (they *score*). If the course content was split into several modules, CREPS can be used for every module independently and the CRE- and P-phases of subsequent implementations may overlap. The course's lecturer is normally only providing the organizational framework implementing the CREPS method but does not interfere in the generation or reviewing of questions. The total number of scored points can be used for grading the students in the course.

4. Implementation of CREPS: The Streber App

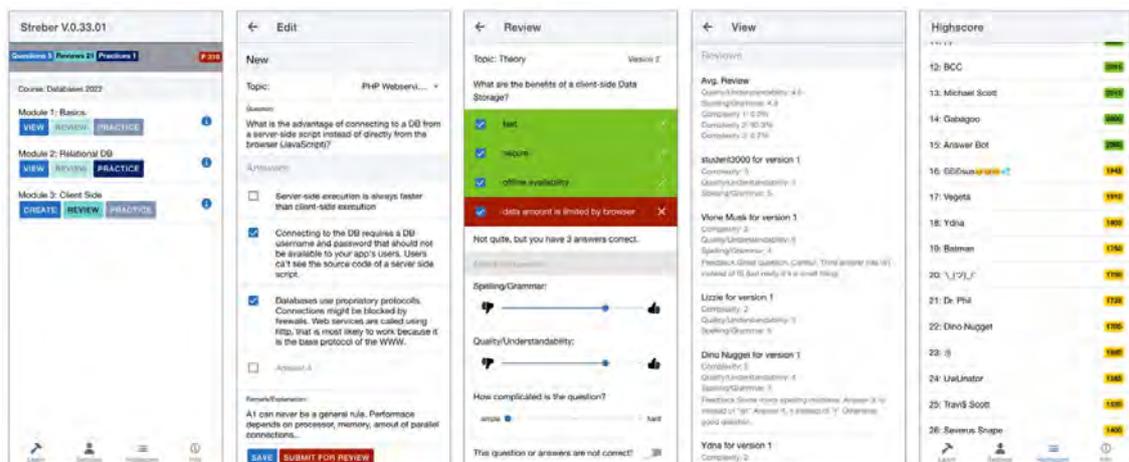
The Streber App is a web application which implements the CREPS method. Lecturers can split the course into several modules, define the start- and end-date for each module's CRE- and P-phase and define the number of points students can score for different actions like creating or reviewing questions. Although the app was optimized for Smartphones it can also be used with every up-to-date web browser on desktop computers.

The basic idea is that learning with the Streber App can take place anytime and anywhere. The application was conceptualized and implemented in parallel with the CREPS method by the authors in early 2020 to be used in a course about basic web technology at the UAS St. Pölten / Austria. By coincidence the introduction of the app was just one week before Austria went into the first Corona-Virus lockdown. Since then, the Streber App has been used (and currently is used) in six different courses.

Figure 2 shows five screenshots of the Streber App used in a course held in 2022. The picture on the left side shows the module screen. Three modules are available, where module 1 is already closed, module 2 is in the Practice phase and module 3 is in CRE phase. The second screen is used for creating new questions. Streber is currently limited to four multiple choice answers per question, although that might change in later versions of the software. The third screenshot is for doing the peer review. A reviewer is first shown the question and answer options and can try to solve the questions. The real work although is reviewing the question. Reviewers must rate for *Spelling/Grammar*, *Quality/Understandability* and *Complexity* of the question. In addition, reviewers are asked to leave written comments and explain their rating.

Screenshot 4 shows the ratings and remarks as the author can see them. Only anonymous nicknames (that can be changed by the users as often as they want) are displayed, so reviewing is done in a double blind manner.

Figure 2. Screenshots from the Streber App.



In the previous and current implementations all six courses varied only in the number of modules but used the same settings and the same points scheme for scoring.

Students were allowed to submit up to 5 questions per module – scoring 30 points for every submitted question. After waiting for reviews each question could be resubmitted for review once. For

every question created themselves students were allowed to review up to 10 questions of their colleagues, scoring 5 points for every review. Authors could later award the most useful review of each of their questions – which added 20 more points to that reviewer’s score.

After a module’s CRE-phase ended, the best questions were evaluated automatically using only the student’s ratings. The best questions (number depended on the total number of students/questions, about $\frac{1}{4}$ to $\frac{1}{2}$ of the questions) were select for the module’s question pool. Practicing 10 random questions from the pool was rewarded with 10 points. The number of practices was not limited, so each student was essentially able to get full points by hard training.

5. The survey

To evaluate CREPS and the Streber app as well as to find out the students' views on and their experiences with both the method and the application, all students who ever enrolled in one of six courses where the Streber App was used were invited to participate in a quantitative survey. From more than 500 enrolled students we identified a total of $n = 460$ users that effectively used the app. 104 students (23%) finally participated in the survey.

In addition to demographic data, the questionnaire contained questions about personal learning behavior, perceived learning success, motivation through the elements integrated in the app, organizational use of the method and the app and technical implementation of the app. These are the most important findings:

If we compare the time spent with the perceived learning quality, the method comes off quite positively:

70% of all students participating in the survey stated that they believe to have dealt with the subject matter more intensively than in other comparable courses. 76% had the feeling that they had learned more sustainably using the CREPS method. If we compare the time estimated to be used for the Streber App with the time normally spent for traditional exams (preparation, administration), the difference is not very significant. 41% believe they spent less time (37% slightly less) using Streber, 59% spent more time (50% slightly more).

The differences between male and female students are not very significant, but visible. While 83% of female students had the feeling that they had learned more sustainably using Streber, only 56% spent more time than with a conventional exam.

96% of the students who already received a grade on their course agreed fully or at least partially that the grade corresponded well with their self-assessment.

Our survey demonstrated well the importance of a well-established feedback culture for the successful application of a peer assessment-oriented method such as CREPS. 75% of the students believe that getting feedback is generally important for their learning. 85% indicated that in general even critical yet constructive feedback is still motivating, and the majority of the students said that they could learn also from critical feedback they got in the Streber app.

But there is room for improvement! 67% stated that negative and derogatory feedback has a demotivating effect on them. Therefore developing the student’s feedback skills is essential for the method. However, 58% said they do not feel comfortable giving peer feedback or even rating the performance of others. On the other hand, when receiving feedback, 81% liked to reward their reviewers for giving helpful feedback. In comparison with *creating questions* or *practicing questions* reviewing their colleagues’ questions is not only an unpopular task, but also believed to be least effective. 14% of the participants state that reviewing is the best way to learn while 59% believe it is the least effective task.

While rating the question’s quality was mandatory in Streber’s review phase, writing a feedback message was an option that was used in only 21% of all reviews. However, while well rated questions got written feedback rarely the rate of feedback messages explaining the rating increased to 35% for critical reviews and even to 44% for the worst rated 1% of questions. The poorer the rating the more likely was a message explaining the problems or even suggesting improvements.

An amazing 87% said they would like to use the Streber app again in another course, 44% even as often as possible (whenever the method makes sense in a course). Only 3% were dissatisfied with the method and app used in their course. Female students are even more satisfied with the app - 50% would opt to use Streber for every reasonable opportunity.

86% of the participants (students from IT related study programs) think that they are the right target group for the app and the learning method. 80% believe that CREPS and the Streber app are suitable especially for theoretical lectures and that the method is a good alternative to a traditional test. For courses of practical content (projects) 24% believe that it would make sense to use Streber at least as a supplement to other possibilities of performance assessment.

6. Conclusions

The concept of structured continuous learning applied in CREPS as well as the idea to deal with learning content in several ways (creating and revising questions, reviewing and rating questions and practicing by repeatedly answering questions) met with broad approval from the students. There is a very high level of satisfaction, both in terms of comparing the learning time spent with the learning results and in terms of the correspondence between the grade and the self-assessed learning success. Students appreciate the flexibility, the chance to learn "more sustainably", the motivating aspects of dealing with the subject matter in more detail and also the novelty compared to more traditional teaching and assessment methods. "The concept is a lot more fun than normal studying and makes every train journey meaningful!" as one student put it.

The students proposed a lot of ideas for new features in the Streber App like the possibility to integrate hyperlinks and graphics into questions in order to create more complex questions or to provide additional information. The Practice Modul could be enhanced by mixing the answer options of all questions instead of displaying them in the original order. We also appreciated the idea that critically reviewed questions created with the Streber App could be reused in the attendance part of the course for substantive discussions.

A culture of constructive and qualified feedback is a key success factor and should be encouraged by the lecturer. It is important that students learn to provide and accept critical but fair, constructive, and appreciative feedback to avoid the otherwise possible demotivating effects of feedback. Some students suggested that a feedback message explaining the rating should always be mandatory however mandatory feedback messages could also result in lower quality. The option to let the author of a question rate his reviews (instead of just promoting the most helpful review as it is implemented currently) was discussed but it would also increase the method's complexity. All in all, we are convinced that there is still potential for technical and organizational optimizations in the peer review process.

Although our observations during the courses had already made clear that our students liked the Streber App, the overwhelmingly high level of approval for the CREPS method and the app as well as the often-expressed desire for repeated use came as a bit of a surprise. It encourages us to continue optimizing the app and to integrate the CREPS method and the Streber app into further course concepts, especially for knowledge-based courses.

The Streber App is currently in closed beta state - fully functional but still work in progress.

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TEACHING WITH TINY ARTICLES AS AN APPROACH TO STIMULATE TRUSTFUL AND COOPERATIVE LEARNING

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Abstract

The current Corona crises demonstrates the challenge of a fruitful and trustful learning dynamics among people with largely varying backgrounds. The dynamics may easily lead to separating people into groups with attributed properties which finally impairs the learning process. In this study we aimed at designing a new teaching concept for first grade bachelor students in pedagogics, psychology and sports science visiting a lecture on „Learning and Working Strategies “. This included to integrate the students from largely varying background in one teaching program. In order to achieve this goal, we created a novel format of a simplified scientific publication (e.g., a journal paper), called Tiny Article. We asked the students to write a weekly Tiny Article based on their thoughts about the lectures. By writing and sharing their weekly Tiny Article, the students learned to formulate their reflections and insights as well as to share and complement their understandings in a virtual *common brain*. This collection of knowledge, ideas and reflections were also shared with the teachers of the lectures and opened the discussion of possibilities for networked learning and working in mixed teams.

Keywords: *Common brain, tiny articles, cooperative learning, learning dynamics, shared reflections.*

1. Introduction

In the last two years the way of teaching has fundamentally changed. The learning process is increasingly challenged by a world which is becoming more uncertain and complex (LeBlanc, 2018; Waller et al., 2019). With the dominant use of digital learning techniques also new opportunities showed up such as the use of digital learning tools. With video conference tools like Zoom it becomes easy to create subgroups for collaborative learning. In this study we aimed at designing a new teaching concept for supporting cooperative learning of first grade bachelor students in pedagogics, psychology and sports science visiting a lecture on „Learning and Working Strategies “. This included to integrate the students from largely varying background in one teaching program. The goal was to enable students to document their reflections on the lectures and to share and comment on their mutual insights.

2. Methods

In order to achieve this goal, we created a novel format of a simplified scientific publication (e.g., a journal paper), called Tiny Article. This idea was inspired by the app Blinkist, which provides short summaries of books in a number of so-called *blinks*. In each blink one key message is presented in a short text. We adapted the concept of a blink to a Tiny Article by limiting the length of the short text to up to 1000 characters, which corresponds to about one-minute reading time. Additionally, the Tiny Article was complemented by a title (with max. 100 characters), an optional figure (e.g., an image or a graph) and up to 5 citations (of other Tiny Articles, lectures or scientific publications). Each student was creating a short name (with four letters) as an identifier of the person. We used the platform Padlet to collect the Tiny Articles. Students did not need to register or login to access the platform. Also, the weekly schedule of the course and instructions were documented in Padlet.

In total, the students were divided into eight tutorial groups (A-H). The name of the real person presented by the short name was only known within the corresponding tutorial group.

We asked the students to write a Weekly Tiny Article based on their thoughts about the lectures. The content of the Tiny Article was very individual. The following questions (among others) could be addressed:

- Which key messages can be noted for future academic activities?
- What was new or interesting?
- Which associations were observed?
- Which questions remained open?

The Weekly Tiny Articles were published in a public whiteboard in padlet which could be read by all students and the presenters of the lectures. In the upcoming tutorial the students were then invited to read and comment the Tiny Article of their peers. Based on the comments provided by the peers, the Tiny Article could be revised. Additionally, in each tutorial an Essence Tiny Article was created based on the most interesting insights of the individual Weekly Tiny Article. At the beginning of the next lecture, selected Essence Articles were presented to all students.

Over the course of the teaching program students were asked to write an additional Examen Tiny Article on a self-selected scientific question. They were invited to present this Examen Tiny Article in the final lecture in breakout sessions with 6-8 students. Based on the feedback they received after presentation, all students were invited to revise and submit the final Examen Tiny Article within two weeks.

3. Results and discussion

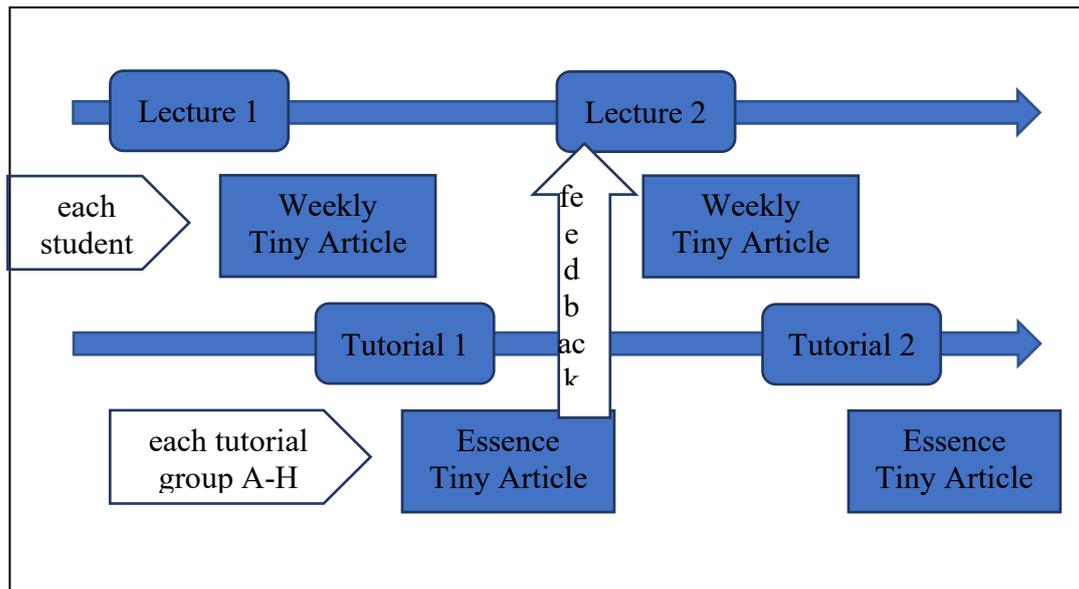
The use of Tiny Article was a new experience for the students and the lecturers likewise. At the beginning a key challenge for many students was to know what “a right” Tiny Article would be. After writing a couple of weekly Tiny Article they became more comfortable in reflecting on their learning experience. By writing weekly Tiny Article the students learned to formulate their reflections and insights as well as to share and complement their understandings in a virtual common brain contributing to a growing mindset of all participants (Hochanadel & Finamore, 2015). This collection of knowledge, ideas and reflections were also shared with the teachers of the lectures and opened the discussion of possibilities for networked learning and working in mixed teams.

The feedback provided by the students in the evaluation of the teaching program indicate following insights:

- The collaboratively developed through digitally available Tiny Articles specifically encouraged independent and cooperative learning, reading, reflection and problem solving as well as oral and written exchange about forms of scientific communication.
- The technical requirements for this teaching concept are low and the potential for transferability to other courses is high.
- The goals of the introductory phase, to inform, motivate and prepare for research-oriented studies, could be achieved through a high and almost constant participation of the students in lectures and tutorials and a high willingness to write the Tiny Articles.
- Although the courses are demanding, the respondents did not state that they were overwhelmed and the majority stated that the course had stimulated their interest and that they were encouraged to work on their own/to think for themselves.
- The digital communication and cooperation options, the support and supportive feedback offers as well as the consideration of previous knowledge were rated as very good by the majority.
- It was emphasized that through the creation of and the exchange about the Tiny Articles, the content and topics were dealt with continuously and not selectively (in the examination phase), as was previously the case.
- The conception based on Tiny Articles contributes to the students' constant examination of scientific topics and to an independent, collaborative and result-oriented learning process.
- The opportunity for teachers to view and perceive results, learning progress and learning difficulties via the Tiny Articles during the semester enables student-oriented teaching and testing.

Comparable to connectivism-based learning systems (Siemens, 2005), an open and needs-based learning environment is created that allows interaction with learners and teachers. The joint construction of knowledge and ideas enables the discussion of opportunities for networked thinking, learning and working processes in diverse teams. With this, a more conscious learning experience could be created and students were able to develop a creative and cooperative learning process based on Tiny Article and a structures review and communication process which was organized in the tutorials (peer-review) and lectures (presentation of Essence Tiny Article).

Figure 1. Learning with Tiny Articles in the lecture on “Learning and Working Strategies”. After each lecture, all students write a Weekly Tiny Article on their insights, reflection, associations and open questions. In the eight tutorials A-H, students read and comment the Weekly Tiny Articles of their peers. Based on this feedback, the Weekly Tiny Articles can be revised and the key messages from this cooperative learning process are documented in an Essence Tiny Article of the tutorial. Selected Essence Articles are then presented at the beginning of the next lecture.



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INTERDISCIPLINARY PERSPECTIVES ON AN INTEGRATED APPROACH TO EMBEDDING WELLBEING IN HIGHER EDUCATION

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Abstract

Supporting student mental health and wellbeing continues to be a foremost concern in Higher Education (HE), as rates of students presenting with mental health conditions, distress and poor wellbeing increase and as demand for counselling and support services exceeds supply. The age range of students in third level education often coincides with the challenging transitional period of emerging adulthood, where instabilities are further compounded by academic, financial, and social pressures. As HE institutes are distinct settings where academic work, hobbies, social life, as well as health and other services are often integrated, HE presents a unique opportunity to address this wider societal concern through a systems-based lens. Despite calls for holistic, whole of institution approaches, a transformation of student wellbeing has yet to be realised.

During a national initiative for valuing teaching and learning in HE in Ireland, the authors hosted an engaged online event to mobilise learning and action in the student wellbeing community. The event included case study presentations from existing examples of wellbeing in the curriculum, a panel discussion on the national landscape, and an open discussion on the future of wellbeing in HE. Attendees included academic faculty, HE management, researchers, staff from health and counselling services and health promotion, student representatives, careers and support services, and others. Data were collected via the recorded oral contributions, Zoom chat, and an anonymous survey. A deductive thematic analysis was completed with the guiding concept of an institution as a system that supports wellbeing.

Findings proposed shared values as the compass for organisational culture, leaders and decision makers as key enablers of change, academic structures as both a vehicle to promote positive wellbeing and mitigate negative impacts, academic staff as the embodiment of the institution and its values, and the student voice as a guide for informed decision making.

Recognising an institution as part of a wider system of HE which is influenced by political and economic climates, there is a requirement for HE to set out its stall with respect to its purpose and responsibility to wellbeing. This affirmation could enable a shared understanding of and commitment to wellbeing across the sector, through which collaborative and system-based efforts to support wellbeing can be actioned.

Keywords: *Wellbeing, higher education, engaged research, systems thinking.*

1. Background

Supporting student mental health and wellbeing in Higher Education (HE) continues to be a foremost concern for institutions, staff, and policy makers alike, as rates of mental illness, distress, and poor wellbeing increase, and as demand for institutional support services exceeds supply (Fox, Byrne, & Surdey, 2020). Young people in third level education are navigating the transitional period of emerging adulthood, forging their identity and meaning in a complex world with a less predictable life trajectory than generations before them. Their instability is compounded by academic, financial, and social pressures (Dooley, O'Connor, Fitzgerald, & O'Reilly, 2019), geopolitical and personal concerns (Fox et al., 2020) and declines in positive health behaviours as they adapt to autonomous living.

Irish HE policy recognises that going through third level education is a transformative experience that can change the lives of students and help them to realise their full potential. International frameworks for the future of education have proposed to model the future that we want in society—individual and collective wellbeing (OECD, 2019). A comprehensive toolkit for embedding mental health in HE has been developed in the UK (Hughes, et al. 2022), and similar approaches have been recommended by the Union of Students in Ireland National Report on Student Mental Health in

Third Level Education (2019), and the National Student Mental Health and Suicide Prevention Framework (Fox et al., 2020), with the latter requiring reporting on the progress and implementation of the framework's recommendations (Surdey, Byrne, & Fox, 2022). HE is also highly valued in economic strategy as an essential cog in the knowledge economy, where wellbeing is increasingly coming into focus in the workplace. The Global Human Capital Trends study (Deloitte, 2020), for example, found 80% of the respondents identified wellbeing as an important or very important priority for their organisation's success.

Scaffolding these future skills needs through primary, secondary, and tertiary educational settings seems like an opportune approach. As distinct environments where academic work, hobbies, social life, and health and other services are often integrated, HE presents a unique opportunity to systemically address this wider societal concern. Recommendations for supporting student mental health and wellbeing have focused on teaching and learning, extracurricular activities, the physical environment, reimaging the understanding of 'student success', top-down leadership, student partnership, settings-based, social-ecological, and whole-of-institution approaches requiring culture and policy change (Dooris, 2001; Fox et al., 2020; NStEP, 2021; O'Farrell, 2019), yet a transformation of student wellbeing has yet to be realised. The concepts underpinning many of these recommendations and frameworks align with respect to the need for holistic and systems-based efforts (Dooris, Wills, & Newton, 2014). Using systems thinking or systems theory enables a view of a system in its entirety, interconnections between its elements and their relationships to the whole system purpose (Meadows, 2008).

Recognising the many individuals and groups undertaking efforts to address student wellbeing through the curriculum and other approaches—but also the limitations of these often individual and siloed efforts—we organised an online event to bring people together for sharing and discussion, with a view to mobilising collective effort toward transforming wellbeing in HE in Ireland. In this paper, we will discuss the findings from the event with respect to the idea of a systems-based approach to wellbeing in HE.

2. Methods

Hosted by the authors during the 'Valuing Ireland's Teaching and Learning' initiative by the National Forum for the Enhancement of Teaching and Learning in Higher Education, the online event sought to bring together people from multiple disciplines and institutions who care about the future of wellbeing in HE. Invited presenters included those whose work was featured in a National Report on Wellbeing in the Curriculum (Byrne & Surdey, 2021), while invited panellists included the Dean of Students from Ireland's largest university, the author of the National Student Success Report (O'Farrell, 2019), and Healthy Campus experts. The target audience was anyone interested in student wellbeing in Higher Education, namely educators and student support staff, service providers, policy makers, industry representatives, and students. The event was communicated to potentially interested participants through the National Forum, the Insight SFI Research Centre for Data Analytics, the Technological Higher Education Authority, the Irish Universities Association, and personal networks via a variety of mediums including websites, mailing lists, and social media. Details of the event can be found here. Data were collected in the form of registration information, text contributions in the Zoom chat, text responses to an anonymous question on Mentimeter (*Thinking about the barriers, what is needed to be able to embed wellbeing in the curriculum?*), and oral contributions from the presenters, panel, and open discussion. The oral contributions were transcribed as live closed captions during the event, and text contributions were integrated in a single text file for thematic analysis.

An initial review of the data by the team noted recurring sentiments appearing through the different data streams that pointed towards a previous conceptual framework employed by the team around systems thinking in HE. A deductive thematic analysis approach was then discussed and applied to the data, the guiding concept for which was "*an institution as a system that is supportive of wellbeing*". Thematic analysis was conducted using the six-step process described by Braun & Clarke (2006). The lead author familiarised herself with the data by rewatching the recording of the event, re-reading the contributions and organising the content in the process of writing the event report. She completed initial coding of the data through a latent approach with respect to concepts underpinning an institution as a system. Codes were noted in the text column and refined in two rounds. Initial theme development began by grouping codes and the underlying data based on larger patterns using Excel sheets, and themes were discarded, split, and combined during development. Understanding the potential for bias given that we, the authors, were the organisers of the event with a shared perspective on the importance of wellbeing in HE and how this should be enabled, we held a meeting to discuss the analysis and associated theoretical frameworks while remaining cognisant of these biases. Follow-up reviews and challenges of themes through collaborative documents were undertaken over a period of two weeks. During theme refinement and naming, the data were revisited to ensure that they reflected the contributions. These processes ensured the trustworthiness of the analysis process.

3. Results

Over 100 people registered for the event and there were over 60 attendees on the day, including students and student representatives, HE management, academics, registry staff, researchers, career advisers, student health and counselling providers, student engagement, health promotion, healthy campus and sport representatives, and charities and business development professionals, among others, from across the island of Ireland. Five themes were created from the data analysis, presented here.

3.1. Shared values as the compass for organisational wellbeing culture

An institutional promise to wellbeing as core to the purpose of HE (and their purpose as an organisation) can frame the narrative for interdisciplinary discussions and facilitate decision making and action that reflect that promise. A shared understanding of wellbeing and the institution and staff's role in it (through a strategy, for example) can be a foundation upon which to build collaboration between and across departments and services and engender both collective and personal responsibility. A recognition of wellbeing as skills—which are lifelong and required graduate attributes—suggests that they should be consciously developed through education, formally and informally. Changing the organisational culture in alignment to a wellbeing strategy was considered to be a core, and challenging, requirement, reflected in the comments below by three different participants.

“Learning and wellbeing are inextricably linked. When students are well they can better engage in their learning, reach their full potential and flourish”

“Whatever you consider the role of higher education to be, it presupposes a foundation on which students are well and functioning effectively”

“What is our understanding of wellbeing? What is senior management's understanding of wellbeing? A lot of times it can [seem] very individualised [to] me. Maybe that's [us] not wanting to take [the] responsibility that we have and the power that we have to improve and support and enable wellbeing”

3.2. Decision-makers as key enablers of change

Leadership (President's, Vice-President's, or equivalent) are seen to set the tone for buy-in and change through their actions, such as through the targets they set for their institution or department, and the way that they resource and communicate those goals. Senior management are seen to enable change and action on strategic decisions through endorsing, resourcing (money, time, support) and reward or recognition. For these reasons, having a ‘champion’ for an initiative who was in a position of influence was proposed as a facilitator of progress in a number of the case studies presented, in addition to providing credibility to encourage wider participation and collaboration.

“Presidents’ get [people] interested”

“And we have support, most importantly, from senior management, including the President of [x], who've all endorsed it and supported it and say, yes, we should be doing this and [who] give us whatever help that they can”

3.3. Academic structures as a vehicle to both facilitate positive wellbeing and mitigate negative impacts

Assessing the way curricular programmes are structured and assessed, as well as their content, was proposed to enable subtle changes which could support wellbeing. These included scaffolding progressive learning journeys, reducing class sizes to facilitate personal relationships both between students and between students and staff, allocation of class places to support diversity and inclusion, and moving toward future-thinking teaching frameworks that better meet graduate skills and ways of working. Academic staff were seen as a key vehicle to action changes to these structures.

“I do think we need to look at not just the taught elements, I know it's important, but also how we deliver education and are we thinking about wellbeing in a way in which our courses are actually physically structured as well as the content.”

“To what extent could or should these initiatives be accompanied by a critical appraisal of the ways in which our programmes, and our institutions more generally, might be detracting from student wellbeing?”

3.4. Academic staff as the embodiment of the institution and its values

As opposed to staff in professional and support service roles who may only meet students in specific contexts and times of need, academic staff were considered to “have the eyes and ears” of all students. As such, they represent an opportunity to decentralise wellbeing away from purpose-built services and into the mainstream academic experience—embodying the agreed shared values of the institution. These staff need to be well themselves in order to teach and support students and need

resources to experiment with and develop their teaching practices. Whilst staff wellbeing initiatives can have a positive impact, and staff were shown to personally benefit from teaching wellbeing, unmanageable workloads were seen as a significant barrier to role modelling wellbeing.

“The main drivers of the learning are the teachers. And notwithstanding these early comments about the expected demands on the teaching staff at the third level institution, I believe that where we want to get to around wellbeing can't happen without the collaboration of the staff...[the] wellbeing agenda can only happen properly if it's infused and embedded in some way into the expectation of the various schools and academic centres”

“If we have institutions that demonstrably [are] set up in such a way that [they] care holistically for every member of the community... and that things like staff burnout, and staff mental health are being looked at and catered for, then we might find ourselves in the position where we also organically... have individuals who are placed in front of students who they themselves have been through journey of understanding how to take care of their own health, their own wellbeing, and maybe imparting same to the group [of students] in front of them.”

3.5. The student voice as a guide for informed decision making

Ensuring that decisions and actions on wellbeing are informed by the student voice was a recurring theme during the event and was considered an essential but challenging requirement. In addition to managing individual preferences around curricular content and how it is delivered (including balancing practicality and relevance), barriers to understanding and evaluating the student experience and the impact of initiatives were discussed. These included the burden on students in research participation and the fatigue of being requested to fill out multiple surveys from different sources, in addition to the challenge of demonstrating the value of initiatives that may have a longer-term impact. Facilitators included partnerships with student representatives and making better use of local and national data collection initiatives. Students themselves spoke of needing spaces in which to grow and develop skills around wellbeing and being able to apply their learnings in a way that is meaningful to them and their programme of study and future career.

“We are expected to automatically know how to manage ourselves, our emotions, how to become independent learners almost overnight... People sometimes say these life skills are common sense, but I would argue against that notion. They need to be taught and are possibly more important than the other things we devote our time to in colleges. We are told our twenties are our time to get to know ourselves, but we don't have the spaces to do that”

“While I was already interested and knew some stuff about wellbeing and healthy living, I never really consciously put my time and energy towards it, so now that it was part of the curriculum, it was worth credits towards my degree, it became a lot more accessible for me, and I became a lot more invested and interested in developing myself in a more applied way... I liked how we were able to take different parts of the curriculum that were of interest to us and apply them in a practical way towards our own lives”

4. Discussion

The findings of this event could be described as the requirements for, facilitators of, or characteristics of an institution as a system that supports wellbeing, and as such, they illuminate some of the potential reasons why the implementation of holistic approaches have not often been realised. A lack of shared values or a shared understanding of wellbeing and the institution's responsibility to it is demonstrated in the recent strategy of the governmental department responsible for Higher Education in Ireland, in which student wellbeing hardly features (Department of Further and Higher Education, Research, Innovation and Science, 2021). And while those in institutional leadership positions have been identified as key enablers of change, their decisions are often shaped by wider political and contextual climates, including with respect to funding and the key performance indicators to which that funding is linked.

Whilst curricular approaches to embedding wellbeing as an area of learning have been recommended as an approach to mainstream wellbeing in HE, and to demand resourcing and engagement, they have equally been criticised in secondary education for reducing wellbeing to quantifiable hours taught, instead of as a guiding principle for how staff and students are treated (Farrell & Mahon, 2022). These wider systems principles were evident in the recognition of how programme and institutional structures can be vehicles to both facilitate positive wellbeing and detract from it, and also in the importance of supporting staff wellbeing, as their words and actions are seen by students as the face and voice of the institution and its values. Wellbeing as an examinable and credit-bearing subject also brings up tensions where academic structures can have a negative impact on wellbeing, in addition to isolated syllabi being viewed as non-essential ‘soft’ content that is not relevant to a discipline or programme of

study. These perceptions of relevance could be considered to be culture driven, where having shared values around the purpose of HE and what an institution seeks to be could serve to strengthen perceptions of the value of wellbeing initiatives.

Students' experiences of the modules reported during the event were critical perspectives to represent, however, our capacity to understand, evaluate and action their perspectives is currently limited by access, know-how, and resources. Future-proofing solutions to these needs with respect to any new strategies for wellbeing should be positioned in the context of the digital world students increasingly inhabit, and the digital transformation approaching institutions.

Whilst many frameworks for student health and wellbeing are aligning in terms of needs and strategies, realistic implementation plans which are conscious of micro political climates, limiting factors of funding and workload, and traditions of siloed working in HE are required to tackle complex organisational change from a systems perspective. As such, many of the national HE frameworks, such as those for mental health and suicide prevention, health promoting campuses, student success, and student partnership, may benefit from integration through a HE sector lens, including through linking KPIs and associated funding.

Actioning organisational and culture change requires individuals working toward a shared vision, benefitting from the merging of top-down and bottom-up initiatives. Whilst capacity for fundamental change has been demonstrated through the Covid-19 pandemic, community momentum now requires HE to outline its values with respect to responsibility for student wellbeing whereby actions can follow, as the purpose of a system is judged not on how it is described but on how it acts (Meadows, 2008).

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COLLABORATIVE ONLINE LEARNING – A CULTURE APPROACH BETWEEN DENMARK AND GREENLAND

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Abstract

Recently, attempts have been made at Copenhagen University College (KP) to combine traditional learning activities with a globally teaching concept, where the students aiming to support digital interactions between students across countries. A COIL (Collaborative Online International Learning) involves online interactions between KP students and students from continuing education institutions in a different country, with the focus to collaborate on a subject-specific teaching assignment (Vil-lar-Onrubia & Rajpal 2015). Compared to traditional face-to-face courses, this course gave students the opportunity to work with the development of digital skills, as well as collaboration with students from other cultures, within the same field of study.

Keywords: *E-learning, higher education, culture and intercultural competence, learning experience.*

1. Introduction

COIL (Collaborative Online International Learning) is a global, widespread, and recognized teaching concept aiming to support digital interactions between students across countries, thereby strengthening intercultural and digital competencies (Coil, 2022).

University College Copenhagen's (KP) International Department and the Institute for Didactic and Digitalization joined forces to offer their support to lecturers wishing to test the method in the period Autumn 2020 or Spring 2021. Together, with interested lecturers across KP's educational programs, we explored the educational potentials recognized by international research (Taylor, 2016) in relation to our students' educational goals and exchange (Coil, 2022).

In 2020-2021 the educational institutions of Denmark, as all over the world, were affected by covid-19 restrictions. It, therefore, required the development of new didactic initiatives within the pedagogical courses at University College Copenhagen (KP).

2. Design

The developed and tested program COIL has been designed as a didactic framework characterized by its freedom of method and flexibility with only a couple of framework-setting requirements, which brings an innovative approach to lessons.

As a part of our pedagogy students' education, we developed a COIL to pair alongside the existing curriculum. This had the intention of challenging the students' own digital comprehension as well as focusing on the exchange between cultures. This created an academic echo chamber, where the students from Denmark and Greenland could discuss "*digital vulnerability within a cultural perspective*", with the main concern being children and youths in the two respective countries.

Greenland is part of the Danish Realm but have a high degree of self-government as lately was expanded in 2009. Even though Greenland is classified as part of Denmark, are our culture and way of living quite different, also the country's digitalization approach.

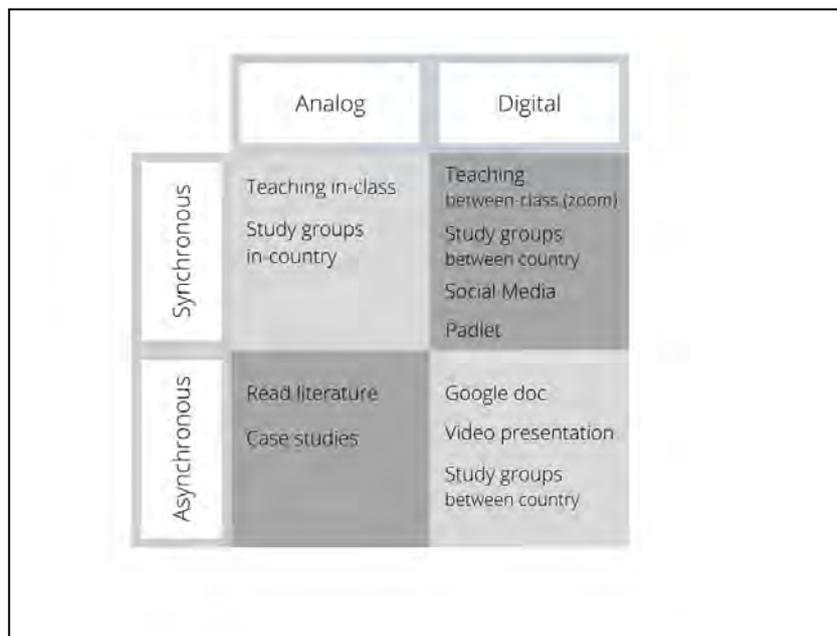
The term *digital vulnerability* is meant to comprehend that digitalization within a given society can bring inequity among youths and children, viewed from the perspective that the digital space does not inherently bring equal opportunity for participation. This can be seen across cultures where digital skills and the approach towards technology are not the same for everyone (Nyboe, 2009). With this topic, we tried to support the students' knowledge on how they can, through their academic work, help facilitate the digital comprehension of children and youths

3. Objectives

The project required essential didactical considerations in advance. Therefore, our COIL included the following:

1. INTERNATIONAL MEETING: Contact was made with the Social Pedagogy Seminary in Ilulissat (Det Socialpædagogiske Seminarium i Ilulissat). The students from University College Copenhagen and Greenland had to, through *blended learning*, be taught together (online synchronically) as well as through group work across borders (online asynchronously).
2. GLOBAL PERSPECTIVE: The project had a selected subject area, which had the ambition to support a global perspective in the classroom. Focusing on “*digital vulnerability*”, the students worked on understanding and knowledge within the subject area. This had the intention of creating transverse cultural understanding and, through their intuition as a pedagogue, to work prophylactically - with regard to the topic of *digital vulnerability* among children and youths in their respective social context.
3. REFLECTION: The project included a reflection segment that facilitated the students’ reflection on the international interaction and their academic dividend. Here the students used the online tool, Padlet (<https://padlet.com/katrinegellert/t3vynzyy585odfb5>).
4. DIGITAL: The project used various digital platforms, which made the international interaction possible - with the help of synchronized interactions (through video conferences, facetime, online classes through Zoom, chat functions and social media) and asynchronized interactions (through e-mail, Google Drive texts, exchanging videos and evaluation tools).

Figure 1. (The diagram below illustrates the different teaching activities in our COIL).



4. Methods

While *Blended Learning* is not a new term, on the contrary, it has even been used as a buzzword within various educational organizations. Blended learning can meet the students’ need for learning to be served in different ways. “*Blended Learning can be defined as the organic integration of thoughtfully selected and complementary face -to-face and online approaches and technologies (Graham, 2006)*” (Kaur, 2013, p. 612).

Blended Learning combines the physical and digital, making learning more engaging, flexible, and effective. The teachings in this project have didacticized the teaching activities for in-class and out-class, across both synchronous and asynchronous methods, and across borders.

Throughout this project, we emphasized that the students be put in the center of their own learning through various teaching activities while making the students in question responsible for their own as well as fellow students’ learning.

With a theoretical grounding in Lave & Wenger's conceptual apparatus *Situated learning* (1991) have we simultaneously created an expanded space for reflection and cooperation with fellow students, as

it is important not to underestimate the social aspect of the learning environment. Hence, it was important for our design that, despite physical distance, the students could socialize through different media. Therefore, we encouraged the students to use contact media such as Facebook, Messenger, and Facetime.

We evaluated with the Danish and Greenlandic students, who emphasized that the online learning environment, did not support the students' learning process equally. So, the challenges in this project have been to create a learning environment for the students, where they are included on equal terms, despite the students' different digital skills.

5. Conclusions

We have seen how this project has created student relations between countries. The students still have contact to this day and are still sparing with each other in an academic sense. Through this COIL, we acknowledge the global importance of preparing students for a digital future, as well as a strategic and academic goal - namely, to strengthen the pedagogy students' understanding of the digital paradigm in which children and youths are growing up.

This COIL project has proven to support fostering a close international collaboration network through program-specific projects, thereby strengthening students' and employees' academic and professional networks globally. Despite the local and cultural differences, this project has been meaningful and rewarding for both educational institutions involved.

“Det har været et super fedt samarbejde og der har været masser af sparring fra alles sider. Det har givet os indsigt i Danske og Grønlandske synspunkter om digital udsathed”

Trans: “It has been an awesome cooperation, and there has been lots of sparing from all sides. It has given us insight into Danish and Greenlandic views and digital vulnerability.”
(students, Padlet <https://padlet.com/katrinegellert/t3vynzyy585odfb5>)

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SUPPORTING STUDENT SUCCESS IN HIGHER EDUCATION: WHAT DO STUDENTS NEED?

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Abstract

The number of university students encountering issues with their well-being is increasing every year, with many struggling to seek appropriate support or lacking the necessary skills to identify themselves as struggling. One of the biggest factors affecting this is academic pressure due to being ill-prepared for the independent learning skills required at university, such as self-management and self-regulation, for which many still need support. To understand what these support needs are, four focus groups were carried out with university students across multiple programmes and stages. These were recorded and transcribed for thematic analysis. Four key themes are presented: (1) supports at university are often impersonal and unapproachable in nature, (2) importance of holistic well-being and personal development literacy to enable students to thrive at university, (3) need for better awareness and sign-posting of available supports, and (4) peer influences can have a substantial positive and/or negative effect on students. The implications of these are discussed in relation to improving supports, the importance of involving varied student voices throughout this process is highlighted, and further research steps are discussed.

Keywords: *Well-being, student success, higher education.*

1. Introduction

The number of students in higher education institutions (HEIs) encountering issues with their well-being is increasing every year, with 96% of HEIs reporting that their well-being services have experienced an increase in demand in the past five years (Worsley, Pennington, & Corcoran, 2020). Only 1 in 3 students struggling with their well-being seek support, citing stigma as the main barrier, followed by lack of knowledge of the support services available (Querstret, 2019). There are also many students who lack the skills to identify themselves as struggling in the first place, thereby needing support whilst also not having the capability and/or motivation to do so (Field, Duffy, & Huggins, 2015).

If prolonged and unaddressed, these issues relating to well-being can impact student success, where ‘success’ encapsulates several factors at both the institutional (academic attainment, academic competence, acquisition of general education) and individual level (personal development, & accomplishments, preparation for adulthood & citizenship, cognitive skills & intellectual dispositions, occupational attainment) (O’Farrell, 2019). Fostering well-being literacy can increase students’ willingness to seek help in times of distress (Gorzynski, Sims-Schouten, Hill, & Wilson, 2017).

Academic pressure is one of the biggest factors affecting student success and could be due to the independent learning style required at university, for which students are ill-prepared. Instruction on how to be an independent learner, which is based on self-management and behavioural self-regulation, is not encouraged at second level and often not formally taught at third level (Denny et al., 2015). Many students do not know what it is, are unaware of the need to develop values, attitudes and skills to make responsible decisions for their own learning, and are often unaware of their own learning needs and interests (Field et al., 2015). There is thus a need to investigate where the gaps in acquiring and fostering these skills at third level remain in order to understand how they could best be addressed.

Increasing emphasis has been put on the importance of including student voices in the development of academic and well-being supports (Querstret, 2019) as this will help foster autonomy, self-determination and user empowerment which are all key to developing successful well-being supports (Baik, Larcombe, & Brooker, 2019). To date, there remains a gap in our knowledge around what students themselves view as the essential actions that HEIs could be adopting to better support their success and

well-being. This is problematic given that students are, arguably, best placed to inform the design of the supports meant to help them based on their own perceived needs and experiences (Busher, 2012).

This research was developed in collaboration with several undergraduate UCD students who participated in the design and delivery of the study as well as the interpretation of results. The aim of this study is to understand the experiences and unmet needs of undergraduate university students in their academic, personal, and professional development journeys. These learnings will enable us to develop student-centred approaches to better support the processes involved in effective self-management and well-being which contribute to student success.

2. Methods

As part of a wider research project, undergraduate students from the university were recruited to take part in focus groups designed to explore their perceptions, experiences and needs with respect to accessing supports in HE. Participants were recruited by the student authors across several undergraduate programmes and stages in the College of Health and Agricultural Sciences. They were provided with an information sheet before giving written informed consent. Ethical approval was granted by the UCD Human Research Ethics Committee. Four focus groups consisting of 3-4 participants each (total N = 15) were conducted by the undergraduate researchers both in-person and online. These researchers received thorough training and were involved in the creation and piloting of the focus group topic guide. To enable more fluidity in participants' discussions, in the first three focus groups participants were presented with a hypothetical scenario of a normally high-achieving student experiencing a period of particularly high stress, resulting in ineffective study efforts and a poor assignment grade. Participants were then invited to discuss various aspects of this scenario (i.e., what might be causing stress, what skills might the person need, how can they be developed, what could they do now, how would you advise them, how might they get support etc.). The participants were then invited to discuss their own experiences of needing and/or accessing support at university and how/when they developed skills to support themselves. The final focus group focused on what a potential solution might look like to help support students in their campus lives. This included a discussion about student needs followed by a prioritisation of these needs.

The focus groups were audio recorded and transcribed verbatim, with all transcripts de-identified to protect participants' privacy. An inductive thematic analysis approach was applied to the data (Braun & Clarke, 2012). After an initial familiarisation period with the data, two coding teams were established with two student researchers in each team, working with a PhD researcher. Each team separately coded two different transcripts, first as individuals before coming together as a team to agree on the main codes identified. Both teams then came together as a whole group to share these codes, using them to identify common patterns across all four transcripts which were then collated into a preliminary set of themes. These themes were then reviewed with the principal investigator and renamed separately by all individuals before once again coming together as a group to refine them for inclusion in this paper. This iterative process using independent coding and several in-depth discussion meetings bolstered the trustworthiness of the analysis.

3. Results

Four key themes were created from the thematic analysis, presented here. Extracts from the data are denoted according to their respective transcripts (T1, T2, T3, T4).

3.1. Supports at university feel impersonal and unapproachable

Participants frequently described the supports offered at university as impersonal and unapproachable. They were perceived as overly formal and professional, "*[university] could be doing a lot more to make their services more approachable to students. At the moment, I very much feel they aren't approachable. It's a very professional setting.*" (T1). They expressed concern about being perceived and treated as a generic number in a much larger crowd of other struggling students, "*I'm not sure how approachable it is. If you feel like you're one in a thousand people that are seen queuing up to do it, they can just tell them the same thing.*" (T1). This led to them feeling disconnected from the university structure as a whole and contributed significantly to their unwillingness to seek support: "*I don't know how comfortable I would feel arranging a talk with my student advisor, just because I feel like I get an email every once in a while telling me all these people are here, but it doesn't really feel like there is that personal connection with the student body.*" (T1). Participants also spoke about the desire to feel "*special*" through a personal touch (T4).

Participants imagined informal, inviting advisory spaces to explore their issues, "*So let's say it was like a student advisor room with a private office where you could go in and have a chat, but in the*

room it had like mindfulness colouring [...] At the moment it's very much like 'that's an office up there that you can go to'." (T1). They suggested the idea of spaces which offer group sessions for those who may find it easier to open up around similar others: "If they perhaps offered group sessions, so like four or five of you went, I'd say it'd be easier to talk through problems when you're with other people." (T1).

Online communication (i.e. email) and online teaching compounds this feeling of unapproachability, due to the impact on the quality of relationships that can be formed online: "I know you get emails for student forums, but they're just kind of marketed as 'yeah, we're just going to have an agenda'. But I think if you can actually promote it as 'we want to hear how you feel, because we want things to improve for you', I think you'd get a lot more engagement and it'd be a much less formal environment." (T1). In comparison, students valued face-to-face communication: "You can't beat in-person, face-to-face interactions. You're going to pick up way more cues, you're going to pick up more rapport with the person, you're going to trust them more, you're going to be perhaps more vulnerable with them." (T1). However, some still felt that there are certain benefits to digital communication methods as a starting point for those who may feel less confident seeking support: "Younger students might not be inclined to meet someone face-to-face, but when they would actually go to the meeting they might be more reassured than a zoom meeting. Maybe there should be an option between the two." (T3).

To appeal more to students and deliver effective support, consideration should be given to how supports can be de-formalised to facilitate personal and individualised connections between students and key institutional figures (i.e., student mentor, academic advisor etc.) (O'Keeffe, 2013) and encourage students to feel like they can discuss their issues in an open, non-judgmental setting (de Moissac, Waddell, Smith, & Rocque, 2020). Additional consideration should also be given to the format in which support is advertised and delivered, as many students feel overwhelmed with emails and desire a certain level of face-to-face communication. Our data are corroborated by Querstret (2019) who suggested a combined approach of digital and in-person support to give students the option to seek support in the format that best suits them.

3.2. Importance of holistic well-being & personal development literacy to enable students to thrive at university

Participants had an appreciation of personal development skills and well-being literacy, referring to processes and concepts such as goal-setting, "Planning efficiently is the key to everything. Because if you have a plan then you at least know what you're meant to do, how you're meant to go about it. But if you just know you have to do X, Y, and Z, and you just have a list, it looks like you have a lot to do. So, planning out days and times is really good." (T1); self-awareness, "I think what is important is getting students to be self-aware because a lot of the time stress often causes a lot of problems, and rather than becoming self-aware because of hitting rock bottom, they need to learn to be self-aware before they hit rock bottom." (T2); reflection, "When you're in it and you can't see how much you're doing and that you're doing great, reflection is good to do." (T3); self-compassion, "Positive affirmations I think are so key. [...] Just giving yourself that time to appreciate what you do have as opposed to always worrying about what you have to do or what you have not done." (T1).

Students also understood that success at university is related to holistic well-being, "Other than sitting at your desk reading notes, it's more about how to balance your workloads. That you need your release in sports, or going out and being with friends, or exercise, or anything like that. And that's what study skills is the overarching bracket of." (T1), and that many structures exist at university to support this balance, "There's so many amenities and activities for us to do in college, they're not there for no reason. There are obviously all our lecture halls. There are obviously all our areas to study. There's also so many sporting facilities. There's so many well-being things to do like just different releases for people." (T1). However, many still struggled with putting this understanding into practice to maintain good work/life balance: "It's so easy to just be so engrossed and trying to get the work done and kind of not going out for a walk even or anything like that." (T4).

These skills were viewed as significant contributors to the overall university experience and beyond: "The main place to make the impact would be in university. Because that's when the workload really does increase because you need to get a good grade and because you need a job." (T1). Students wished to improve these skills, "As soon as a child enters any sort of schooling, or goes from one stage to the next, the importance of well-being should really be pushed." (T1), but felt that dialogues around these are neglected throughout education, "Not many students are taught exactly how to do that and, like I'm taught how to do it in nursing, and we've had those kind of lectures. But I feel like not all students, especially [those] not in Health Science, would be taught how to do that." (T1).

There needs to be much more encouragement and structures put in place to support students in acquiring holistic well-being and personal development skills during the transition from second to third level education so that they are well prepared for the independence required of them, as is well-

documented as having a positive effect on students when implemented (Fox, Byrne, & Surdey, 2020). Achieving this necessitates a change in the perception of these skills, often viewed as ‘soft’ or non-essential, through increased awareness and advocacy of their indispensability to student success in academia and beyond.

3.3. Need for better awareness and sign-posting of available supports

Participants frequently described themselves as lacking appropriate knowledge around how to find or access supports: *“I’ve been here for three years and I still have no idea where student counselling actually is. Like I don’t actually know where to go.”* (T2). In many cases, they did not know where to start looking for support as information on this tends to get lost amongst all of the other supports that they feel have been ‘thrown’ at them: *“I feel like it can be kind of hard to know who to turn to. I mean, you can go and talk to your lecturer and see like, where did I go wrong? How can I improve? But I feel like in terms of, making it specific...sometimes I feel like they throw all the supports at you.”* (T1).

There is a demand from students for more awareness of supports for health, well-being and academic management, in the university setting, *“It wouldn’t hurt for them to pop up to us at the start of every orientation at the start of every year and say ‘lads, I know you might not remember me from last semester, but remember my room is upstairs in room whatever and I am here to listen to whatever you guys have to say and I will help you in whatever way I can.”* (T2), but also general health management systems outside of university, *“Learning about health-orientated skills, it could also be really helpful. I’m not from Ireland and I don’t really know how to navigate the health system.”* (T4).

Available supports need to be better sign-posted, at the opportune time so that students know how and who to turn to for a specific issue. Getting the right information to students at the right time is a well-documented challenge in HEIs. Promotion via channels that students are already aware of or more connected to, such as word of mouth or social media, is a recommended strategy (IUQ Board, 2006). These supports should also be promoted more consistently over time throughout all stages the academic journey, not just at the beginning of the academic year, as students’ each have their own unique circumstances and contexts which will cause their needs to vary and change over time (Baik et al., 2019).

3.4. Peer influences can have a substantial positive and/or negative effect on students

Participants recognised that academic success and well-being go hand-in-hand, *“If you’re not having fun, if you’re not socialising, then you’re just going to contribute to the anxiety and contribute to the stress. And you need that release to do well, whenever you do your studies.”* (T1), and that personal relationships are strong mediators of both. These students saw the value of receiving additional perspectives on their issues from peers, *“From my own experience, when you struggle through that stuff on your own and you don’t get to talk to people about it and normalise it, it feels a lot harder.”* (T3).

They did not want to feel like they were the only ones going through something, *“The advantage of going to your peers and seeing how they’re getting on, it’s going to help you realise that everyone is in the same boat. That it’s not just you and you are not just on your own.”* (T2). They valued having shared experiences with their fellow students who they could then rely on for support and additional guidance, *“My first port of call would be to go to peers and classmates in my year because they’re going through the same thing as me.”* (T3), but also to help reduce the stigma one might experience in seeking out support, *“You might feel ashamed that you’re struggling and you’re not coping very well, so seeing that other people use those services as well would definitely be encouraging.”* (T3). Indeed, they valued being able to learn from each other, specifically from someone who was more relatable to them or had gone through something similar, *“Like if you can see someone in a higher year that’s around the same age, was probably a lot more helpful than going to one of the services that [the university] throws at you.”* (T1), to help normalise their own experience, *“Sometimes it can make you feel reassured that other people went through this too and like other people find this really hard as well and maybe it’s not as bad as I thought it was or that it’s manageable.”* (T3).

However, students sometimes felt insignificant among their peers: *“I think a big problem in [a big university], is the fact that it’s very one in 30,000 as it is [...] you’re one in a thousand and you kind of think, if you don’t have that supervisor or someone that you actually know, and you know you’re one in a thousand, they’d be like ‘right here’s ten minutes that’s it’.”* (T4). Rather than helping them feel less alone or like they’re in the same boat as everyone else, this can have the opposite effect of making them feel like their problems are not big enough to warrant seeking support and that they should be able to handle it as well as everyone else, *“Sometimes you’re like, no, this is my hurdle I need to kind of overcome and I can do it and I’m, like, smart enough, I can get through this all. There’s enough time in the day and everything.”* (T1), or that they would just *“get missed in the big crowd”* (T1).

Students need to be made to feel less alone and know that they can turn to each other for support and/or reassurance, as this can help foster a sense of belonging (Darwin & Palmer, 2009) as well as

positive well-being and mental health (Leach, 2014). This can be achieved through additional fostering of positive peer interactions in university, such as the provision of peer-mentor groups, as students' feel more encouraged to believe in themselves and their ability to succeed when this support comes from 'sympathetic others' who more closely relate to their own situation (Jacklin & Le Riche, 2009).

4. Conclusion

We believe that including the student's perspective is essential in finding ways to foster student success through the collaborative design and implementation of HEI programmes and supports. The student perspectives presented here have helped us identify which self-management and well-being skills are considered valuable to them and their success, and what their needs are regarding the acquisition and application of such skills. Supports that nurture these skills that reach into the student body in a personalised way are lacking. The influential nature of their peers in all of this has been identified as an important lever in student well-being. The next phase of this project will involve taking these learnings and combining them with further student-led discussions and suggestions around the design and implementation of a tool which will support them to succeed and thrive in the HEI environment, with the goal of fostering student empowerment and creating something useful and meaningful to them.

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SUSTAINABLE COMPUTER ARCHITECTURES: USE OF GRID, VIRTUALIZED, AND CLOUD COMPUTING IN ADDRESSING COVID-19 PANDEMIC

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Abstract

Combating electronic waste, energy consumption, as well as carbon emissions requires an enterprise to focus on creating sustainable computer architectures. A sustainable computer architecture identifies ways for an organization to stay competitive while becoming less dependent on computing resources and energy consumption. Sustainable computer architecture is a critical part of Corporate Social Responsibility. This paper highlights the components of a sustainable computer architecture: Grid, Cloud, and Virtualized Computing, and addresses their current applications in tackling COVID-19 pandemic. The COVID-19 pandemic sent virtually all office employees as well as school and University students home worldwide. Working and studying from home has been the only option for them, with in person settings implemented during Fall 21 semester. Under these unprecedented circumstances, sustainable computer architecture providers have become the cornerstone of virtual collaboration and learning platforms on a scale never experienced before. While the Internet has been part of our lives for quite some time now, without scalable Grid, Cloud, and Virtualized Computing platforms addressing the COVID-19 pandemic would have been disastrous. Under the pandemic crisis, sustainable computer architectures have become indispensable for Universities, schools, enterprises, governments, and all virtual students and business professionals.

Keywords: *Sustainable computer architectures, grid, cloud, and virtualized computing, COVID-19 pandemic.*

1. Sustainable information systems infrastructure ecosystem

Five companies utilizing sustainable computer architectures captured over 70 billion US dollars already in the 2019: IBM, Google, Microsoft Azure, Amazon, and Alibaba and they have thrived under the COVID-19 pandemic. Other global cloud based sustainable computer architecture providers include companies like: Salesforce, Oracle Cloud, Tencent Cloud, VMware, and Rackspace. All on-line teaching activities, video meetings and conferences, as well as digital collaboration tools utilized under COVID-19 pandemic by colleges and businesses: open source Moodle and Workspace, as well as Canvas, Zoom, WebEx, Slack, Microsoft Teams, Blackboard, Google Classroom, Any Meeting, Hangouts Meet, and Monday, run on cloud computer architectures. The most often utilized digital platforms: Zoom and Blackboard run on Amazon Web Services. Netflix, a streaming video service for television shows, movies, and documentaries, as well as Twitter, a social media platform also run on Amazon Web Services. Hewlett-Packard and Adobe depend on Microsoft cloud platform, while WebEx Cisco collaborating center utilizes Tata's cloud computing architecture (Frattini, 2020).

2. On-line learning shift

For Universities and schools, the biggest challenge in the on-line transition has been to acknowledge that providing a digital platform for teaching the class that would be otherwise taught in-person, is simply not enough. Additionally, studio and laboratory teaching provided additional extraordinary obstacles. On-line learning necessitates a complete makeover of the teaching and delivery modes on one hand, and the use of sustainable computer architectures, on the other hand, to satisfy curricular activities as well as students learning objectives. One needs to acknowledge that in an in-person teaching, while the professor utilizes in many instances computer classrooms with dozens of computers in them, three different learning mechanisms are being deployed. From the students' learning perspective, there is the need to transfer to students' knowledge acquisition relevant to a particular discipline. Then

comes the transformation of that knowledge into professional competence by solving case studies. Third, students need to exchange ideas and to participate in discussions to satisfy class learning outcomes. These three interwoven components differ in their rankings in primary, secondary, and tertiary educational settings. In tertiary education, the application of knowledge and exchanging ideas rank first, while in primary and secondary educational settings transferring knowledge is most important. In an on-line education, these three learning mechanisms cannot be delivered through a single digital platform. They have to be taught through different tailored delivery modes. All of them utilized either Grid, Cloud, and Virtualized Computing. Knowledge acquisition and its transfer is realized through live, on-line sessions, using digital platforms such as Zoom, Microsoft Teams, WebEx, Slack, Google Hangout, for example. Exchanging ideas and participating in discussions is accomplished through semi-synchronous social platforms tools, accurately moderated by professors. Thus, these three different learning mechanisms need to be tailored carefully by schools and Universities to deliver effective on-line educational experience (Foley, 2020).

3. Grid computing

Grid Computing leverages multiple computers, often geographically dispersed, yet interconnected by internet, that are synchronized to accomplish complex joint tasks. Some of the computers are unutilized, due to the location and time difference, thus contributing to the sustainable computer architecture. Grid computing is realized through software installed on every computer that utilizes data grid. The software manages the entire system and coordinates multiple tasks across the whole grid by assigning subtasks to each computer, so the computers could work simultaneously on their respective assignments. After the completion of subtasks, the outputs are collected and subsequently combined to address a larger-scale complex problem. The software lets each computer coordinate its output over the network with the other computers, so the information on what portion of the subtasks each computer is processing could be shared and consolidated to produce the required output. One of the tiers of Grid Computing, coined Distributed Computing, is an approach used to distribute and subsequently solve complex problems. Each interconnected computer on a grid is tasked with a particular portion of the larger science problem being solved. As the tasks are completed, the results are collected by centrally controlled computer(s).

Folding at Home (Folding@Home) is an example of a Distributed Computing architecture. It is based at Washington University School of Medicine in St. Louis, Missouri. Folding at Home is an undertaking to address scientific and medical research for finding cause and effect relationships with respect to illnesses with currently unavailable medical treatments. Proteins, which are the foundational building blocks of the human body, are large complex molecules that play a significant role in addressing this challenge. Proteins are fundamental in skeletal systems, muscular systems, in hair and skin, as well as in vascular systems. Proteins are necklaces of amino acids, which are long chain molecules. They include many essential biological compounds. As enzymes, they are the driving force behind all of the biochemical reactions that make biology work. In order to carry out their function, for example as enzymes or antibodies, they must take on a particular shape, also known as a 'fold' (Bowman, 2020). Thus, proteins are truly amazing machines: before they do their work, they assemble themselves. This self-assembly is called 'folding'. The process of protein folding is of significant importance in human health. If proteins do not fold properly diseases, such as Alzheimer's disease, can occur. Therefore, understanding how proteins fold, and how errors in the protein folding process arise is important to help find solutions to and cures for cancers and diseases. Recently, the Folding at Home project has published peer reviewed articles which showcase medical applications benefited through the work of Distributed Computing. Cryptic binding sites are not visible in protein targets crystallized without a ligand and only become visible crystallographically upon binding events. These sites have been shown to be druggable and might provide a rare opportunity to target difficult proteins. However, due to their hidden nature, they are difficult to find through experimental screening. Computational methods based on atomistic molecular simulations remain one of the best approaches to identify and characterize cryptic binding sites (Kuzmanic, Bowman, Juarez-Jimenez, Michel & Gervasio, 2020). Protein folding and other biological behaviors must be studied using large quantities and massive amounts of variants and simulations in order to view anomalies and stimuli which negatively impacts human health. Larger datasets help show true outliers and problematic scenarios and then can be more accurately studied. Hanson et. al. (2019) indicated that through clustering analysis of a large kinome profiling dataset, a cluster of eight promiscuous kinases that on average bind more was unusually stable in this inactive conformation, giving a mechanistic explanation for inhibitor promiscuity. This research showed that due solely to the size of the computational dataset were the researchers able to find abnormalities in the protein synthesis. Knowing the explanation for such behavior within the protein structure allows accurate treatments to be made specific to the abnormality, thus allowing for treatments to be more effective. Folding at Home has been active for twenty years. The first software was launched in

the year 2000, with an initial success. Afterwards, as an example of distributed computing, thousands of unutilized computers were donating their CPU cycles to the computational task. Within five years, significant research was made in specific areas involving Parkinson's Disease, Huntington's Disease, and Alzheimer's Disease. A benefit of shared computing is that the technical elements of the computer may vary. Operating system, power, and resources matter much less, all the while the problem being solved is being computed on many devices. In 2007, Folding at Home collaborated with Sony to develop a client for Sony's PlayStation3. This allows gamers to run a disease-solving shared computing platform in the background of their entertainment and gaming system at no cost to the user.

An alternative to distributed computing is to allocate massive resources by investing in a supercomputer. Currently, the most powerful supercomputer is Summit – an IBM computer capable of computing 200 petaFLOPS. One petaflop is 10¹⁵ Floating Point Operations Per Second (10,000,000,000,000,000 operations per second). While Summit is used for scientific research, millions of dollars is spent to build and maintain its data center. Meanwhile, Folding at Home celebrated 10 Petaflops in 2013, and today, is operating around 2.3 exaFLOPS. One exaFLOP is 10¹⁸ operations. One exaflop is 1,000 petaFLOPS. With minimal resources, a global community of researchers connected via the Internet are combining scientific computational output that no supercomputer can compete with.

Folding at Home is now applying resources to research the current pandemic of COVID-19. Just as proteins play a role in human anatomy, proteins are an important element in viral activity. Viruses also have proteins that they use to suppress our immune systems and reproduce themselves. By understanding the protein structure and behaviors of this virus, medical treatments become more focused and effective. While studying viral behaviors is an established science, observing a static virus is much different than watching a virus grow and adapt. By simulating protein structures and atomic movements, scientists and researchers are therefore given a much more complete picture of what the virus is, how it grows and interacts with stimuli. Watching how the atoms in a protein move relative to one another is important because it captures valuable information that is inaccessible by any other means (Bowman, 2020). The Folding at Home team remains optimistic in its research. Calculation power has increased steadily since inception and has contributed to many excellent peer-reviewed manuscripts in medical science. As a global pandemic has strained global resources in all industries, Distributed Computing is an accessible way for citizens with merely a laptop can provide meaningful support to the medical research community. Treatment and cure for Alzheimer's and Parkinson's is still being sought, and shared computing may help accelerate treatments for novel viral pandemics such as COVID-19.

4. Virtualized computing

Virtualization is the process of designing and implementing a software-based, or virtual, representation of applications, servers, storage, and networks. It is one of the most effective ways to utilize sustainable computer architecture, combat electronic waste and energy consumption, as well as reduce information technology expenses while enhancing efficiency and agility for enterprises and business units.

A virtual computer architecture, coined Virtual Machine (VM), is a single software piece running an operating system and containing applications. Each virtual machine is completely independent and self-contained. Placing several virtual machines on a single computer enables several operating systems and applications to run on just one physical server, or host, thus addressing sustainable computer architecture issues in a very powerful way.

Within a virtualized computing system, a piece of software, called a hypervisor disengages the virtual machines from the host and dynamically allocates computing resources to each virtual machine as required. VMWare is a website which describes virtual computer architecture (<https://www.vmware.com>). Virtual Machines share the following features, which offer several benefits: Partitioning, Isolation, Encapsulation, and Hardware Independence.

The COVID-19 pandemic has forced organizations to rely on virtualized computing infrastructures to enable their workforce to remain productive while maintaining profitable operations. Virtualized Computing has become part of the sustainable computer architectures, and organizations' Corporate Social Responsibility agendas. The on-line workforce has, in many enterprises, become a sustainable long-term solution rather than just a digital benefit to employees in the on-line workplace environment. As such, many virtualized computing infrastructures have been built as secondary systems, or built in addition to the existing company's legacy, localized systems. Pandemic imposed increase of demand on these systems have shown the need to allocate resources in a more sustainable way. It also allowed to organize enterprises in such a way that virtualized computing has become essential to an enterprise workflow rather than a method to circumvent a problem or serving as a secondary methodology.

Distributing desktop computers as a sustainable service enables businesses to accommodate changing workplace needs as well as to seize emerging opportunities. Virtualized desktop computers and

their applications could also be rapidly and efficiently deployed to branch offices, outsourced, utilized by off-shore employees as well as on-line workers using Windows or Apple-based servers, or running programs under Unix / Linux operating systems. In research reported by Sztandera (2020), using the desktop virtualization allowed Windows-based computer to run computational chemistry calculations on a virtualized Unix operating system. This virtualization provided for an inclusive tool that could facilitate manufacturers across the industrial spectrum create more hazard-free products for consumers. This application could also serve as a much-needed tool in preventive health care. The final development phase could incorporate many additional features including data about tumor tissue DNA, enabling the system to serve as a much-needed health care disruptor tool in personalized medicine for both patients and clinicians. It is envisioned that such computer architecture could provide an indispensable tool for clinicians to identify potential cancer type in patients who have a certain genetic makeup by running corresponding compound matches.

5. Cloud computing

Although both are often used technologies during the COVID-19 pandemic, and both part of sustainable computer architecture, virtual and cloud computing are not transposable. Virtual Computing is realized through software that makes computing environments unconstrained of the physical computer platform. Cloud computing, on the other hand, is a service that delivers shared computing resources data and software on demand through the Internet. As integral solutions, enterprises could begin by virtualizing their servers and subsequently moving to cloud computing for even greater coordination and self-service.

Cloud computing tools such as Oracle's Zoom virtual meeting tool has enabled organizations to transition successfully, or at least less disruptively, to a remote workforce. At Thomas Jefferson University Jefferson Health, implementation began months prior to the pandemic to equip its facilities with teleconferencing equipment run on Zoom platform. The need for an enterprise teleconferencing infrastructure became apparent as the Philadelphia health system acquired other locations, and offices and clinical treatment areas spanned the metropolitan area, and neighboring states of New Jersey and Delaware. The implementation of the virtual meeting technology added the flexibility for faculty and staff teams to meet virtually in real time, while being able to work from their traditional office areas. The execution of the tele-meeting workflow was largely on-campus, with technical support services nearby and resourced ready to assist in the facilitation of the on-line meetings. As the pandemic swept across North America, Jefferson's workforce was able to continue schedule and hold its meetings using Zoom's cloud infrastructure with minimal or no additional adaptation required.

A formal extension of the infrastructure was the establishment of the National Center for Telehealth Education and Research (NCTER) at Thomas Jefferson University. The center has led efficient practices for telehealth implementation through breakthrough research, teaching, and training to deliver health services thorough the digital mode¹. In terms of teaching and training, it has provided ground resources to support realization and strategies for appropriation. A suite of carefully designed educational offerings was provided to equip healthcare personnel to embrace and subsequently implement telehealth technologies to improve patient care. Examples of teaching and training avenues include certificates in Telehealth and Digital Health Innovation, as well as in Telehealth Facilitator Program; coursework in Telehealth and Connected Care, and in Conducting an Effective Physical Exam. In addition, Jefferson's flagship fellowship program in Telehealth Leadership was established.

In terms of research, National Center for Telehealth Education and Research (NCTER) at Thomas Jefferson University has utilized ethically sourced data to elevate patient care, as well as outcomes to measure telehealth efficacy, and empower patients to remain healthy at home and their communities. As the use of telehealth has increased rapidly under the unprecedented circumstances of the COVID-19 pandemic, it was acknowledged that scores of patients faced digital hurdles to utilization of the services related to access and digital literacy limitations. Research in digital readiness was initiated and supported to ensure digital health equity across vulnerable communities. In addition, as a result of the implementation of a sustainable computer architecture, a computer model of uncertainty and care seeking was developed based on the primary unmet needs after the hospital emergency department visits. The Jefferson Uncertainty Scale to measure patient uncertainty during an acute care visit, and the Uncertainty Communication Checklist to improve communication with patients who are discharged with ongoing uncertainty were developed. Subsequent research projects have focused on crafting health care interventions to guide patients in terms of handling their uncertainty, improving their experience, and most importantly decreasing healthcare costs through significantly reducing the need for non-routine care visits.

¹<https://www.jefferson.edu>

Cloud computing architecture also allowed for a significant contribution to, and social impact into, nutrition aspects of patients' wellbeing through research in healthy food choices to support chronic illnesses, and following recommendations on developing methods to coalesce nutrition-related services into routine scheduled care. It has also contributed to social impact of COVID-19 vaccination efforts through data analytics techniques to understand and address obstacles to vaccine confidence among minority and underserved populations in the Philadelphia metropolitan area. Furthermore, it aided conducting and evaluating multiple sustainable computer architecture approaches of telehealth care models, and incorporating telehealth as a care delivery model during the COVID-19 pandemic.

Another research area that has been investigated was utilizing cloud computing in applying qualitative and quantitative research approaches to bring forth patient perspectives with regard to unmet needs in terms of looking for non-routine care, with an ultimate goal of informing decisions of a health care provision system more responsive to personalized patient medicine interventions.

As community engagement and participation are indeed the key factors, the Jefferson VaxConnect team utilized cloud computing architecture to simulate, model, and subsequently deliver community outreach to patients across the University health system to ensure equitable access to COVID-19 vaccines. The efforts have been focused on specific geolocations to ensuring residents in underserved zip codes and communities have been reached out to. Addressing challenges of digital divide and patient self-scheduling, low health access, literacy, access, vaccine confidence, as well as logistic challenges such as lack of transportation in addition to supply issues, were key components of simulation, and subsequent vaccination delivery efforts.

Thomas Jefferson University graduate students in Public Health programs formed Digital Outreach Taskforce (DOT) to serve patients through an initial set up and following engagement in telehealth options. It was first assembled in September 2020 to provide personalized health interventions to patients through setting up computer tablets as well as remote digital monitoring devices that had been distributed as part of government secured during the COVID-19 pandemic. To date, it has conducted outreach to thousands of patients, with ongoing outreach. Thomas Jefferson University is a website which provides various examples of the university's applications of virtual computing (<https://www.jefferson.edu>).

6. Conclusions

As a global pandemic has strained global resources in all industries, grid, virtualized, and cloud computing have been accessible ways where merely a computer tablet or a wearable digital device could provide meaningful support to the medical research community. Treatment and cure for Alzheimer's and Parkinson's is still being sought, and sustainable computer architectures, such as shared computing, might help accelerate treatments for novel viral pandemics such as COVID-19. At the same time combating electronic waste, energy consumption, and carbon emissions requires enterprises and entities to focus on creating sustainable computer architectures as a critical part of Corporate Social Responsibility.

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TRAUMATISED REFUGEE CHILDREN AND YOUTH AT SCHOOL: RESOURCES AND CONDITIONS OF SUCCESS

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Abstract

Refugee children and youth have been exposed to stressors that cause trauma. Research in the migration context assumes that complex trauma is the result of consistent or repeated traumatic exposure over a period. Many children and youth are exposed to different stressors over a long period and they are still exposed in the host country. The trauma symptoms have a broad spectrum, from impairment in school functioning and increased absence from school to decreased intellectual functioning and academic performance or lower rates of graduation.

In the present study, refugee children and youth, a widely neglected group within school-related research, were considered from the perspective of school and teachers. A model based on Flanagan's critical incident technique revealed the main challenges of schools with traumatised students. To identify such critical incidents, focus group discussions were conducted. The total sample included 55 teachers, 32 of whom were working in primary schools and 23 in lower secondary education in Germany.

The critical incident analysis showed challenges and conditions on different levels of the school, influencing traumatised students' education, integration and self-concept. In the incidents, the teachers referred to circumstances they knew about their students' traumatisation related to experiences in the country of origin, during flight and in the host country. Furthermore, they reported how trauma became visible at school. Beyond the findings on trauma sequelae in general, topics specific to the school context were revealed (e.g., the role of language and the legal framework), which should be considered with regard to their implications. The excessive demands of an unknown school environment were depicted as refusal to attend class, running away, crying for a long time or sitting under the table during the whole school day. Under these circumstances, teaching, learning and acceptance from the peer group could hardly succeed. Such behaviours decrease students' opportunities to socialise and integrate.

These results implicate that successful resources and conditions should be aimed from a systemic perspective. Mixed models of teaching in and outside the classroom enable both social contacts and options for withdrawing. Multi-professional teams would bring together the expertise and perspectives of different professions, raising awareness of trauma sequelae and symptoms in the classroom context. Moreover, the role of extracurricular support should be considered.

Keywords: *Models of teaching, refugee children/youth, school, trauma, trauma sequelae.*

1. Introduction

Statistics on migration highlight the need for both school-related research and classroom practices to address the education of traumatised refugee children and youth. In 2019, 80 million people worldwide, with 30 to 40 million of them being children and youth, were on the move because of war, violence, persecution or displacement (United Nations High Commissioner for Refugees [UNHCR], 2019). The current developments in Ukraine intensify displacement and migration in the European area. About 47% of the asylum seekers in Germany in 2019 were minors (Federal Office for Migration and Refugees [BAMF], 2020). Many of the children and youth that have entered the German educational system and society after forced migration have been or are still being exposed to pressures causing traumatisation (Fazel & Stein, 2002). Thus, the present study concerns:

- (1) the backgrounds and circumstances of the traumatisation of students as reported by their teachers;
- (2) critical situations at school, where the trauma becomes visible;
- (3) resources and conditions that contribute to the traumatised students' positive development.

2. Traumatised refugee children and youth: Some backgrounds

The pressures that refugees are exposed to may occur in the country of origin, during flight and in the host country (Fazel & Stein, 2002). Young migrants are especially vulnerable to threats like human

trafficking, abuse and exploitation, particularly, when they travel alone or in the context of irregular migration. Research on migration assumes that many refugee children and youths have experienced not only one traumatic event. Complex trauma is the result of consistent or repeated traumatic exposure over a period. A traumatic experience is subject to individual perception; not every child or youth exposed to a traumatic event develops psychological problems. Nevertheless, there is an increased risk for long-term psychosocial consequences (Buchmüller, Lembcke, Busch, Kumsta, & Leyendecker, 2018). The symptoms of trauma vary, with the most frequent being social withdrawal, somatic complaints such as stomach pain or headache, attention and concentration problems and behavioural disorders (Buchmüller et al., 2018), as well as the resurgence of events by certain stimuli (flashbacks), including nightmares (Bronstein & Montgomery, 2013). Anxiety and depressive disorders have been documented (Jaycox et al., 2002). Such symptoms are also present in posttraumatic stress disorder (PTSD) but could also occur individually or as a comorbidity of PTSD. As a result, adverse effects on mental and physical health lead to detriments in all areas of life, such as family and school life or peer group dynamics. Also, trauma is related to impaired school functioning, including increased absence from school, decreased intellectual functioning, reading ability and academic performance, and lower rates of graduation (Delaney-Black et al., 2002; Milam, Furr-Holden, & Leaf, 2010).

Preventing traumatised students from such negative effects by ensuring successful access to school and peer groups entails new demands for teachers and educational staff. Addressing the special demands of students suffering from trauma due to displacement should be based on a resource-oriented approach as presented in this study.

3. Method

3.1. Procedure, sampling and data collection

The present study is part of the project ‘School for All’ at Ludwig-Maximilians University in Munich, Germany. The project’s ultimate goal is to implement sustainable measures for the structural improvement of schools, educational institutions and universities, as well as introduce standards for new concepts in the field of education. In the present study, we used the critical incident technique (CIT), first described by Flanagan (1954), which aims at investigating significant events in professional fields with high demand, high levels of responsibility and a need for complex problem-solving. A detailed analysis of critical incidents enables researchers to identify similarities, differences and patterns and seek insight into how and why people engage in different activities (Butterfield, Borgen, Amundson, & Maglio, 2004). To identify such incidents, focus group discussions were conducted aiming at an empirical analysis of social subsystems, collective phenomena and supra-individual behaviours (Krueger & Casey, 2014).

CIT assumes that the participants of a certain study are subject-matter experts who have both expertise and practical experience in their respective fields. The sample included 55 teachers (49 females, 6 males) with a minimum of six years in the teaching profession, 32 of whom were working in primary schools and 23 in lower secondary education in Germany. The teachers were divided into seven discussion groups, with six to eight participants per group (Krueger & Casey 2014). The groups were structured to include teachers from different schools to achieve a more diverse and broader argumentation.

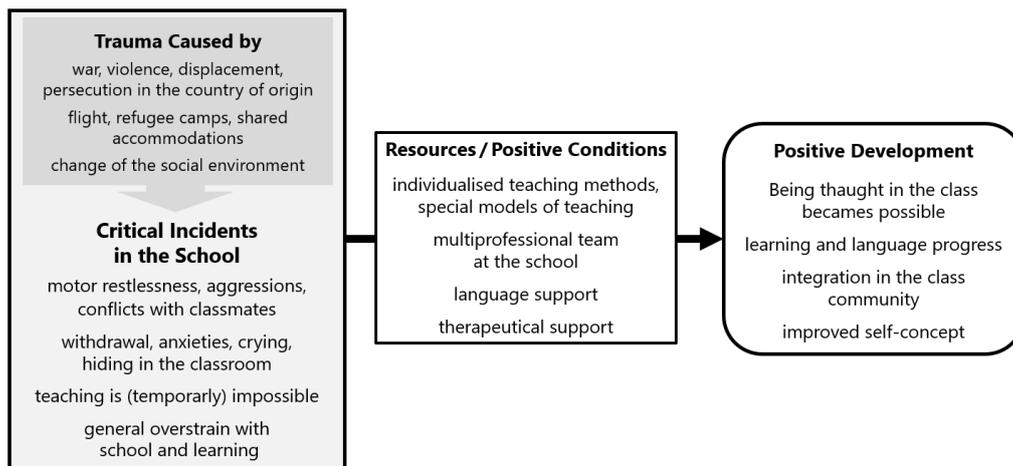
3.2. Analysis and validation

The group discussions yielded a total of 30 critical incidents concerning refugee children and youth at school. According to Flanagan (1954), critical incidents are to be analysed by creating categories and subcategories. Therefore, we used qualitative content analysis (Hsieh & Shannon, 2005). The goal of content analysis is to reduce the material so that the fundamental content is maintained and employ abstraction to obtain a straightforward corpus that retains an image of the raw material. Altogether, 270 codings were encoded. To verify the analysis, two researchers encoded all incidents. First, inter-rater reliability (IRR) on the basis of percentage was used to verify the encoding. A consensus was reached when at least 80% of the categories were identically encoded (> 70% overall is considered satisfactory). IRR was initially .83 for all categories combined. To improve this, communicative validation was performed (Kvale, 1995). By revising some categories, a higher degree of selectivity and, thus, higher IRR was reached (.89). Additionally, Cohen’s kappa coefficient (κ) (Brennan & Prediger, 1981) was calculated. For all categories together, κ was .89, corresponding to ‘almost perfect agreement’ (Landis & Koch, 1977).

4. Results

Figure 1 displays the model resulting from the critical incident analysis. The teachers reported backgrounds and circumstances they knew about their students’ traumatising, events that reflected trauma in school, and resources and conditions considered to be a positive development.

Figure 1. Model of traumatised refugee children and youth in school: backgrounds, resources and development.



4.1. Backgrounds and circumstances of the traumatising of children and youth

The teachers reported different backgrounds and circumstances of traumatising of their students. The majority of the teachers referred to a single context in which children and youth were exposed to trauma. In some cases, they referred to exposure to a variety of stressors.

In six incidents, teachers reported experiences of war, violence, religious and ethnic persecution and displacement in the country of origin. 'The boy's father was murdered in Afghanistan. The father went to his mother's funeral and was murdered with a headshot in a mosque due to a vendetta. The family was sent a picture' (PS_6_4). 'The parents are Iraqi Christians. Family members were murdered before the eyes of the family' (PS_7_7). In some events, the students' fathers were forced to be soldiers or were detained and persecuted. In 14 incidents, representing the majority of those reported, teachers described traumatic experiences their students suffered during flight. Here, teachers often referred to the flight by boat in the Mediterranean Sea. Some children and youth were separated from their parents or siblings during flight and often lost contact with their parents. 'A refugee child, a 7-year-old boy, came from Somalia with seven years, first passing through Italy. The mother and the child were separated during the flight; the mother could not be traced' (PS_3_10). Some children and youth were physically and sexually abused during flight, in refugee camps, accommodations or foster families. Many of them stayed in accommodations under harsh conditions. Furthermore, the teachers referred to the students' traumatising by the sudden shift into an unknown social environment. This is mostly accompanied by additional difficult circumstances: 'A 8-year-old student from Ethiopia, with a cleft lip had surgery in Germany. She completely refused to use the German language. She understands but she does not speak at all. She is traumatised by the sudden cultural change, the language change and the surgery' (PS_3_11).

The teachers further reported that a few children and youth suffered trauma in more than one context. 'A boy from Somalia, in the second grade, fled. His mother could not be found during nine months in Italy. He was taken into care by a foster family, where he was abused. Then, the family was reunited in Munich [...]. Then, he was raped in a refugee home' (PS_3_9).

4.2. Critical incidents: how does trauma become visible in the school context?

Teachers reported that trauma often became visible as motor restlessness, classroom disturbances and conflicts with classmates. Restlessness disturbed the classroom and disrupted the learning processes. 'He is very restless in motor terms, easily distracted and able to concentrate only for a short time' (PS_7_3). Furthermore, teachers reported an inability to follow the rules and routines of the class mainly caused by restlessness and difficulties to sit quietly during class. Disruptive behaviours were mostly directed towards classmates. 'A student with special learning needs who lives in refugee accommodation is traumatised. He constantly gets negative attention and displays violent behaviour against his classmates' (PS_4_7). The teachers attributed some of the behaviours to the specific traumatising experiences. For example, a teacher referred to a student whose father was a soldier in the civil war, while the mother and the children were living in Germany. 'As he felt unjustly treated, he threatened some classmates: "When my father comes to Germany on vacation, he will shoot you with his rifle". The other children are scared on their way to school and during break' (PS_7_3). The teachers also reported withdrawal, for example, students would not speak at all for weeks or months, would cry in the classroom or hide under and behind some furniture. 'A Syrian boy fled to Germany without his parents. He was

enrolled in the first grade in July. [...] He did not speak at all, was permanently unsettled and cried continuously' (PS_3_1).

Furthermore, events when teaching traumatised students in the classroom was impossible, either temporarily or permanently, were reported. The teachers described either externalising and internalising behaviours or a 'complete rejection to attend school' (PS_3_12) and enter the classroom. Other students entered the classroom but were not able to take part in class and social life. 'A refugee child, a 7-year-old boy, arrived in Germany from Somalia. He sits completely frightened under the table. Teaching him is not possible' (PS_3_1). Other students ran away from school several times (PS_3_11).

Apart from that, some teachers depicted an excessive demand of some students: 'A brother and a sister fled from Ethiopia, [...]. They had no academic socialisation at all. They were enrolled in the second grade but were overburdened with all school processes' (PS_1_3). Such situations characterised the sudden change in the migrant students' life in the social, linguistic and educational environment.

4.3. Resources, positive conditions and consequences

The critical incident analysis revealed a positive direction of the development due to positive conditions and resources in different areas and groups of persons.

On the teaching level, individualised teaching concepts, and particularly models of variably teaching traumatised students in and outside the classroom, were advantageous. Such models enabled children and youth to spend at least part of the day in the class community and, thus, build relationships. 'In order to enable further evolution, the boy repeated the first grade. However, he was maintained in the same class with his classmates to give him more opportunities to speak and remain integrated' (PS_3_3). Such concepts allow teaching where it was initially impossible. 'Severe separation anxiety is caused by the sudden cultural change. First, the child was taught outside the class and she made rapid progress. The number of hours the student was taught in the classroom increased over the weeks. She could be fully integrated into the class.' (PS_3_12). These concepts supported the integration in the class community and fostered the 'acceptance by the peer group' (PS_3_10).

On the school level, the support of a multi-professional team contributed to positive development. These teams are composed of regular teachers, special needs educators, social workers, school psychologists, professionals from the area of language and educational assistance staff. 'A student is extremely burdened by his mother's severe illness and his experiences during war and flight. He can be comprehensively supported by a multi-professional team with teachers, special needs educators and social workers' (LS_5_1). The composition of the team differed according to the students' specific needs. 'An unaccompanied minor boy from Syria enrolled in the first grade was supported by the class teacher, social worker and an expert in second language acquisition from the very beginning. However, his severe insecurity did not improve. In order to achieve stability, a context was created where the student was supported by a smaller group' (PS_3_1). The collaboration of teachers and special needs professionals, for example, to 'create individual educational plans' (LS_5_1) was a cornerstone in enabling teaching.

Other resources on the school level concerned the language. The measures to support language skills ranged from 'carefully introducing students to the language of instruction during the lessons' (PS_3_11) to concrete measures such as the 'promotion of literacy in a small group for three hours per week' (LS_5_1) or 'the individual support of a small group with four children having the same language level helped overcome language barriers and achieve rapid progress' (PS_3_1). This progress enabled access to the learning content and academic advances. In turn, this contributed to communication and inclusion and, therefore, positive experiences for children and youth who often experience rejection. Therefore, positive effects on the self-concept were reported. 'The boy has made much progress and has developed into a bright student that is eager to learn' (PS_3_1).

Positive development on a structural level was closely connected to extracurricular support, especially, psychotherapeutic services. 'After being raped in a refugee home, the student's personality structure collapsed. With the support of the psychotherapist, the boy could attend class again' (PS_3_10).

5. Conclusions: Implications from a systemic perspective

- The concepts and measures need to consider different levels and groups of people in school.
- *Mixed models of teaching in and outside the classroom enable both social contacts and options for withdrawing:* Such models could be modified and adjusted to the students' development and needs. These models also facilitate the integration into the educational system and everyday school life.
 - *Multi-professional teams bring together the expertise and perspectives of different professions:* Collaboration enables the implementation of the aforementioned teaching models and support plans. Professionals like social workers offer different perspectives and help students beyond

the context of academic competition. Linguistic barriers may interfere with trauma-related symptoms, cognitive and language delays or normal adjustment to a new language (Langley, Santiago, Rodríguez, & Zelaya, 2013). Thus, professionals with expertise in these areas could help distinguish these symptoms.

- *Language support is an interface of educational development*: Addressing language in class or through additional support is a key element for teaching traumatised students. There is pressure to act in educational settings that are marked by a monolingual orientation (Siemund, Gogolin, Schulz, & Davydova, 2013). Concepts such as plurilingual didactics could initiate development.
- *Schools need extracurricular support, especially from psychotherapists*: The school is not the only institution responsible for the children/youth and their wellbeing. Schools need to pursue collaborations with partners, such as local mental health agencies or child welfare institutions. Psychotherapeutic support is of special importance. Thus, a structural demand is to enable access to psychotherapeutic services for refugee children and youth, as soon as possible after their arrival.

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MICRO-CREDENTIALS – IMPROVEMENT OR FRAGMENTATION IN HIGHER EDUCATION?

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Abstract

This paper¹ analyses various approaches to micro-credentials, one of the most recent trends in higher education. Micro-credentials represent an “alternative” to traditional study programmes for acquiring independent formal qualification in higher education, whereas higher education institutions use it to achieve their mission of supporting adult education, i.e. lifelong learning in higher education. Even though a consensus regarding the definition of the term micro-credentials does not exist at either EU or national level, it can be stated that they represent small-scale and short learning programmes designed to offer specific knowledge, skills and competencies that satisfy social, personal, cultural as well as labour market needs. Apart from different interpretations of the term, the challenges of micro-credentials in higher education are identified in regard to regulatory frameworks, integration into national qualification frameworks, recognition and accumulating of micro-credentials as well as application of quality assurance mechanisms.

Similar to other programmes, micro-credentials are not equally assessed. They can be understood in regard to their purpose and structure, as a mean of flexibility in higher education through the development of individual learning paths, as a mean of supporting higher education in an attempt to become more accessible to non-traditional students as well as an initiative to strengthen adult education in higher education. On the other hand, as the abovementioned education form is oriented towards specific set of knowledge, which is, despite emphasizing other needs, in neoliberal politics predominately oriented towards labour market needs, fragmentation in higher education can be identified. This state is in contrast with holistic nature of study programmes which have to be designed to enable students to acquire well rounded and complementary, theoretical and practical set of knowledge and skills during their respective studies. Despite numerous challenges of micro-credentials, learning programmes designed for the acquisition of micro-credentials deserve systematic consideration in higher education by respecting not only their specific context and structure and higher education system, but also the characteristics of the complete education system.

Keywords: *Micro-credentials, higher education, lifelong learning, flexibility in education, fragmentation in education.*

1. Introduction

Certain types of micro-credentials have existed for a long period of time in vocational education. However, the same phenomenon has recently become the focal point of higher education policies. Micro-credentials have thus become educational concept that governments are beginning to implement strongly with the aim of transforming higher education into the specialized area of preparation for labour market. After this idea was spread from Australia, New Zealand, the USA and Canada, EU have recognized the “potentials” of the idea in question. Micro-credentials have existed in different forms prior to 2020, but they gained momentum due to the emergence of COVID-19 crisis that sped up its implementation in numerous jurisdictions as a part of the governments’ answer to the increase of unemployment, during which universities recognized new markets and target user groups, partially as an answer to the decrease of number of international students whose mobility was restricted (Wheelahan & Moodie, 2021a).

The key documents, on which the EU bases its approach to micro-credentials are *Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030)* (The Council of the European Union, 2021), *European Skills Agenda for sustainable competitiveness, social fairness and resilience* (EC, 2020) and *Digital Education Action Plan 2021-2027* (EC, 2020a). The listed documents are focused on two primary micro-credentials user groups, university students and adult education learners with the aim of ensuring more flexible and modular learning possibilities as well as offering inclusive learning forms.

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Micro-credentials concept is in its core an upgrade of the 21st century skills as well as the concept of employability rather than employment that follows the idea of lifelong learning and individual learning paths chosen by the individual himself along with the consequences their choice brings. Simultaneously, the focus is on individual's needs and interests, whereas universities and regulatory bodies' duty is to make the choice in question easier. In this scenario, higher education institutions are becoming increasingly more focused on their students' employability skills as one of their fundamental goals (Suleman, 2018) in order to improve their chances to enter labour market. This situation raises the question of whether micro-credentials will improve higher education by opening towards non-traditional students by following lifelong learning concept or will it make it more fragmented by being exclusively led by the needs of rapidly changing labour market?

2. Micro-credentials in higher education – state and challenges

Micro-credentials represent one of the conceptual forms of “alternative credentials” in which “alternative credentials” are defined as credentials that are not accredited as independent formal educational qualifications (Kato, Galán-Muros & Weko, 2020). This term, popularized in the USA, which, along with micro-credentials also encompasses other conceptual forms such as certificates and digital badges, was used to emphasize its contrast to the qualifications traditionally awarded by higher education institutions after graduation.

Micro-credentials' main challenge is the lack of universally accepted definition. Additionally, common and transparent definition represents a key for further development and acquisition of micro-credentials as a reliable form of gaining competencies in higher education. Although the term micro-credentials is relatively new in higher education, in the past, higher education institutions have offered various short-term study programmes that have met certain micro-credentials criteria (MicroHe, 2019; OECD, 2021) where the issue of how to integrate micro-credentials concept with the already existing programmes within higher education system appears.

European Commission (2020b) defines micro-credentials as a certified document issued by either institution or organization about learning outcomes achieved during short learning experience in which quality assurance standards were respected and which also contained additional information on the provider, applied assessment methods and, where applicable, qualifications framework level and acquired credits. Moreover, according to Oliver (2019), micro-credential represents a proof, a certificate of assessed learning which represents either additional, substitutional, complementary or formal component of formal qualification. Micro-credential represents credential's subunit or credential that can be accumulated into larger credential or become a part of personal portfolio (MicroHE, 2019). According to MICROBOL report, micro-credentials are defined as small-scale learning programmes that are used to gain specific knowledge, skills or competencies that meet personal, social, cultural or labour market needs, and can be either offered by higher education institutions, recognized in accordance with Lisbon Recognition Convention or in line with Recognition of Prior Learning (RPL). In the same matter, micro-credentials should meet quality assurance mechanisms that are in line with ESGs, possess explicitly stated learning outcomes at the national qualifications framework level, workload expressed in ECTS credits as well as clearly defined assessment methods and criteria (Lantero, Finocchietti & Petrucci, 2021).

Furthermore, what is common to every definition is the fact that not only can micro-credential represent exclusively a part or addition to formal qualifications, but it can also represent a stand-alone qualification. Additionally, micro-credential can be understood as a learning experience and/or qualification award. In comparison to traditional study programmes, micro-credentials are smaller in their scope, last shorter, focus exclusively on the development of particular knowledge and skills, flexible in delivery modes, available in digital format due to easier transfer, accumulating with the aim of recognizing and gaining comprehensive qualifications as well as connected with transparent and validated assessment instruments that have to meet quality assurance criteria (OECD, 2021).

MICROBOL report results (Lantero, Finocchietti & Petrucci, 2021), which show both the state and application of Bologna tools in micro-credentials context in member states of European Higher Education Area (EHEA), draw a conclusion that the understanding of micro-credentials concept differs from country to country, that very different approaches in regulatory aspect in regard to integrating micro-credentials into national legislation exist, that there are no existing credential digitalization policies that would enable easier transfer in the majority of EHEA members as well as the fact that the majority of micro-credentials have their workload stated in ECTS credits. However, a political consensus exists regarding the relationship between micro-credentials and already existing credentials, i.e. their integration into national qualifications frameworks (OECD, 2021a). The position of micro-credentials, in comparison to national qualifications frameworks, restricts their interpretability outside of certain higher education institutions, which is something that will require coordinated efforts of both abovementioned institutions and governments.

In regard to recognition, vast majority of countries recognizes micro-credentials with the aim of increasing learner competitiveness on the labour market, whilst smaller number of countries conducts recognition process for either academic purposes or continuation of studies (in the form of approving credits and prior learning). Apart from that, accumulation as well as “stacking” of micro-credentials in order to acquire full degree is enabled in the majority of EHEA states, although, in some cases neither accumulating of micro-credentials with the aim of entering into higher education nor “stacking” is possible. Instead, in order to gain the abovementioned entrance, a formal qualification is required. Individual states do not recognize other provider’s micro-credentials, excluding higher education institutions, due to the lack of quality assurance mechanisms. Furthermore, incorporating micro-credentials into national quality assurance systems represents another enormous challenge because external quality procedures are deemed too administratively overloading to be applied on micro-credentials (Lantero, Finocchietti & Petrucci, 2021).

The abovementioned facts indicate that micro-credentials can be understood as recognizing as well as recording of the results of short learning situations/learning programmes (often in digital environment) in order to increase the flow between various education levels and forms which enables flexibility during the learning process. Micro-credentials are learner’s property who can transfer, combine and accumulate them into larger units or full degree. Additionally, these are the ways in which learning activities can be adapted better to the needs of the learner. The Rome Ministerial communiqué adopted in November 2020 by the EHEA countries, identified micro-credentials as a conduit for “creating a supportive environment, both in terms of funding and regulation, that enables higher education institutions to tailor education provision to the needs of different types of learners (lifelong learners, part-time learners, learners from under-represented and disadvantaged groups) and to build a culture for equity and inclusion” (EHEA, 2020: 3-4). Implementation and integration of micro-credentials into higher education curricula requires a change in higher education institutions’ paradigm from the transfer of knowledge towards active learning model as well as authentic assessment scenarios (Sokhanvar, Salehi & Sokhanvar, 2021).

Maina, Guàrdia Ortiz, Mancini & Martinez Melo (2022) indicate that micro-credentials present an opportunity to improve certain skills which consequently makes the transition from higher education into the world of work more challenging, something which numerous developing countries have to cope with. In this sense, micro-credentials fill in the gaps between traditional study programmes offered by higher education institutions and skills required by labour market, and they offer aimed training for different target groups of non-traditional students. Additionally, micro-credentials possess different purposes that often intertwine, thus enabling the learner to participate in micro-credentials programme in order to advance academically, develop either professionally and/or individually (OECD, 2021). However, alternative approaches to micro-credentials also exists which consider them the source of higher education fragmentation.

3. Critical approach to micro-credentials

If we turn back the time and try to maintain university defined by Humboldt (free organization that should provide broad theoretical and practical knowledge, including experimental science, and whose comprehensive content should enable quality education of complete personality that will be responsible in both learning and scientific work), there are numerous arguments against implementation of micro-credentials in higher education. University diploma is the “lifeblood” of the things that the majority of modern societies appreciates as the evidence of intellect, advanced knowledge, ability as well as success in the chosen profession (Brown & Nic Giolla Mhichil, 2021). *Ivy League* Universities diploma is the ticket into the world of knowledge and work, enabled by the holistic nature of their study programmes. Additionally, holistic nature implies study programmes designed (or they should be designed) to provide students with an opportunity to gain comprehensive and complementary, theoretical and practical knowledge as well as skills in certain field of study. Thus, study programmes or macro-credentials designed in this way (Brown & Nic Giolla Mhichil, 2021) go in favour of an argument that universities encourage both individual and society’s development.

However, during the last couple of decades, neoliberal politics has shaken the universities foundations as both education (and knowledge) are becoming more and more determined by the market criteria. Universities are burdened by learning outcomes derived from economic sphere because they have to provide students with competencies that will enable them to be competitive on both labour market and economy of knowledge and work. Universities are well-known for their professors’ lack of interaction with the students due to their focus on research, instead of creating situations that will motivate students to learn and cooperate. Certain institutional politics are based on the belief that research encourages learning, an academic myth still dominant among the academic community, despite the findings that show that scientific work does not translate into automatic strong incentive for teaching. Žunec (2010) claims that university transformed into pedagogical department that does not nurture the relationship between teaching and scientific work, instead it insists on subordination to market as the only measure of

both institution and individual's value. As a result, the author highlights that neither the development of critical thinking nor habit building is being encouraged among students, but only the development of market-competitive competencies.

By respecting universities' educational policies, it can be stated that micro-credentials do not represent the newest trend of fragmentation in science and higher education, but rather even stronger market orientation (Marginson, 2006; Walsh, 2021; McGreal & Olcott, 2022). Micro-credentials are based on attributes of graduated students, employability and 21st century skills which leads to a logical conclusion; the purpose of learning is to prepare individuals for labour market, something which can be done in small pieces (Wheelahan & Moodie, 2021). Micro-credentials represent new educational concept that contributes to the "genericism" discourse in which individuals have to be ready for "permanent competence" in which, this kind of education, or even more precisely, training, is separated from fundamental scientific disciplines and fields as well as related professional identity (Bernstein, 2000).

Denying this discourse requires the denial of public pedagogy, the type of pedagogy on which university teaching is based on. Furthermore, as stated by Biesta (2005), it is important to differentiate learning and education because education represents contingent process integrated into social relationships and constituted by teachers and students during research and interaction. Neoliberal economy has transformed the meaning of education by imposing certain different pedagogies according to which education became prescriptive ideology of instrumental calculation. On the one hand, learning was reduced to economic exchange between service providers (universities and teachers) and users (families and students), while on the other hand, into currency that serves to achieve economic goals. Thus, the open question of where higher education is heading to and how to conceptualize it remains. However, it seems that we are collectively subscribed to neoliberal economy because it is easier to imagine the end of the world than the end of capitalism (Means, 2018).

4. Conclusion

Micro-credentials enable more flexible and modular learning opportunities by offering inclusive forms of learning. From this perspective, micro-credentials can contribute to the improvement of higher education by implementing fundamental principles of lifelong learning into higher education as well as opening towards non-traditional group of students. Therefore, supporting the improved approach to higher education and the element of inclusivity, especially for those that do not possess formal university entrance qualifications as well as those that wish to develop continuously at the higher levels of education, should not be neglected in future implementation.

On the other hand, under the influence of neoliberal politics on higher education, implementation of micro-credentials empowers the concept of employability, rather than employment, ultimately leading to a change in how both knowledge and competencies are understood, a process in which knowledge at higher education level is being granulated, which leads to the fragmentation in education and the loss of universities' purpose to provide broad (holistic) education. Despite the micro-credentials' critics, it seems that they are the future of higher education as more and more digital natives, who are able to acquire knowledge in small fragments, enter higher education systems.

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STUDENT-CENTERED PROJECTS: RURAL HIGH SCHOOL STUDENTS LEADING PROJECTS IN TECHNOLOGY, IDENTITY, AND SOCIAL JUSTICE

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Abstract

CompuPower is a student-centered program integrating computer technology, identity exploration activities, and community outreach projects. The program was implemented in six rural high schools in Arizona, USA between 2019 and 2021. Students worked in groups in project-based learning environments to create technology-based products (for example, websites, social media campaigns, and public service announcement videos) and to explore their individual identities and skills as they set education and career goals. To understand the CompuPower program from the students' perspective, our research team conducted a qualitative, retrospective interview study using photo elicitation (Harper, 2002). This paper reports on the experiences of 13 rural high school student participants from diverse backgrounds. It explores students' CompuPower experiences, including the technical and non-technical skills they gained throughout the program as they worked on community outreach efforts.

Keywords: *Student-centered projects, rural computing education, technology-based projects, social skills, high school STEM education.*

1. Introduction

Imagine walking into a high school classroom where students are working in teams on projects about a wide range of social issues. Some students are in one corner of the classroom creating a flyer to gather a group of community members and create awareness about their carbon footprint. Other students are setting up a meeting with their administrators to create a student council. Another group is developing a survey asking students about substance abuse in their personal lives and communities. As part of the curriculum, these same students are talking openly about who they are and how their intersectional identities relate to their interests, values, and positions of power in society. While getting to know each other more deeply, they set goals for their projects and for themselves. They talk about how their projects could influence their schools and their communities, and they learn to use different technologies to research, develop, and disseminate their work. The teacher acts as a facilitator guiding students through the activities, yet the students are deciding how to present themselves, what projects to work on, how to divide their work, and what to prioritize. CompuPower is a student-centered program focusing on community outreach projects, identity exploration, and computer technology. During the 2019-2020 and 2020-2021 school years, 146 tenth and eleventh graders attending one of six schools in rural areas of Arizona, USA participated in CompuPower. This was one of the first computing courses for most participants and it was conducted face-to-face, with some hybrid and virtual sessions at the peak of the pandemic. CompuPower addresses the shortage of culturally responsive STEM (science, technology, engineering, and mathematics) courses that ensure rural high school students feel a connection to the curriculum and a sense of belonging in tech spaces (Jenkins, 2009). This paper contributes to filling the current knowledge gap in literature related to rural high school students technological and social skills gained when working on self-directed social action projects.

2. Literature review on student-centered projects using technology

Student-centered learning (SCL) is a learning process in which students have autonomy and responsibility for their own learning (Hannafin & Land, 1997; Lee & Hannafin, 2016). Classes that focus on SCL often encourage individual or group projects where students choose their topic of interest, conduct research, consult with others, and share their project outcomes (Lee & Hannafin, 2016). SCL

programs that integrate technology imitating the way “professionals use it in the workplace...can enhance academic achievement, civic engagement, acquisition of leadership skills, and personal/social development” (Moeller & Reitzes, 2011, p. 7). Furthermore, research shows that using technology for constructivist activities such as researching, collaborating, writing, analyzing, and publishing has a greater impact on student achievement than using it for drills, tutorials, and grammar (Warschauer & Matuchniak, 2010).

When students work in self-directed groups to develop projects of interest, they tend to build skills related to teamwork, critical thinking, communication, information access, and technology (Arches, 2012). Moreover, students working on self-directed group projects aimed at social change gain both cognitive and social skills and are more positively perceived by teachers (Wilson et al., 2007; Arches, 2012). These skills include enhanced confidence, empathy, and increased interest in academic endeavors (Arches, 2012).

3. Research methodology

During the fall of 2021 and winter of 2022, our qualitative research team conducted one-hour retrospective interviews and/or focus groups with 13 high school students who participated in the 2020-2021 iteration of the CompuPower program. Students came from five different rural schools in Arizona and were sophomores and juniors (ages 15 and 16) when they participated in CompuPower. Seven students were male and six were female. Two males and two females self-identified as Black or Hispanic/Latinx; three males and four females identified as white or Caucasian; and two students did not identify racially or ethnically. Two students identified as LGBTQ+ (lesbian, gay, bisexual, transgender, queer, and other sexual identities). Researchers worked with TERC’s Institutional Review Board (IRB) to protect the rights and welfare of study participants. Parents and students both signed consent/assent forms, and students were given an option to select their own pseudonyms. All interviews were conducted over Zoom or face-to-face on school campuses. When asking questions about the CompuPower activities and group projects, researchers took a photo elicitation approach, sharing images of the work students had completed during the program to help them remember and describe specific aspects of their work, which made the interviews more valid and reliable (Harper, 2002). Student work included identity collages, project logos, public service announcement videos, presentations slides, project websites, and social media campaigns. Our research questions related to student group work were:

- What technical skills did students learn?
- What non-technical skills did students learn?

Our team conducted thematic analysis to answer these research questions (Miles & Huberman, 2018; Swain, 2018). We developed a codebook with deductive codes from Scott’s (2021) CompuGirls research which was used to develop the CompuPower program, and derived inductive codes identifying new patterns and themes from student interview data (Glaser & Strauss, 2017). We used the NVivo qualitative data analysis software to store our interview data, assign codes and notes to our transcripts, and link multiple data sources. We assigned interview transcripts to two pairs of researchers to code, and periodically coded as a whole team to verify coder drift and provide further trustworthiness of our analysis.

4. Findings

4.1. Gaining technology-related skills

In the CompuPower program, students learned about technology as a means to collect and disseminate information, conduct research, and design project artifacts. CompuPower offered basic programming language lessons that students could use to develop a personal and/or project website. There were lessons on graphic design, video development, creating presentations with Google Slides, and using Zoom. During the interviews, all students talked about some technological tool or skill they gained or honed when participating in the program. David (all names are pseudonyms), who identified as white, talked about the technology skills he learned, “I learned about **HTML** and **programming**. I learned how to deal with **Google Slides** a lot better and with ease. I did a lot with that.” He mentioned how he has continued to use these skills when creating slides, advertisements, and videos for a “World in Conflict” college course he is taking as a junior in high school.

Damian, who identified as Black, mentioned his group created a website, surveys, PowerPoint slides, and a video about the negative effects drugs can have in one’s life. He mentioned the experience was new, saying, “It’s always **nice to try new things**,” and added that because technology is everywhere,

learning about all these tools and being able to create his own websites is important. Bryce, who identified as white, talked beyond the technology aspect, describing some of the groupwork and bonds that formed as they created the project website:

The website was really good too. We all worked on that too. So, we learned a lot about how to make one. **We watched so many videos and research about it, and it was fun. [The] design of the website was pretty complicated, but it was still really good.** And we all came together again. We always came together on everything. It was the most I've seen we all worked together ever, and I've been with that class for a long time, because we mainly know a lot of people that have been here forever and everything. So, yeah, the website was very nice, and we all agreed on it, and that's what really mattered in the end.

Some students mentioned learning about technology and its relation to other topics such as race and the brain. When asked about the two most important things learned in CompuPower, Rosie, who identified as white, mentioned:

I think a **big one that actually stuck with me was AI [Artificial Intelligence] and race.** That was something that I had never heard about before, and **I've never heard it talked about, even in all of the research that I've done.** And that was really something that was quite interesting to me, being that I am pretty Eurocentric. So, I have never been like, oh, okay, this isn't picking up my features.

Another student who identified as white, Venus, talked about a lesson on technology and the brain, "And there was another one where we looked at the brain, and we had to see **how technology and computers can look at the brain** and see little details in it, and I thought that was really cool." One student summarized her experience learning about different technology topics with her classmates. Burke, who identified as white, described how students focused on skills they were interested in learning. She expressed:

I think this project was a really good idea, 'cause I know a lot of **my classmates had different interests.** So, I really liked that **we kind of learned them on our own and then taught everyone** with presentations about it, instead of all of us learning, 'cause I knew I'd be a lot **more interested in graphic design than coding,** but some people were super interested in the coding. And so, I really liked how we did this project.

These examples demonstrate how CompuPower offered technology-related lessons that students could focus on based on their interests, apply to their group projects as needed, and use beyond this class.

4.2. Gaining non-technical skills

CompuPower was also a space for students to gain social skills and other non-technical skills when working with others, and to get to know themselves more deeply. Bryce talked about CompuPower as an "**eye-opening**" experience where he learned from everyone around him and got a deeper understanding of their personal lives. Another student, Sky, who identified as Latina and described herself as shy and nervous, talked about getting a better understanding about her whole self, "I think [it's] about your own personal life and how you view yourself as a person. How do you **learn to help yourself and view yourself now differently,** in a way?"

Her classmate, Josh, who identified as white, expressed how one cannot know a person's story "until you really get to know them" and it's important to understand that because people "could have **different beliefs**" and "everybody is different." Their teacher, who was present during the student interviews, said, "There's a lot we learned together, and having a lot of open conversations, you know, I think made us a lot closer. And **I saw you guys become good role models inside our school**" (originally cited in Ong et al., in press).

Some students talked about growing personally and professionally. Three students in the same school, Thalia (who identified as biracial), Max (who identified as Latino), and Josh (who identified as white) mentioned they became more confident after presenting to a group of 60 people as part of their final project. Thalia also mentioned learning, "to **speak more powerfully and clearly,** so you can actually reach others and have others hear you."

Venus, who identified as white, talked about learning skills like working with a new partner, being fair when assigning tasks, and making sure they worked things out when they didn't see eye to eye while developing their final project. She expressed, "I definitely think that working with my partner on

the group project helped me figure out **how to work in a bigger environment** with more people.” Another participant, Burke, talked about what she learned from her group dynamics:

I learned that **group effort is really important**, and that I think **assigning roles really helped us**. And I think that making sure that your point is getting where you wanted it to, I think that was our biggest focus. I think what I learned is to **focus on what you want to say and what you want to get across**, and not focus on everyone else, 'cause then that's when it gets all tangled up.

Throughout the program, students worked together strengthening bonds with their peers, and becoming more understanding of people's needs and beliefs. They developed teamwork skills that can be transferred to other educational and professional settings. Furthermore, students led community outreach projects that helped develop their leadership skills and social justice agent identities. Armando, who did not specify his racial/ethnic identity, led a teen mental health project with his group. They created an anti-depression website where students could find information about how to tell if someone is depressed and how to offer help. They included a suicide hotline, a contact information for group members, and an anonymous email address where students could vent. Armando explained:

We felt like **there wasn't enough being done to help**. We felt like the **students felt like they were alone**. They had no one to talk to, and sometimes that is true. Some people don't have anybody. And we just wanted to make it feel like they had somebody, and the teachers are a big part of that, to make them feel like they're somebody. We told the teachers, and basically taught them how to be somebody for them.

Another group of students led an environmental justice project and surveyed people to measure their carbon footprint. Burke described:

We really wanted to figure out how to help and **raise awareness to the earth and the animals that are being affected**. And so, we really wanted to get across that we care... We kind of tried to make it **easier to understand**, 'cause I know reading into some of it is harder to understand. So, we tried to break that down for our audience.

5. Discussion

Interviews with CompuPower participants provided a lens to understand how self-directed projects can enhance technology-related skills and non-technical skills in rural high school settings with students coming from diverse racial, ethnic, and gender identities. CompuPower students had the autonomy to work on projects that were valuable to them and to their communities, choosing topics such as teen suicide prevention and environmental justice. While preparing these projects, students were exposed to different technologies such as programming languages, presentation programs, website design, and video editing software. As mentioned earlier, one student David said he continued to use his video and presentation skills in a college course he is taking a year after participating in CompuPower. Several students mentioned the importance of learning how to develop presentations, videos, and websites to create awareness and address issues in their community. Moreover, they described ways they imagined using these skills beyond the CompuPower course, including developing presentations for future courses, creating a personal website to find a job, and filming and editing videos for sport reels. These examples demonstrate how the program taught practical technologies that can be transferred to multiple settings (Moeller & Reitzes, 2011).

Beyond technology skills, students gained skills related to communication, teamwork, confidence, and empathy (Wilson et al., 2007; Arches, 2012). Thalia felt empowered to “speak more powerfully and clearly” to reach her audience. Venus realized the importance of working as a team and assigning roles to work more efficiently. One teacher related that the course helped everyone bond, and he saw students become role models in their school. Student-centered programs like CompuPower can not only enhance students' skills, but can also build stronger relationships between peers, and between teachers and students (Wilson et al., 2007).

6. Conclusion and recommendations

Our study found that within CompuPower, rural high school participants were motivated to pursue projects that would make an impact in their schools and neighboring communities. These self-directed projects encouraged them to remain curious and find creative solutions to issues they encountered in their everyday lives. Through their projects, they gained technical skills as well as non-technical skills preparing them for future coursework, diverse careers, and leadership roles. For educators interested in providing students, especially rural students and members of other underrepresented groups in STEM, with powerful learning experiences, we recommend promoting project topics that center marginalized identities and community values. We also recommend engaging in activities that encourage students to understand each other more deeply and become peer mentors, fostering collaboration, empathy, and self-confidence.

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CHOOSE YOUR PROBLEMS! A FLEXIBLE LEARNING METHODOLOGY FOR ENGINEERING STUDENTS BASED ON PBL+

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Abstract

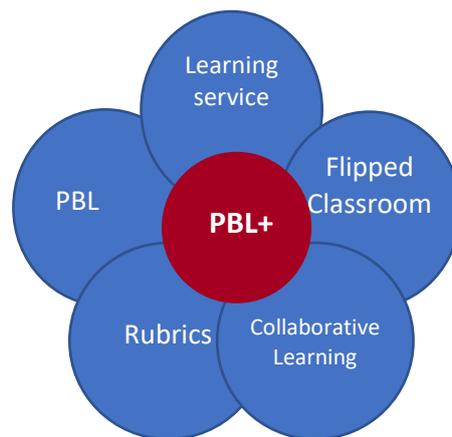
Problem Based Learning Plus (PBL+) is a teaching-learning methodology developed by the Teaching Innovation Group INGENIAQ from the University of León in Spain. It is designed for engineering students, including environmental and agricultural engineers, and also for biotechnologists specializing in production processes. PBL+ is based on the traditional PBL methodology, but with a wider aim. The proposed methodology combines three other teaching-learning methodologies, namely the flipped classroom; the use of rubrics for the evaluation of the activity; collaborative learning, and in some cases, the service-learning. This latter is understood as a service for microenterprises and self-employed workers. A relevant aspect is that students are free to choose the problem they will be working on, thus increasing motivation. The problem must be a real situation confronted by the company. Thus, students get in touch with a company having a close relationship with the subject topics and choose the case to be solved in a face-to-face meeting in conjunction with a company representative. In this way, students have an active role in defining the course's practical assignments. This flexible way of constructing their curriculum has proven to be motivating and it is an excellent strategy to approach real problems in their specialty. Moreover, the contact established between the University and enterprises is a valuable source of information for professors and students regarding current problems in the sector. Notwithstanding, not all engineering sectors are willing to share their issues with students. In this sense, the biotechnological industry is very reluctant to do so, whilst the agricultural sector is prone to it. In this work, we summarize the technical problems affecting the agricultural sector, tackled by the students after 4 years of PBL+ implementation. Sixty percent of the issues are related to phytosanitary topics, mainly emerging pests or diseases. This is a severe threat to the agricultural sector, and many small companies lack the technical knowledge necessary or experience in fighting plant diseases not previously suffered, asking for help to the University. The other 30% corresponds to alterations in crop growth due to abiotic factors. The remaining 10% consists of adapting productive processes to legislative changes.

Keywords: *Problem Based Learning, flipped classroom, flexible practices, rubrics, motivation.*

1. Introduction

The PBL+ is a teaching-learning methodology intended to immerse students in the business world (Urbano et al., 2020). This methodology is based on the classical Problem Based Learning but with a substantial change which is the direct interaction between students and a company so that the first ones solve a real problem faced by the company. Moreover, instead of selecting a company from a list proposed by the teacher, students are encouraged to search themselves and look for a company they can work with based on their interests. Students are also free to choose the problem among the several raised by the company (Urbano et al. 2022). For this reason, it is possible to say that students “choose their own problems”. PBL+ includes other 4 learning-teaching strategies (Figure 1), namely: i) Flipped Learning because the activity starts at the very beginning of the course, to have enough time for the activity to be carried out and thus search for the theoretical knowledge needed to provide students with skills needed to solve it; ii) collaborative learning, because PBL+ includes at least two tutorships in the group, with the rest of the colleagues, so the work is subjected to peer review; iii) learning service in the cases in which students solve a problem from a microenterprise unable to access a consultancy for help — a very common situation in small agriculture companies — iv) the use of rubrics for evaluation because such an innovative activity needs evaluating guidance (Urbano et al., 2022).

Figure 1. PBL+ Components.



During the last four years, PBL+ has been used in 10 engineering subjects from three different knowledge areas, namely Biotechnology, Agronomy and Economy. The strengths and weaknesses related to the use of PBL+ in three model subjects, one from each of the three mentioned knowledge areas, were analyzed by Urbano et al. (2021), and a SWOT (strengths, weakness, opportunities and threats) analysis for each area was performed. According to that work, the teaching-learning process becomes more attractive with PBL+, being useful for the different knowledge areas that make up the engineer training. However, they found that some problems hinder the use of PBL+. Public information accessible in scientific databases is overly theoretical, and it is difficult for the students to distinguish that information useful for the industry from the pure theoretical musings.

In the present work, we analyze the application of PBL+ in the agriculture sector to fulfill the competencies of Agricultural Engineers. Specific aspects related to the use of PBL+ were evaluated in the Agrarian sector. Moreover, we summarize the type of problems considered more relevant that correspond to those proposed by the different companies students get in contact with.

2. Objectives

The objective of this work was to show the experience of using PBL+ in Agricultural Engineering subjects. The specific aims were:

1. To ascertain the impact of PBL+ in the improvement of the teaching-learning process of Agronomy subjects of the Agricultural Engineer curriculum
2. To summarize the most and less common problems raised by companies which can be solved by agronomic students

3. Methodology

3.1. Assessment of the impact of PBL+ in the teaching-learning process

The impact of PBL+ in the teaching-learning process was assessed by evaluating seven learning outcomes (see Table 1) in the “Crops Production Systems” course of the Master in Agricultural Engineering. An indicator was created for the verification of each learning outcome.

Table 1. Indicators used for evaluating learning outcomes with PBL+ for the “Crops Production Systems” course of the Master in Agricultural Engineering.

Learning outcome	Verification
Improvement of academic performance	Marks achieved by students in the evaluation process (using rubrics)
Students' motivation	Satisfaction survey applied to the students / Self-evaluation using rubric
Effective interaction between students and company	Number of contacts student – company representative
Development of autonomous learning	Evaluated by the average of the rubric items: quality of the literature used and technical quality
Critical thinking development	Survey applied to the teacher
Competences achievement (readiness of students to join the job market)	Survey applied to the company representative
Interaction between students and collaborative work	Average number of times that each student participates in the group tutorships/total number of students

The courses analyzed were those in the period 2017-2022, and one previous to incorporating PBL+. In the satisfaction survey applied to the students, the points evaluated were:

- i) Rate from 1 to 5 the usefulness of entering into real contact with companies in the sector
- ii) The evaluation of their own learning was assessed by the self-evaluation using rubrics

In the satisfaction survey applied to the teachers, they were asked about (rate 1 to 5):

- i) The students' ability to search for the information needed to solve the problem in an autonomous way, and the quality of the information managed
- ii) The students' achievement of critical thinking
- iii) Other factors not related to the learning outcomes, for example, the company's willingness to collaborate and the alignment of PBL+

In the satisfaction survey applied to the company representative, the points evaluated (related to the achievement of the learning outcomes) were the following:

- i) Readiness of students to join the job market
- ii) Usefulness for the company of results obtained by students

3.2. Summary of the most and less common problems raised by companies which are to be solved by students

The problems solved by students during the courses previously indicated were compiled, classified and presented in table 2.

4. Results

4.1. Assessment of the impact of PBL+ in the teaching-learning process

The evaluation results of the seven learning outcomes considered are shown in Table 2. The course 2016-2017 corresponds to the year before using PBL+, and the mark included for that year corresponds to the practical activity before implanting PBL+. The period 2017-2018, was that where PBL+ was not fully established, i.e., there was no rubric for evaluation. The rubrics are delivered to the students at the kick-off session so that they know from the start the evaluating criteria and what is expected from the activity. It can be observed that the introduction of PBL+ without a rubric not only did not improve the marks achieved by students in the practical activities, but it was slightly lower. Moreover, in the absence of a rubric, the difference between marks obtained by students in the evaluation, and self-evaluation differs in more than 20%, indicating that students did not understand what it is expected from them. However, complete PBL+ (including rubrics) improved marks compared to the previous practical activity. In general terms, all learning outcomes improved when rubrics are introduced as a component of PBL+.

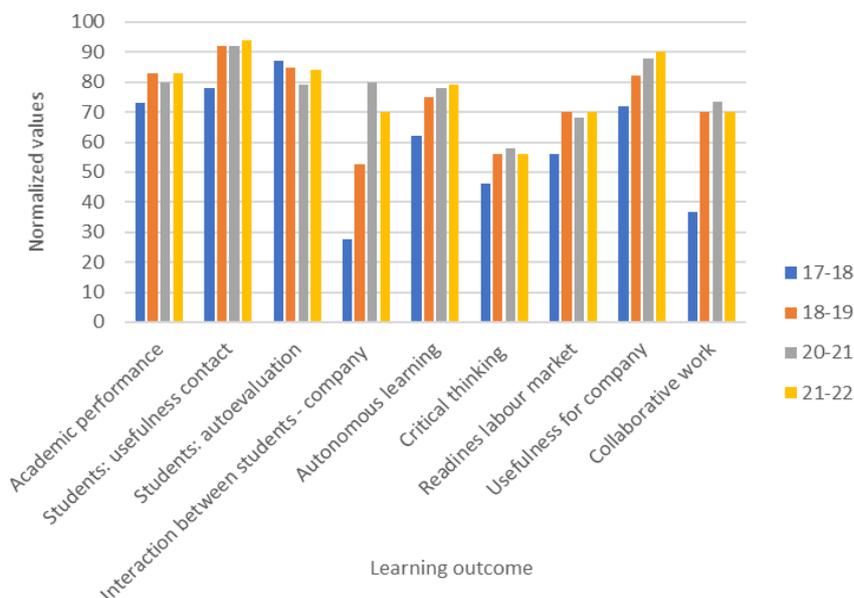
Figure 2 shows normalized values for the seven indicators of the learning outcomes performance. In general terms, after the rubric was included as a component of PBL+ (From 2018-2019 onwards), all indicators exceeded the value of 70 out of 100, except for the critical thinking, that in the opinion of the teacher, reached less than 60 out of 100 normalized points. Related to this parameter, the employer gave only a mark of 70 normalized points out of 100 about the readiness of the students to join the labor market. Incorporating a rubric improved the performance of all learning outcomes as already stated, except for self-evaluation, indicating that the absence of clear criteria favors misleading and false optimistic feeling about their own learning.

Table 2. Absolute values obtained for indicators used to evaluate learning outcomes with PBL+ for the “Crops Production Systems” course of the Master in Agricultural Engineering. Four years were considered (2017-2022) while for 2016-2017 practical activities were based on the resolution of a theoretical problem in the classroom. Values represent averages and number in parenthesis are the variation coefficient (standard deviation/average value)*100.

Learning outcome	Verification	Range	Year				
			16-17 (before PBL+)	17-18 (PBL+ no rubric)	18-19	20-21	21-22
Improvement of academic performance	Student marks achieved in the evaluation process (using rubrics)	0-10	7.4 (±22%)	7.3 (±20%)	8.3 (±25%)	8.0 (±28%)	8.3 (±25%)
Students' motivation	Survey: Usefulness of getting in contact with companies of the industrial sector	1-5	-	3.9 (±6%)	4.6 (±8%)	4.6 (±9%)	4.7 (±7%)
	Self-evaluation using rubrics	0-10	-	8.7 (±12%)	8.5 (±20%)	7.9 (±25%)	8.4 (±18%)
Effective interaction between students and company	Number of contacts student-company representative	0 - ∞	-	1.1 (±5%)	2.1 (±10%)	3.2 (±15%)	2.8 (±12%)
Development of autonomous learning	Evaluated by the average of rubric items: quality of the literature used and technical quality	0-10	-	6.2 (±26%)	7.5 (±16%)	7.8 (±24%)	7.9 (±21%)
Critical thinking development	Survey applied to the teacher ¹	1-5	-	2.3	2.8	2.9	2.8
Competences achievement (related to integration in professional activity)	Survey applied to the company: Readiness of students to join the job market	1-5	-	2.8 (±11%)	3.5 (±9%)	3.4 (±12%)	3.5 (±14%)
	Survey applied to company: Usefulness of results obtained by the students	1-5	-	3.6 (±21%)	4.1 (±28%)	4.4 (±19%)	4.5 (±33%)
Interaction between students and collaborative work	Average number of times that each student participate in the group tutorships/total number of students	0 - ∞	-	1.1 (±22%)	2.1 (±32%)	2.2 (±28%)	2.1 (±20%)

¹There was no dispersion measurement because there was only one teacher

Figure 2. Normalized values (0-100) obtained for indicators used to evaluate learning outcomes with PBL+ for the “Crops Production Systems” course of the Master in Agricultural Engineering. Normalized values are relatives to the maximum possible score (5 or 10 as corresponds) except for the “number of interaction student-company” and “number of times that each student participates in the group tutorship” in which values were relativized to the value that was considered as optimum (4 and 3 respectively).



4.2. The most and the less common problems raised by the companies which are to be solved by the students

Interestingly (see Table 3), the agronomic problems that concern farmers more often are those related to phytosanitary or physiopathy issues, whilst issues related to the environmental performance of agriculture, e.g. biodiversity improvement, microbiological soil activity, etc. not even appear mentioned.

Table 3. Indicators used for evaluating learning outcomes in PBL+ application for Agronomy subjects in Agricultural Engineer studies.

Type of problem	Details (wherever necessary)	Number of works	Percentage
Phytosanitary issues	Emerging plague or diseases	8	28%
	Development of resistances to classical treatments	9	31%
Physiopathies from unknown but not-biotic origin		6	21%
Weeds control	Due to the appearance of resistance to classical treatments	2	7%
Adaptation of productive practices to new regulations	Reduction of acrylamide contents in potato chips that involves changes in potato production process	1	3%
Transformation to organic production		1	3%
Other agronomic problems	Includes the distribution of the plots (pollination problems due to the distribution of pollinators in the plot); irrigation and fertilization management	2	7%

5. Conclusions

The use of PBL+ in the course “Crops Production Systems” gave good values for the learning outcomes considered. One of the components, namely the use of rubrics, was critical to obtaining good performance. The reason is that rubrics help students to focus their work on relevant aspects closely related with competencies to be achieved. Critical thinking continues to be the most challenging competence to be attained. The main concerns of Agrarian businessmen keep relation with phytosanitary or physiopathy issues. The results obtained can be extrapolated to other subjects related to the curriculum of Agricultural Engineers, especially those associated with Agronomy.

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A QUALITY ASSURANCE FRAMEWORK FOR OERs BASED ON QUALITY SEALS AND THE PHOTODENTRO SEALS REPOSITORY

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Abstract

Open Educational Resources (OERs) offer unique opportunities to enhance the quality of education and ensure equitable access to learning resources. A major concern, however, is the quality of OERs. This article presents a *generic conceptual framework* for the *Quality Assurance (QA)* of OERs based on *Quality Seals* and introduces the *Photodentro Quality Seals (QS) Repository and e-service* (photodentro.edu.gr/seals), which was initiated and developed to support the quality assurance processes of the Greek national digital OER repositories for primary and secondary education. The proposed QA framework is based on three main entities: *Quality Seals* (describing either a set of quality criteria, a well-defined quality assurance procedure, or a reliable source of origin); *Quality Seal holders* (e.g., OER certifiers); and *Sealings* (representing e.g. certificates for OERs). The *Photodentro QS repository* hosts and manages Quality Seals and Sealings for OERs, which reside on various OER repositories, and provides a registry of OER certifiers. Our experiences from its nationwide use are also discussed.

Keywords: *Quality assurance, OERs, quality seals, Photodentro seals repository, e-learning.*

1. Introduction

Open Educational Resources (OERs) have an important role to play towards achieving *Sustainable Development Goal 4: Quality Education (SDG4)*, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. A major concern, however, is the quality of OERs. The plethora of available OERs could also be considered as a hindrance, sometimes leaving educators "adrift in an ocean of information" without knowing how to easily find quality resources.

In recent years, several frameworks, methodologies, and tools have been developed or proposed for ensuring quality of OERs. Among them, we mention the widely-used LORI (Learning Object Review Instrument) (Leacock & Nesbit, 2007) and LOEM (Learning Object Evaluation Metric) (Kay & Knaack, 2008), both focusing on Learning Objects; the OERTrust framework (Almendro and Silveira, 2018) which recognizes the pedagogical, content-oriented, and technical dimensions in verifying and assuring OER quality; and the SciLOET evaluation tool (Mikropoulos & Papachristos, 2021), which specializes on Learning Objects for Science Education. (Camilleri et al, 2014) provide an overview and analysis of quality issues related to OERs. Among others, they highlight an important issue, namely the federation of responsibility at each step of the OER life cycle, which has resulted from the involvement of many stakeholders; from a quality perspective, this has led to the introduction of federated quality tools, such as peer assessment and social ranking systems. A state-of-the-art overview of quality assurance systems from an international perspective is also provided by (Zawacki-Richter et al, 2020), along with their IQOER Instrument for Quality Assurance of OER. The UNESCO (2019) Recommendation on OER refers also to the significance of quality assurance and encourages member states *"to develop and integrate a quality assurance mechanism for OER into the existing quality assurance strategies for teaching and learning materials"*.

The OER movement has led to the development of numerous Repositories of OERs (ROER) whose goal is to *"help educators search for content in a structured way, share their own resources, reuse existing materials, and create new resources through adaptation or translation"* (Atenas & Havemann, 2013). Initial approaches to measuring the quality of OERs in repositories focused on the quality of their metadata (Palavitsinis et al, 2014b), which is an important factor towards facilitating their selection and retrieval. In recent years, however, attention has also been given to the quality of OERs themselves. Two extended and comprehensive literature reviews on quality approaches of OER repositories can be found in (Connell & Connell, 2020) and (Clements et al, 2015). Clements et al. also propose a classification of

quality approaches in OER repositories into three categories, namely generic (e.g. generic quality standards), domain-specific (e.g., quality criteria), and quality assurance instruments (e.g., ratings, recommendation systems, peer reviews). To ensure the quality of OERs, some repositories offer *user evaluation tools* (e.g., star ratings, rubrics), while others have adopted *peer review* as a policy to revise resources and ensure their quality. However, this information (i.e. assessment results, scores) remains within each repository, while in most cases the assessment tools provide users of the OER repository with limited information about the methodology, criteria, or learning context to which this assessment relates.

The concept of Quality Seals has been used to ensure quality in many fields; other similar terms or concepts are *quality stamps*, *quality badges*, or *certificates*. Electronic quality seals or certificates are nowadays widely used to verify/state that an entity or an object meets the criteria or the process defined, while recent research focuses on their security issues (eIDAS Regulation, ENISA, 2016). Seals of approval have also been used in the domain of Trustworthy Digital Repositories (TDRs); as mentioned in (Donaldson, 2020), “as visible token of successful certification, repositories are permitted to use seals and certification marks to communicate with stakeholders about their certification”.

In this article, we propose a generic Quality Assurance (QA) framework for OERs based on *Quality Seals* and we introduce the *Photodentro Quality Seals (QS) Repository and e-service*, which hosts and manages: *OER Quality Seal holders* (i.e. certifiers); *Quality Seals* (i.e. documents describing the criteria or the processes defined by a certifier to ensure quality of OERs); and *Sealings* (i.e. certificates for OERs). To the best of our knowledge, this is the first implementation of an online repository of Quality Seals for OERs, which provides an open registry of OER certifiers and openly shared Quality Seals. The *Photodentro QS* was originated and developed by CTI Diophantus, in the context of the “Digital School” Greek National initiative (Megalou & Kaklamanis, 2018), funded by Greek NSRF 2014-2020, and it supports the QA process of the National OER repositories for primary and secondary education.

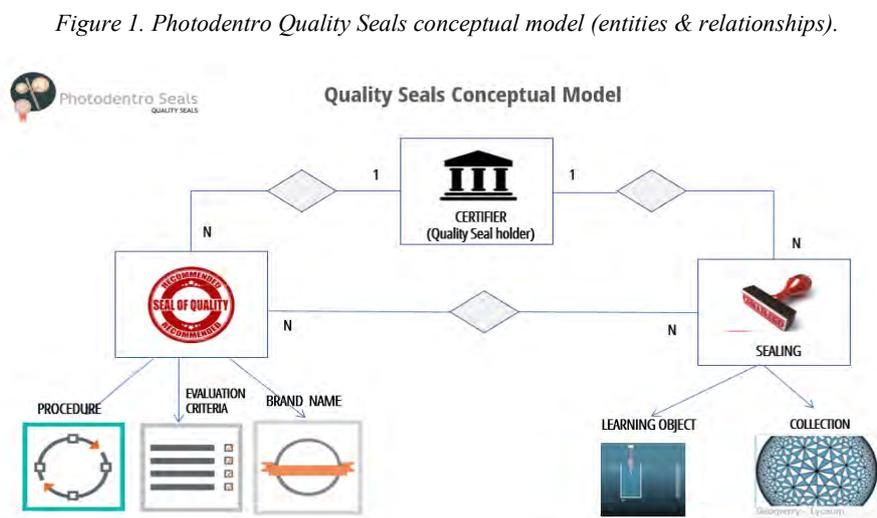
2. Photodentro QS: quality assurance framework for OERs based on quality seals

The “*Photodentro Quality Seals*” (or “*Photodentro QS*”) is a generic conceptual framework designed to support Quality Assurance schemes for OERs and their metadata. The framework is broad enough to accommodate existing quality assurance schemes that have been defined and relate either to quality assurance criteria for OERs or to quality assurance procedures for their design and development.

The basic idea behind the proposed framework is that each quality assurance scheme for OERs defines and can be represented as a “*Quality Seal*”. Each body (e.g. certification authority, organization, company, or consortium) who implements or has defined a quality assurance scheme (e.g., a process for designing OERs, or a set of criteria for evaluating OERs) can thus define their own “*Quality Seal*” that applies to a certain context, purpose, OER use, or target audience, by describing what an OER should meet in order to be awarded it. The Quality Seal is documented with metadata and it is published by its owner on an *open, digital repository of Quality Seals*; thus, the quality seal represents itself an *Open Educational Resource*. When users view a quality seal on an OER, they know about the quality assurance process that has been followed for this OER and the body by which its quality is ensured.

2.1. The Photodentro QS conceptual model: main entities and relationships

Figure 1 depicts the conceptual model of the *Photodentro QS framework*, its main entities, and their relationships.



The Photodentro QS conceptual framework is based on three main *entities (concepts)*:

(a) *Quality Seal*: It signifies that an OER has successfully “passed” a quality assurance process. It may refer to the quality of *OER itself* or to the quality of *metadata* describing the OER.

(b) *Quality Seal holder*: A legal entity (such as a certification authority, organization, or company) or a consortium of entities (such as a project) who defines, “owns”, and awards quality seals. A Quality Seal holder may own many Quality Seals, each focusing on various quality aspects (e.g. impact, accuracy, relevance) or uses of OERs (e.g. use in class or as reference material). Awarding quality seals to OERs is usually done by authorized persons, who are designated by the Quality Seal owner to handle their quality seal.

(c) *Sealing (or stamping)*: The awarding of a Quality Seal to an OER. It is performed by the Quality Seal holder. A Sealing record is characterized by (i) the Quality Seal and (ii) the information related to the sealing itself, e.g. timestamp or the evaluation outcome. An OER may receive one or more Quality Seals (i.e. it may be subject to more than one sealings). Sealing may be carried out for a single OER or for a group/collection of OERs.

The Photodentro QS framework identifies three *types* of Quality Seals for OERs, depending on *how* the quality of the OERs is ensured, namely:

(a) *Procedure*: A Quality Seal of this type describes a quality assurance procedure that needs to be followed for the design, development, formative or summative evaluation, testing, or approval of OERs. Although not for OERs, the ISO 9001 standard is an example of this QS type.

(b) *Evaluation criteria*: A Quality Seal of this type defines a set of qualitative and quantitative pedagogical, scientific, or technical evaluation criteria, based on which OERs are assessed.

(c) *Brand name*: A Quality Seal of this type indicates a reliable source of origin of OERs.

The Photodentro QS framework also identifies two *categories* of Quality Seals, depending on *what* they relate to, namely: (a) *Object*, if it refers to the quality of the OER itself, or (b) *Metadata*, if it refers to the quality of metadata describing the OER.

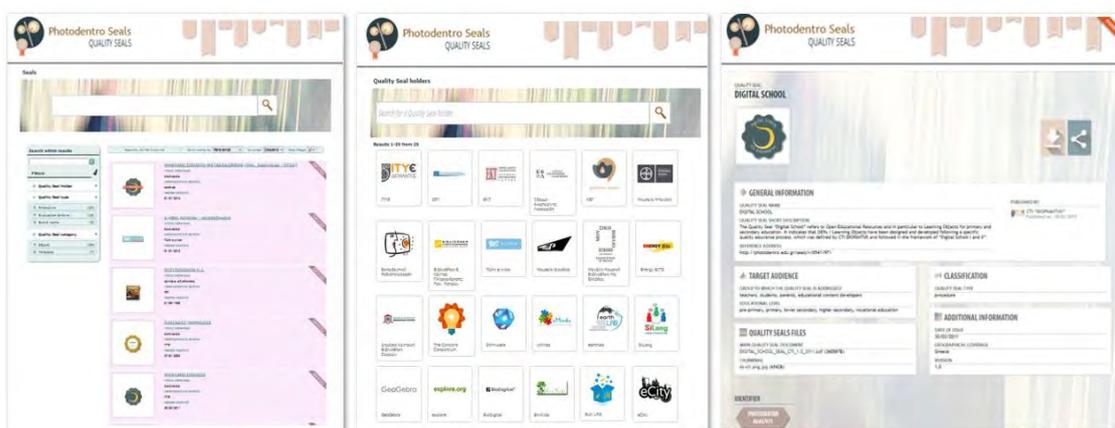
3. The Photodentro Quality Seals repository and e-service (Photodentro QS)

The *Photodentro QS* is an integrated web-based platform designed and developed to support the proposed Quality Assurance generic framework for OERs. It is addressed to (a) bodies (e.g. certification authorities), organizations, companies, or consortia (e.g. projects) who implement quality assurance procedures for digital resources, by providing them with tools to describe and publish their Quality Assurance schemes in the form of Quality Seals, and award them to OERs hosted in various online repositories, and (b) users of OER repositories, to be informed about the quality assurance process followed for each OER or search for OERs based on certain Quality Seals. It consists of two web-based environments: (1) An open to everyone *Repository* of QS holders, Quality Seals, and Sealings, and (2) a Quality Seals *authoring environment* for authorized users, to define, share and award Quality Seals.

3.1. Photodentro QS open repository of quality seals, QS holders, and sealings

The Photodentro Quality Seals *Repository* is available at <http://photodentro.edu.gr/seals>. It hosts and manages (a) *Quality Seal holders* for OERs, thus operating as a Registry of OER certifiers, (b) *Quality Seals* for OERs of various types and categories, and (c) *Sealing* records, including the results of applying a corresponding QA process on OERs, timestamps and additional info, such as evaluation files.

Figure 2. Photodentro QS Repository: (a) Quality Seals / Filters, (b) Quality Seal holders; (c) Quality Seal metadata.



The repository is open to everyone, teachers, pupils, parents, and the general public, to browse, search and display OER Quality Seals, Sealing bodies/Quality Seal holders, or Sealings. Users can search for published Quality Seals for OERs using free-text and keywords, sort out the results, or use filters to refine results based on the Quality Seal holder, the Quality Seal type (i.e. procedure, evaluation criteria, or brand name), or the Quality Seal category (i.e. object or metadata) (see (a) and (b)). Figure 1

An important functionality of the Photodentro QS *Repository*, however, is that it can be interconnected, through open interoperability protocols, with existing online OER Repositories or portals with OERs. In this way, OERs hosted in third-party repositories or portals are enabled to link to open Quality Seals, published and registered in the Photodentro QS repository. Linking an OER to a Quality Seal signifies its “sealing” with this Quality Seal. The Quality Seal logo is displayed on the OER metadata page; when selected, it leads to the Photodentro QS Repository and in particular, to the OER’s Sealing record, and through this, to the Quality Seal description page providing all information about it, such as its type, category, authority who owns it, detailed description of evaluation criteria or process, etc.

3.2. Photodentro QS authoring environment for defining and awarding quality seals

Photodentro Quality Seals provides a web-based environment for *Quality Seal holders* to (a) define and describe Quality Seals as well as add metadata, publish, and manage them; (b) award quality sealings to OERs that qualify; (c) authorize people (assessors) to award their quality seal on OERs; (d) store and manage their OER sealings; and (e) manage their profile and identity as a sealing body on the quality seals repository. Each entity of the repository has a handle ID uniquely identifying it.

3.3. An IEEE LOM-based metadata application profile for quality seals

The Photodentro QS repository is based on international standards to ensure interoperability with other platforms. A metadata Application Profile based on IEEE LOM standard was defined to describe and classify all three entities of the Photodentro QS repository, namely Quality Seals, Quality Seal holders, and Sealings, as well as to support filtering according to various aspects of these entities.

The metadata scheme for **Quality Seals (QS)** includes the following elements per LOM category:

General: *identifier* (the unique identifier of the quality seal in the repository); *title* (the quality seal name); *brief description* (what the quality seal concerns, in which context, etc.); *geographical coverage* (the country/ies where the quality seal is valid or appropriate); *reference address* (URL of the quality seal metadata page in the repository).

Lifecycle: *version* (the version of the quality seal, e.g. 1.0, 2.0); *published by* (the sealing body that published the quality seal); *date of issue* (the date the quality seal was issued).

Educational: *target audience* (group to which the quality seal is addressed); *context* (the educational level of OERs for which the quality seal is intended).

Classification: *category* (category of the quality seal, either object or metadata); *quality seal type* (procedure, evaluation criteria, or brand name).

Quality Seal files: *thumbnail* (the Quality Seal logo icon); *Quality Seal document* (the main document file describing the Quality Seal). Depending on its type, i.e. procedure, evaluation criteria or brand name, the QS main document file presents respectively: (a) the procedure to be followed for the design, development, evaluation or approval of the object, in order for the OER to qualify for the Quality Seal; (b) the set of evaluation criteria, qualitative and quantitative, on the basis of which the object is evaluated and graded; the threshold for its approval is usually provided; (c) information on the validity and reliability of the source of OERs.

The metadata scheme for **Sealings** includes elements such as: *identifier* (the unique identifier of the sealing within the repository); *brief description* of the sealing; *reference address* (URL of the sealing record in the repository); *sealed by* (the Sealing body / Quality Seal holder who awarded the quality seal to the OER); *Quality Seal* (reference to the Quality Seal with which the sealing was made); *timestamp of sealing* (date and time on which the award of the quality seal to the OER took place); a *thumbnail* (the icon of the OER sealed, with the mark “Sealed”); and *Sealing files*, which include documents certifying the award of the quality seal to the OER, such as certifications or relevant decisions.

3.4. An example: the “digital school” quality seal

As an indicative example of a Quality Seal, we mention the “*Digital School QS*” that CTI DIOPHANTUS has defined and published on the Photodentro QS Repository. This QS refers to interactive open Learning Objects for primary and secondary education and it defines the QA “*procedure*” followed for their design and development in the “Digital School” national project. In this context, OERs are designed and developed by groups of experienced, highly qualified teachers, under the scientific guidance and supervision of a Scientific Coordinator (an academic with significant domain and pedagogical expertise). The process includes the following steps: (a) Needs and requirements *analysis*

(concepts, topics or modules that the learning object is called to support) based on bibliographic documentation and educational experience; (b) *pedagogical design* (collaborative negotiation and feedback from all team members for the content and shaping of pedagogical and technological characteristics); (c) *technical design* and implementation; (d) continuous, internal *formative evaluation* of the OER (comments and suggestions by team members for corrections and improvement), which implies multiple cycles of pedagogical and technical design, implementation, critical commentary, and technical testing); (e) *pilot evaluation* of the prototype; evaluation dimensions include: content, user-interface, pedagogical design, added value, technical and functional characteristics; (f) *approval / acceptance* by the scientific coordinator. The Digital School QS includes also a special part, which specifies the process for each subject/domain. Figure 2 (c) presents the metadata page of this QS.

4. Nationwide use of the Photodentro quality seals repository: results and next steps

The Photodentro Quality Seals Repository currently hosts 43 OER Quality Seals, provided by 25 Sealing bodies. Among them, 36 Quality Seals refer to OERs and 6 to metadata quality. As for their type, 23 Quality Seals describe a QA procedure, 5 are based on evaluation criteria and 15 define a trustful source of origin. CTI Diophantus has published 11 Quality Seals, all of them of type “procedure”.

The Photodentro Quality Seals Repository has been linked to the Greek national OER Repositories of the Ministry of Education and the national OER Aggregator (photodentro.edu.gr) for primary and secondary education, which contains 17,000 OERs from 19 external OER repositories. The application of the various quality assurance schemes on these OERs, as defined by the corresponding Quality Seals, has resulted in 37,450 *sealing* records for OERs. When browsing the OER repositories, users can see whether a selected OER has received a quality seal, of which type, and from which body (or bodies); read the detailed description of the quality seal that includes its methodology, criteria, or context; study the assessment results; or search OERs by *Quality Seals* or *Quality Seal holders*.

Next steps include the creation of the European, multilingual edition of the Photodentro Quality Seals Repository and e-service to operate as a European repository of Quality Seals for OERs and registry of Quality Seal holders, as well as linking to other OER repositories at the European level.

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THE GAME OF LEARNING! APPROACHING ECOSYSTEMS THROUGH BOARD GAME DESIGN

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Abstract

Game-based learning is proven to be a motivational and effective approach, especially in STEM education. However, the process of developing a game is rarely used as an educational tool. Ecology is part of the science curriculum in Italian high schools, but for students results not easy to understand the ecosystem structures and functions from a systemic perspective. Furthermore, addressing ecological issues in a changing world will request them not a reductionist approach but a systems perspective.

In this work our main objective is to consider further possibilities offered by board games, exploiting not only the game experience but also the use of the game design process as an immersive motivational learning tool for science, with a learning by doing approach. Ten students have been engaged (16-18) in two activities: events to test and analyse cooperative board games and a laboratory for the development of a new board game on ecosystems ("YouTopia – La Valle ecosistemica"). Two focus groups were conducted, before and at the end of the laboratory, to test students' engagement and to collect feedback about the efficacy of the method to boost interest and specific knowledge in ecology.

The research reveals that game development can foster system thinking skills among students, and act as a powerful learning tool for complex subjects such as ecology. Results are encouraging and the proposed approach has the potential to be applied and replicated in high school and middle school, to foster students' engagement in tackling and understanding topics such as evolution, genetics other topics characterized by complexity and systemic approach. Preliminary results show as the YouTopia game could be a valid tool for citizenship education. By playing the game, students investigate and practice democracy, the mechanisms of land planning and natural resources protection, and the principle of co-responsibility in making choices for the future.

Keywords: *Game-based learning, system thinking, science didactic, ecology, student engagement.*

1. Introduction

Game-based learning (GBL) is defined as the use of games as a main lesson or the enhancement of a lesson, while keeping learning as the main, desired outcome (Denham, Mayben, & Boman, 2016, Plass, Homer, & Kinzer, 2015). GBL aims to facilitate learning through the playing of actual games. It fully integrates game characteristics with instructional content so that players will either know something or be able to do something because of playing the game (Craig, Brown, Upright, & De Rosier, 2016). In other words, players learn through playing in the gaming contexts, such that the act of playing the game itself constitutes the learning process. Over the past years, a great number of research has indicated that GBL has the benefit of facilitating learning at all educational level, from primary school to academy. It shows a great potential in STEM education (Bakker, Van Den Heuvel-Oppenhuisen, & Orbitz's, 2016) because GBL can provide a rich learning context to help learners construct higher-level knowledge through ambiguous and challenging trial-and-error and creating immersive and engaging environments it stimulates cognitive and emotional involvements which are critical in the learning process (Cheng, She, & Annetta, 2015, Garris, Ahlers, & Driskell, 2002). In Italy, the study of ecosystems is part of the Science programme in secondary education cycle but is often illustrated in a traditional way and is not sufficiently deepened, in Citizenship and civic education subject, sustainability and nature conservation are discussed but it's just roughly touched the complexity underneath the ecosystem preservation in a future perspective. Addressing contemporary ecological problems in an increasingly complex world requires that the next generation of citizens possess "systems thinking" (ST) skills and deep knowledge of ecology principles. The importance of developing these ST skills is reflected across many sustainability-related educational programs but in the other hands there is still low

attention in teaching ecology principles in a deepen and more concrete way (Wyek et al. 2011). To support the growing of informed and resilient citizens a change in secondary educational environment is needed, especially in science education it is important to enhance approaches not just focus on content, but also allow learners to organize and apply that content in problem-solving, real-life situations thus GBL can be an effective solution. This is more relevant in ecosystem understanding which requires clear understanding of elements and relations among them and energy flow (King et al. 2014). The game development is one of the pedagogical application of games which is increasingly used in education for the high potential of promoting the use of higher-order skills and system thinking skills. Game development is inherently multi-disciplinary, and it is now starting to be used in academic context in a wide range of scientific studies such as Chemistry, Biology, Physics, Software engineer and so on (Rieber, 2005, Bixler, 2006, Burke, Dettori & Settle 2007, Chiarello & Castellano 2016). The game design process took place empirically, through trials, failures, and repeated changes, exploiting some prior experience in the creation of “conventional” board games and always keeping in mind the above-mentioned principles. Special efforts are always required to balance the functionality and playability with the educational needs, and this can be obtained only by a lot of tests and experiments. This development process drives students in two directions; deepen learning of ecosystems concepts and practice system thinking skills.

2. Objectives

As reported earlier, even though there are a considerable number of studies on playing board games in learning activities there are few studies on using game development as didactic tool and examining to what extent the game development process enhances learning of complex subjects as ecology and can unlock system thinking skill. To bridge this gap, the objective of this study is to examine whether developing board game improves students’ knowledge in the school subject Ecology and if this approach can be used in approaching complexity of systems in a changing world.

The current study was conceived with the aim of exploring:

1. What are the effects of game development approach in understanding ecology concepts in high school students?
2. What are the effects of game developing, as a creative act, in unlocking system thinking skills in high school students?

3. Design and methods

This case study was conducted at La Rosa Bianca high school, located in a rural valley in Trentino (Northeast of Italy). A group of 10 students from different classes (16 -18 years old) and from two curricula (Science and Engineer) from March to June 2021, for a total of 40 extracurricular hours, voluntarily participated in the “GameDev Lab” with the mandate of developing a board game, possibly cooperative, for educational purposes and targeted for teenagers, fully focused on ecosystems and sustainability.

At the beginning of the laboratory students participated in a focus group to explore their knowledges in ecology, specifically in Alpine ecosystems and ecosystem services, and their system thinking skills.

During the laboratory activities, the creative and cooperative parts of the process have been videorecorded and a logbook was compiled over the whole project with the support of a teacher.

A focus group was conducted at the end of the laboratory to collect students’ perceptions and feeling about the creative process of game development and to explore what they learned about how ecosystems work, how they provide vital services for humans, how anthropic activities affected ecosystems functionality and how our choices could positively or negatively affect ecosystems and the future and changing scenarios.

3.1. The “GameDev Lab” process

As kick off activity of the GameDev Lab, students take part in a focus group and the most relevant answer emerged from the focus-group are included in table 1. Additionally, at the beginning of the laboratory, students played three cooperative board games (Forbidden Island, Pandemic and CO₂ second chance) to figure out how a coop game is, which are the most common rules or mechanics, and to boost their group working skill.

For the game development part of the laboratory, students firstly worked together in the definition of didactic objectives, main theme and the main story of the board game then they were split in three groups; the *design team* worked in storylines and mechanics, the *art team* picked up the themes and set by the design team to create assets and the engineering team worked in parallel with the art team to create any infrastructure or content creation tools.

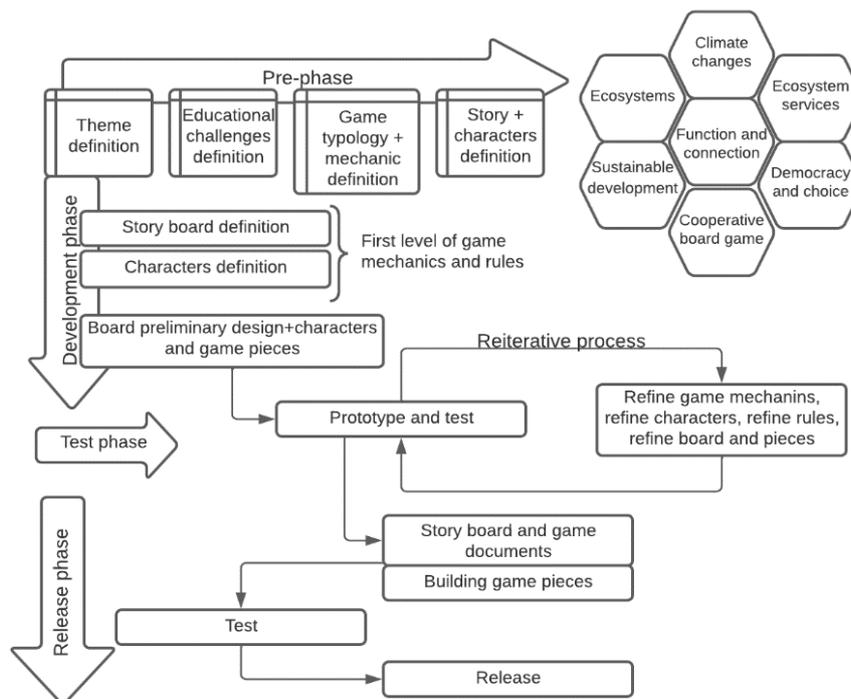
Table 1. Results of the focus-group before the GameDev_Lab.

Questions	Students' answers
Can you define what ecosystems are?	"Ecosystems are made by animals and plants and water and other "natural" things". "Ecosystems are part of the planet with something in". "Ecosystems are part of the nature".
Do you know what a habitat is?	"Is a part of the ecosystems" "Is a physical place where animals and plants live and interact".
Do you know what ecosystem services are?	Nobody knew the meaning and definition of ecosystem services
Does forest depletion affect your villages and rural economy of your valley? How?	"If you are asking me this question I assume yes, the forest reduction affects the rural economy and probably because we can't sell wood". "Also for the tourism isn't good have less forests for bikers and tourists". "Less mushrooms or other things we collect in the forests and we can lose animals and is not good at general level".
Do you know how ecosystems works?	"An ecosystem has an internal set of rules and relations". "Humans can act from outside the system as a perturbant". "In the end humans can be considered part of the ecosystem". "There is also energy and chemical interaction to consider as part of the ecosystem mechanic"
If you will be the major of your town and you must decide if build or not a new infrastructure, which will be your main criteria?"	"How much does it cost and if it's really relevant for local economy". "Costs and benefits for the community". "We should consider also the ecological impact". "Possible economic income and cost for ecosystems". "The long-term effect for local communities and for the environment"

The creativity process was conducted with the design project method modified to fit better students' and educational needs, as indicated in the flowchart presented in Figure1.

At the end of the game development process the students participated in a focus group in which the same questions posed at the beginning were asked again to assess whether there had been a change in term of knowledge and in ST attitude.

Figure 1. Flowchart of the GameDev Lab creative process.



4. Results

As results of the GameDev Lab the board game “YouTopia – la valle ecosistemica” was finalized and delivered. Also results in terms of knowledge, ST skills and engagement have been evaluated.

4.1. YouTopia – la valle ecosistemica, story, characters, and game mechanic

After more than 30 work hours conducted at school with students and with the support of the science teacher and of the technic and engineer teacher, and after more than 5 tests and different version of the prototype, the game was ready to be produced.

YouTopia is a cooperative board game for six players or group of players, to learn how to manage human activities and ecosystem services conservation in a changing world. Each character has a different role (major, economist, geologist, activist, biologist, and climatologist) and each one has a single or two special abilities to spend during the game. The board simulate a mountain valley with lakes, glaciers, forests, plateau, peaks and open areas and the game's underlying story is: six characters represent six pioneers arriving the YouTopia valley for the first time and they must build up a new city supporting local economy and preserving ecosystems and their services. Each human action has an impact, assigned with different scores, in terms of local economy or for ecosystems and each decision must be justified to the other gamers and when an adverse event occur (geological events, extreme weather events or biodiversity losses). To enliven the game, there is also a deck of cards containing unexpected events and challenges related to ongoing environmental and social changes that can be addressed by making choices that can have different impacts. All players can make different choices with different long-term effect they have to argue, which are also criteria for choosing the solution they prefer and that can be put in place after. All gamers win if after the occurrence of all the changes the final score in sustainability will be maintained as well as the score in economy benefits.

4.2. Learning and skills improvement

After the board game development, the students participated in a focus group using the same questions done during the first focus group and the most relevant answers gave by students are reported in table 2.

Table 2. Results of the focus-group after the GameDev_Lab.

Questions	Students' answers
Can you define what ecosystems are?	“Ecosystems are a complex of biological and abiotic elements interacting among them”. “Ecosystem is a geographic area where biotic and abiotic elements interact and evolve in a complex network”.
Do you know what a habitat is?	“Is a geographic area where organism live and interact”. “Is a geographic area, part of an ecosystem, where a specie lives and where interact with other species”.
Do you know what ecosystem services are?	“Are services that and ecosystem provide us, such as food, water, support for our economy and wellness”. “Ecosystem services are what ecosystems provide us just existing and we can have for our
Does forest depletion affect your villages and rural economy of your valley? How?	“Because of the networking beneath of each ecosystem yes, an effect can be clear also a lot of time after the last thing we do”. “Yes, cultivated forests of the valley are an example, we cultivate our forest thus we had a lot of income from wood, but we lost biodiversity and we are now more vulnerable to the extreme weather events and climate change”
Do you know how ecosystems works?	“Each ecosystem is a network; it means that each element can interact with more than one and in different ways”. “Also, energy and chemical processes are part of the network and influence or are affected by other elements”.
If you will be the major of your town and you must decide if build or not a new infrastructure, which will be your main criteria?”	“Economic incomes but not more than sustainability and ecosystem services” “Ecosystem services conservation, community wellness and economic benefits”.

5. Discussion and conclusion

Bearing in mind that the above refers to a case study involving a small number of students, we can consider the results achieved as valid and especially promising and useful guidelines for possible future research. Results appear encouraging, is remarkable how much the students deepen the knowledge of ecology principles by themselves, just as consequence of the needs of game development process. Also

notable is the positively active approach they have shown in seeking, exploring and grasping the complex nature of the mechanisms underlying ecosystems. By a learning point of view thus the approach seems to be effective. The game development process was too engaging for students, and it also help them in experimenting the group working and negotiations abilities. An additional point is the mind change students have in approaching games, from a competitive perspective they experiment cooperative games and the effect of playing these games changed their approach at the team working.

ST skills might help to unlocked by the creative act of the game development and by the prevision skills needed in developing game mechanics and in matching them with scientific concept. However, a more focused work on the system theory could be improved to reach a higher level of awareness in systems understanding. It is encouraging the possibility of the YouTopia game to be used in citizenship programs as a tool to experiment the democratic decision process, active citizenship and the mechanisms underlying the sustainable land management.

Critical aspects of this approach are the timing because as each creative activity needs time and the learning process need time. Additionally, the game development process requires a lot of different competencies and could be tough for young students.

An advancement that will start in the on-field phase in October 2022 is the use of the YouTopia game as game to play to test its effectiveness in learning sustainability concepts in Citizenship and civic education classes. This preliminary research was a start point for future research which can focus on validation of the game development as tool for some specific learning objectives, on feasibility of this approach in supporting students with special educational needs and on the creative act as necessary part of the process to boost ST skills and learning.

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PROMOTING TEACHERS' INTERCULTURAL COMPETENCES FOR TEACHING IN THE DIVERSE CLASSROOM

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Abstract

Culturally inclusive education continues to be a challenge in many countries: while teachers attempt to create responsive learning environments and teaching strategies, students from migrant backgrounds still face disadvantages in education. Only 35% of teachers in OECD countries feel prepared for teaching in a multicultural setting. Teachers may lack the necessary sensitivity, knowledge and/or skills, feeling insecure about how to respond to cultural diversity in the classroom. Even if there are theoretical courses in pre-service teacher training programmes, practical training opportunities in actual diverse classrooms are lacking. Also, schools are lacking experienced mentor teachers competent in culturally responsive teaching, as in many countries the demographic situation has undergone major changes in the last decades and continues to evolve. These issues need to be better addressed. The overall aim of our study is improved intercultural preparedness of teachers, through rich and authentic learning experiences. Based on in-depth analysis of current best practices, we will create an evidence-based teacher training program. This will feature video clips of the most common challenging pedagogical situations that may arise in a culturally diverse classroom. We expect the teachers who pass this program to have better intercultural competences so that they can practice culturally responsive and inclusive teaching. In order to assess the impact of the program, we have developed an instrument to measure the teachers' self-reported intercultural competences (knowledge, attitudes and skills) prior to and after the completion of the program. The structure of the questionnaire and differences in the domains of teachers' intercultural competence according to their teaching experience is introduced in the paper.

Keywords: *Intercultural competences, training program, questionnaire, diverse classroom.*

1. Introduction

In Europe, ethnic and cultural diversity in the classrooms is increasing, as a result of globalization and migration (Catarci 2013; Cloonan et al. 2017; Coulby 2012). This poses challenges to the societies who need to create preconditions for the social cohesion. Educational institutions are particularly important actors in linguistically and culturally diverse students' successful integration. While schools attempt to create inclusive learning environments, students with migrant background still face disadvantages (Dusi et al., 2017; OECD, 2015) and this may lead to their marginalisation. Teachers' knowledge, skills and attitude are important factors in successful inclusion of diverse student populations (Arar, 2021; Kozikoğlu & Aslan, 2018; Dimitriadou & Efstathiou, 2012; Moule, 2012). Attitudes, essential for the development of knowledge and skills needed for intercultural competences (Deardorff, 2006), are formed by significant personal experiences (Vedder et al., 2006). However, only 35% of teachers in the OECD countries feel that they are prepared for teaching in a multicultural or multilingual setting (OECD, 2019). Many teachers feel unprepared to work in a classroom with high cultural diversity (Catarci, 2014), making high-quality professional development in this area crucial (Parkhouse, Yi Lu, & Massaro, 2019).

Intercultural competencies in the teaching profession are reported to prevent exclusion among children and support the development of positive student self-image (Layne & Lipponen, 2016). These competences manifest on cognitive, emotional and relational levels, enabling teachers to operate in socially, culturally and linguistically complex contexts and understand the specific needs and challenges of the children they are working with. Despite the attempts to update university programmes to prepare teachers to serve in linguistically and culturally pluralistic classrooms, it is unclear how successful these are (Sleeter, 2001), or how substantively they address the needs (Zeichner, 2003). It must also be noted

that in several countries the schools' responsibility in preparing student teachers for their future work has increased over the last decade (Sandvik, Solhaug, Lejonberg, Elstad, & Christophersen, 2019): while theoretical knowledge of pre-service teachers is constructed in university classes, the student teachers often draw their teaching model from school mentors during practical training. However, as the changes in classroom diversity have been rapid, there is a shortage of experienced mentor teachers competent in culturally responsive teaching to serve as professional role models in tacit knowledge sharing.

These issues need to be addressed by creating richer learning experiences for both pre-service and in-service teachers, addressing knowledge and skills as well as attitudes, and involving the mentor teachers with a potential to become intermediaries between the universities and the schools, connecting student teachers' theoretical concepts with practical training and setting a professional example (Clarke, Triggs, & Nielsen, 2014).

While there are educational initiatives that address the issue of teachers' intercultural competences, not many of them focus on the early years and primary education; however, this is where the foundation is often laid to successful integration and learning.

2. Design

The overall aim of our study is improved intercultural preparedness and competence of teachers. The study consists of three phases, one of which is completed and the second one is in progress. In the first phase the teachers' intercultural competence questionnaire was developed. In the second phase, a training program is being developed. In the third phase, the impact of the training program will be assessed with the instrument, compiled in the first phase. Following, the development of the instrument and its' ability to distinguish differences between teachers' groups are presented.

3. Objectives

We expect the teachers who pass the novel teacher training program to have better intercultural competences, manifesting in knowledge and skills as well as attitudes. In order to assess the impact of the program, we developed an instrument to measure the teachers' self-reported intercultural competences. The following goals have been formulated, and the hypotheses based on them established.

- (1) To compile the teachers' intercultural competence instrument and determine its structure. Based on Deardorff (2006) and Spanierman et al. (2011), the three-factor model in the questionnaire is expected to detect domains of attitudes, knowledge and skills in the teachers' intercultural competence.
- (2) To find out differences in the domains of teachers' intercultural competence according to their teaching experience. We hypothesise that mentor teachers with longer teaching experience in teaching migrant students evaluate their knowledge, attitudes and skills of intercultural competence higher, in comparison with less experienced novice teachers.

4. Methods

4.1. Sample

A total of 167 pre-school teachers and 227 primary school teachers participated in the testing of the questionnaire (see also Timoštšuk, Uibu, & Vanahans, 2022, in press). Among them were 372 females and 21 males, one teacher did not specify their gender. Teachers' average age was 46.70 years (SD = 12.25, min = 21, max = 73), and their average teaching experience was 20.79 years (SD = 14.01, min < 1, max = 58). Three teachers did not specify their experience. Based on competence of teaching migrant students, teachers were divided into three experience groups: 1) teachers who had no experience in teaching migrant students (N = 140); 2) teachers with less than four years of experience (N = 180); 3) teachers who had more than five years' experience (N = 41). Many of teachers of the third group had also mentoring experience of novice teachers.

4.2. Instrument

The instrument was developed to evaluate teachers' intercultural competence across its domains of attitudes, knowledge and skills. *The Attitude scale* included items of respect, openness and curiosity towards diversity (n = 15; for example, *Intercultural classroom fosters learning between cultures*). *The Knowledge scale* involved items of teachers' knowledge of theory, culturally responsive pedagogy and strategies related to diversity (n = 6; for instance, *I am knowledgeable about the teaching strategies that affirm the ethnic identities of students*). *The Skill scale* comprised of items on teaching practices that integrate different cultures and cultural values (n = 10; for example, *When planning teaching activities, I*

consider the customs of different cultures). The agreement rate with each item was assessed on a five-point Likert scale (1 – strongly disagree ... 5 – strongly agree). The relevance of items were discussed with teacher educators, intercultural scholars and in-service teachers with experience in teaching migrant students. The questionnaire was piloted among 38 preschool and primary school teachers.

5. Results and Discussion

Estonian pre-school and primary school in-service teachers were surveyed with the aim to examine their intercultural competencies. To this purpose, the questionnaire was elaborated to evaluate teachers' competence in their intercultural attitudes, knowledge and skills. The findings supported the three-dimensional intercultural competence concept (Dearborn 2006; Spanierman, 2011), which included interactively associated domains of attitudes, knowledge and skills. Our questionnaire focused on the assessment of teachers' competence in teaching migrant students at preschool and primary school levels. Besides, the social-cultural context was considered in the formulation of items.

Next, we expected that teachers with different teaching experience evaluate their knowledge, attitudes and skills of intercultural competence differently. According to the results, experienced teachers evaluated their attitudes towards intercultural competences significantly lower than less experienced teachers, and teachers without experience in teaching migrant students evaluated their skills and knowledge lower than teachers with corresponding experience. This result is related to the idea that attitudes are directly associated with personal experiences (Guskey 2002). Previous research suggests that more multicultural education in pre-service teacher education positively affects teachers' attitudes and sense of efficacy toward helping culturally and linguistically diverse students (Bodur, 2012).

Following, we found that teachers without any experience in teaching migrant students evaluated their knowledge and skills of intercultural competence lower than teachers who had such an experience. This leads us to recognise the need for exploring the wider personal context of teachers, for instance, consider the positive effect of personal multicultural background (Gay, 2015). Thus, the follow-up study qualitative study, conducted in Estonia, showed that participants feel the need for a longer training module or professional development programme that incorporates theory and practice of teaching in heterogeneous classrooms (Vanahans, Timoštšuk, & Uibu, 2022, submitted). In this study teachers stressed the importance of such a preparation during both pre-service and in-service training to support the development of intercultural competencies required in diverse educational settings.

Based on this findings on first phase of the study and in-depth analysis of current best practices, we will design an evidence-based teacher training program featuring authentic video material with examples of the most common and challenging pedagogical situations that may arise in a culturally diverse classroom. These videos will be accompanied by texts for additional reading, assignments for reflection, self-assessment tests etc. We aim that teachers be able to create novel teaching strategies in order to boost the language acquisition and social inclusion of diverse student populations (i.e., subject-specific language training, active and contextualised teaching of academic skills, intercultural pedagogy, using process drama and digital devices, etc.). This will be a step further from the existing programs that concentrate on theoretical knowledge and lack authentic practical learning.

The training program will be launched, to be used for multi-faceted competences development, comprising knowledge, skills and attitudes of student teachers and mentor teachers. In co-operation with partner universities (e.g., from Sweden, Austria, and Latvia) we intend to implement the program in virtual collaboration of international student teams. In the third phase of the study, the trainees' intercultural competences prior and after the training program will be assessed with the designated instrument developed and validated in the first phase of the study. This feedback will be used to further develop the training program and add specific components or adjustments, if needed. The universities' and schools' networking needs to be further promoted, in order to support both novice and experienced teachers in becoming effective facilitators of intercultural competence.

6. Conclusions

Context, policies and practices regarding intercultural education vary across the countries of Europe. As the situation with migration changes, even experienced teachers who have mostly worked in ethnically and linguistically homogenous classrooms face new pedagogical challenges. The schools need to tackle these challenges in co-operation with the universities, combining theoretical approaches and critical reflection on authentic real life scenarios. We have laid down the groundworks of a training program that would address the professional development needs of both novice and experienced teachers in the domains of attitudes, knowledge and skills. We have also created and validated an instrument to

measure the program's efficiency. Based on a pilot study we will be able to estimate the efficiency of the training and get feedback for its further elaboration. Co-operation with partner universities in countries with different historical context and experience with cultural and linguistic diversity is an important added value that enables teachers and teacher educators to construct their pedagogical repertoire that will best suit the needs of the students and the society.

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LEARNING BY DRAWING. A CONVERSATION ON HAND DRAWING WHEN EDUCATION IS GOING DIGITAL

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Abstract

The paper displays a conversation between the two authors. They reunite after ten years since the international summer school *Around the Wall*, which they co-organised and run in Lucca (Italy) in 2012, to reflect on hand-drawing education, mainly through their experience in teaching in different design environments. The conversation tells about how that summer programme represented for the authors the first steps to test some learning strategies that later on fed their teaching approaches, one at the BA in Design at Universidade da Madeira (PT) and the other at the BSc in Product Design at Politecnico di Milano (IT). In particular, *Around the Wall* summer school focused on hand drawing as a tool of personal discovery, reflection and visual communication, serving each phase of a design process. Also, the summer programme provided the participants with a multicultural and multidisciplinary environment to encourage a sense of collaboration and stimulate creative thinking.

Over the ten years of teaching drawing within different design curricula, the authors encountered various teaching challenges and requirements to respond. Hand drawing education at the Design BA at Universidade da Madeira follows a horizontal approach. The learner is provided with many hours to experiment with different exercises and techniques to identify and develop a personal style for visual communication. At the Design BSc of Politecnico di Milano, the approach is vertical. Here the teaching aims at optimising the few hours dedicated to drawing so that learners can effectively develop their skills and methods for drawing by hand within a product design process.

In the context of a design education moving faster toward digital learning environments - especially forced during the lock-downs in 2020 and 2021 - the authors reflect on their personal teaching experiences to identify educational guidelines for using hand drawing as a creative tool to learn to communicate, in any field. Finally, the authors conclude their conversation by imagining some future teaching/learning scenarios as a cross-pollination result between their personal experiences and considerations.

Keywords: *Hand drawing, design education, visual communication, learning-by-drawing.*

1. Around the Wall Summer School: discovering hand-drawing as a method to learn, research and communicate

The two authors share similar design training and a PhD in Design at the Department of Design of Politecnico di Milano. Their doctoral research focused on design education and representation techniques: mainly Flora Gaetani (FG) on hand drawing for product design and Valentina Vezzani (VV) on colour as a visual communication variable.

FG: *Do you remember why we decided to organise an international summer school based on hand-drawing?*

VV: We first met at a design summer school in Sicily in 2010 during our PhD years. We were so enthusiastic about that experience that it allowed us to connect with people from various parts of the world, studying and teaching in different creative and design fields. We realised that we could create a learning programme that could be exported and applied to different contexts and adapted to different needs. Thus, in the end, *Around the Wall* was born.

*We picked Lucca as the *Around the Wall* summer school location because the city could offer various opportunities to explore hand-drawing as a communication tool. Right?*

FG: The 500th anniversary of Lucca city walls inspired the central theme of our summer school; in fact, the walls define an enclosed space, but they can be walked, and they allow one to observe either outwards toward the more modern portion of the city or inwards toward the old city.

I remember that both programme and mentors' contributions had been chosen carefully to provide the participants with a complete educational experience. What were we trying to achieve?

VV: We had invited four mentors from different countries and with different professional backgrounds: Marianna Calia (IT), PhD in Architecture and Urban Phenomenology; Anthony Latino (US), Architectural Project Coordinator for The Pertan Group; Yulia Kryazheva (RU), architect and illustrator, and Jonas Piet (NL), service designer. The basic idea was to provide the participants with a multidisciplinary and multicultural learning experience that could enrich their personal and professional paths. In particular, each mentor proposed different hand-drawing exercises to observe and investigate the city. The ten-day programme included quick knowledge transfer moments, which we used to call *pills of knowledge*, and practical hand-drawing exercises. Each one of these was led by the expertise of one of the mentors. So, for example, you, Flora, proposed an exercise in surveying, Yulia and Jonas focused on collecting the voices and stories of the city, and I proposed to observe the city's colours and how they changed. We made the students walk and cycle along the walls, climb the Guinigi Tower to see the city from the top, get lost in the labyrinth of its narrow medieval streets and finally sit down in the main squares to capture the still-moving city. While the participants were learning about different methods to investigate the complexity of an old city in constant change and evolution, they were also using their drawings as a base for some design ideas to propose eventually to Lucca's councillor for culture.

2. From 2012 to 2022: ten years of drawing experience and tools evolution

VV: *From the experience of Around the Wall summer school to today's teaching methodology, what is the role you assigned to hand-drawing? And what for designers?*

FG: Drawing is the primary tool for professional designers to express their ideas for themselves and others. Over the past ten years, I have refined my drawing technique by favouring fast-sketching, investigating, researching and trying to pass on to my students the techniques I was experimenting with. On the relationship between drawing and design, in the introduction pages of the book *The Hand of Designer* (Serrazanetti & Schubert, 2010), Vanni Pasca starts from the historical meaning of the term drawing, dividing it into a double meaning: the *inner drawing*, such as the mental, ideational, intellectual one, and the *outer drawing*, that is the operational one, learnt through exercise and practice. With this in mind, teaching in *Drawing Studio*, a first-year course at the BSc in Product Design, I have built up a method to help the students develop the ability to express themselves through fast, instinctive drawing to develop the *inner drawing* in their daily practice. As for *outer drawing*, in my practice as a teacher, it is what I most associate with digital technologies, which allow us to arrive at aesthetically consistent results with the project and the scenario of use while decreasing the time it takes to create the final image. Optimising the time we have available is fundamental in teaching representation tools. In Politecnico di Milano, the number of hours available to teach drawing techniques is limited. Therefore, the idea is to optimise them by focusing above all on their ability to use the drawing daily: the ability to express a more aesthetic and evocative image is postponed to the teaching of digital rendering following three-dimensional modelling and the work that is done within the project laboratories.

What are the main objectives of your teaching hand-drawing? What do you want the learner to achieve?

VV: From a design education perspective, drawing by hand is functional for developing some of the professional design skills and capabilities mainly related to visual thinking and communication. Before this, though, I see hand-drawing as a tool for understanding the real and facilitating a process of self-knowledge. In fact, by experimenting with various ways to draw by hand and discovering different materials and techniques, the learner becomes aware of his interests, capacities, limitations and potential. These aspects highlight the importance of hand drawing in design curricula before any computer graphics course. To contextualise my beliefs, I have been teaching the BA in Design at the Universidade da Madeira for seven years. The three-year degree course provides the students with basic design knowledge and skills to look for specialisation either through professional experiences or a master's degree. In particular, I teach *Desenho2*, a first-year curricular unit, whose purpose it aims to provide tools and methods to become good communicators, aware of their skills and potential when it is to representation and visual communication. Anita Taylor writes: "As a primary visual language, essential for communication and expression, drawing is as important as developing written and verbal skills. The need to understand the world through visual means would seem more acute than ever; images transcend the barriers of language and enhance communications in an increasingly globalised world" (Taylor, 2014).

3. The teaching methodology built on ten years of experience.

FG: *What is your teaching methodology, then?*

VV: I have been able to build a teaching methodology that assigns hand drawing four main functions (and their learning outcomes): *drawing as therapy* (to get confident in hand drawing; to discover personal capacities and strategies); *drawing to learn* (to observe carefully and imitate brings to understand what is in front and get knowledge); *drawing to think* (to support visually a thinking process -

visual thinking); *drawing to communicate* (to communicate visually an idea, a concept, a process, a story). The proposed practical exercises and projects aim to make the students aware of these four functions and learn to consider hand drawing as a tool for designers to communicate. For instance, to rediscover hand-drawing and become confident in holding a pen and tracing some lines on paper, I have collected a series of basic exercises regarding lines, strokes, textures, and colour basics that will then be at the base of more complex projects. Alternatively, to learn to observe, I have gathered some short experiences of drawing in the field, either in the streets of the city or in a park, to allow the students to become more aware of scale, points of observation, and geometry or structure. I think I was inspired very much by our summer school *Around the Wall!*

FG: While your methodology is based on providing hand-drawing with specific functions, particularly as a visual communication tool, the teaching methodology I have developed over the years at the Politecnico di Milano - that, let us remember, it is a technical university - reflects the challenge to enhance the limited time available for teaching representation subjects in design courses. Integration with digital tools allows a significant improvement in time, focusing efforts on communicating project content effectively. However, the fact remains that, even when assisted by digital technologies, drawing remains an analogue gesture involving hand-eye coordination and the ability to perceive and analyse shapes and proportions (Coradeschi, 1986). To systematise the knowledge required from the students, I mapped the representation skills a product designer must possess and the tools he or she must master. Then, focusing on freehand drawing, I created a second map that relates the tools to the design process (Brevi et al., 2018). The leitmotif of the two maps is represented by the *shape-image* axis that describes the fields to be investigated during the Product Design creative process: from creating the shape to choosing materials and finishes that define the final image of the object.

4. Results from the two teaching methodologies

FG: *What have you got out of applying your methodology within your teaching practice?*

VV: The semester is relatively short for the students to become very confident in hand drawing, develop good observational and representation skills and find a personal visual language to apply to different visual communication project intents. So the first two weeks are dedicated to producing an A5 booklet gathering various experiences with lines, strokes, textures and colour samples as a visual and practical index for following projects and illustration experiences. From the basic exercises, the students then move to a project that requires life drawing experiences. They again move through a series of propaedeutic exercises of discovery: from identifying the morphology structure to the drawing of the same subject with different lines and strokes, changing material and types of gesture (Figure 1).

Figure 1. Life drawing experience with a focus on some endemic plants in Madeira Island; from morphology studies to free exploration of representation techniques.



Figure 2. Collection of fanzines for the project Fanzines Against Apathy.



The final project would instead focus on visual narratives, and these require the students to connect their visual choices of composition, style and technique firstly with the message they want to convey visually. I have proposed that the students use fanzine formats to disseminate their visual

narratives and ideas in the last few years. In particular, during the lockdown, I started to get worried about the quantity of disinformation and apathy that hit today's societies and our youngsters. The project *Fanzines Against Apathy* demonstrated promising results in making the students gather exhaustive research on a particular theme, identify the message to convey, and test and identify the visual style and sequencing to catch the attention and effectively communicate the contents (Figure 2).

What about your methodology? How did you apply it?

FG: The numerous exercises provided during the Drawing Studio demand the students to keep up with their daily hand drawing practice routine (Figure 3). Drawing reviews occur collectively so that by participating in the critique of their peers' work, they can develop their critical way of observing and thinking. The collection of all the exercises in a coursebook integrates analogue drawing tools with digital ones and makes communication more effective, enhancing the expressiveness of initial sketches (Figure 4).

Figure 3. A student's (J. Lopez) evolution of graphic technique during the First Year Drawing Studio.



The idea of the booklet had a double sides goal: to train students in a process from analogue (sketches on paper) to digital (the scan, the selection of the better images, the filling of the graphic template) and back to analogue (booklet printing) keeping a good quality all over the entire process; to start putting students on the path for the future creation of their portfolio, a composition that will become of fundamental importance for them in the following years. Avoiding the booklet's design helped save time and let the students be more focused on the quality of visual communication.

Figure 4. Students Coursebook



5. Discussion and conclusions

VV: *How do you see hand-drawing today? I mean, why is it essential for you?*

FG: Freehand drawing is essential because it allows one to jot down a thought. According to Franco Raggi (Serrazanetti & Schubert, 2010), a Milanese architect and designer, it serves to explain oneself by following a quick and elusive thought. He asserts that drawing is the only way to express ideas that pass through the head like phantoms because: "drawing can also be deficient, approximate, partial, wrong, but it is still a testimony of our thought that becomes legible, that can be looked at and criticised and even sometimes thrown away if it is not very effective" and, about the drawing exercise, he claims that: "the quality of the exercise of drawing [...] choosing what to look at, choosing what to draw means training the hand, and the eye first and the brain before that, to erase, to remove to decide what to erase and overshadow and instead focus on what is (seems) interesting". It is not vital which tool one decides to use, as long as it is always available and allows us to have a trace of what is needed and essential.

What do you think is still missing, either in design education or in higher education in general?

VV: In design education, especially at a bachelor's degree level, I can notice that the trend is to create design technicians, able to cope with the demands and intense rhythms of the industry. However, universities should have the pure role of enabling students' critical consciousness, supporting them in training curiosity and engagement with societal, economic, political and environmental issues. In today's design education, foundational courses must provide essential knowledge and tools to understand, think,

and do in a design context. However, they must boost the learners' self-confidence, break their system of misconceptions, and open their minds by building curiosity and motivation as the main engines for creativity and innovation.

FG: *Thanks to Around the Wall experience, we had started to figure out how freehand drawing can become a valuable tool of communication, not only for creativity or arts. Haven't you found more opportunities to explore the learning opportunities that this type of practice can open?*

VV: Oh yes! I can mention the events *Drink & Draw Funchal* that my colleague Elisa Bertolotti and I have been running since 2019, following the international movement based on informal gatherings of people interested in spending some fun and social time through hand drawing. In the situation of a Drink & Draw, the activity of drawing is once again a collective experience and allows people to open up, connect and sometimes even heal. Another experience that I would mention was the *Atlantic Wonder 2019 Summer School* when we provided the participants with a booklet rich with different types of papers and layouts to record their discoveries in the field and dialogue with local biologists and natural scientists. In that case, we were assigned to hand drawing the role of communication tool, or better, to bridge the technical and scientific information with a simple and personal way of representing internalised reasoning.

So to conclude, tell me three keywords or guidelines that cannot be missing from freehand drawing teaching or even design education in general?

FG: The first guideline that comes to mind is also the most obvious: show students how to do the exercises through practice. **Displaying the exercise** allows students to *learn by seeing* through their mirror neurons (Freedberg et al., 2007), which activate when we see an action being performed, as drawing is. For this reason, it is essential to allow all students to see the teacher's hand drawing rather than using stationary materials (such as slides) to transfer the technique. **Continuous, daily practice** is an exercise that is important to stimulate. In this way, students will be able to use drawing as a natural language, without worrying about the gesture made but concentrating exclusively on the message to be communicated. In this way, the representation will be more effective. Moreover, it is essential to create the conditions for classroom time to be used for **collaborative activities and experiences** from a horizontal didactic perspective. In this way, the teacher does not assume the role of the leading actor but instead becomes a kind of facilitator, the director of the teaching activities, and the students feel free to help each other.

VV: I agree with your idea of **sharing** and **collective experience**; what matters is that in this *learning-by-doing* process, they find comfort and curiosity in other people's work and visual/technical solutions. As solving problems requires more than ever, the participation of more minds and types of expertise, also hand drawing in a shared mode, would set the right mindset for future creatives and designers! **Autonomy** is another essential concept. Learning is a progressive path that requires patience and self-discipline. Even in the case of hand drawing, learners should have clear in mind that the professor cannot provide the complete recipe to become the best drawer or illustrator. Each person is different and may take different time and types of practical experiences to achieve optimal results. Finally, hand drawing has got this reputation of being only for a few talented people. I introduce *Desenho2* classes by clarifying that everyone can draw, just most of us have forgotten how not to be scared of the white paper and old a pencil. **Making mistakes is a good thing**, it is essential, but it is also essential to reflect on the error and try again and again until satisfaction. Moreover, I would say that personal satisfaction is a real prize to achieve.

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A PRACTICE PERSPECTIVE ON DOCTORAL EDUCATION – EMPLOYER, POLICY, AND INDUSTRY VIEWS

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Abstract

As we enter the Transformative Age of digital and green transitions, the European Commission and other global policy-makers herald universities as key players in innovation and transformation. PhD students ostensibly represent the pinnacle of higher education and suitable candidates for policymakers' visions. Academic research has shown that traditional PhD programmes may fail to equip their graduates with the necessary skills and knowledge required. Practitioners' voices have, however, been less well heard. We review thirteen policy and industry reports relating to doctoral education including EU policy documents, wider policy contributions across the EU, and industry-led reports. We also conduct thirteen semi-structured interviews with PhD employers or experts in PhD recruitment/placement. Findings highlight the lack of transferable skills in doctoral graduates, but also shed new light on attributes and experience as key hiring factors. We examine interdisciplinarity and intersectorality as potential solutions to employer and policymaker demands.

Keywords: *Doctoral education, practice perspective, programme design, skill acquisition, PhD programmes.*

1. Introduction

We have entered the Transformative Age and “can expect fundamental shifts in how we live, work and play... how we learn – and, along with it, the nature and role of the university” (Halloran and Friday, 2018, p. 2). The European Commission’s vision of “a fairer, healthier, greener and more digital society” (2020, p.1) requires new skill acquisition for students at all levels. The highest level of academic achievement is the doctorate and as such, doctoral should be key to meeting the challenges that our society faces. However, doctoral education faces its own challenges, with common critiques surrounding the overspecialization and lack of real-world applicability of their work (Cui and Harshman, 2020). Change is needed to meet the goals of national and international strategies and to enable doctoral graduates to improve their own employability in the process, given how few remain in academia (Alfano, Gaeta, & Pinto, 2021). While the topic has understandably become popular with academics, there is still a considerable lack of other voices in the discussion. Thus, we offer a practice-based perspective on the current state of doctoral education through analysis of employer, policy, and industry views. This paper begins with a discussion of our methods, our findings across two main themes, and concludes with a discussion section.

2. Methods

Our multimethod study includes a) a systematic review of thirteen policy and industry reports relating to doctoral education; and b) thirteen in-depth semi-structured interviews with PhD employers or experts in PhD recruitment/placement. The systematic review process included three sources of non-academic reports and policy documents:

1. Directorate General for Education, Youth, Sport and Culture strategy and plans.
2. EU level policy reports citing doctoral education.
3. Big 4 (KPMG, PwC, EY, Deloitte) consulting reports citing doctoral education.

The first search was conducted within the Directorate General for Education, Youth, Sport and Culture website while the second and third searches were conducted using Google’s advanced search function. Filters applied were as follows: pdf format documents, English language, and that the website had been updated in the last year. These filters ensured a level of formality, the author’s ability to analyse

the information, and the currency of the documentation respectively. Each were then reviewed using the qualitative data analysis software NVivo.

Interviewees for the semi-structured interviews were identified in the first instance through an international doctoral education consortium, spanning multiple countries including Ireland, Spain, Greece, and Finland. Further interviewees were then added through a snowball sampling approach. Having first obtained informed consent, interviews were conducted virtually using Microsoft Teams. They lasted an average of 34 minutes and ranged between 18 to 52 minutes. Interviews took a semi-structured approach and as themes began to emerge, questions evolved through an iterative process. All interviews were recorded, transcribed verbatim and analysed inductively using NVivo.

Table 1. Overview of interviews.

Interview No.	Country	Occupation	Duration
Interviewee 1	Spain	Co-founder, medical informatics company	40 mins
Interviewee 2	Spain	Medical Director, pharmaceutical company	52 mins
Interviewee 3	Finland	Market Research Analyst, health research clinic	27 mins
Interviewee 4	Ireland	Head of Innovation, technology MNC	30 mins
Interviewee 5	Portugal	HR Director, private clinic and hospital group	43 mins
Interviewee 6	Ireland	Co-founder, sports wearables company	32 mins
Interviewee 7	Ireland	Supervisor, hospital-based research institute	39 mins
Interviewee 8	Ireland	Founder, social media marketing company	34 mins
Interviewee 9	Ireland	Principal Investigator, national software research center	45 mins
Interviewee 10	Ireland	Director, national data analytics research center	30 mins
Interviewee 11	Spain	Head of Innovation, healthcare NGO	20 mins
Interviewee 12	Ireland	Careers Guidance Counsellor, university	34 mins
Interviewee 13	Ireland	Data Analyst, national health organisation	18 mins

3. Findings

Findings highlight two main points for discussion: firstly, the changing role of universities in society, and secondly, the emerging role of interdisciplinarity and intersectorality as means of addressing challenges through adaptability and transferable skills in doctoral graduates.

3.1. Role of universities in changing contexts

There are “growing expectations that universities will not only undertake their core pedagogical function and carry out research, but also engage in other activities, such as contributing to the development of culture, cooperating outside academia, citizen engagement in research and science carried out by universities through societal outreach, and the use of research to tackle societal challenges” (Whittle and Rampton, 2020, p.15). This is particularly important now, as we enter changing times, only accelerated by the COVID-19 global pandemic. “Changes in climate, digital technologies and geopolitics were already profoundly affecting our society and driving our agenda. However, the pandemic has sharpened the need for Europe to lead the twin green and digital transitions and make its societies and economies more resilient. This creates an unparalleled opportunity to move out of the fragility of the crisis by creating a new vitality for our Union” (European Commission, 2020, p. 1-2).

Green and digital transitions are a priority for policymakers and industry, especially within the European Union as the EU strives to be a global leader in innovation and societal change. This is critical for universities to be aware of when preparing graduates, especially those at the doctorate level, for the changing nature of work. Deloitte explain that this change to the nature of work is due to “technology innovation, a growing demand for new competencies, changing employee expectations, shifting labour demographics and inclusion/diversity strategies, new workforce models, and the evolving business environment with all its regulatory changes” (Lutin, 2020, p.1).

In terms of the digital transition in particular, it is important that we are “ensuring strong collaboration and smart specialization between universities, research centers and firms, and adequate availability of skills” (Directorate General for Education, Youth, Sport, and Culture [DG EAC], 2020, p. 9). To do so, DG EAC (2020) suggest four key criteria for successful digital transition:

1. New environments that are conducive to collaboration and innovation;
2. Stronger innovation capabilities across both academia and the research sector;
3. A new generation of entrepreneurial people; and
4. The creation and the development of innovative ventures.

Innovation and collaboration are also key to employers, as interviewees noted that teamwork was important for the organization's success in being one step ahead of their competitors. However, the traditional isolation of doctoral programmes led some of the employers to believe that doctoral graduates – despite their expert knowledge – were not valuable assets to the organization as they lacked adaptability to the fast-paced industry environment. Expert knowledge only played part of the role in the hiring process, as experience in a professional setting was highlighted as a key benefit. Both would make it easier for the candidate to fit into the organization on both a technical level and personal level, the latter of which was highlighted by one of the employers as taking priority in some cases.

3.2. Skills, interdisciplinarity and intersectorality

Two ways of introducing opportunities to build adaptability and provide professional experience to doctoral students are through interdisciplinarity and intersectorality. Interdisciplinarity - the act of working with and transferring knowledge from different disciplines to one's own – has become increasingly visible in doctoral education (Kemp and Nurius, 2015). Interdisciplinarity provides students with new perspectives and methods of working, which one of our interviewed employers mentioned as one particular way of bringing much needed diversity to their organization (Interviewee 9). Industry leaders also highlight the importance of interdisciplinarity, with statements that futureproofing will require “building mechanisms so that understanding of the world outside Universities is drawn in systematically and across the full range of academic disciplines” (Andrew and Bagshaw, 2019, p. 12) This will allow universities to “shape the work of businesses through their research and teaching innovations which capitalise on new technologies, processes and approaches” (Andrew and Bagshaw, 2019, p. 12).

Intersectorality, whereby universities will work in collaboration with industry, is also on the radar for industry and policymakers. The European Universities Association (EUA) stresses that universities are well able to equip researchers with the necessary basic and advanced skills to meet current technological and societal challenges. At the same time, universities also engage in and co-implement numerous collaborations with partners outside of academia. Through collaborative doctoral education schemes, universities foster the involvement of public and private sector actors in doctoral training” (European Universities Association [EUA], 2020, p. 13).

Chircop, Karakas, Kiss, and Szczepanski (2020, p. 14) paint a picture of an ideal industry-academia interaction where “both the expectations of industry and those of academia are satisfied to a similar extent and an equal partnership develops”. Such productive collaborations are “strategic and long-term. They are built around a shared research vision and may continue for a decade or beyond, establishing deep professional ties, trust and shared benefits, which can bridge the important cultural difference between academia and industry. Ideally, they are led by individuals who understand both the academic and business world” (Chircop et al., 2020, p.14).

Both interdisciplinarity and intersectorality are deemed not just desirable, but essential. They increase doctoral student employability by augmenting their potential for innovation due to the variety of skills, knowledge and perspectives they experience. It appears that the main issue, however, is that these students are not aware of their unique capabilities and thus can have lower confidence than their peers despite being much more qualified for a multitude of roles (Interviewee #7 and #9). It is also why when interviewed, employers stated that they tend not to see any particular benefits to choosing a job candidate with a PhD over one without, unless a highly specific technical role was waiting to be filled “towards the back” (Interviewee #2) of the organization and less so in a role dealing with people (Interviewee #8).

Whittle and Rampton (2020) identify a need to increase the inter-sectoral mobility of academics and researchers: “Whilst there remains a need for many academics to work in-depth within their own disciplines, two trends are increasing the need for inter-sectoral and inter-disciplinary mobility amongst researchers: first, the trend towards short-term funding for research positions at R2 and R3 levels in general; this is requiring researchers to change roles within academia or even into and out of other sectors; second, many of the key challenges facing society require solutions that draw on and combine expertise from different academic disciplines and with expertise from non-academic sectors. There is therefore a need to develop a mix of specialist and transversal competences, which typically requires a degree of inter-sectoral and inter-disciplinary mobility, although such mobility will take very different forms and vary across different disciplines” (p. 88-89).

Another priority for practitioners is ensuring that the correct skills are developed within university programmes. The European Council of Doctoral Candidates and Junior Researchers, calls for quality standards that encourage transferable skills training in doctoral programmes (European Council of Doctoral Candidates and Junior Researchers [Eurodoc], 2020). The Council Conclusions also note the need to broaden researchers' skills and competences and propose an enhanced European Competence Framework for Research Careers (Eurodoc, 2020).

The topic of transferable skills is not new, particularly in doctoral education. It is another reason why interdisciplinary and intersectoral doctoral programmes are becoming more common, as they develop through practical work where they can be applied across a variety of contexts and careers. Some of the most commonly sought transferable skills include communication, teamwork, time management, organization and project management (Interviewee #1, #2, #4, #6 and #12).

It is worth noting however, that employers revealed that attributes such as confidence, determination, positivity, and resilience would also be considered desirable skills (Interviewee #5, 7 and 9). Resilience specifically was also described as a skill by the DG EAC (2020) though this was linked to the pressure placed by the COVID-19 pandemic.

4. Discussion and conclusions

As society progresses, policymakers highlight the importance of universities in preparing a highly skilled workforce equipped to deal with the modern challenges of a more technologically advanced and sustainable future. Universities are now considered a major player in this societal development (Whittle and Rampton, 2020). However, a distinct lack of transferable skills and practical experience lead many employers to dismiss the potential of universities' most educated prospective workforce: doctoral graduates. The introduction of interdisciplinary and intersectoral doctoral programmes aim to tackle the past criticisms of overspecialization and isolation by placing doctoral graduates in new environments where they must learn to adapt and work in complex teams and organisations thus better preparing them for the future. Such diverse knowledge and practical work are deemed as highly desirable from employers, industry and policymakers alike (Interviewee #8).

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EXPANDING THE ROLE OF UNIVERSITIES TO PROMOTE SOCIAL AND ECONOMIC DEVELOPMENT OF THE TERRITORY: A NEW MANAGEMENT PARADIGM AT RIO DE JANEIRO STATE UNIVERSITY

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Abstract

The present work deals with the management experience at Rio de Janeiro State University– UERJ, where a new management and governance model was adopted in order to strengthen university autonomy. This new model has given rise to the expansion of universities' responsibility and has reorganized management sectors in a process that involves the renewal of internal legislation with the view to regulate and guide the university's action in the process of knowledge transfer to society through services.

The result of this new regulatory framework is the improvement and increase in the spectrum of partnerships between universities and governments, the strengthening of pre-existing partnerships, and, finally, the attribution of new responsibilities to the so-called supervisory units or “supervisory bodies of the central administration of the university”.

Great part of the efforts aimed at rearticulating UERJ's internal system points to the need to overcome the historical internal fragmentation, redirecting management to an articulated system which is able to reflect the political will of the authorities involved, in the sense of an autonomous and radical evolution of the institution's internal governance.

It can be stated that the transformations seen at UERJ are part of a broader process inscribed in the scope of the current management strategies to bring universities closer to the demands of society. Its main characteristics are, as follow: the integration of disciplines and thematic areas that enhance knowledge in the face of regional development; the prioritization of partnerships with the public sector, the valuing of innovation and projects with the potential for technology transfer, the expansion of the role of universities to promote social and economic development of the territory; the strengthening of the role of universities for the planet sustainability; the financing associated with academic results (publications and students' involvement), the sophistication of monitoring, management systems and their indicators; the encouragement of regional action and the implementation of correlated management and governance models. This work, therefore, presents a brief balance of this experience based on systematized data between 2020 and 2021.

Keywords: *Higher education, education management, university and society.*

1. Introduction

The strategic theme of University-Society integration as a premise to combat institutional isolation and as a desirable university model has clear recognition from UNESCO – World Conference on Higher Education (CMES), held in Paris - 2009.

Understood as public goods by the participating countries, universities are expected to make commitments to expand opportunities for access and implementation of flexible research systems that can be useful to society, and to seek greater integration, avoiding isolation. (Dilvo Ristoff, p. 284)

This commitment, however, involves the issue of university autonomy. Established as a principle and a necessary condition for the freedom of academic works, autonomy implies a social commitment and, in this sense, both must necessarily walk together. Such an institutional dimension must not exist by itself. Autonomy can only be justified by quality, pertinence, effectiveness, transparency and social responsibility.

In this sense, socioeconomic, cultural and political reality forms the substrate of social demands, involving the great challenges of the present moment and its potentialities, as well as the lack of existing knowledge without disregarding the future that needs to be thought, rethought, created, formulated and made possible. (idem, p.288)

Departing from this perspective, Rio de Janeiro State University has made efforts to reorganize its management, through actions that range from new internal regulatory frameworks to greater openness to incorporate responsibilities and services that expand the constitutional tripod of “teaching, research, extension”, especially valuing institutional participation within the scope of public policies in the State of Rio de Janeiro.

2. Discussion: The strategic character of university-society interface for the promotion of citizenship

The expansion of university-society integration interfaces – aimed at strengthening its strategic character in promoting citizenship – is not limited to partnerships to develop services. Furthermore, it is worth looking at direct actions of inclusion, as part of the search for greater integration and realization of the institution's emancipatory purpose. In Brazil, this potential is seen in a paradigmatic way from the approval of the so-called quota law – Law 12.71 of August 2012 – which reserves 50% of vacancies in admission exams to universities and federal institutes for students who have completed high school at public institutions. Defined percentages of these vacancies must be reserved for black, brown, indigenous students and those from families whose average monthly income does not exceed a minimum wage and a half. In a short time, this radically altered the spectrum of the university, whether in its academic routine, or in the establishment of new challenges of democracy. It is worth noting the pioneering role of UERJ in this process, since it is the first Brazilian public university to adopt the quota system.

Wrana Panizzi (2015) states that the university can be understood both from an instrumental dimension, whose foundation is the idea that it must unilaterally meet the interests of the market versus the anthropological dimension of the university, where the conception is sustained by the subjects and their experiences as holders of citizenship rights.

This idea is also defended by Chauí (2003), when she states that: “[...] Education and culture came to be conceived as constitutive of citizenship and, therefore, as a right of citizens, causing, in addition to the vocation republic, the university would also become a social institution, inseparable from the idea of democracy and the democratization of knowledge: either to realize this idea or to oppose it”. (Chauí, in: Wrana, p.311)

The principle of autonomy, considering it as a basic condition for sustaining a democratizing institutional project, reveals that the university is “marked by constant tension between autonomy as a *sine qua non* condition for the production of knowledge and innovation, and its social responsibility, which translates into the necessary commitment to the exercise of the right to education that imposes limits on this autonomy”. (p. 335)

It is important to stress that university autonomy cannot be understood as a means for universities to avoid the necessary relationship with society, to which they are accountable. Therefore, autonomy, in this case, would gain a relative meaning, with the constant need to establish a dialogue with the field of social rights, namely the social responsibility of the university.

Based on the principles of autonomy and the university's social responsibility, and with the need to overcome the conflict of quality dissociated from relevance and pertinence, a model of university radically linked with society is envisaged, stating that it is up to universities to develop projects aimed at satisfying social demands, whose result should have immediate implications for increasing the efficiency and effectiveness of public policies, engendering orientation for the research agenda reflected in a vision of curricula and in a more effective extension practice. (p.338): “The university system must identify, in the large blocks of government investment, the knowledge demands that can be satisfied by mobilizing its research potential, through the formulation of projects promoted by the public sector”. (p. 339)

If on the one hand, the neoliberal winds blowing throughout the 1990s and still continues in the present, imposed budget reduction and a new rationalization to manage universities and knowledge production bodies, on the other hand, contemporary challenges, especially those linked to the effort to mitigate the consequences of the capitalist production model and its impacts on nature, the higher education system is urged to bring its internal agenda closer to social and economic demands.

Thus, universities assert themselves on the global stage as one of the strategic instruments to face issues involving environmental resources, poverty eradication, health and well-being, infrastructure, gender conflicts, migratory processes, etc.

The understanding of such experience permits to expose a model which allows the public spirit, ethics and transparency to preside over their actions, preserving the great public mission of universities and research centers, but, at the same time, that such establishments can act in the process of society development.

Paradeise (2013) calls this process a virtuous circle between “autonomy, resources and a balanced governance model”, an indispensable circuit for such a model to produce positive results, generating mutual trust between academics and institutions, executive legitimacy for managing projects and partnerships, attracting of material resources, solid reputation as well as attraction and retention of talent (professors and students).

This strategy became a sensitive factor of transformation in universities' life, since such alliances generated new opportunities, especially when it comes to the establishments' new positioning in the territory, constituting new identities in terms of their mission in the face of society's demands.

3. Conclusion: UERJ's experience

With this point of view, UERJ instituted in the last biennium (2021-2021) a set of actions, such as integrating disciplines and thematic areas which enhance knowledge on regional development; prioritizing partnerships with the public sector; valuing innovation and projects with technology transfer potential; expanding the role of universities to promote social and economic development of the territory; strengthening the role of universities for the planet sustainability; financing of activities associated with academic results (publications and student involvement); promoting the sophistication of monitoring and management systems and their indicators; promoting the encouragement of regional action and the implementation of correlated management and governance models. In order to illustrate the results, three cases follow below:

Environmental Management and Education (2021) - The project involves professors from the Faculty of Engineering (FEN/UERJ) in partnership with the Department of Roads and Highways of the State of Rio de Janeiro (DER/RJ), where UERJ guides DER/RJ inspectors in the adoption of new attitudes towards specific aspects of the monitoring of works, introducing new routines.

In this way, UERJ supports DER/RJ so that – parallel to the knowledge transfer – the works in progress are already monitored in terms of respect for the current environmental requirements, thus configuring a scenario of “in-service training”.

For this, the University works in field services, carrying out periodic inspections in the works, observing the fulfillment of the environmental requirements and the conditions imposed in the licensing.

Additionally, UERJ uses its specialized technical staff to prepare Studies, Reports and Assessments, which require short-term contracts by the DER/RJ, for continuity and compliance with licensing processes. The University also acts in environmental education actions with the workers involved and provides communication material which allows it to act in the dissemination of environmental awareness to society, as well as to account for the efforts it has been making, generating preservation and social transformation.

Public Health Assessment and Management (2020) - Comprised of professors from the Institute of Mathematics and Statistics (IME/UERJ), the project has the participation of retired professor Narcisa Maria Gonçalves dos Santos, one of the greatest national references in the treatment of statistical data, in addition to encompassing professors/researchers and the University's student body in all its stages. With the purpose of evaluating the satisfaction of patients treated at 64 Health Units in small towns located in the State of Rio de Janeiro, the project aims to give voice to patients who use the Unified Health System in these towns. Through this quantitative research, UERJ developed an inferential results platform that allows the identification and referral of parameters on the image and performance of the services provided by the Health Units linked to the SES/RJ and the alignment of activities relevant to the Management Excellence Program of the Secretariat, creating conditions for permanent improvement of public health services.

Education and the Indigenous Peoples (2021) - The project aims to carry out the course “Cultures and history of indigenous peoples: subsidies for the implementation of Law 11.645/2008”, which will be held by the Center of Studies on Indigenous Peoples, Interculturality and Education at Baixada Fluminense Faculty of Education (FEBF), under the coordination of Professor Kelly Russo (FEBF), within the scope of UERJ. This course is justified by the need to offer subsidies to elementary and high school teachers on issues related to indigenous peoples in their relationship with Brazilian cultural diversity, the inclusion of indigenous themes in national school – with a view to apply the Law

11.645/2008 – as well as training education professionals in the municipal network of Duque de Caxias, with the aim at improving the approach to themes of cultures and history of Indigenous Peoples in pedagogical and curricular proposals.

The project aims to strengthen the partnership and integration between the university and the basic education network in order to improve the quality of education; guide the production of didactic-pedagogical strategies to deconstruct mistaken and prejudiced notions about indigenous peoples; encourage practices which value multiethnicity and cultural plurality as a heritage of indigenous peoples and Brazilian society; promote theoretical-practical training for teachers on contemporary realities of indigenous peoples in Brazil; and expand, through Distance Learning (EAD), access to educational technologies for teacher training.

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RELATIONSHIP BETWEEN SCHOOL CLIMATE AND SOUTH AFRICAN GRADE 9 LEARNER ACHIEVEMENT IN MATHEMATICS AND SCIENCE

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Abstract

School climate has become a staple of organisational-educational research and is considered here in relation to learner academic achievement. In South Africa, poor learner achievement in mathematics and science has occupied the centre stage with the release of the Trends in International Mathematics and Science Studies (TIMSS) 2019 results. At Grade 9 level, 39 countries participated, and South Africa was very last and second from the last in science and mathematics achievement, respectively. We used a quantitative design with a positivist philosophical stance. Maslow's hierarchy of needs was used as theoretical framework, as learners attending a school with a negative climate cannot devote their full attention to learning. We analysed cross-sectional TIMSS 2019 South African data by considering two models: one with the dependent variable being mathematics achievement and the other with it being science achievement. For both models, gender and socio-economic status were included as control variables, the sense of belonging scale was included as a predictor at learner-level, and nine predictors relating to school climate were considered at school-level. The multi-level analysis using HLM software showed that learners with a high sense of belonging, schools with sufficient instructional materials, and technologically competent staff are significant predictors of both mathematics and science achievement. We recommend that South African schools with insufficient instructional materials be prioritised for receiving the necessary material and that all South African teachers be trained in the use of technologies, as these are significant predictors of learner achievement. This will, in turn, enhance learners' sense of belonging, which is also a significant predictor. Another recommendation is that stakeholders invest in school climate surveys and other interventions supporting a healthy school environment, as many researchers, including this study, have shown that a healthy school climate is a significant predictor of learner achievement. Additional research is encouraged to establish the nature of the impact that a healthy school climate has on learner achievement through longitudinal studies where causation can be proven.

Keywords: *School climate, learner achievement, TIMSS 2019, hierarchical linear models.*

1. Introduction

In South Africa, poor learner achievement in mathematics and science (M&S) has occupied the centre stage with the release of the TIMSS 2019 results where TIMSS refers to the "Trends in International Mathematics and Science Studies" (Reddy et al., 2021, p. 1). TIMSS studies are conducted on Grade 4 and Grade 8 levels. South African learners tried participating on the Grade 4 and Grade 8 level, but due to low performance changed the participants to Grade 5 and Grade 9 level (Reddy et al., 2015). The focus of this study is on Grade 9 level. TIMSS 2019 can be divided into low (under 400), intermediate (under 475), high (under 550), and advanced (under 625) benchmarks (Mullis, Martin, Foy, Kelly & Fishbein, 2020) with learners achieving above 400 points being classified as "having acquired basic mathematical and science knowledge" (Reddy et al., 2021, p. 4) and only 41% and 36% of South African Grade 9 learners achieving this for mathematics and science, respectively. School climate has become a staple of organisational-educational research and is considered here in relation to learner academic achievement. Many researchers have found school climate to be a predictor of learner achievement (Belton, 2021; Berkowitz, 2021; Jackson et al., 2021; Richard, 2021; Zysberg & Schwabsky, 2021). Belton (2021) conducted a study in Virginia, USA, using Grade 5 data from 97 schools, and found a strong correlation between school climate and learner achievement. In another American study using data from 6,670 fifth-graders, Richard (2021) found that a positive school climate had a significant relationship with English Language Arts achievement. Another American study (Jackson et al., 2021), who used bootstrapping mediation analyses on 1,106 eleventh-grade learners, found that school climate partially explained the relationship between math identity and learner performance. Berkowitz (2021) used a multi-level model on data from 53,801 Israeli fifth- and eighth-graders, and also found school

climate to be a significant predictor of learner achievement. Zysberg and Schwabsky (2021), using data from 1,641 learners from 21 middle and high schools in Israel, built a model showing that self-efficacy mediates the association between school climate and learner achievement. Within the South African context, Arends, Winnar and Namome (2021), using TIMSS 2015 data, showed that school climate and access to and use of school resources has a significant association with learner achievement. In another South African study, Winnar (2021) used TIMSS 2019 data and found school climate to be significantly associated with learner achievement. Maslow's hierarchy of needs (Maslow, 1943) was used as theoretical framework, as learners attending a school with a negative climate cannot devote their full attention to learning, which, in turn, negatively impacts on learner achievement.

2. Methodology

2.1. Methods

We used a quantitative design with a positivist philosophical stance and a deductive approach. A secondary data analysis was run using South African Grade 9 TIMSS 2019 data. Secondary data analysis refers to a research design that mostly uses existing data, mostly quantitative data, to reapply and reanalyse such data to test hypotheses or to validate models (Mouton, 2001).

2.2. Participants and instruments

A total of 519 schools participated in TIMSS 2019, with 20,829 learners and 519 school principals completing the TIMSS questionnaires. Table 1 shows the TIMSS 2019 variables considered in this study. Multi-level models were built using HLM software (Raudenbush & Bryk, 2002). Re-coding has to be done since, for the multi-level model, it's ideal to either use continuous or dichotomized variables in the analysis. The majority of the variables are categorical (with more than two response options), which makes interpretation of the categorical variables difficult in relation to achievement since we do not know what the reference categories are, and HLM will most likely read these variables as continuous variables. Accordingly, all variables have been re-coded to be binary. For binary variables, it is typical to use no centring at Level-1 (learner-level) and grand-centring at Level-2 (school-level), and this is what we have done (Raudenbush & Bryk, 2002). Missing values were replaced using multiple imputation, which Van Ginkel, Linting, Rippe and Van der Voort (2020) have shown is the best way to deal with missing values regardless of the type of missing value it is.

Table 1. Details on the variables used in the multi-level model and information on re-coding.

Variable	Description	Response options	Re-coding done
Level-1: Learner questionnaire answered by learners			
BSBGHER	"Home educational resources" (Martin et al., 2020, p. 16.168)	1 – 8.4 = "Few" 8.4 – 12.2 = "Some" > 12.2 = "Many"	1 – 12.2 = 0 = "Few or some" > 12.2 = 1 "Many" New variable name: BSBGHER → L1V1
BSBG01	"Gender" (TIMSS, 2018b, p. 3)	1 = "Girl" 2 = "Boy"	0 = "Boy" 1 = "Girl" New variable name: BSBG01 → L1V2
BSBGSSB	"Sense of school belonging" (Martin et al., 2020, p. 16.198)	1 – 7.8 = "Little" 7.8 – 10.7 = "Some" > 10.7 = "High"	1 – 10.7 = 0 = "Little or some" > 10.7 = 1 = "High" New variable name: BSBGSSB → L1V3
Level 2: School questionnaire answered by principals			
"How much is your school's capacity to provide instruction affected by a shortage or inadequacy of the following?" ¹			
BCBG13AA	"Instructional materials (e.g., textbooks)"	1 = "Not at all"	0 = "Some or a lot"
BCBG13AB	"Supplies (e.g., papers, pencils, materials)"	2 = "A little"	1 = "Not at all or a little"
BCBG13AC	"School buildings and grounds"	3 = "Some"	New variable names:
BCBG13AD	"Heating/cooling and lighting systems"	4 = "A lot"	BCBG13AA → L2V1
BCBG13AE	"Instructional space (e.g., classrooms)"		BCBG13AB → L2V2
BCBG13AF	"Technologically competent staff"		BCBG13AC → L2V3
BCBG13AG	"Audio-visual resources for delivery of instruction (e.g., interactive white boards, digital projectors)"		BCBG13AD → L2V4
BCBG13AH	"Computer technology for teaching and learning (e.g., computers or tablets for student use)"		BCBG13AE → L2V5
BCBG13AI	"Resources for students with disabilities"		BCBG13AF → L2V6
			BCBG13AG → L2V7
			BCBG13AH → L2V8
			BCBG13AI → L2V9

¹All direct quotes of the school questionnaires are from TIMSS (2018a, p. 2)

2.3. Ethical considerations

No permission was needed to analyse the TIMSS 2019 data, as the data is available for public use on the IEA's website where IEA stands for "International Association for the Evaluation of Educational Achievement" (Fishbein et al., 2021, p. II). The TIMSS 2019 data also has no identifiers so that schools and participants cannot be identified.

3. Results and discussion

Three multi-level analyses were conducted. Firstly, the null models without variables were created with the purpose of indicating the variance in achievement amongst schools (see Table 2).

Table 2. The null models.

		var component	df	χ^2	p	var explained
Mathematics	Intercept	3,036.75	518	20676.96	<0.001*	49.8%
	Level-1, r	3,065.79				50.2%
Science	Intercept	5,840.41	518	22580.62	<0.001*	52.5%
	Level-1, r	5,275.08				47.5%

Note: *Statistically significant $p < 0.05$, var = "variance", df = "degrees of freedom"

The parsimonious model was created by introducing all independent variables into the null model and then removing all insignificant variables one at a time with only significant variables retained. Table 3 shows the results of the parsimonious model (also referred to as the final model).

Table 3. The parsimonious models.

		var component	df	χ^2	p	var explained
Mathematics	Intercept	2,715.11	516	18,990.24	<0.001*	47.1%
	Level-1, r	3,044.37				52.9%
Science	Intercept	5,240.22	516	20,749.54	<0.001*	50.0%
	Level-1, r	5,243.00				50.0%

The average reliability estimate was 0.975 and 0.978 for the mathematics and science final models, respectively, indicating that sample averages reflected the true school means. By comparing the variance components of the final models to those of the null models, the percentage reduction in the variance at learner-level was 0.7% and at school-level was 10.6% for the mathematics model and 0.6% (learner-level) and 10.3% (school-level) for the science model. Table 4 shows the effect sizes (β 's) of the significant predictors of the parsimonious models. The first value in each cell is for the mathematics model and the second for the science model.

Table 4. Significant predictors of the parsimonious models.

	β	s.e.	t	p
Intercept	378.61 352.41	2.84 6.83	133.11 51.59	<0.001* <0.001*
Level-1/learner-level (Learner predictors)				
L1V1: "Home educational resources" (Martin et al., 2020, p. 16.168) 0 = "Few or some" 1 = "Many"	18.29 23.52	3.52 5.36	5.19 4.39	<0.001* <0.001*
L1V2: "Are you a girl or boy" (TIMSS, 2018b, p. 3) 0 = "Boy" 1 = "Girl"	0.12 3.64	1.02 1.62	0.12 2.25	0.904 0.027*
L1V3: "Sense of school belonging" (Martin et al., 2020, p. 16.198) 0 = "Little or some" 1 = "High"	8.06 8.94	1.29 1.67	6.27 5.36	<0.001* <0.001*
Level-2/school-level (School predictors)				
L2V1: "Instructional materials (e.g., textbooks)" (TIMSS, 2018a, p. 2) 0 = "Some or a lot" 1 = "Not at all or a little"	20.42 26.89	5.26 13.38	3.88 2.01	<0.001* 0.045*
L2V6: "Technologically competent staff" (TIMSS, 2018a, p. 2) 0 = "Some or a lot" 1 = "Not at all or a little"	22.14 30.17	4.98 12.68	4.44 2.38	<0.001* 0.018*

Note. *Statistically significant $p < 0.05$, s.e. = "standard error", t = "Approximate t-ratio"

For both models, gender and socio-economic status were included only as control variables and not discussed in detail here. At learner-level, learners who reported a high sense of school belonging performed significantly higher (on average by 8.06 and 8.94 points for mathematics and science, respectively) than those that reported little of some sense of school belonging. This finding is not surprising, as Winnaar's (2021) South African study also used the TIMSS sense of school belonging scale and had a similar finding. At school-level, there were two significant predictors. Learners from schools where the principals indicated that the school's capacity to provide instruction is "not at all or a little" affected by a shortage or inadequacy of instructional materials performed significantly better (on average by 20.42 and 26.89 points for mathematics and science, respectively) than learners in schools where principals reported that it is affected "some or a lot". This is not a surprising finding, as Winnaar and Namome's (2021) South African study also showed that access to and use of school resources has a significant association with learner achievement. Learners from schools where the principals indicated that the school's capacity to provide instruction is "not at all or a little" affected by a shortage or inadequacy of technologically competent staff performed significantly better (on average by 22.14 and 30.17 points for mathematics and science, respectively) than learners in schools where principals reported that it is affected "some or a lot".

4. Conclusion

The multi-level analysis using HLM software showed that learners with a high sense of belonging, schools with sufficient instructional materials, and technologically competent staff are significant predictors of both M&S achievement. We recommend that South African schools with insufficient instructional materials be prioritised for receiving the necessary material and that all South African teachers be trained in the use of technologies, as these are significant predictors of learner achievement. This will, in turn, enhance learners' sense of belonging, which is also a significant predictor. Another recommendation is that stakeholders invest in school climate surveys and other interventions supporting a healthy school environment, as many researchers, including this study, have shown that a healthy school climate is a significant predictor of learner achievement. Additional research is encouraged to establish the nature of the impact that a healthy school climate has on learner achievement through longitudinal studies where causation can be proven.

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CONECTA: A VIRTUAL SHOWCASE FOR SOLVING PROBLEMS REQUIRING KNOWLEDGE AND TECHNOLOGY

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Abstract

The project aims to contribute to the strengthening of university-society relations, agreeing that higher education is an important means of promoting citizenship, combating social inequality, increasing the competitive capacity of States, increasing local economies, either through the placement of skilled workforce on the market, or through a likely emergence of innovative markets and the generation of a range of sociocultural factors which are essential to promote life in society.

The model of higher education, open and articulated with external actors, occupies a prominent place in many countries. The so-called “triple helix”: universities – governments – society, constitutes an undeniably successful model. This model has helped to leverage national economies, which simultaneously has generated virtuous processes of economic development and appreciation of higher education institutions in these countries.

The necessary process to transform scientific creation and technological innovation into something able to improve the life quality of populations and cities requires countless interactions among the world of science and technology, governments and the market. In this context, scientific and technological activity is perceived as a complex process in which the strategic integration between actors in the three domains and the establishment of networks become the key elements.

This is about understanding university governance from a more contemporary perspective, considering the present day complexity and the availability of existing technological tools, enabling the establishment of a dialogue and knowledge sharing in a plural and democratic way.

In times of so many challenges, it is up to the university to exercise creativity and critical thinking to find sustainable and ethically valid paths that guarantee the consonance of the public university with the country’s development, reaffirming the institution's role in society, as its participation in confronting inequality and the different forms of discrimination based on gender, race, religion, as well as, and especially, THE ROLE OF THE UNIVERSITY AS A VECTOR OF ECONOMIC AND SOCIAL DEVELOPMENT, highlighting its potential for collaborating in the production of innovative solutions to overcome problems requiring technology and knowledge.

It is understood that a connection between theory and practice and, even more, a connection between different areas of knowledge will lead to the interdisciplinary approach demanded by social issues, making CONECTA a showcase of easily accessible solutions and innovations.

Thus, the project proposes the creation of an application which can 1) SHARE KNOWLEDGE: Produce a database composed of projects already carried out by the university, in a user-friendly language accessible to the non-academic public and focused on experiences, innovative methodologies and solutions; 2) IMPROVE AND EXPAND INTEGRATION UERJ – SOCIETY: Strengthen UERJ’s integration with society through scientific dissemination and technology transfer; and 3) GENERATE POSITIVE IMPACT: Create, implement and consolidate an application to promote projects developed by UERJ, and which are able to provide benefits to society (Public Management, Industrial Sector, Civil Society, etc.).

Keywords: *Higher education, education management, university and society.*

1. Justification and institutional environment: Introducing Rio de Janeiro State University

Rio de Janeiro State University was founded in 1950 and currently has 30,488 undergraduate students enrolled in its 56 courses. It offers 63 master's courses, 46 doctoral courses and 142 specialization courses. There are 2,614 professors and 4,594 technical employees, totaling a community of more than

37,000 people. The University's structure is divided into eight regional *campi*, with the Maracanã Campus as its headquarters. With 515 laboratories, a University Hospital with 348 beds and treating about 14,000 patients with high-complexity health, as well as an Application School with a body of 1,500 elementary and high school students, UERJ is the second largest university in Rio de Janeiro and the 620th in the world, according to the Center for World University Rankings (CWUR), 2021-2022 edition.

Since it belongs to the State of Rio de Janeiro, UERJ has a particular mission focused on issues related to local development, without losing its international articulation. Thus, currently the Directorate of International Cooperation at UERJ has 187 active cooperation agreements with around 40 countries.¹. UERJ also has a technology park including 4 incubators of technology companies and recognized experience in partnership projects with public and private sectors. In this sense, it is worth highlighting UERJ's successful projects on environmental preservation, human and social rights, infrastructure, human health, among other areas.

The present project has been developed by the Center for Strategic Studies and Development in partnership with the Pro-Rectorate of Extension and Culture, where the management of the services provided by the university is done, identifying strategic areas of research, and training of human resources and academia-society partnerships.

To illustrate UERJ's technical capacity in this sector and how this process happens in practice, here is a case of what is considered to be the focus of dissemination and integration, an example of content to be available on the Platform:

Paraty-Cunha Park Road

The construction of the highway which crosses an area of environmental protection (National Park), for this reason called Park Road, connecting the municipalities of Paraty (RJ) and Cunha (SP), represented a successful experience carried out by professors from UERJ who were assigned the task of adapting engineering actions to the necessary environmental care for the area preservation. The university team's performance was widely recognized and received an award for the best environmental project of 2014, granted by the Regional Council of Engineering and Agronomy of Rio de Janeiro. Up to the present, it has been the object of studies by those interested in the area. The project involved 55 professors and researchers from different areas: engineering; biology; architecture; archeology; veterinary; communication and; education. The work, which lasted 30 months, was developed from the adaptation stage – adjusting the engineering project to environmental interests – and proceeded with the monitoring of the work execution. Among its main purposes, the university has sought to develop technical solutions for constructive practices that can mitigate impacts on the environment; monitor the dynamics of fauna populations and protected vegetation; promote intense interaction with the community of the two municipalities through a communication system (by using different media); hold public hearings; provide environmental education in schools; archaeological studies and studies of urban impacts in the participating municipalities.

To continue the challenges of integrating such different areas, the work developed innovative management practices which promoted the multidisciplinary approach required by the environmental area. In addition to being successful from a practical and objective point of view, it has generated numerous academic research works.

(<https://youtu.be/P8POksGKn2A>)

¹**Current agreements with French Universities:** École Supérieure D'Art des Pyrénées - PAU Tarbes | www.esapyrenees.fr, Institut de Commerce International de Dunkerque | www.iscid-co.fr, Institut D'Etudes Politiques de Lyon (Sciences Po Lyon) | www.sciencespo-lyon.fr, Institut D'Etudes Politiques de Paris (Science Po) . **Coverage:** IESP | www.sciencespo.fr, Institut D'Etudes Politiques _ Sciences Po Rennes | www.sciencespo-rennes.fr, Institut de Recherche Pour le Développement - IRD | www.ird.fr, L'Institut D'Etudes Politiques de Bordeaux | www.sciencespobordeaux.fr, Université Blaise Pascal | www.univ-bpclermont.fr, Université d'Angers | www.univ-angers.fr, Université de Limoges | www.unilim.fr, Université de Pau et des Pays de L'Adour | www.univpau.fr, Université de Poitiers | www.univ-poitiers.fr, Université de Rennes 1 | www.univ-rennes1.fr, Université de Rouen - Normandie | www.univ-rouen.fr, Université de Strasbourg | www.unistra.fr, Université Jean Moulin - Lyon 3 | www.univ-lyon3.fr, Université Du Littoral - Côte D'Opale | www.univ-littoral.fr, Université Nice Sophia Antipolis | www.unice.fr, Paris 1 - Université Panthéon-Sorbonne | www.univ-paris1.fr, Paris 2 - Université Panthéon-Assas | www.u-paris2.fr, Paris 3 - Université Sorbonne Nouvelle - **Coverage:** Arts and Humanities | www.univ-paris3.fr, Université Rennes 2_Haute Bretagne | www.univ-rennes2.fr, Univeristé Toulouse 1 - Capitole | www.ut-capitole.fr, Université Toulouse Jean Jaurès | www.univ-tlse2.fr.

2. Design

From the point of view of technological feasibility, the Platform became tangible, especially with the advent of universal access to mobile telephony, through 3G, 4G networks and, in a near future, 5G, the use of applications through cell phones, tablets, laptops, with emphasis on smartphones as pioneers and most used in this process. This fact definitely consolidates the need to transmit and receive information through the so-called applications - Apps, making such tools the last frontier in obtaining and exchanging information.

Data collected for the Continuous National Survey of Household Sample (PNAD) - 2018/2019, carried out by the Brazilian Institute of Statistics - IBGE, indicate that 95.7% of internet users prefer the fastest and easiest forms of communication, using their mobile devices to send and receive messages, either through voice or image, in addition to exchanging information via installed programs. Besides, 88.4% of the users watch videos, including shows, series and movies, on their mobile devices.

Globally, countries such as China, India, the United States, Brazil and Indonesia stand out as the largest monthly users of applications, reaching the astounding mark of 155 billion downloads in 2021, according to the State of Mobile report 2022 – Appannie.²

Therefore, it can be stated that the project's uniqueness is being an integration platform, a mechanism for communication, dissemination, mediation, dialogue, sharing and integration among the academic community, entrepreneurs, citizens and governments, seeking innovative, sustainable projects aimed at the development and the common good. It is about articulating common interests, technical capacity, external financing partners and investing in the formation of a new interdisciplinary, intersectoral and citizen community, integrating concrete actions made possible from its own installed capacity.

3. Conclusion

In terms of scientific dissemination, implementing the platform will result in the availability of a tool aimed at promoting the capacity installed at the university for different segments of users served in their specificity through a “menu” of targeted content.

PROFILE	USER
GOVERNMENT REPRESENTATIVES (MUNICIPALITIES, STATES AND FEDERAL GOVERNMENT)	FOCUS ON PROBLEMS X SOLUTIONS
ENTREPRENEURS	FOCUS ON INNOVATION, EXECUTIVE CAPACITY AND RESULTS
RESEARCHERS, STUDENTS AND THE GENERAL ACADEMIC COMMUNITY	FOCUS ON METHODOLOGIES, ACADEMIC OUTCOMES AND PUBLICATIONS
ALL PROFILES	SHORT VIDEOS AND IMAGES, INTUITIVE CONTENT, INTERACTION AREA (E.G.: LEAVE YOUR CONTACT, SEND A MESSAGE, TALK TO THE TEAM).

Finally, it is important to stress that the platform is not a final product, but yet one more piece of a bigger gear which involves the current strategy adopted by Rio de Janeiro State University in the sense of carrying out new academic projects, valuing partnerships, cities, public authorities, companies and social interests, thus bringing benefits to society (Public Management, Industrial Sector and Civil Society).

²Find more at www.appannie.com/en

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THE POSTPANDEMIC REVITALIZATION OF A MINORITY SERVING INSTITUTION THROUGH STRUCTURAL AND OPERATIONAL ORGANIZATIONAL CHANGES

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Abstract

St. Augustine College, a small, bilingual higher education institution, survived the pandemic by implementing structural and operational changes. The primary objective was two-fold: to create organizational changes that addressed the consequences of an unprecedented pandemic and to create the tools and mechanisms needed to sustain those organizational changes. Despite the circumstance, the institution's commitment to its nontraditional student population, primarily female (78%) and Hispanic students (85%), motivated the necessary changes.

The theoretical framework that supports this research study is the work of Kurt Lewin (1942)'s 3-Stage Model of Change. A mixed methods study determined the framework for data collection and analysis. The newly created Office of Academic Effectiveness (OAE) was the unit of analysis. The OAE is responsible for the quality assurance of the institution. Through qualitative data including interviews and observations, the Latino Educational Model, the new foundational teaching and learning philosophy of the institution, was developed. The quantitative data that served as the model's creation was generated from four satisfaction surveys as well as students' evaluations of course and instructors.

This study provides a close examination of the office's accomplishments and failures, institutional obstructions and passageways, and the balancing of existing traditions with new best practices. As a result of an arduous reframing process intended to revitalize the traditional culture, the college community united to create new units, revamp enrollment and admission procedures, update technology for different instructional delivery modalities, hire system disruptors, design and implement new policies, enforce assessment measures, craft onboarding regulations, establish faculty evaluation guidelines, build new academic programs, restructure and reevaluate the curricula, set up academic internships, conceive new certificates, and rebrand the institution, among other initiatives. The institutionalization of these changes seems to be the catalyst that will lead the institution to reclaim its position in the higher learning community.

Keywords: *Organizational change, quality assurance, restraining forces, driving forces, reframing.*

1. Introduction

The unprecedented pandemic forced institutions of higher education to address long-standing institutional challenges that had not been prioritized before the arrival of COVID. Upper management of the institution had historically responded to challenges with a lack of urgency, at times stalling organizational changes that would have been institutional-saving practices, though likely unpopular amongst some stakeholders. However, the major changes precipitated by COVID allowed the institution to revisit those initiatives that had become stagnant. The small bilingual college located in Chicago took full advantage of the opportunity to embrace change and began implementing measures that supported the revival and survival of the institution.

1.1. Background information

Institutional lockdown in March 2020 served as a catalyst for reinvigorated discussions surrounding existing organizational structures, processes, and policies and their efficacy in light of the new remote environment. Elimination of offices, consolidation of units, layoffs of non-essential staff and faculty, creation of new departments, and renewal of existing processes were among the necessary changes driven by the pandemic. As a result of a painful reframing process intended to revitalize institutional culture, the college community united to create new units, revamp enrollment and admission procedures, update technology for different instructional delivery modalities, challenge the status quo, design and implement new policies, enforce assessment measures, craft onboarding regulations, establish faculty evaluation guidelines, build new academic programs, restructure and reevaluate the curricula, create academic internships, conceive new certificates, and rebrand the institution, among other initiatives.

One of the major changes undertaken by the institution was the elimination of the position of Vice-President of Academic Affairs. The Office of Academic Affairs and three distinct Schools were created. Academic programs with their respective associate bachelor and associate degrees were distributed within the three Schools: School of Education, the School of Healthcare and Social Sciences, and the School of STEAM. The rush to adopt new technologies, safeguard students, and support faculty through the unanticipated shift to remote instruction highlighted the institution's areas of opportunity. Forced to confront the challenges that had been magnified by the onset of the pandemic, academic quality assurance became a strategic priority. In response, the college founded the Office of Academic Effectiveness in an effort to bolster quality control within the institution. This innovative institutional move served as an attempt to reclaim academic accountability and ensure streamlined operations within academic units.

1.2. Theoretical framework

1.2.1 Reframing the college. Bolman and Deal (1999) created the four frames or lenses for explaining organizational structure. The frames invoke and influence changes in an organization. They define four frames of leadership as structural, human resources, political, and symbolic. Through analogies, Bolman and Deal stated that the structural frame operates as a factory, goal-oriented with clear directions, roles and structure, departmentalized, and with measurable outcomes. The human resource frame represents a family that focuses "on the needs of people as well as their roles, skills, interests, values, and interactions" (Black, 1999, p.16). The image of a jungle was used by Bolman and Deal (1999) to provide the analogy of the political frame. Individuals in this frame make coalitions, alliances, and negotiations to get what they would like from the organization. Finally, the carnival, represented by the symbolic frame, plays a major role in the organization as it describes the organizational culture and climate and the diversity of the entity.

Bolman and Deal (2017) outline that no frame works well in every circumstance. Consequently, a leader that bounds to one frame eventually behaves inappropriately and ineffectively. According to Bolman and Deal (2017), the reframing process increases the probability of seeing and solving "real" problems, while encouraging people to expand the scope and flexibility of their own thinking. Reframing is presented as the alternative use of the frames as organization change internally. The art of reframing empowers one to act and to learn simultaneously. To reframe, a leader takes time to find out what is happening, and, based on the data, acts. The college community has witnessed a process of reframing that continues into present day. There clearly was an unintentional invitation to reframe the institution by looking at systems and procedures from different viewpoints.

1.2.2. The force field analysis. In organizational behavior, Kurt Lewin is analogous to organizational change. In 1940, he identified two forces that all organizations experience as they undertake changes: driving momentum to a desired future state and one pushing in opposition to that goal, the restraining forces. Unfortunately, change and reform often focus on solutions without understanding the forces at play. Kurt Lewin created the Force Field Analysis model for change. It explains the relationship between driving forces for positive change and the restraining forces against change. As organizations embark on a change process, these forces must be recognized and identified in the planning, controlling, directing, and supervising the expected and desired change in the organization. The Change Theory proposed by Lewin emerged unintentionally as we examined the institution's internal processes. Resisting forces became apparent as changes were introduced and implemented. Driving and restraining forces, the freezing and unfreezing events, appeared as a natural change progression. Inevitably, restraining and driving forces were identified during this change process that either impeded necessary changes or urged changes that were necessary to institutional survival. The examination of these theories of change and reframing organizations prompted this research study.

2. Design

The research design called for a combination of qualitative and quantitative research practices. The mixed research design allowed the researchers to examine (quantitative) and explore (qualitative) data that would eventually inform institutional changes. The president's decision to create the Office of Academic Effectiveness (OAE) with the purpose of planning, organizing, developing, and directing academic quality assurance in teaching, curriculums, assessment, and reporting was one such change. The OAE also serves as experts for innovative education initiatives, design, and learning formats that address the specific learning needs of the college's unique student population. In fact, most of the organizational changes that have been implemented at the institution recently have originated within this unit and, undoubtedly, have prompted strong opposition from resisting forces.

The OAE designed this study to reevaluate its functions, structure, and opportunities for improvement. The quantitative aspect of the design calls for data collected through various forms of surveys. The qualitative aspect of the mixed research design focused on random interviews and focus

groups consisting of faculty, students, administrators, and staff members. Open-ended survey responses were also used to construct the case for institutional revitalization. The study also analyzed three academic programs through a curriculum evaluation process.

3. Objectives

There are two objectives in the study:

3.1. to examine satisfaction with new organizational changes implemented to mitigate the negative effects of an unprecedented pandemic.

3.2. to create tools and mechanisms to sustain those organizational changes in the post-pandemic environment.

4. Methods

The mixed method research design involved individuals in many different roles within the institution. Faculty, administrators, students, and staff provided data through a combination of purposeful and convenience sampling. By definition, purposeful sampling is a non-random sampling technique that utilizes a specific criteria or purpose to select particular sample. Meanwhile, a convenience sampling is the first available primary data source to be used for the research without additional requirements (Creswell & Guetterman, 2018).

4.1. The Site Description

St. Augustine College (SAC) is a federally designated private, nonprofit four-year Hispanic Serving Institution (HSI) founded in 1980 in Chicago to provide low-income, bilingual Hispanic adults access to higher education. SAC was the first institution of higher education in the Midwest to deliver bilingual academic and workforce programs designed to serve low-income, underrepresented students, the majority of whom are Pell-eligible and underrepresented in institutions of higher education in Illinois. St. Augustine College has graduated over 8,000 low-income bilingual, bicultural students since 1980 and has a Carnegie classification as a Baccalaureate/Associate Mixed, private not-for-profit, 4-year institution which is accredited by the Higher Learning Commission. SAC's programs are intentionally designed to make higher education accessible to a diverse student population, with special emphasis on low-income students and students of Hispanic descent.

4.2. The sample description

4.2.1. Students. A high percentage of students, 81%, are low-income Hispanic/Latinos. One hundred percent of students are Illinois residents. SAC's most distinctive feature has always been its intense focus on delivering bilingual college-level instruction and workforce education in culturally appropriate settings. The majority of SAC students are Hispanic, first-generation, low-income women. Spanish language-dominant students have the option to begin their coursework at the college in their native language, and, by the time they graduate, students are fluent in English and Spanish. For over a decade, low-income Latinos have accounted for 84% to 87% of SAC's student body who are Spanish-language dominant working women, 65% were first-generation, and 76% had \$0 Pell household contribution status.

4.2.2. Resident and adjunct faculty. There are 12 resident (full-time) faculty and 78 adjunct faculty members representing the three schools and their respective academic programs. Full-time ethnically diverse faculty are comprised of 65% females and 35% males whose ages range from 45 to 67 years old, with master and doctoral degrees.

4.3. Data collection procedures

Quantitative data was collected at the end of 2020 (Fall) and the beginning of 2021 (Spring). By utilizing EvaluationKit software, four surveys were built and sent to faculty, staff, and students. They were given two weeks to complete their corresponding instrument. All surveys asked for participants to rate their levels of satisfaction with various aspects of organizational culture and climate.

4.3.1. The measurement instruments. The four instruments went through two validity processes. Understanding that validity is the extent to which a test measures what it claims to measure, after forming a team of experts, the surveys were examined and the content validity was determined (Creswell & Guetterman, 2018). The items on all tests represented the entire range of possible items the test should cover. Most items (85%) were drawn from previous satisfaction surveys, though some items were reworded, changed, eliminated, and/or created given. Beginning in 2020, the institution underwent many technological, personnel, procedural, and cultural changes. The institution purchased the EvaluationKit software platform that facilitates the creation of digital surveys and provides automatic calculation of

descriptive statistics with easy report generation. To ensure content validity, experts recommended the elimination of items that were obsolete and inadequate for the new emerging institution after COVID. The majority of the items were reworded and personalized to better capture the personal perceptions and views of each respondent. The newly created items were primarily related to the use of technology in the classroom, the remote delivery system, online assessments, the virtual classroom, and onboarding process. Each of the surveys ended up with a fewer number of items than the original surveys.

4.3.2. Survey description. The Resident Faculty Satisfaction Survey has 27 items with and utilizes different measurement scales. Those intended to measure satisfaction used Likert scales and the other items were measured by checklist, yes/no, and multiple-choice questions. The Adjunct Faculty Satisfaction Survey has 28 items with 10 sections. Similar to the resident survey, the adjunct survey uses different measurement scales. About 75% of questions in the survey are similar to the Resident Faculty Satisfaction Survey excluding those items that are specific to full-time faculty such as benefits, recognition of institutional service, and research activities. The Staff Climate Survey was designed to elicit feedback from all staff about not only their satisfaction with college practices but also with shared governance, diversity and inclusion, values and beliefs, salary, benefits, and other elements of work at the College. The 23-item Student Satisfaction Survey asked students to rate their satisfaction with different administrative and academic units on and off campus.

5. Discussion

The analysis and discussion of the results are aligned with the objectives of the study. Organizational changes implied reframing situations to provide different solutions to persistent challenges affecting the institution.

Objective 1: *to examine satisfaction with new organizational changes implemented to mitigate the negative effects of an unprecedented pandemic.*

Surveying faculty, staff, and students and learning their satisfaction level with many aspects of their daily roles and functions determined that the overall level of satisfaction has a mean of $X=2.92$ and $SD=0.62$. Using descriptive data alone, strong statistical arguments cannot be drawn from the data. It can be said that, generally speaking, resident faculty are somewhat satisfied with the institutional changes that occurred due to the pandemic. Among all 29 items, salary seems to be the area in which faculty are most dissatisfied, followed by research opportunities, tutoring services, benefits, and committee load. The most satisfying factors were CANVAS (learning management system) and the SAC laptop loan program. The mean of both were over 3.5 and the standard deviations showed homogeneity of responses given by respondents. With an overall mean $X=3.34$ and a $SD=0.78$, adjunct faculty expressed higher level of satisfaction than resident faculty on similar institutional issues. Again, compensation per course ($X=2.39$, $SD=.8$) was the area in which most adjunct faculty were most dissatisfied. Opportunities for professional development, teaching load, library services, and digital books also scored below 3.5, but not less than 3.0. It seems that adjunct faculty are relatively satisfied with the services and opportunities that the college offers. The overall satisfaction of the college staff (including administrative personnel, lower level administrators, and technicians) was rated with a mean of 3.15 and $SD=0.73$. For example, retirement benefits represent the lowest level of satisfaction among all questions posed on the survey. On the other hand, relationship with supervisor(s) has the highest level of satisfaction with a $X=3.59$ and $SD=0.57$. The SD evidenced the homogeneous responses given by the respondents.

Student satisfaction is of primary importance for any higher education institution. Despite concerns with the subjectivity of student evaluations, they have been used as an evaluation of students' overall experience with academics, services, facilities, and administration at the institution. Student Satisfaction with the college, has a mean equal to 3.69 and a standard deviation equal to 0.69. The responses were homogeneous. It seems that students are satisfied with the college in general. Upon closer inspection, the item "instructors encourage students to succeed" has a mean equal to 3.54 being the highest, whereas item "my learning facilitator gave ideas on how to succeed academically" has the lowest mean (3.31). The Learning Facilitator is a new position that evolved from the traditional advising model used in the past.

Additional qualitative data was collected from the curriculum evaluations conducted in three academic programs. The curriculum evaluations identified areas of expansion, need for curriculum modernization and re-sequencing, and necessary changes in leadership organization. Although recommendations from each curriculum evaluation have been met with some resistance and implementation has been slow, faculty teaching in those programs have acknowledged the importance of making changes in order to improve enrollment and academic quality.

Objective 2: *to create tools and mechanisms to sustain those organizational changes into the post-pandemic environment.*

Organizational changes were planned, designed, and progressively institutionalized regardless of the restraining forces impeding the implementation. Many changes were able to be achieved due to the driving forces that made them happen. Many of those changes were institutionalized between 2020 and 2021. Drastic measures of personnel and staff reductions, faculty contract reconsideration, elimination of number of course offered, cancellations of courses, eligibility criteria for student awards, among other reforms continue to be enforced at the college level.

6. Conclusions

The process of reframing the college has taken time. In the analysis of the organizational frames, the two most relevant frames identified were political and symbolic. Bolman and Deal's (2017) political frame sees organizations as jungles in which leaders must govern politics and organize power. Constant conflict among members has emerged as an inherent component of the organization as time and resources are limited. The political frame is made up of individuals with several different and opposing beliefs, interests, and perceptions of the group and its current circumstances. The political frame is observable in several areas at the college. For example, lack of resources is a constant threat to employment stability. Faculty contracts, regardless of academic rank, are signed yearly, making academic life very unstable. Questionable ethical decisions regarding faculty teaching load and preferential awarding of courses is noted within the institution. Conflicts are present between offices due to overlapping responsibilities and/or functions, and the absence of an institutional organizational chart reinforces the deficit of clear reporting lines and the functions and roles of each unit of operation.

On the other hand, the symbolic frame is a foundational resource for all organizations that focuses on vision and inspiration. The organizational culture created by values, beliefs, traditions, norms, and customs of a shared background support the organizational vision. Organizational culture and climate are shaped by leaders who use myths and metaphors, stories and tales, and rituals and ceremonies to symbolically inspire followers in organizations to get things done. In this regard, the institution is clearly governed by culture and traditions.

The reframing process being introduced through structural and human resources frames is systematically triggering the need for balance between the four frames, the ideal situation as stated by Bolman and Deal (1991). Clear policies (i.e., Faculty Handbook), goal-orientation (i.e., mission statement revision), infusion of technology (i.e., zoom platform, CANVAS learning management system), and other structural elements have assisted in the structural reframing. The institution has also witnessed reframing through the use of the human resources frame in many daily institutional activities. The full adoption and implementation of the four frames would allow what is known as balanced leadership. The college is heading in that direction. We are aware of the complex challenges at hand. The organizational changes required to build an institutional culture of continuous assessment and academic quality is not possible within a one-year period, as this case study illustrates. While progress has been made, the OAE has faced multiple setbacks that have hindered progress. After the introduction of new policies and processes, it became apparent that the institution lacks articulated approval processes, leading to long delays in the review, collaborative feedback process, and ultimate approval of new initiatives. Additionally, without institutional precedence of regular assessment and critical evaluation of academic programs and policies, buy-in to quality assurance processes has been sluggish, with few resources allocated to assist in OAE endeavors. Lastly, unforeseen obstacles such as a lack of urgency perception have prevented many initiatives from being implemented by the time of publication. A culture of administrative paralysis for new policies and processes permeates decision-making at the institution. Time and buy-in from all stakeholders will be critical to the success of proposed initiatives in the coming months and years.

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FINNISH EARLY CHILDHOOD EDUCATION AND CARE LEADERS' PERCEPTIONS OF THEIR ROLE IN SUPPORTING STAFF'S WELL-BEING

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Abstract

It is widely recognized that in early childhood education and care (ECEC) environments, work-related well-being is one of the key elements of job satisfaction and coping at work. The well-being of ECEC professionals strengthens the quality of early childhood education and care and supports children's well-being, development, and learning. ECEC leaders have an important role in boosting their staff's well-being, especially when working in groups with children with special educational needs. The purpose of this study was to investigate Finnish ECEC leaders' perceptions of their role in supporting their staff's well-being. The study involved five ECEC leaders, and data was collected using semi-structured interviews. The findings showed that ECEC leaders brought up different kinds of dimensions concerning their role in supporting staff's well-being: conversation partner, administrative actor, negotiator, pedagogical mentor, supporter of social cohesion, and supporter of expertise. By working according to these roles, ECEC leaders affected to their staff's work-related well-being by decreasing job demands and increasing job resources. This research provides valuable information concerning the ways to support the well-being of ECEC professionals and leaders' role in this crucial element of high-quality early childhood education and care.

Keywords: *Early childhood education and care, work-related well-being, leadership in early childhood education and care, job demands-resources model.*

1. Introduction

Early childhood professionals' work-related well-being has been a popular research topic in recent years. Despite its popularity, research concerning the role of early childhood education (ECEC) leaders in supporting their staff's well-being has been minor. ECEC leaders have an important role in enhancing their staff's work-related well-being. During the global COVID 19-pandemic, the well-being of ECEC professionals has decreased and supporting it has become more important than ever (Bigras et al., 2012; Crawford et al., 2021). It is recognized that general life well-being affects work-related well-being as well, but in this study the focus is on the work-related well-being of ECEC professionals.

Usually, work-related well-being is understood as a combination of employees' psychological and physiological states (Kuykendall & Tay, 2015) and his/her experiences of the organization's culture (Dagenais-Desmarais & Savoie, 2011). Work-related well-being is constructed of job satisfaction, stress, and work engagement (Cumming & Wong, 2019; Orsila, Luukkaala, Manka, & Nygard, 2011). It has also been suggested that experienced appreciation and meaningfulness of work are significant elements of work-related well-being (Nislin, Paananen, Repo, Sajaniemi, & Sims, 2015). Work-related well-being of early childhood professionals can be understood as "a dynamic state, involving the interaction of individual, relational, work-environmental, and sociocultural-political aspects and contexts" (Cumming & Wong, 2019, p. 276).

Well-being of ECEC professionals is a significant contributor of quality in an ECEC environment. Compromised well-being may have a negative effect on relationships between ECEC professionals and children (Jennings, 2015; Whitaker, Dearth-Wesley, & Gooze, 2015), teaching practices (Sandilos et al., 2015), and children's social-emotional skills (Jeon, Buettner, Snyder, & Nezu, 2014; Zinsser, Christensen, & Torres, 2016).

A high level of work-related well-being reduces absenteeism and employee turnover (Barford & Whelton, 2010; Logan, Cumming, & Wong, 2020). Turnover of ECEC professionals is a global problem (Grant, Jeon, & Buettner, 2019; Heilala et al., 2022), and it is essential to find solutions and ways to solve this regrettable phenomenon. In order to ensure a qualified and motivated workforce, it is important to pay attention to the well-being of ECEC professionals.

Work environment, professional background, and self-efficacy of ECEC professionals have associations to well-being (Jeon, Buettner, & Grant, 2018.) According to research, well-organized and structured work environments have a positive effect to ECEC professionals' well-being (Jeon et al., 2018). It is also known that children's varying support needs such as behavioral problems may increase job stress (Emery & Vandenberg, 2010; Friedman-Krauss, Raver, Neuspiel, & Kinsel, 2014). Supporting ECEC professionals' well-being is crucial as it is known that long-lasting high stress and low well-being may lead to psychosomatic responses (Ritvanen, Louhevaara, Helin, Väisänen, & Hänninen, 2006), depression (Shen et al., 2014), and other common mental health problems (Harvey et al., 2017).

2. Job demands-resources model

One way to understand work-related well-being is the job demands-resources (JD-R) model (Bakker & Demerouti, 2014). In the JD-R model, work-related well-being is seen to be constructed from the demands of the workplace and resources that help the worker to manage their work and develop and learn (Bakker & Demerouti, 2014). Demands can include aspects related to physical, psychological, social, or organizational factors (Bakker & Demerouti, 2007). The demands are not necessarily negative, but prior research has shown that too strict demands can lead to, for instance, job stress, exhaustion, and burnout (Dicke, Stebner, Linninger, Kunter, & Leutner, 2017). Resources are understood as physical, psychological, social, and organizational factors that will help workers to cope with demands and achieve goals and personal development and learning (Bakker & Demerouti, 2007). In educational professions, demands can refer to, for instance, work overload, problems related to children's behavior or motivation, or lack of administrative support, whereas resources can include factors such as collegial support, supervision from the leader, common practices and values, and the feeling of doing a meaningful job (Skaalvik & Skaalvik, 2018).

Job demands and job resources have been found to interact with each other. This means that job resources can help to cope with job demands (Skaalvik & Skaalvik, 2018) and thereby decrease the risk for burnout (Bakker, Demerouti, & Euwema, 2005). On the other hand, high job demands and low job resources have a negative effect on well-being and may lead to burnout (Bakker & de Vries, 2021). The mechanisms between the relations can vary based on organizations, job characteristics, work situations, and the characteristics of an individual (Bakker et al., 2005).

3. Methods

The aim of this study was to figure out how Finnish ECEC leaders describe their role in supporting their staff's well-being. The study involved five ECEC leaders, and the data was collected by semi-structured interviews. The leaders worked in middle-sized or large towns in Eastern and Southern Finland, and each of them had two or three ECEC centers to run. This case study is part of a larger data collection project for a doctoral thesis that concentrates on children with special educational needs, and this aspect was on display during these interviews. These particular leaders were selected because the ECEC centers they run participated in the data collection for the doctoral thesis. Each participant was asked for personal consent to participate in this study, and research was approved by the policymakers of the municipalities. Ethical principles were followed in every phase of this study, and the anonymity of the participants was carefully protected.

The duration of the interviews varied between 42–83 minutes, and the total amount of data was 310 minutes. Recordings were transcribed and anonymized carefully. At first all the transcriptions were read multiple times. After forming an overall picture of the data and the content, it was noticed that themes related to staff's work-related well-being emerged in the discourse and reflection of the leaders participating in this study. After this, the data was analyzed with the Atlas.ti-software. In the first phase, all utterances that contained information concerning the aim of this study were coded and named by the content. In the second phase, similar codes were grouped together. In the end there were a total of six code groups.

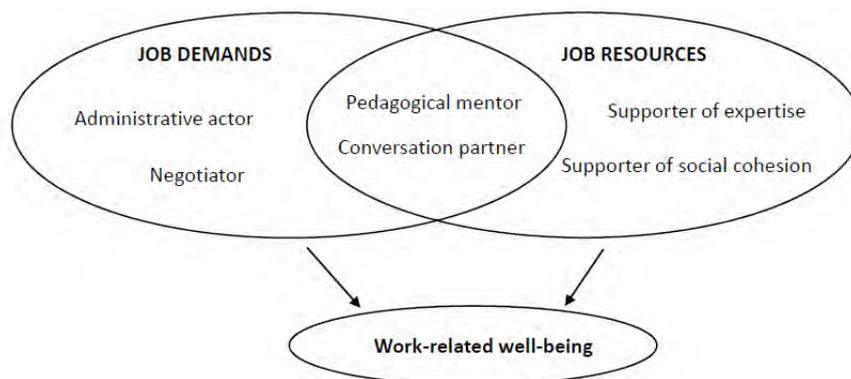
4. Results

The findings of this study show that ECEC leaders' role in supporting their staff's work-related well-being can be perceived through six different roles brought up in the interviews: *conversation partner*, *administrative actor*, *negotiator*, *pedagogical mentor*, *supporter of social cohesion*, and *supporter of expertise*.

Being a *conversation partner* included dyadic conversations and solving problematic situations together. Leaders saw their role as a listener and compassionate helper in difficult and burdening situations. The role of an *administrative actor* included recruitment and working as a messenger to policymakers and head of ECEC in municipalities. Finding enough qualified and motivated workforce and substitute workers was described as the responsibility of leaders. Being a messenger emerged if there was a need for more staff or more support services for children who needed special educational support. Leaders worked as a *negotiator* if there was some conflict between team members or between staff and children's parents. In these situations, leaders described their actions as an unbiased actor who helped to find a solution to suit both parties. *Pedagogical mentoring* included pedagogical conversations with one or multiple staff members. The subject of these conversations varied between things related to learning environment, organizing the structure of the day, and providing essential support to children in the group. *Supporter of social cohesion* included organizing mutual social evenings, creating a positive atmosphere, and general encouraging and cheering. *Supporter of expertise* was seen as valuing the staff's professional skills, supporting autonomy, and providing further education for all staff members.

These six roles can be considered more closely through the J-DR model as they can be seen to affect job demands and job resources differently (figure 1). By acting as an administrative actor or negotiator (e.g., by ensuring that there was enough workforce and negotiating in conflict situations), leaders intended to decrease job demands, but it was also not directly aimed at increasing job resources. Pedagogical mentoring and being a conversation partner both decreased job demands and increased job resources. Through these roles leaders aimed to help their staff solve taxing issues, such as children's behavioral problems and problems related to time and workload, and by doing so, they had the possibility of decreasing job demands. At the same time, they also increased job resources by providing collegial support and being a supervisor when needed. Leaders also intended to increase job resources by supporting the expertise and social cohesion of their staff. By supporting expertise, they showed appreciation toward their staff's professionalism and skills. To increase the feeling of doing a meaningful job and the overall positive atmosphere, leaders provided positive feedback and intended to support social cohesion in their work community.

Figure 1. Leaders' roles in the J-DR model.



5. Conclusions

To ensure quality ECEC, it is essential to support ECEC professionals' well-being as it is one of the key elements in creating an environment that supports children's learning, development, and well-being. According to the results, the role of ECEC leaders as a supporter of their staff's work-related well-being is multidimensional and variable. Through their variable roles, leaders have the possibility to decrease job demands and increase job resources. However, the model of work-related well-being and its associated factors is not a phenomenon that is so easily described. It must be kept in mind that with job resources workers also have personal resources, such as optimism and resilience, that can buffer

well-being in work (Bakker & de Vries, 2021). Relations between these different dimensions need further and broader investigation.

The size of the data is relatively small and that sets certain limits when interpreting the results. Despite the size of the data, this research provides important information when planning future research topics and when developing ways to enhance ECEC professionals' well-being and high-quality ECEC. Interviews were implemented during the COVID-19 pandemic, but it was not a prevalent theme in leaders' discourse. The reason for this might be that factors related to COVID-19 were not involved in the structure of the interview. Restrictions and the distribution of the virus varied regionally, which might have affected this as well.

Leaders' role in supporting staff's work-related well-being is crucial, and this topic needs further research in order to identify and specify factors related to the big picture. Additionally, it is important to find ways to support and enhance leaders' own well-being. The job characteristics of ECEC leaders are a factor that needs to be considered carefully. Each leader who participated in this study brought up the fact that administrative actions take much time and therefore there might not be enough time left in the day to undertake actions that could increase the job resources of the staff, such as pedagogical mentoring or regular conversations with staff members.

To ensure that ECEC will have a qualified workforce in the future, it is essential to make efforts to boost work-related well-being. By supporting ECEC professionals' work-related well-being right from the start of their career, it is possible to prevent employee turnover and burnouts. It is also important to assure that the overall discussion about ECEC professions and practices is positive and uplifting. Valuing and appreciating ECEC professionals and their work is one of the key elements in boosting their work-related well-being.

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PEDAGOGY AND GOVERNANCE: A PERFECT MATCH

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Abstract

It is a truth universally acknowledged that scholars argue that standards and performance measurements are instruments of control that have a profound influence on the day-to-day lives of individual academics, students, professional services staff, as well as organizations, causing the education environment damage. However, the authors argue in this paper that a strategy that triangulates the perspective of the teacher, the learner and the administration can and does result in an improved experience for the students. It also enables raised standards of good practice; opens up space for innovation in learning and teaching; drives progressive policies such as inclusion, access and equalities, and recognizes civic and international opportunities. The authors of this paper hold two different roles in the School of Humanities at the University of Glasgow, that of Deputy Head of the School of Humanities and Head of School Professional Services. The experience of jointly developing and delivering a School L&T strategy across six subject areas has had an effect on our student feedback and that of our staff. Developing a professional Services team that is engaged in the strategy is a key to successful delivery. However, it is not simply team building that delivers success, it is taking a student experience based approach. Ensuring our L&T strategy is built to enhance and deliver an excellence in the entire experience of a student while at university has brought about engagement from teaching staff, professional services team and students. Together, we explore the methods used to develop our strategy and the tools we use to monitor, reflect, adapt and enhance as necessary. We debate methods of measuring success, using not only the standard sector tools but also in terms of sustainability, health and wellbeing of the staff and students. We are committed to excellent learning, teaching and assessment; we seek to re-ignite passion for, curiosity about and commitment to advanced enquiry; rooted in the knowledge, expertise and experiences of all staff and students. Our partnership supports our core focus on developing students who are connected, civic-minded citizens and graduates who are well prepared for their chosen professions and future success.

Our team approach ensures an excellent student learning experience through a commitment to enhancement. We review, reflect on and develop our teaching practice, processes and facilities to engage our students in innovative, relevant and challenging curricula. Central to this is partnership working with our diverse learning community to understand their needs and to provide them with flexibility in what, how, when and where they learn. Combined with ethical and social awareness to engender positive behaviours free from discrimination, harassment and unfair treatment. Our approach develops, supports and encourages our staff, who in partnership with our students, create a learning experience, and a student support and engagement culture that reflects the ethos of the professional services and academic staff.

Keywords: *Strategy, governance, educational policy and leadership, environment, student experience.*

1. Introduction

The role of professional services is integral to our core sector missions of learning, teaching and research. Professional support services are crucial to the overall quality of the student learning experience and can impact significantly on student and staff well-being. Within this paper we will discuss the model we have developed at the University of Glasgow, and specifically in the School of Humanities. The two authors of this paper are based in an academic role and a professional services role. Prior to the two authors taking up these roles, there was a division in expectation about how the roles both complimented and enhanced the other. While we have not developed a research project as such, it is our experiences of working together and around existing structures that led to a greater understanding of the roles and how with a more integrated approach to policy and strategy, particularly in the area of learning and teaching, that we developed a sounder base for decision making and implementing strategy.

With an increasing emphasis on student satisfaction, student retention and success, and more recently student resilience, the contribution of professional staff to these issues has been overlooked. Our experience and activities were developed more thoroughly due to the pandemic, as the response to Covid-19, removed many artificial walls and brought together staff determined to ensure quality of education, assessment and awards for students with the pivot to online. We also are engaging with student retention and progression issues, again a project not possible without an integrated approach across role.

2. Context

The University of Glasgow (UofG) like other Scottish Universities is quality assured by the QAA Scotland (Quality Assurance Agency). This agency has a variety of streams for enhancing and measuring quality in Scottish HEIs, one path is the Enhancement-led Institutional Review (ELIR) an evidence-based method of peer review, meaning that staff and students from other institutions join a team of reviewers to assess what each higher education institution does. ELIR results in a judgement and a set of commendations and recommendations relating to the way the institution is securing academic standards and improving the student experience.

Based on work from the QAA, UofG enhances quality within the four Colleges and their Schools, through standard committees and projects. College and School strategies for Learning and Teaching derive from the overall UofG strategy, and we have taken deliberate steps taken to enhance the student experience.

The University of Glasgow has developed a new Learning and Teaching strategy that seeks to develop and support our students through an excellent University experience so that they fulfil their academic potential and contribute in the fullest way possible to culture, society, and the economy throughout their lives.

There are three main pillars to this strategy:

Evolving Approach to Student-Centred Active Learning

- Redesigning teaching to support interaction
- Maximising, and supporting engagement with, blended learning opportunities
- Developing team approaches to design and delivery of teaching
- Redesigning formative and summative assessment to connect to real world challenges
- Developing students' independent learning and groupworking skills
- Enabling relationship building to support wellbeing and retention

Transforming curricula and assessment

- Connecting with real-world challenges
- Programmes and assessment that foster creativity and problem solving
- Programmatic and inclusive curriculum design and assessment
- Work-related learning, employer engagement and student-led practice engagement
- Flexibility to support relevant course combinations and multidisciplinary
- Easier transition through routes to study

Students' Professional & Skills Development

- Short, stand-alone academic courses focusing on insights and skills and refreshed in light of employer feedback
- Professional and academic development focusing on integrity and behaviours
- Enhanced focus on graduate attributes

In order for the University to achieve these goals, this strategy will be enabled by:

- New approach to articulate and demonstrate skills development
- Investments in SMART campus, technology and analytics
- Improved learning environments and infrastructure
- Increased Staff Support and Development
- Consolidation of Online and Blended Learning Support & Expertise
- Enhanced Support for Enterprise and Student-Led Activities

It is the implementation of this strategy that gives the context to our model in the School of Humanities, engaging professional services staff with academic staff.

Professional services staff can imply a range of roles within a University, for our purposes we are focusing on those staff who deliver the administration for teaching and learning activities; student support

experiences and overall quality of delivery. The School of Humanities, is the largest in the College of Arts, is at the forefront of research, teaching, and civic engagement. The School has six Subject Areas, a dedicated Professional Services team, and over 140 academic and professional staff. We teach around 1500 undergraduate students, over 250 taught postgrads, over 100 postgrad researchers, and are in addition home to a number of postdoctoral researchers, visiting staff, and students from all over the world. As well as the subject base, the School of Humanities are committed to developing, maintaining and supporting a culture of diversity and inclusion for all staff and students within our School, including the promotion of our discipline to women and other minority groups.

We aim to create an environment where all staff and students - regardless of any protected characteristics as defined by the Equality Act 2010 - are welcome and included, and where discriminatory attitudes and behaviour are not tolerated.

The two authors of this paper are the Deputy Head of School & Learning & Teaching Convenor (2017-2021) and the Head of Professional Services. The model they have built was developed to ensure that all staff who have any engagement with teaching and learning, were explicitly identified in strategic and action plans.

3. Method and model

3.1. Pre-Pandemic

It would be remiss of any discussion concerning HE to avoid the impact the pandemic has made on work and working practices. Like all other universities, UofG pivoted to online from 23rd March 2020.

It is useful to discuss the approach of the authors and the model they sought to implement prior to the pandemic and lockdown.

The basis of our model of partnership was that we agree that the notion that successful student outcomes are not the result of a hierarchical activity involving academics merely being supported by professional staff. It also recognises that the activities and behaviours of professional staff often outwith the academic hierarchy lead directly, or indirectly, to building student focused activity for successful outcome. This is achieved by all higher education staff, working in a collegial and collaborative way, with the student as a co-contributor to that outcome.

School L&T strategy is developed across the existing silos of roles and each action that is crafted, is done so including routes through academic, professional services and collaborative practices to delivery. We meet with all staff and look at how we can implement UofG KPIs within the School setting and engage all staff in how they can contribute to the implementation.

Table 1 gives one example of action plan with collaboration with PS and academic staff. It may not seem revolutionary but was the first action plan that explicitly referred to PS staff. This was in response to meetings with PS staff who felt that as academic roles changed, much of the knowledge remained in the PS roles and was not used in a way that would enhance the strategy. The strategy action plan had over 40 items, with all of them referring to and engaging PS staff.

Table 1. Example of Action plan – academic staff in BOLD and PS Staff in Underline.

Timely and transparent feedback	Each subject will identify potential block upload assessments and implement.	This will be undertaken by <u>HoSA</u> , <u>TSSA</u> and <u>L&T/PGT</u> convenor to agree roles in the process – to be trailed and completed in terms of developing the expertise of the <u>admin team</u> by DATE
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3.2. Pandemic

Like all HEI across the globe, UofG had to pivot to online delivery from mid-March 2020. The sense of urgency and response ensured that the academic hierarchical system was disrupted completely. We developed an emergency group at School and College level to address the issues of online teaching and the huge challenges to assessment. To ensure fairness to students, UofG developed a No Detriment Policy that required complex tools and guidelines to be created within a very short framework. This would not have been possible without a team approach across all roles. Our model was adopted as Good Practice and enabled us to deliver the complexities of online teaching and assessment in a way that did not disadvantage students and in fact, had their well being and support at the core.

We are assessing the value of this approach and the tools, techniques and working practices which can inform our next steps.

Commitment to the strategy at the start of 2021, is built on the fact that the University has already made substantial changes in approach to learning and teaching in our response to the pandemic. From April 2020, University guidance on approaches to learning design for blended and online learning has been created with these strategy pillars in mind. As such, the response made by staff and students across the University community has accelerated engagement with this strategy even before it was fully articulated, and these efforts have served as a huge catalyst for change already. The considerable gains in creating online resources, and in developing engaging online teaching, place us in a strong position to realise much of what follows and to continue to benefit from the considerable investments that staff have made in changing teaching practice to respond to the impact of the pandemic

4. Implementing strategy as a team

We seek to create an inclusive environment where students develop meaningful relationships with one another and with staff, and through those encounters, create new knowledge, challenge received wisdom, build inter-cultural and leadership capabilities, and develop disciplinary excellence and an appetite for lifelong learning and enquiry. Rapid and seismic impacts on societies and economies around the world from the Coronavirus pandemic, combined with the fast pace of change resulting from the impact of technology, require flexible and adaptable graduates who can integrate knowledge across disciplines to bring creative solutions to complex world problems.

Using this model of implementation of the UofG Strategy, we are in the process of engaging all staff in the School and College around these key stages.

1. Set Clear Goals and Define Key Variables
2. Determine Roles, Responsibilities, and Relationships
3. Delegate the Work
4. Execute the Plan, Monitor Progress and Performance, and Provide Continued Support
5. Take Corrective Action (Adjust or Revise, as Necessary)
6. Get Closure on the Project, and Agreement on the Output
7. Conduct a Retrospective or Review of How the Process Went

With our model of shared PS and academic governance over the strategy we are intending to focus on these areas.

- Redesigning teaching so that students can engage more deeply in their learning of the discipline during contact time, through interacting with their peers and with staff and focusing on developing understanding.
- Maximising the benefits of learning technologies to create blended approaches that focus students more fully on understanding and engagement with material during class time for example, through exploring areas of uncertainty in the topic, engaging with feedback and identifying and creating learning resources.
- Taking a team approach to course design and delivery, involving more diverse staff inputs. This may include disciplinary, technical, and skills development expertise to support active learning and increased student self- and peer-assessment.
- Creating interdisciplinary teaching teams that can support team-based learning where appropriate.
- Redesigning summative and formative assessment with both more readily taking place during classes and connecting to real world challenges as we transform the curriculum.
- Designing in opportunities for students to develop both responsibility for their own learning and the collaborative skills that are essential in group work and team learning and in extra-curricular activities such as volunteering, societies, employment and competitions.
- Enabling students to connect with their peers and develop the relationships that are essential to enabling wellbeing and retention.

5. Measures of Success and going forward

We will be using standard UK HEI metrics for measurement as set out in the QAA. We will also ensure regular student focus groups internally as well as the NSS and other student quality measures. This work is ongoing and we will ensure we monitor and reflect on the model of partnership in the success of our implementation. As well as student focus groups, we will run staff focus groups to engage the experience and impact of our model and refine more closely with staff input.

We are planning on engaging with a QAA initiative to review professional services. At present this is focussed on central professional services as the view is that school PS are reviewed as part of Periodic Subject Review. We intend to use our model to cascade this to School level and integrate policy and practice going forward.

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CORRELATIONS BETWEEN GOVERNMENTAL FINANCIAL CONTRIBUTIONS TO EDUCATION AND THE AUTONOMY OF ALTERNATIVE SCHOOLS IN HUNGARY

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Abstract

Besides state-funded schools, private schools play a role in public education both abroad and in Hungary, however the financial aid they receive from the governmental budget is different from country to country. There are countries where they receive the same amount of support that state-funded institutions get. Whereas there are other private institutions that cannot gain any financial resources from the subsidy. Financial contribution by the government to educational costs, however, always goes together with a restriction of the autonomy of schools by said government. These restrictions may include forcing the exemption of tuition fees or mandating that private schools cannot control the admission of pupils. Moreover, it might convey the restriction of the pedagogical autonomy of alternative private schools according to the educational system's degree of centralization. The liberal and decentralized Hungarian education system has become centralized again due to the current government's aspiration of creating an integrated and unified educational policy. In this study, we seek to answer the question of how the financial contribution of the state to the operation of alternative private schools affects their pedagogical autonomy.

Keywords: *Public education, alternative education, educational financing, autonomy.*

1. Introduction

Besides state-funded schools, private schools play a role in public education both abroad and in Hungary (Ercse & Radó, 2019). The state also plays a significant role in financing public education in most countries (Varga, 1992), however the financial aid they receive from the governmental budget is different from country to country. There are countries where they receive the same amount of support that state-funded institutions get. Whereas there are other private institutions that cannot gain any financial resources from the subsidy (Varga, 1998).

In Hungary, the majority of alternative schools are private schools, which have a cooperation agreement with the state for the provision of educational services and therefore receive some financial support from the state. Financial contribution by the government to educational costs, however, always goes together with a restriction of the autonomy of schools by said government. These restrictions may include forcing the exemption of tuition fees or mandating that private schools cannot control the admission of pupils (Langerné Buchwald & Muiy, 2020). Moreover, it might convey the restriction of the pedagogical autonomy of alternative private schools according to the educational system's degree of centralization.

The liberal and decentralized Hungarian education system has become centralized again due to the current government's aspiration of creating an integrated and unified educational policy. It was worth examining the effect of state-funded support on the autonomy of private schools' education.

2. Methods

On the one hand, laws pertaining to the operation of alternative schools were investigated: the 2011 Public Education Act and its amendments, the subsequent curriculum regulations, and the budget laws that determine the level of the state's financial contribution.

On the other hand, pedagogical programmes of well-known alternative schools were analysed, and interviews were conducted with their professional and educational leaders. The study included alternative schools that were already in operation before the period under review, before 2011 and after 2011, and can be considered alternative in pedagogical terms because they had an approved alternative curriculum and/or a ministerial pilot licence. Accordingly, a total of seven alternative schools were

included: the Alternatív Közgazdasági Gimnázium (Alternative Economics High School), Rogers Általános Iskola (Rogers Elementary School), Rogers Akadémia (Rogers Academy), Zöld Kakas Líceum (Green Rooster High School), Montessori Oktatási Központ (Montessori Education Centre), Színes Iskola ("Colour" Elementary School), Novus Gimnázium (Novus High School) and the Hungarian Waldorf Association, which brings together Waldorf schools in Hungary, as the development of Waldorf curricula is one of the tasks of the Association. The study sample does not appear to be large, but with the exception of two schools, it covers almost the full range of alternative schools that meet the selection criteria.

3. Results

The results of the study showed that private alternative schools in Hungary have continuously received state budget support during the period under review. Prior to 2011, private schools were required to receive at least the same level of state budget support as state and/or municipal schools, but the 2011 Public Education Act no longer states the need for an equal level. As a result, alternative private schools receive only the minimum necessary subsidies, while other institutions receive additional subsidies (Langerné Buchwald, 2020), and the real value of state support has steadily decreased over the past period. This has led to the closure of some alternative schools due to a lack of financial resources to implement their alternative pedagogical programme, and the decrease in state budget support could not be compensated by an increase in the tuition fees paid by parents.

Prior to 2011, the 1993 Public Education Act regulated the operation of alternative schools in areas where alternative schools could define their specific character: the curriculum taught, the requirements, the preparation for state examinations, the building regulations, tools and equipment used, the system, methods and tools of quality policy, the management model in operation, the organisation of education, the qualifications and qualifications of the teachers accepted. In the first version of the Public Education Act of 2011, the paragraph allowing the operation of alternative schools was omitted and was only included after the Hungarian Waldorf Association indicated its absence. It extended the areas in which alternative schools can define their specific character and added principles concerning the compulsory number of hours for pupils and the rules on teachers' fixed and flexible working hours.

The biggest change, however, was the amendment of the Public Education Act of 219, which removed the term "alternative school" from the Act and thus from Hungarian public education and introduced the term "schools licensed to apply individual solutions" instead, and took the licensing procedure away from the professional committee established for this purpose and placed it under the authority of the Ministry of Education. On the other hand, it has capped at 30% the degree of deviation from the central framework curriculum for the subject structure and has also restricted the possibility of setting specific principles for the qualifications and specialisations of teachers, by allowing alternative schools to deviate from the qualifications of the teachers employed only if there is no equivalent national higher education qualification for the subject or subject module.

Interviewees involved in the licensing process said that, although the government's declared intention during the ministerial discussions was not to limit the deviation of alternative schools from the central curriculum, by the end of the process of licensing individual school solutions it was clear that the aim was to reduce the number of alternative schools and to align them as much as possible with the central curriculum. In this way, the pedagogical freedom of alternative schools, particularly in terms of curricular choice, timetabling and subject structure, was severely restricted, and it was made more difficult for institutions that departed to a greater extent from the current centrally regulated institutional education and training, such as Waldorf schools or Montessori schools, to operate.

The constant adaptation of pedagogical concepts to changing content standards puts alternative schools in a difficult situation. For schools that have not been able to adapt their pedagogical concept to the 2013 curricular framework without significant loss of content that would affect the specific alternative character of the school, two pathways have been identified. In one case, where the restriction of pedagogical autonomy was coupled with difficulties in financing the school, this led to the complete closure of the school (Montessori Education Centre). In the other case, in order to preserve its pedagogical freedom and the alternative nature of its programme, the school's director opted for an alternative form of education, the Rogers Academy, which is limited in the Hungarian education system. Pupil communities are autonomous democratic communities, completely independent of the state, whose 'pupils' are private students of formal schools and undertake the preparation of students for the final examinations in an organised framework (Langerné Buchwald, 2019).

Those alternative schools that undertook to adapt their pedagogical programme to the 2013 curriculum standards for the first time and participated in the ministerial approval procedure for the application of individual solutions in 2020 reported that the interviewees reported that the freedom of

schools to formulate and implement their pedagogical programme was constantly being restricted and that they were increasingly obliged to implement and follow the central curriculum. As a consequence, they were forced to make a number of compromises in order to survive, which were also experienced with difficulty by the teachers and pupils of the school and which, to varying degrees, but in all cases, led to a reduction in the alternative nature of the programme. This was confirmed by the analysis of the pedagogical programmes. The need to record and thus authorise their operational specificities from the point of view of pedagogical work became more and more detailed and more and more widespread, which in turn often made it difficult to implement the specific elements of alternative programmes. "In the end, practically everything was prescribed, as the years went by, there were more and more constraints" (Interviewee 2). They did not support the use of methods and forms of teaching organisation and assessment that were more divergent from traditional school practice, such as course and credit systems, mentoring, text-based assessment, different ways of structuring the curriculum, or yoga instead of traditional physical education (Interviewee 3). In the case of Waldorf schools, text-based assessment was one of the critical points of the concept, which they did not manage to fully preserve, since from grade 11 onwards, since in Hungary the marks of the school-leaving examination and the marks of the last two grades form part of the admission scores, they have to assess pupils with a merit mark. Another negative change in their case was the abolition of the possibility to take the Euritmia exam.

Regulations that have steadily reduced the pedagogical autonomy of alternative schools have led to a specific solution. The interviewees said that in the process of revising their pedagogical programmes they had to look for the 'loopholes' left open by the legislation that allowed them to use alternative methods and procedures, and that despite the fact that 'the programme became more and more schematic to comply with the legislation, the practice did not really change. This in turn resulted in a widening gap between the paper form and everyday practice" (Interviewee 2).

4. Conclusion

In Hungary, alternative private schools are only partially independent from the state, as the state also contributes financially to their operation. However, this does not negatively affect the autonomy of alternative schools in the case of a liberal and decentralised education policy government and leaves them free to shape their pedagogical work. As the results of our research have shown, the change in educational policy and the government's efforts and measures towards centralisation and unification have also affected alternative private schools, steadily reducing their pedagogical autonomy and the extent of alternation. From the point of view of the pedagogical work in schools, the period from the regulation of the curriculum to the granting of licences to use individual solutions is seen as a restriction of the freedom of movement of alternative schools: 'A narrowing tunnel in which we can hardly move anymore and we see it narrowing further. It is really narrowing our possibilities, our freedom of thought and our freedom of method" (Interviewee 1).

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POSTERS

IMPLEMENTATION OF AN OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE) IN A KINESIOLOGY BACHELOR DEGREE

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Abstract

For the past four years, the Laval University's kinesiology bachelor degree has been using an OSCE to assess their students' clinical competencies. This presentation will describe the format the OSCE and will discuss the quality improvement process implemented following psychometric analysis of the test and its nine stations. The psychometrics qualities were tested using the Cronbach's alpha, the stations' difficulty level and discrimination index. An ANOVA has also been realised to ensure that the students' results of a same station in a different circuit were equivalent regarding the examiners.

In the 2018 edition, the psychometrics qualities were under the standards, especially the Cronbach's alpha and the stations' discrimination index. In order to improve the reliability of the test, modifications were made to seven of nine scoring grids. A committee revised each competencies' component assessed and removed the ambiguous ones. The psychometrics qualities of the revised results improved accordingly.

To prepare the 2019 edition, the OSCE committee reviewed the nine stations and adjusted the scoring grids. It also designed three new clinical situations. The psychometrics qualities of the 2019 edition have shown an improvement of the Cronbach's alpha and the stations' discrimination index. It has also demonstrated no significant differences between the circuits' performance. The appreciation surveys administered following each edition revealed the quality of the support offered to the students, examiners and simulated patients and the authenticity of the clinical situations. We thus consider this OSCE to be a reliable method to assess students' competencies of our kinesiology program.

Keywords: *Objective structured clinical examination (OSCE), assessment, competencies, kinesiology, test score reliability.*

1. Introduction

1.1. Kinesiology bachelor degree program's revision

From 2013 to 2016, the bachelor's degree in kinesiology at Laval University's Faculty of Medicine underwent a complete overhaul of its program, now centred on the competency-based approach (Scallon, 2004). In order to foster these skills' development, three classes on clinical approach were integrated to the program. They bring students to solve clinical vignettes involving a variety of clients and kinesiology-related issues. Due to the complex nature of the acquired knowledge, the implementation of these courses has necessitated a revision of the evaluation methods traditionally used in this program. Among the changes that were made, we note the addition of an objective structured clinical examination (OSCE) that is worth 40% of the last clinical approach course.

1.2. Project's objectives

This presentation aims at evaluating the validity of the first and second editions of the kinesiology program's OSCE (2018 and 2019). It is hypothesized that the OSCE provides a valid assessment to validate students' skills development following the last clinical approach course and to identify those who may be experiencing academic difficulties.

2. Design of the objective structured clinical exam in Kinesiology

The kinesiology OSCE contains nine clinical vignettes, divided into eleven ten-minute stations, interspersed with a two-minute transition time (Figure 1). Two of these vignettes are made of two linked stations, meaning that they are based on the same case. Completing this eleven stations circuit takes 2h36 minutes. The exam is divided into two periods: in the morning and in the afternoon. To ensure that all

forty registered students complete their examination in the same day, two circuits are held concurrently in the morning (10 students per circuit) and two others in the afternoon.

For nine stations, students have to interact with a patient who is played by an actor. To guarantee that the actors' performances are realistic and stable from one student to the other, actors meet with content experts for each vignette so that their performance is standardized (Loye & Fontaine, 2018). In addition, there are two writing stations: one in which the students must analyze a sports performance shown on video and another one during which they have to review an exercise program.

The students' performance, in acted vignettes, is evaluated by an examiner who is present in the room. The examiner may be a content expert for this particular vignette, a teacher in the program or a clinician. The evaluation grids that are used are mixed (Harden et al., 2016; Regehr et al., 1998). They contain a list of tasks that are assessed with a binary scale (observed/not observed), in addition to an overall qualitative scale measuring, with four response options, the level of students' professionalism (superior, adequate, limit, unacceptable).

Figure 1. Kinesiology's OSCE Design Plan.



3. Method and results

As in other studies, the OSCE validity of both editions was assessed using four of the five sources of Messick's validity framework (1989; Yazbeck Karam et al., 2018). These are presented in Table 1. Appreciation surveys were also submitted to each participant at the end of the OSCE (students and examiners) to collect their opinion about some aspects of the event. A four-point Likert scale was used in each survey (totally agree, agree, disagree, and strongly disagree). 75% percent of the students responded to the 2018 survey, whereas 55% responded to the 2019 survey. For the examiners, the response rate is respectively 78% in 2018 and 72% in 2019.

Table 1. Sources of validity, description and measures used to assess OSCE psychometric qualities.

Source	Description	Measure
Content	Assessed competencies in the OSCE represent the competencies taught in the courses	Clinical expert (clinical station development) Examiners' opinion (survey) Table of specification (Blueprint)
Internal structure	Psychometric properties of the OSCE and the stations	Cronbach's alpha (OSCE results) Discrimination index (stations results) Level of difficulty (stations results) Success rate for each competency's assessed component (stations results)
Response process	Evidence of data coherence	Comprehension of the task (students' survey) Examiners' opinion (survey) Analysis of variance (ANOVA) between mean groups (am, pm) and circuits (OSCE results)
Relation with other variables	Alignment of results with similar tools measuring the same subject	Correlation between OSCE scores and third clinical course scores (60% other than OSCE ones).

Content validity was supported by three initiatives. First, every station was designed by clinical experts, accompanied by an assessment consultant. Blueprints of the OSCE and the third clinical course were elaborated and compared to assure that the proportion of competencies assessed was respected in both. In addition, examiners' opinion was collected and they all agreed that the stations were realistic, authentic and well developed (mean of 3,9/4 on Likert's agreement responses scale).

The results of the 2018 edition were globally good (mean = 74,5%, low score = 60,3%, high score = 85,7%, stations' difficulty levels were between 57,5% and 85,4%). All students succeeded the

test. In regards to internal structure, some results of the psychometric analysis were below the standards, especially the Cronbach's alpha ($\alpha = ,40$) under the adequate rate of ,66 (Brannick et al. 2011). In addition, four stations' discrimination indices were inadequate to discriminate the good from the inferior performances ($D_{station1} = ,041$; $D_{station3} = -,022$ $D_{station5} = -,025$ $D_{station7} = ,032$). Otherwise, validity by response process was supported with the nonsignificant analysis of variance between the means of the groups and circuits ($F_{groups} = ,068$, $p = ,854$; $F_{circuit} = ,035$, $p = ,854$). It was also supported by students' survey answers about the clearness and unambiguous instruction of the clinical stations (mean of 3,8/4), and the observers' opinion about the ease of use of score grids (mean of 3,2/4). Students also agreed that the OSCE should be maintained in the program (mean of 3,5/4). The validity was also supported by the significant and positive correlation between OSCE's and the third clinical course's results (Pearson $r = ,729$, $p = ,000$).

To improve the internal structure validity of the second edition, a committee, composed of clinical experts, kinesiology teachers and an assessment consultant, revised competency's components failed by 70% or more of the students. The committee also created two new clinical stations to renew the exam and to reduce the chances of plagiarism from one year to the next.

The results of the second edition were as good as the previous one (mean = 74,8%, low score = 55,7%, high score = 89,8%, stations' difficulty levels were between 71,6% and 84,4%), although three students failed (score under 60%). The internal structure has shown improvement. More specifically, the Cronbach's alpha was adequate ($\alpha = ,747$) and 8 out of 11 stations showed an acceptable discrimination index ($D > ,20$; Bernier & Pietruliewicz, 1997). No significant difference was observed between the means of the groups and circuits ($F_{groups} = 1,345$, $p = ,254$; $F_{circuit} = ,862$, $p = ,360$). The appreciation surveys revealed almost the same results as in the 2018 edition for students' perception of clearness and unambiguous instruction of the clinical station (mean of 3,9/4) and for the ease of use of score grids (mean of 3,5/4). 2019 edition's students were also favorable to maintain the OSCE for the next cohort (mean of 3,7/4). Finally, a significant and positive correlation between OSCE's and the third clinical course's remaining results (60% other than OSCE ones) was also found (Pearson $r = ,888$; $p = ,000$).

4. Discussion and conclusion

Based on the results of the validity sources, we consider the OSCE in the kinesiology program as a valid method to assess students' competencies at the end of the third clinical course. Both editions seem to measure representative clinical courses' learnings. The OSCE situations appear to be realistic and the score grids are considered well developed. Stations are not too difficult nor too easy and, especially for the 2019 edition, are effective to discriminate a good from an inferior performance. The standardisation of the actors looks effective, as well as the examiners' training.

Nevertheless, here are some limitations about this study. First, the OSCE results are only based on checklist grids whereas many studies showed that global rating should be more effective to assess competencies (Hodges et al., 1999; Reznick et al., 1998). A global score should be added to the next edition to compare this score to the checklist results. Finally, data should be collected about the feedback provided on students' performance at the OSCE.

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PANDEMIC IMPACT ON THE COGNITIVE-LINGUISTIC SKILLS OF 1ST AND 2ND GRADE BRAZILIAN SCHOOLCHILDREN

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Abstract

The Covid-19 pandemic made discrepancies between the different educational realities more evident for schoolchildren in the beginning of literacy. Aim: to characterize the performance of cognitive-linguistic skills of students in early literacy phases during the pandemic. Forty-eight Brazilian schoolchildren participated in this preliminary study, distributed in GI, composed by eighteen schoolchildren for 1st grade and GII, composed by thirty schoolchildren for 2nd grade, submitted to the application of the Cognitive-Linguistic Skills Assessment Protocol for students in the initial stage of literacy. Results: students from GI and GII showed average performance for writing the name, sequential alphabet recognition, and visual memory of shape. The GI presented a refusal response for the subtests of word dictation, nonword dictation and picture dictation, word repetition and visual sequential memory of shapes and poor performance for alphabet recognition in random order and average performance for alphabet recognition in sequence. GII showed lower performance for the subtests of word dictation, nonword dictation, picture dictation and superior performance for alphabet recognition in random order, alphabet in sequence and visual sequential memory of shapes. Discussion: the appropriation of the letter-sound relationship mechanism raises questions, since it evidenced the difficulty of all students in cognitive-linguistic skills necessary for the full development of reading and writing in an alphabetic writing system such as Brazilian Portuguese. Conclusion: students in the 1st and 2nd grade showed lower performance in cognitive-linguistic skills important for learning reading and writing.

Keywords: *Literacy, pandemic, learning, child development, education.*

1. Introduction

COVID-19 spread rapidly around the world in 2020 and generated the unprecedented situation where 90% of the student population was being isolated worldwide (Arruda, 2020). In this pandemic scenario, social isolation was initiated as a measure of prevention and attenuation of the virus. Among these measures, in addition to the closing of many educational institutions, the suspension of in-person classes and remote teaching were implemented (Camacho, Joaquim, Menezes, and Sant’Anna, 2020).

Regarding remote learning, it was implemented on an emergency basis, that is, the schoolchildren would only return to the face-to-face format once the health crisis had been resolved or controlled, thus providing schoolchildren with temporary access to educational content in a way that minimizes effects of social isolation on their education and learning (Joye, Moreira, and Rocha, 2020).

Based on the above, this study aimed to investigate whether the period of remote access education established during the pandemic compromised the development of cognitive-linguistic skills necessary for the full literacy of schoolchildren in the early literacy phase.

2. Objective

To characterize the performance of cognitive-linguistic skills of students in early literacy phases during the pandemic.

3. Method

This study was approved by the Research Ethics Committee of the Faculty of Philosophy and Sciences of the São Paulo State University “Júlio de Mesquita Filho” - FFC/UNESP - Marília-SP, under number 4.862.668.

A total of 48 schoolchildren of both sexes, aged from 6 years to 7 years and 11 months from the 1st and 2nd year of Elementary School, with complaints of learning problems were referred by municipal public schools in the region of Marilia – São Paulo, Brazil. From the analysis that 26 schoolchildren were unable to read and write, these were excluded and the number of participants was redefined to 22 schoolchildren divided into two groups: Group I (GI): composed of 10 schoolchildren from the 1st year of Elementary School, 50% male and 50% female and; Group II (GII): composed of 12 schoolchildren from the 2nd year of Elementary School, 83.3% male and 16.7% female.

All schoolchildren were submitted to application of the collective and individual version of the Cognitive-Linguistic Skills Assessment Protocol for schoolchildren in the early phase of literacy (Silva and Capellini, 2019). The procedure of this study was applied in person and followed the UNESP guidelines to reorganize activities during the pandemic. Data analysis was performed using the Statistical Package for Social Sciences, version 25.0. The results were statistically analyzed at a significance level of 5% (0.05).

4. Results

Table 1 shows there was a statistically significant difference between the study groups with the application of the Likelihood-Ratio Test.

In Table 1, it was possible to verify that the schoolchildren from GI and GII showed average performance for writing their name and writing the alphabet in sequence.

Table 1. Frequency distribution of the performance classifications of schoolchildren from groups GI and GII in the Cognitive-Linguistic Skills Assessment Protocol. Likelihood-Ratio Test ($p < 0.05$).

Subtests	Classification	G1		GII		p Value
		Freq.	%	Freq.	%	
WN	Refusal	0	0.00	0	0.00	0.036*
	Inferior	4	40.00	1	8.30	
	Average	6	60.00	6	50.00	
	Superior	0	0.00	5	41.70	
CS	Refusal	0	0.00	0	0.00	0.015*
	Inferior	4	40.00	0	0.00	
	Average	6	60.00	12	100.00	
	Superior	0	0.00	0	0.00	
WD	Refusal	7	70.00	2	16.70	0.027*
	Inferior	3	30.00	7	58.30	
	Average	0	0.00	3	25.00	
	Superior	0	0.00	0	0.00	
NWD	Refusal	7	70.00	2	16.70	0.036*
	Inferior	3	30.00	9	75.00	
	Average	0	0.00	1	8.30	
	Superior	0	0.00	0	0.00	
FD	Refusal	8	80.00	2	16.70	0.023*
	Inferior	2	20.00	6	50.00	
	Average	0	0.00	2	16.70	
	Superior	0	0.00	2	16.70	
RAS	Refusal	2	20.00	0	0.00	0.002*
	Inferior	3	30.00	0	0.00	
	Average	4	40.00	1	8.30	
	Superior	1	10.00	11	91.70	
RARO	Refusal	2	20.00	0	0.00	0.006*
	Inferior	4	40.00	0	0.00	
	Average	3	30.00	3	25.00	
	Superior	1	10.00	9	75.00	
RW	Refusal	5	50.00	0	0.00	0.030*
	Inferior	1	10.00	1	8.30	
	Average	3	30.00	5	41.70	
	Superior	1	10.00	6	50.00	
VMS	Refusal	5	50.00	0	0.00	0.031*
	Inferior	2	20.00	2	16.70	
	Average	2	20.00	5	41.70	
	Superior	1	10.00	5	41.70	

Caption: WN: writing name, CS: copy shapes, WD: word dictation, NWD: nonword dictation, ND: figure dictation, RAS: recognition of the alphabet in sequence, RARO: recognition of the alphabet in random order, RW: repeating words, VMS: visual memory for shapes.

5. Discussion

The beginning of literacy, a phase in which the schoolchildren in this study found themselves, is an important period for the acquisition of cognitive-linguistic skills, considered predictors for the learning of reading and writing (Cunha and Capellini, 2010; Silva and Capellini, 2019; Santos and Capellini, 2020). Furthermore, any delays resulting from an inadequacy in the teaching of alphabetic and orthographic principle, that is, in teaching the letter-sound conversion mechanism, can trigger difficulties in the reading and writing of words.

In this study, we found that among the schoolchildren in the GI group there was a refusal response for the tasks of dictation and repetition of words and visual sequential memory of shapes and poor performance for alphabet recognition in random order. On the other hand, the schoolchildren from GII presented lower performance in the dictation tasks, showing that knowledge of the sequence of the letters of the alphabet for the two groups was not a guarantee of acquisition for the application of the alphabetic and orthographic principle at the time of writing.

Based on the data found in this study, we conclude this article by highlighting the need for the clinical and/or educational speech therapist to act as overseers of the acquisition and development of school learning, helping to plan specific actions to promote normal development and detection of deviant processes from the teaching-learning process. Thereby gaining an important space with teachers and educational staff regarding relevant discussions; not only about the importance of cognitive-linguistic skills for the development of academic learning, but also regarding the milestones of child development and predictors of literacy. The latter are so important to ensure the success of reading and writing for these schoolchildren in the early stage of literacy and yet so disregarded or not prioritized in the remote teaching-learning process during the COVID-19 pandemic.

6. Conclusion

Schoolchildren in the early literacy in the first and second-year, showed lower performance in cognitive-linguistic skills that are important for the development and learning of reading and writing. In that, schoolchildren from the 1st year still presented a refusal response to several of these skills since they did not know how to perform the tasks requested. This was probably due to the fact that they were not sufficiently literate and therefore unable to use the cognitive-linguistic skills necessary to trigger the analysis and synthesis processes necessary during the formation of words for both reading and writing.

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METHODS TO IMPROVE THE QUALITY OF DESIGN CAD TEACHING FOR TECHNICAL SPECIALIST

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Abstract

Digital literacy is a necessary skill for a modern specialist and an important factor influencing the development of the economy in all industries. Automation of technological processes requires an appropriate level of training of specialists, among the necessary skills of which should be knowledge of a CAD program.

In order to improve the level of education and competitiveness of specialists (including those who have temporarily lost their jobs), Tallinn University of Applied Sciences (TTK UAS, Estonia), in cooperation with the Estonian Unemployment Insurance Fund, has been organizing and conducting training on the use of CAD programs since 2012, including CAD design with AutoCAD, both 2D and 3D, as the most universal CAD program. To ensure more effective training, teachers of advanced training courses, who are the authors of the article, constantly monitor the labour market to determine the requirements for technical specialists. In accordance with changes not only in the requirements for the level of training of specialists but also taking into account constantly developing technologies, the training program is also changing. Recently, in connection with the pandemic, it has become necessary to conduct not only face-to-face training but also online, hybrid, which required not only updating the educational material but also a new approach - the use of interactive tools in training.

Since 2021, TTK UAS conducts in-service training for adults including CAD design with AutoCAD within the framework of the Ministry of Education and Research's state training order for in-service training "Promotion of adult education and broadening of learning opportunities", for learners is free of charge.

This article analyzes the statistics and demonstrates the use of this analysis to assess the necessary changes in the curriculum to improve the effectiveness of the study of the CAD program.

Keywords: Lifelong learning, CAD design, distance learning, interactive education.

1. Introduction

High demands are placed on a modern specialist - professional solution of current problems, successful participation at all stages of product development. The rapid development of IT technologies is reflected in the work of production, updating equipment, which requires specialists to work. Successful implementation of these technologies requires extensive use of 3D geometric models. Engineering courses should deal with the development of spatial imagination and 3D models using CAD tools. Universities should be more actively involved in the process of faster implementation of these technologies. The general background knowledge needed to solve this problem is the development of spatial visualization skills, since both of these concepts are based on a three-dimensional (3D) geometric model or database (Dobelis, 2019). Involving a learner in an active educational process to gain new knowledge is a priority to ensure the effectiveness of independent distance learning, educating an independent and modern specialist who is able to solve complex production problems and be guided by the priorities of society (Figure 1).

Figure 1. Educational tasks of a technical specialist.



To improve the qualifications of a specialist, not only the appropriate training of teaching staff is needed, but also modern interactive educational materials for self-work of learner and mostly online or e-learning.

Electronic learning, or e-learning, is education based on modern methods of communication including the computer and its networks, various audio-visual materials, search engines, electronic libraries, and websites, whether accomplished in the classroom or at a distance (Showkeen, 2015).

Students learn more when they see objects in reality. Creating 3D virtual reality (VR) models and immersing students in that virtual reality can provide an engaging and meaningful experience (Salman, 2020).

Educational institutions will benefit from better accessibility to virtual technologies; this will make it possible to teach in virtual environments that are impossible to visualize in physical classrooms, like accessing virtual laboratories, visualizing machines, industrial plants, or even medical scenarios. The huge possibilities of accessible virtual technologies make it possible to break the boundaries of formal education (Martín-Gutiérrez, 2017).

2. Objectives

Educational institutions will benefit from better accessibility to virtual technologies; this will make it possible to teach in virtual environments that are impossible to visualize in physical classrooms, like accessing virtual laboratories, visualizing machines, industrial plants, or even medical scenarios. The huge possibilities of accessible virtual technologies make it possible to break the boundaries of formal education (Martín-Gutiérrez, 2017).

The Estonian Unemployment Insurance Fund has sufficient financial reserves to start offering services aimed at preventing unemployment and helping small businesses. These services are for employees who need support to change jobs or keep a job due to lack of skills or their outdated skills, as well as employers to help them find and train a skilled workforce and restructure their companies.

From 2019 to the present day, a program to help businesses in conditions of increased risk of infection and Covid disease has been operating in Estonia.

The Department of Academic Affairs and the Science Center of the TTK UAS, in cooperation with the Estonian Unemployment Insurance Fund, conduct training courses to improve the qualifications of company employees and acquire digital skills and computer skills.

Based on training courses conducted using various CAD programs, TTK UAS developed a new training course using Autodesk AutoCAD as the most versatile CAD program (Ovtšarenko, 2021).

In the period 2017 - 2022, The Department of Academic Affairs of the TTC UAS and the Center for Sciences conducted 7 training courses (30, 64, 120 hours long) on teaching AutoCAD (including 2D and 3D). There were a total of 74 participants in the courses, and a maximum of 18 students per course.

Since 2017, a very different level of computer proficiency among students has led to a radical change in the curriculum, the creation of multi-level tasks for students to choose feasible tasks and the creation of video lessons for independent work. Since the beginning of 2020, the pandemic has affected all aspects of education and course teachers - the authors of this publication have developed teaching materials for conducting online courses.

All training materials are posted on the e-course website and are divided into modules. Each module consists of a theoretical part - linked individual websites, short step-by-step instructions for practical exercises, exercises for online work both with the participation of the teacher and independently, and forums for group and homework. Some course participants dropped out of the course, mainly due to the busy schedule of the course and poor computer proficiency. Most of the participants, after completing the course, indicated during the survey that they can successfully use the knowledge gained at the training in their daily work and independently find and use the necessary information to develop the acquired skills.

The results of the conducted surveys and the analysis of current changes in the requirements for specialists in the labour market made it possible to obtain information for making significant changes in the content of the training material of the courses and to test it during the courses. In the period 2017-2022, the authors of the article created video tutorials to support and gain more stable skills in working with the program. Also, in addition to practical training material and exercises on creating drawings, theoretical material was compiled based on a review of the standards and rules for creating drawings, and the basics of engineering graphics, which is necessary for competent and successful work in an enterprise, for transmitting and processing information using technical drawings.

The surveys of additional training participants showed qualitative changes in the acquisition of skills in working with the AutoCAD program, as students in a fairly short period of time learned to understand drawing images, annotations and dimensions well.

The effectiveness of the educational material on the basics of engineering graphics was also achieved through the use of simulation of 3D objects (Figure 2), which are very effective when it is impossible to demonstrate or visit real objects depicted in the drawings as the cross-disciplinary collaboration (Pulido-Arcas, 2021), and provide a very interesting opportunity for a student to immerse himself in the study of engineering or technology (Makuteniene, 2020).

Figure 2. The integration of BIM into the subject of basic engineering graphics. Wall part of the house and the house digimodel.



3. Conclusions

The Estonian state program not only takes care of retraining and additional training of employees of enterprises, but also includes a plan for retraining people with partial disability. Employers are very interested in employees who work and only replenish existing knowledge and skills but do not need to study from beginning.

It turned out to be necessary for the successful implementation of the training to monitor the needs of the labour market just before the starting of the training program and the development or updating of exercises for work in class and homework. It is this tracking of changes in the need for certain skills and abilities that is the key to the successful work of both course teachers and the study work of course participants.

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RELATIONSHIP BETWEEN ORAL READING FLUENCY MEASURES AND VISUAL ATTENTION SPAN IN BRAZILIAN'S SCHOOLCHILDREN IN PANDEMIC CONTEXT

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Abstract

The aim of this study was to relate the measures of oral reading fluency and visual attention span in Brazilian students from the 4th grade of elementary school. Eleven students were submitted to three measures of oral reading fluency and the global visual attention span (VAS) for five characters. The reading correct word per minute measure was used with three texts that differed in complexity. The study was carried out after the adoption of remote teaching in the Pandemic. Spearman analysis was performed between fluency and VAS variables, with no significance. The results revealed a greater number of correct words per minute in the third reading time compared to the first two times, revealing that the real reading performance of 4th grade students is the average of 39 to 40 words per minute and average of fixation of 50% of the characters. These findings indicate academic losses due to low reading fluency rate, fewer characters per fixation and lack of relationship between the variables. These results pointed out to the decrease in reading practices during the Pandemic. As conclusion, there is a need for further studies about this theme.

Keywords: *Reading fluency, visual perception, learning, education, educational measurement.*

1. Introduction

In early March 2020, with the worsening caused by the new coronavirus COVID-19 pandemic, and to minimize the impacts of the disease, the suspension of face-to-face classes was decreed, replacing them with non-face-to-face activities and remote teaching (Sampaio, 2020). The return to face-to-face activities only occurred in August 2021, when this study had begun.

A fluent reader will have the ability to read aloud quickly, accurately and expressively. Reading can be understood as a visual-perceptual task that requires string processing of several letters that make up words. Readers need to pay attention to each letter of the word, successively, for its identification (Laberge, Samuels, 1974). The involvement of attention in the visual processing of letter sequences was formalized by Bundesen (1990). Thus, in Bosse et al. (2007) the visual-attentional interval (VA) was defined as the number of distinct visual elements that can be processed simultaneously at once.

Thus, a fluent reader is expected to present adequate accuracy in decoding words, automatic processing (speed) and prosody during reading and it is consolidated in the third school year, with readers who have achieved the automation of reading processes. (Barth et al., 2014). In this way, it becomes important to measure and observe reading performance for schoolchildren from this school year and in subsequent years.

2. Objectives

The aim of this study was to relate the measures of oral reading fluency and visual attention span in Brazilian schoolchildren from the 4th grade of elementary school.

3. Methods

This is a prospective, cross-sectional study. The procedures of this study were applied face-to-face during the Covid-19 Pandemic, following the recommendations of the World Health Organization (WHO). The study was approved by the research ethics committee of the Faculty of

Philosophy and Sciences of the São Paulo State University – UNESP, São Paulo, Brazil, under number 5.050.126. All schoolchildren presented the Free and Informed Consent Term. The schoolchildren were indicated by the teachers, who mentioned reading and learning difficulties. They underwent the followed procedures.

-Reading Fluency Text (ADFLU, Martins; Capellini, 2018). Each student performed reading fluency measurements of a 4th grade's text, three texts that differed in complexity. For each text, measures were taken, such as the number of words read correctly per minute (WCPM) and the measure of words read incorrectly per minute (WIPM) were measured. Therefore, for WCPM, words pronounced correctly, words corrected by oneself, repeated words, words mispronounced due to the accent and inserted words were considered. For WIPM, mispronounced words, words substituted for others, omitted words, words read out of order, addition or omission of morphemes and hesitations were considered errors (if a student hesitated with a word for 3 seconds, he was told the word and marked as incorrect). For the quantification of errors, punctuation rules were also used for unique situations, such as: lines or several words omitted, reading numbers, words with hyphens that can exist independently and abbreviations. (Good; Kaminski, 2002).

-Visual Attentional Span Tasks - Global Report (Whole report condition), (Bosse et al, 2007; Valdois et al, 2014) – notebook version. The visual attention test is a software in which the stimulus will be presented on the notebook screen, aiming to verify the number of characters captured by eye fixation movements, during eye movement. A sequence of five aleatory consonants was displayed for 200ms in the center of the computer screen. The student should verbally report the name of the letters identified, with a score in total percentile of correct answers.

The results were analyzed statistically, adopting the value $p < 0.05$ for the statistically significant values, being indicated with an asterisk ($*p < 0.05$). Application of the Friedman Test, to verify possible differences between the variables of interest, when compared concurrently. The Spearman Correlation was also used to verify two variables without any restriction regarding the distribution of values.

4. Results

Table 1 presents the comparison for the reading fluency measures of the number of words read correctly per minute (WCPM) and words read incorrectly per minute (WIPM), three texts that differed in complexity, and one measure of Visual attentional span tasks (%VAS).

Table 1. Comparison of read correctly per minute (WCPM) and words read incorrectly per minute (WIPM).

Variables	Mean (standard deviation)	p-value	Variables	Mean (standard deviation)	p-value
WCPM 1	39,18 (31,37)		WIPM 1	6 (2,32)	
WCPM 2	37,45 (26,89)	0,005*	WIPM 2	6(5,35)	0,839
WCPM 3	47,73 (30,56)		WIPM 3	13,73 (31,33)	
%VAS	55,9 (11,2)				

Caption: WCPM: number of words read correctly per minute; WIPM: words read incorrectly per minute; %VAS: Visual attentional span tasks.
Friedman Test ($*p < 0.05$).

Table 2 presents the analysis of Spearman's Correlation between the Visual attentional span tasks (%VAS) and the fluency measures.

Table 2. Correlation between the Visual attentional span tasks (%VAS) and the fluency measures.

Variables	Statistic	%VAS	Variables	Statistic	%VAS
WCPM 1	correlation coefficient	0,527	WIPM 1	correlation coefficient	-0,266
	p-value	0,095		p-value	0,429
WCPM 2	correlation coefficient	0,397	WIPM 2	correlation coefficient	-0,261
	p-value	0,226		p-value	0,438
WCPM 3	correlation coefficient	0,478	WIPM 3	correlation coefficient	-0,303
	p-value	0,137		p-value	0,365

Caption: WCPM: number of words read correctly per minute; WIPM: words read incorrectly per minute; %VAS: Visual attentional span tasks.

The results revealed a greater number of correct words per minute in the third reading time compared to the first two times, revealing that the real reading performance of 4th grade schoolchildren is the average of 39 to 40 words per minute and average of fixation of 50% of the characters.

5. Discussion

These findings indicate academic losses due to low reading fluency rate, fewer characters per fixation and lack of relationship between the variables.

The development of reading fluency is essential for schoolchildren, especially when they move from learning to read to reading to learn. To perform any activity automatically, it is necessary to carry out, for example, activities with some properties, such as reading without conscious attention, without effort, with speed and with autonomy (LaBerge; Samuels, 1974). Automatic decoding allows that conscious attention and memory, previously dedicated entirely to the word level, can be used in cognitive processes at the sentence level and in the meaning itself, specifically. (LaBerge; Samuels, 1974).

The schoolchildren in this study had visual-attentional difficulties, which were not related to reading fluency. This finding may be related to the fact that the visual-attentional interval plays an important role in reading acquisition, since it outlines the amount of orthographic information that can be processed at each stage of the reading process (Valdois et al., 2004). A larger VA range encompasses an entire string of letters in a word, allowing each letter to be accurately identified, in parallel, so that the word can also be identified, quickly. The schoolchildren in this study presented 50% of this interval, suggesting a deficit in visual processing capacity, since they were unable to capture the entire visual-attentional interval, resulting in slow decoding (Bosse et al., 2007). Reading practice is necessary for the development of fluency, which will be stagnant and may compromise the student's opportunity to learn academic content, which also consecutively depends on good reading (Rasinski, 2017).

However, it is noteworthy that such findings may have been influenced by the lack of reading practices, aggravated by the pandemic. In the school context, Brazilian education has adopted social distancing and remote teaching, which have led to unfavorable situations for both professionals and families, such as forced digitization, lack of preparation for handling technological tools and greater elaboration and availability of academic rather than social content (Hoofman; Secord, 2021;).

6. Conclusion

These findings indicate academic losses due to low reading fluency rate, fewer characters per fixation and lack of relationship between the variables. Thus, it is important to measure and observe reading performance for schoolchildren from this grade onwards, since the impacts of low reading performance will be reflected in academic performance.

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OUTCOMES OF SLAM WRITING WORKSHOPS FOR HAITIAN STUDENTS AT THE END OF ELEMENTARY SCHOOL

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Abstract

In Haiti, the success rate in elementary school remains very low and the majority of teachers do not have sufficient knowledge of effective pedagogical approaches to writing which leads to demotivation and a low sense of effectiveness as scriptwriters among students. We chose slam as a genre of contemporary and urban poetry (Vorger, 2011) and the workshop device to work on slam poetic writing (Troia, Lin, Cohen and Monroe, 2011), ideal to improve students' writing skills, motivation and sense of effectiveness. The research took place in two primary schools in Port-au-Prince against the backdrop of a socio-political crisis. Twelve facilitators (10 women and 2 men), trained in advance, facilitated the workshops in 13 sessions of 90 minutes each. A total of 61 students aged 12-13 participated in the after-school writing workshops (26 boys and 38 girls). Students completed a questionnaire on their motivation and sense of writing skills before and after the program. A corpus of 41 texts of claimed poetry written by students is the subject of a thematic and linguistic analysis. The results indicate that students benefit from their writing and oral expression skills, self-confidence and empowerment, and that their texts demonstrate a high degree of linguistic creativity and thematic richness. The positive results are consistent with those obtained in other socio-cultural contexts (Patmanathan, 2014) regarding the impact of the writing workshops. They contribute to new knowledge about slam poetry as an appropriate literary genre for young people, even at the end of primary school.

Keywords: *Creative writing workshops, slam poetry, elementary school, Haiti, writing skills.*

1. Background

In Haiti, the success rate in primary school (called basic school) remains very low. In addition, little time is devoted to writing in the classroom which leads to a lack of motivation and a low sense of effectiveness as scriptwriters among students at the end of primary school. Moreover, the majority of teachers do not have sufficient knowledge of effective pedagogical approaches to writing. In fact, writing is little taught and those who practice it do so by copying texts or "classic" writing without any recourse to the effective practices uncovered by the research of recent years (work on the writing process and on motivation, explicit teaching of writing strategies, development of metacognition, critical look at writing, variation in the devices and in the genres addressed, writing and reading workshops, creative writing, frequent feedback on writing, sharing and consultation among peers, etc.). As a result, students accumulate gaps and difficulties in writing and develop a fear of writing in a school context. In addition, teachers are sometimes helpless in the face of their students' difficulties and are sometimes themselves in difficulty with writing and its teaching, due to a lack of training and support.

2. Theoretical Framework and objectives

Haiti is in a situation of diglossia where two languages coexist: Haitian Creole and French. Why using slam? As slam is a genre that admits the possibilities of "code mixing" and "code switching", the choice was made for this kind of contemporary and urban poetry (Boultif, 2017; Vorger, 2011). Also, slam allows to work on oral and written reception and production. It is both the oral and written practice of urban poetry inspired by the daily life of slammers (M. Kelly Smith). It comes from the oral tradition of the American spoken word (Beat generation). It is an integral part of the hip-hop movement in the same way as rap, street dance, tagging and graffiti art (Vorger, 2015). Also, slam is close to the oral

storytelling art of lodyanse well known in Haiti.

This project is innovative because it aims to develop cultural and intercultural competence through creative writing workshops based on Quebec and Haitian works, as well as training in this device. The creative writing workshop is recognized in the scientific literature (Troia, Lin, Cohen and Monroe, 2011) as a way to foster motivation to write and a sense of competence in writing. The creative workshop device is also ideal to work on slam poetic writing to improve students' writing skills and sense of effectiveness.

As the writing workshop represents the ideal device to work on the dimensions and processes of writing, we decided to collaborate in the planning and organization of slam writing workshops and to rely on slammers, poets and authors from both countries, with the aim of training teachers and thus disseminating this approach to writing.

The objectives of the research project in this paper in particular were, at the end of 13 training sessions with students, to: 1) to assess late elementary students' motivation and sense of writing skills; and 2) to enhance their creativity in writing.

3. Methods

The research took place in two primary schools in Port-au-Prince against the backdrop of a socio-political crisis. Because of our expertise in slam writing workshops, the Haitian partners took the initiative to ask us to set up these workshops in two schools that have opened their doors. The collaboration focused on developing a training program for teachers and trainers for primary school students that could be transposed to secondary school students, all in an intercultural context of sharing expertise and resources between Haiti and Quebec.

Twelve facilitators (10 women and 2 men), trained in advance, facilitated the workshops in 13 sessions of 90 minutes each. In order to have representative results for girls and boys, the recruitment in the two voluntary schools allowed us to have a population of girls and boys and to associate them as well as the teachers in order to have mixed writing workshops, which represents a first for the students of the two schools and their teachers. Finally, we chose to work with 6th and 7th grade, because these are the pivotal years that allow the transition to secondary school, which is more demanding in terms of writing and reading in French.

A total of 61 students aged 12-13 participated in the after-school writing workshops (26 boys and 38 girls). Students completed a questionnaire on their motivation and sense of writing skills before and after the program. A corpus of 41 texts of claimed poetry written by students is the subject of a thematic and linguistic analysis. The open-ended questions on the questionnaires and the students' texts were subjected to content analysis using the qualitative analysis software Nvivo 12.

4. Results and discussion

The results indicate that students benefit from their writing and oral expression skills, self-confidence and empowerment, and that their texts demonstrate a high degree of linguistic creativity and thematic richness. Facilitators have seen beneficial effects in the young authors: they have improved their ability to express themselves freely, their mastery of figures of speech and their motivation to write. Facilitators and students would like to see this experience repeated in many schools.

The positive results are consistent with those obtained in other socio-cultural contexts (Patmanathan, 2014; Troia, 2007) regarding the impact of the writing workshops.

5. Conclusions

The results contribute to new knowledge about slam poetry as an appropriate literary genre for young people, even at the end of primary school. In a context of educational reform in Haiti, this project has contributed to a renewal of teaching practices in connection with the reinforcement of reading-writing and the Haitian and Quebec cultural heritages.

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THE POWERFUL AND CONTROVERSIAL STRATEGY OF USING STUDENTS' FIRST LANGUAGE KNOWLEDGE IN FOREIGN LANGUAGE TEACHING

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Abstract

This study explores the extent to which using the students' first language in teaching foreign languages is beneficial, and recommends some successful strategies of putting L1 knowledge to good use. Given that it is widely recommended to avoid the use of L1 in favour of monolingual approaches, that provide complete language immersion, it is especially challenging to define the situations when students' first language can be used as a valuable and beneficial tool to support foreign language learning. Although L1 use is widely discouraged, some researchers suggest that, if used correctly and coherently, it does not hinder, but promotes language learning. In order to establish the extent to which L1 could support foreign language learning, this study sheds light on strategies used during teaching Romanian as a foreign language, aiming to make enlightening connections between L1 and L2, thus exploring the similarities between Romanian and Italian, the mother tongue of the students. The teacher used basic information about etymology, language history and phonetic transformations to explain the connections between words in Romanian and Italian, based on the common Latin inheritance. Moreover, the teacher used brief explanations and informal comments in Italian to build a meaningful relation with the students and create an inclusive, friendly and relaxed environment for language teaching. This comparative linguistics approach was assessed in relation with the results obtained by another class of Italian students, where the teacher made no such linguistic comparisons and avoided use of L1.

Keywords: *L2 teaching, L1 use, comparative linguistics, etymology.*

1. Introduction

Monolingual approaches to language teaching have been acclaimed since the end of the 18th century and have been stealing the spotlight in language teaching, through strategies like the direct method, the communicative language teaching, task-based language teaching (Howatt, 1984). Researchers have argued that extensive use of the learners' target language helps them follow the same learning pattern as in the process of acquiring their own mother tongue (Krashen, 1981), as well as those languages are based on distinct systems, that should not be overlapped in the learning process (Lado, 1957). For such reasons, researchers advocating the avoidance of L1 are adamant on maximal target language exposure (Duff and Polio, 1990; Mori, 2004).

Rarely challenged until recently, the monolingual approach works wonderfully when students come from different linguistic backgrounds. However, researchers have begun to question the exclusive use of L2, particularly when there is a linguistically homogenous group of learners, and to consider the potential benefits (Medgyes, 1994; Auerbach, 1993). Some approaches suggest that learners might be provided with more cognitive support when allowed to strategically use their native tongue, which would enable them to process and analyse language to the benefit of L2 learning (Anton and DiCamilla, 1998; Swain and Lapkin, 2000). Related to L1's usefulness in explaining tasks and classroom management, researchers have reached near consensus, stressing the importance of such a strategy for a thorough understanding of instructions and clarification of directions and rules (Auerbach, 1993; Brooks and Donato, 1994; Swain and Lapkin, 2000). Besides this administrative side of the lessons, there are studies highlighting that providing extensive grammar explanations, correcting errors, checking comprehension and linguistic analysis are areas where L1 could provide consistent and welcomed support for language learning (Atkinson, 1993; Auerbach, 1993). Butzkamm (2003) advocates fervently L1 use as a valuable pedagogical and cognitive tool, meanwhile stressing the emotional advantages resulted from such an approach, reflected in a more confident and less frustrated attitude of the learners. Additionally,

collaborative tasks might benefit from L1 use, as it supports enhancement of language proficiency when wisely allowed (Bloor, Azman, and Ismail, 2014). This finding is in line with the studies that suggest that L1 use has sociocultural benefits, thus supporting group cohesion and creating an inclusive and relaxed environment. “Learners’ first language is seen both as a tool for communication when used in their interpersonal speech with others, as well as a tool for thought in learners’ self-directed intrapersonal speech. In other words, L1 serves both social and metacognitive functions in the SLA process.” (Yaghobian, Samuel, and Mahmoudi, 2017: 38). However, supporters of this method also warn against overuse of L1, which could result in high dependence on L1 (Lantolf, 2000: 87). Consequently, prudent and systematic resort to L1 in foreign language classes, in correlation with the educational objectives, might be a valid method so as to achieve optimal learning of L2.

2. Data collection

This study aims to take researches regarding L1 use in the classroom further, in an attempt to apply the conclusions of the numerous studies mainly focused on ESL to the uncharted territory of Romanian as a foreign language. The data collection has taken place in autumn 2021, during an intensive Romanian language course for Italian students (aged 17 – 20), which aims to take learners all the way to B1 level in two months of lessons, so that learners would pass a linguistic competence exam needed for faculty admission. The study analyses the progress made by two groups of students (15 students in each group) that had simultaneous classes, following the same curriculum and using the same textbooks and audio-video materials. The activity of the students was observed during two weeks of lessons (level A1). The teacher of Group 1 did not speak Italian and applied an L2-only approach, using full language immersion to achieve linguistic skills acquisition. Group 2 had a teacher with medium level of proficiency in Italian, and used the students’ first language in specific contexts, in order to boost language acquisition. The tools used to assess the outcomes of this didactic strategy were: teacher observation sheets, linguistic competences tests, and student feedback questionnaires. The results were processed qualitatively and quantitatively, so as to establish whether a controlled and didactically coherent use of L1 is a good approach to language learning.

3. Educational key points

The teacher of Group 2 defined beforehand the key points where L1 should be employed and set the objectives of the lessons. The approach aimed for a systematic and coherent use of the students’ native tongue, in defined contexts: giving instructions, clarifying classroom routines and rules, making linguistic connections between Italian and Romanian, supporting collaborative tasks, and establishing student-teacher rapport. With regards to linguistic aspects, the teacher chose to focus on a comparative linguistics approach, aimed to stress the similarities and the dissimilarities between Italian and Romanian with respect to: phonetics, vocabulary, and grammar.

In terms of the comparative linguistics approach, we shall briefly review a few examples that would shed light on the teacher’s choice of educational key points. In order to improve pronunciation, phonetic rules were presented in relation with their Italian correspondents: the identical pronunciation between the Romanian group of letters *ci, ce, che, chi, ge, gi, ghe, ghi* and their Italian counterparts, the phonetical correspondence *t* (Ro) – *zz* (It) and *ș* (*ro*) and *sc* (*it*). For vocabulary, the teacher chose to use images, mime and context to render meaning, avoiding translation and confirming whenever students could identify by themselves the correct L1 correspondent. Moreover, to support learning and enable students to make linguistic connections, the teacher presented a set of etymological rules that are consistently observed in the formation of the two languages, tracing the roots of the words back to the Latin roots. L1 was also used by the teacher for brief explanations, classroom management, small comments aimed to create cohesion and build a relaxed and friendly environment, and discussions on cultural aspects related to customs, habits, cultural symbols and sharing memories and funny stories.

4. Results

The teachers’ observation sheets have shown that students were highly responsive to the comparative presentation of L1 and L2 and have even shown a keen interest for etymological comments, especially since some of them had previously studied Latin. Words whose meaning was explained contrastively, in connection to Italian, were better remembered, as revealed in the recapitulative sections of the lessons and test results. While the teacher from Group 1 noted that the L2-only environment was sometimes met with frustration and could not prevent L1 conversations between the students, the 2nd Group teacher noticed a high interest for intercultural discussions and for the common Latin inheritance. Furthermore, Group 2 teacher considered that interpersonal use of metatalk about assignments was effective, given that more proficient students managed to mediate their colleagues’ learning of L2 through

L1, which resulted in a better involvement of all students in the learning process and in increased confidence and motivation.

After the first two weeks of studying Romanian, students took a test which assessed their linguistic competences: listening, reading and comprehension, vocabulary, grammar and speaking. The results obtained by the two groups were compared and associated with the student satisfaction questionnaire and teacher feedback. The comparison revealed that the performance of the students in Group 2 was better. Thus, the overall score obtained by Group 2 after the written and oral test comprising all linguistic competences was higher by 24%. Another important finding is that a thorough analysis of the typical errors made in writing or speaking led to the conclusion that pronunciation, vocabulary and grammar knowledge were improved through the appeal to L1, given that students in Group 2 made fewer mistakes in the use of the notions that were approached contrastively.

The student satisfaction questionnaire was aimed to assess overall perception of the students on the effectiveness of the lessons and on the classroom dynamics and also inquired about the learners' perception on the use of L1 or lack thereof. The overall satisfaction score was higher by 28% in Group 2. The questionnaire for Group 2 was enriched with additional items aimed to evaluate how students viewed the use of L1 in three specific areas: clarifications and task completion, comparative approach of phonetics, vocabulary and grammar, and classroom interaction. All students found that task completion was easier when the teachers' explanations also used L1. When asked to define classroom interaction, students from Group 2 described the learning environment as inclusive, relaxed, and engaging. Nevertheless, regardless of how promising the results of the data analysis might be for L1 use, it is important to also stress that language learning has surely been impacted by other factors that could not be quantified: the teacher's skills and personal style, and group dynamics.

3. Conclusions

Starting from the assumption that L1 use in foreign language learning can be beneficial, as numerous studies have previously shown, if used methodically and in line with the educational objectives, this study examined the extent to which the use of Italian, the students' native tongue, is valuable in learning Romanian language. L1 was used only in carefully defined contexts, so as not to run the risk of students becoming overly dependent on L1 and of unnecessarily diminishing linguistic exposure to L2. The findings show that the students' progress has been consistent and significant, and that the comparative linguistics approach resulted in a better acquisition of all language skills and was met with enthusiasm. Moreover, task completion and classroom interaction were at optimal level, and learners considered that the educational environment was encouraging, inclusive, and felt that their needs were adequately met by the teacher's bilingual approach.

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‘KIDS THESE DAYS!’ A META-ANALYSIS OF CHANGES OF ATTENTION PROBLEMS IN REPRESENTATIVE SAMPLES OF CHILDREN

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Abstract

It is a common belief that the attention of new generations of children is in decline (Protzko & Schooler, 2019). However, such devastating claims about new generations are challenged when inspecting the evidence (Protzko, 2020). The current meta-analysis aimed to explore comprehensively whether attention problems have increased, decreased, or remained unchanged among children over the past decades. Findings allow us to determine whether there has been any problematic development of attention among children.

Studies that used the Child Behavior Checklist (CBCL) with representative samples of 1.5-14 year-old children were systematically searched in multiple databases (i.e., Web of Science, Scopus, Google Scholar, PubMed). Informants varied between studies (i.e., teachers, self, parents), but parent-reported data was dominant.

Preliminary results from the meta-regression analysis of raw scores from 22 studies showed no change in reported attention problems over the past decades ($b_{year} = -0.009$, $p = .72$; 95%CI = -0.06 to 0.04). However, when mean age of children was analyzed in interaction with the year of data collection, we found that attention problems have increased with age over the past decades ($b_{year \times age} = 0.007$, $p = .01$; 95%CI = 0.002 to 0.011). When analyzing the percentage of maximum possible scores from the same 22 studies, there was an increase in reported attention problems over the past decades for all children ($b_{year} = 0.4493$, $p = .03$; 95%CI = 0.03 to 0.87), regardless of age ($b_{year \times age} = -0.0022$, $p = .35$; 95%CI = -0.07 to 0.02). These findings show that attention problems among children are increasing, and school-aged children might be especially at risk. A possible explanation of these results might be that children usually spend more time on screen from year to year (e.g., surfing on the internet, playing online games, using social media, media multitasking) which might have had a negative effect on their attention regulation skills in the last decades (Moisala et al., 2016; Rideout et al., 2010).

Keywords: *Meta-analysis, attention problems, children, mental health, representative samples.*

1. Literature Background

Attention problems are often experienced among children in both educational and clinical practice (Koch, 2016; Närhi et al., 2017; Schonert-Reichl & Lawlor, 2010). Although, inattention can be a typical and age-appropriate sign of immature self-regulation among children and adolescents, it is a common belief that the attention of new generations of children is in decline (Protzko & Schooler, 2019, 2022). It is conceivable that the commonly used term ‘Kids these days are more inattentive!’ is not necessarily based on objective data, but on subjective beliefs. Such subjective beliefs can be erroneous because of a memory bias in which people tend to project their current qualities onto the youth of their past, and also the tendency that people easily notice the limitations of others in something they have already mastered (see Protzko & Schooler, 2019).

Interestingly, contrary to the belief that new generations decline, a previous meta-analysis found that children’s ability to delay gratification, measured by the famous ‘Marshmallow Test’, has actually improved over the past few decades (Protzko, 2020). This means that children today can resist rewards for a longer time than they did 50 years ago, which might be mainly due to an increase in intelligence caused by the number of years children spend in education, an improvement in the living standards of families, and an increase in parents level of education. Along with these positive changes in self-regulation, one might think that attention problems decrease. However, there have been certain

changes in our environment and habits over the last decades which could have negatively affected our attention and cause an increase in attention problems.

From the growth of digital devices and information technology becoming an integral part in the lives of people, our environment and habits have incrementally changed. Reports from all over the world state 70-80% of the 5- to 16-year-olds have internet access in their own room, own a smartphone, and spend 3-3.5 hours per day gaming, using social media, and/or watching videos (Childwise, 2020; Konca, 2021; Pew Research Center, 2020). Furthermore, interactive touchscreen devices have become key components of young children's lives as well, having their first experience with this technology before the age of two (Dardanou et al., 2020). Digital devices can offer a lot of educative benefits—but they can also be harmful, depending on children's individual characteristics and the context in which use occurs (Vedechkina & Borgonovi, 2021). Generally, excessive passive screen time has been reported to have many potential adverse associations among children, such as sleep disturbance (Lissak, 2018), stress (Khan, Lee & Horwood, 2022), attention problems (McDaniel & Radesky, 2018), internet/gaming addiction (Montag & Elhai, 2020).

Based on these previous findings, we could not assume if attention problems would increase, decrease, or stagnate over time, as all possibilities appeared equally likely. No meta-analysis regarding cross-temporal changes in children's attention problems has been performed thus far. Hence, the purpose of the present meta-analysis was to thoroughly examine the validity of the 'kids these days' effect by exploring whether attention problems have increased, decreased, or stagnated among children over the past decades.

2. Methods

A systematic search was conducted in multiple databases (i.e., Web of Science, Scopus, Google Scholar, PubMed) to identify studies to be included in the meta-analysis, as part of a larger meta-analysis studying the reported changes in behavior problems in the last decades. We chose a classical measure of behavior problems, the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983), which has been used to measure such problems reported by the parents, teachers, and children themselves for approximately 50 years. Our inclusion criteria for the current study were: (i) the study used the Attention problems subscale from the CBCL as an outcome measure and reported the raw means (M) and standard deviation (SD); (ii) all children in the sample were 14 years or younger; (iii) the sample of the study was representative or population-based. Studies were excluded in case the sample was an atypically developing subsample derived from a representative sample.

Each included study was coded for CBCL Attention problem subscale raw M and SD, sample size, country of data collection, mean age of children in the sample, and year of data collection. In case the year of data collection was not reported, studies were coded as collected two years prior to publication year. Coding was done by two independent coders (lead author and research assistants). POMP (Percentage of Maximum Possible Scores) scores and standard deviations were calculated from raw M and SD because the earlier and older versions of the CBCL had different maximum points.

3. Results

Preliminary results from the meta-regression analysis of raw scores from 22 studies showed no change in reported attention problems over the past decades ($b_{year} = -0.009$, $p = .72$; 95%CI = -0.06 to 0.04). However, when mean age of children was analyzed in interaction with the year of data collection, we found that attention problems have increased with age over the past decades ($b_{year \times age} = 0.007$, $p = .01$; 95%CI = 0.002 to 0.011), meaning that older children were reported to have an increasing tendency in attention problems from 1983 until 2017. When the POMP (percentage of maximum possible) scores were analyzed from the same 22 studies we found that attention problems significantly increased with the year of data collection over the past decades ($b_{year} = 0.4493$, $p = .03$; 95%CI = 0.03 to 0.87) regardless of children's age ($b_{year \times age} = -0.0022$, $p = .35$; 95%CI = -0.07 to 0.02). These results mean that children are reported to have an increase in attention problems over time, and school-aged children might be at risk for such problems. It is important to note, that informants varied between the 22 included studies (i.e., teachers, self), but parent-reported data was overrepresented.

4. Discussion

Findings of this cross-temporal meta-analysis showed that attention problems have increased among children from the 1983 until 2017. A possible explanation of these results might be that children usually spend more time on screen from year to year and usually engage in digital multitasking which

might have affected their attention regulation skills in the last decades (Rideout et al., 2010). Findings of this meta-analysis are somewhat in contrast with the increasing ability to delay gratifications (Protzko, 2020). However, in this previous meta-analysis only studies with children under 10 years were included. Even though attention seems negatively affected, it seems that other processes such as delay of gratification may be spared or even benefit. Future research is required about the direct and longitudinal effects of digital devices and information technology on children's attention, considering children's individual characteristics and the context usage occurs.

Moreover, findings highlight the need for interventions, such as mindfulness, to support children's attention regulation skills.

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INTEGRATED MODEL OF MATHEMATICS PROBLEM SOLVING ADAPTED TO A STUDENT WITH AUTISM SPECTRUM DISORDER

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Abstract

Mathematics problem solving is one of the main axes of mathematical activity and is the cornerstone of mathematics education, so it should be the main source and support of learning throughout Primary Education.

Caballero et al. (2009, 2016, 2020) y Blanco et al. (2015) presents an Integrated Model of Mathematics Problem Solving (IMMPS) that integrates cognitive and affective aspects. The efficacy of this model has been empirically contrasted in teachers in initial training (Caballero et al., 2011, 2021; Blanco et al., 2013), wondering if it would be equally valid in students with certain learning difficulties.

That is why in this proposal we present an intervention carried out around Mathematics Problem Solving with a student in the first year of Primary Education with Autism Spectrum Disorder. In this proposal, the Integrated Model of Mathematics Problem Solving (IMMPS) has been adapted to this type of disorder. IMMPS is composed of five phases in which emotional management techniques and heuristics for Mathematics Problem Solving are integrated.

It is a single case study, where the subject of study has been selected through a non-probabilistic discretionary or judgmental sampling.

The conclusion is that the student is able to carry out a more elaborate and complete process of Mathematics Problem Solving, using different heuristics. However, they do not put into practice the techniques of emotional control in the face of nerves or blockages arising in the resolution of Mathematics Problem Solving.

Keywords: *Autism spectrum disorder, primary education, mathematics, problem solving, learning disabilities.*

1. Introduction

Mathematical problem solving (MPS) is one of the areas in which students may mainly encounter difficulties (Baroja et al., 1991).

Cueli, García, and González (2013) indicate general principles for teaching mathematics to students with learning disabilities: precise sequencing of content, student involvement, concrete feedback, emphasising prerequisite skills, explicit instructions in self-regulation in the use of strategies and the use of self-instructions and self-questioning in problem solving, Tárraga (2011) recommends the following procedures: teaching sequences of cognitive and metacognitive strategies (different phases in which a problem can be solved and the strategies which can be used for each one); identification and elaboration of schemas underlying the problem: understanding the type of problem, understanding that they first have to identify the data, then establish the relationships between them, translate them into mathematical language and operate and analyse whether the result is adequate; teaching problem solving with the support of manipulative materials and then translating it into the abstract language of mathematics.

On the other hand, some authors such as Juidías and Rodríguez (2007) propose that a solution to the language problem would be to show the statements through drawings in order to overcome difficulties generated by language. We consider that all this is included in the IMMPS and that it is necessary to adapt it to students with Autism Spectrum Disorder (ASD) and to use pictograms to apply the last of the recommendations indicated. The IMMPS (Caballero et al., 2016) comprises five phases in which activities for emotional management are integrated, such as self-instructions and muscle relaxation and breathing techniques, and heuristics for Mathematical Problem Solving (MPS) (Caballero, 2020). The efficacy of this model has been empirically contrasted in teachers in initial training (Caballero et al.,

2011, 2021; Blanco et al., 2013), wondering if it would be equally valid in students with certain learning difficulties.

The elaboration of self-instructions must be carried out through pictograms that indicate to the student, before starting the resolution, that he must be calm and think that he/she is going to do well and succeed. During the process, the images will indicate that he will be calm and concentrated and that he will count to ten if he gets nervous. Finally, after solving the problem, he must be happy, not angry and calm.

Regarding relaxation and breathing techniques, Jacobson's progressive muscle relaxation (Schwarz and Schwarz, 2017), diaphragmatic breathing and relaxation games of the Rejoue method (Nadeau, 2007) are used. As for the heuristics, they will also be presented through pictograms that the student will select and paste next to the problem being carried out to internalize the process. These pictograms, in phases, indicate the following aspects:

1st phase: Read, circle (the data), draw, order (the data) and think about what it asks us.

2nd and 3rd phases: Solve the problem and write (or fill in) the solution.

4th phase: Analyzing the process with pictograms of "right or wrong" and "correct or incorrect".

5th phase: Emotional appraisal. For the application of the IMMPS, specific visual mathematical problems were posed for the training of the different phases of the aforementioned resolution model.

2. Objective

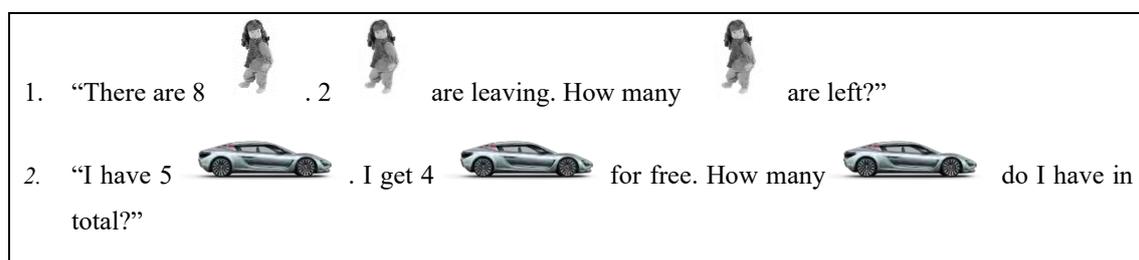
The aim of this paper is to assess the suitability of IMMPS with students with Autism Spectrum Disorder (ASD).

3. Method

It is a single case study, where the subject of study has been selected through a non-probabilistic discretionary or judgmental sampling. The pupil is six years old, in the first year of Primary Education and is diagnosed with ASD; he has associated attention deficit and impulsivity and his communication is very basic. He knows many of the basic mathematical concepts, although the higher the level of understanding or abstraction, the greater the difficulty. Recognizes spelling up to 100, makes series of two and three elements and knows geometric shapes (square, rectangle, triangle, circle and rhombus). Begins to order temporal sequences of three images and to associate pairs of given elements. He also carries out numerical serialization, basic addition and subtraction operations and problem solving. The latter must be very graphic. At the communicative level, he shows reduced intentionality and uses gestural and verbal communicative strategies in response to needs that arise. In the motor aspect, he has an autonomous gait, very good general dynamic coordination, he is very agile and with marked motor activity. In fine motor skills, there are difficulties in visual-motor coordination.

For both the initial and the final assessment, the student was presented with the two mathematical problems shown in Figure 1.

Figure 1. Problems posed for initial and final assessment.



The solving of these problems was assessed through student productions and an observation scale.

4. Results

An improvement in mathematical problem solving and in autonomy in carrying out this process is observed. There is also an improvement in self-confidence, self-concept as a problem solver and emotional control. Thus, the student's nerves and frustration disappear and there is an improvement in his or her concentration and attitudes towards the MPS. In addition, in the final assessment, the pictograms are dispensed with MPS.

5. Conclusions

The IMMPS is suitable for students with ASD and they can acquire the different phases of the model as long as they are adapted to their characteristics.

Acknowledgments

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MIXED REALITY TOOLS FOR EDUCATION IN THE METAVERSE

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Abstract

Education needs to adapt to the constant changes of society and integrate modern technologies to enhance the process of teaching and learning. The recent Covid 19 pandemic has generated a shift towards digital education, as most educational institutions were forced to temporarily suspend all physical activities. The transfer and absorption of knowledge suffered greatly from this, especially in the underdeveloped countries where the infrastructure is limited. Nevertheless, the current crisis has paved the way for digital campuses, online classrooms and digital teaching platforms. In this article we briefly present several free tools that educators can adapt and use to create a virtual classroom based on mixed reality (XR) technologies, along with the main XR hardware (such as Oculus Quest, Hololens 2). We also share insights on how a virtual classroom can increase student participation and engagement, and how we envision the future of digital classrooms and their potential in the Metaverse.

Keywords: *Education, mixed reality, tools, Metaverse.*

1. Introduction

Metaverse is a digital world that aims to enhance our experience in the real world. The Metaverse can be defined as an imagined world with immersive digital spaces, ensuring the extension of synchronous communication for a significant number of users who can share different experiences (Akour, 2022). The integration of the physical and virtual worlds requires a synergy between different modalities to design the tridimensional spaces, the development of smart non-player characters (NPC), as well as customizable player characters (avatars) (Zhao, 2022).

As people enjoy their connection to the virtual world through the Metaverse, its potential as an educational tool for learning comes to light. Digital classrooms in the virtual world Metaverse have seen a dramatic increase over the past years in educational institutions and organizations around the world adopting this technology for classroom training or virtual conferences. The inclusion of extended realities, mainly virtual reality (VR), augmented reality (AR) and mixed reality (MR), in the learning process offers students opportunities and enhanced virtual experiences (Estrina, 2021). The learning activity of virtual classrooms is based on the collaboration of students, which takes advantage of its ability to allow easily bring together a relatively large number of people in a carefully designed environment in order to promote inclusiveness, openness and safety. Through virtual classrooms, students can learn about and practice some activities that are hard to conduct in a real-life classroom due to limitations in time, location, weather, and safety. For example, students can have access to simulations, conduct field experiments and tests, and perform virtual observations through virtual laboratories.

Also, the role of the educator will be transformed, it will become more complex in the sense that it must be up to date with new technologies and manage technological tools, to teach students how and when to use them (Scarlat, 2020), how to integrate them into the learning process, and how to adapt the existing teaching practices and teaching materials to these technological tools to enhance their learning process. The teacher becomes a facilitator of learning, an information broker to share knowledge, providing students with skills, methods, tools, and processes to deal with technology and enhance the interaction and learning.

In this paper, we briefly present several free tools that educators can adapt and use to create a virtual classroom based on mixed reality (XR) technologies, along with the main XR hardware. We also share insights on how a virtual classroom can increase student participation and engagement, and how we envision the future of digital classrooms and their potential in the Metaverse.

2. Mixed reality platforms for collaboration

The ability to communicate and collaborate in real-time has allowed our society to minimize the impact of the travelling restrictions imposed by COVID-19. The main platforms which were used for 2D virtual meetings are Zoom, Teams, Cisco Webex, Google Meet. However, these are limited and greatly affect the process of teaching and learning. Therefore, we propose the use of 3D virtual platforms that educators can adapt and use to create custom environments that can be explored with a variety of devices, from smartphones and tablets to virtual and augmented reality glasses. In Table 1 we present a list of free collaboration platforms that allow users to meet in the same virtual space and participate in training or educational activities (Diaz, 2020). For each tool, we highlight the main features, such as: device compatibility, the number of people who can connect at the same time to the same virtual space, and two other features that affect the feeling of immersion: 3D spatialized audio and customizable avatars.

Table 1. Mixed reality tools for education in the Metaverse (VR collaboration platforms).

Name	Device availability	No. of users	Spatialized audio	Customizable avatar
Alcove	Oculus Go, Quest 1, Meta Quest 2	up to 4	N/A	N/A
AltSpaceVR	Vive HTC, Oculus, Windows Mixed Reality, Desktop mode	up to 50 avatars per space	yes	yes
Horizon Venues	Oculus Quest 2	N/A	yes	yes
Horizon Worlds	Oculus Rift S, Oculus Quest 2	N/A	N/A	yes
Microsoft Mesh	HoloLens 2, VR Headsets, PCs and mobiles	max 8 concurrent users	yes	yes
Mozilla Hubs	all major VR platforms, as well as non-VR devices	a maximum capacity of 25 people in-room	yes	yes
NeosVR	Oculus Rift, Oculus Rift S, Oculus Quest with Oculus Link, Oculus Go, Pimax headsets, HTC Vive, Valve Index, and Windows Mixed Reality headsets	as many avatars as the local pc or cloud storage	yes	yes
Rec Room	Microsoft Windows, PlayStation 4/5, Oculus Quest 1/2, iOS 12.0 and up, Android 7.1 and up	up to 40 per room	yes	yes
Spatial	Oculus Quest, Oculus Quest 2, Mobile (iOS+Android)	up to 50 users in a room	yes	yes
VRChat	Oculus Rift, Oculus Quest, HTC Vive, Windows Mixed Reality, desktop mode	up to 16 players in a hub	yes	yes
vTime XR	Oculus Go, Google Daydream, Samsung Gear VR, Google Cardboard, Oculus Rift, Windows Mixed Reality, iOS, Android	N/A	yes	yes
OpenSimulator	Multi-platform	over 60 simultaneous users	N/A	yes

There are several XR headsets on the market that can be used in the classroom, however the Meta Quest 2 is the most promising and most popular. Its key points are the accessible cost and reasonable quality, but also the fact that it is standalone, which eliminates cables and the need for a VR-ready computer. The immersion is enhanced by the hand tracking function, thus students can interact with the virtual elements without the need for a dedicated controller. Other popular VR headsets are: HP Reverb G2, HTC Vive Cosmos, HTC Vive Pro 2, Samsung Odyssey+, Sony Playstation VR, and the Valve Index. Although a completely virtual scene can offer more flexibility and visual effects, in some situations a see-through headset (or augmented reality headset) is more suited. First of all, the risk of motion sickness is greatly reduced, as well as the risk for injuries caused by sudden, uncontrolled reactions of the user. The most promising devices are the HoloLens 2, Magic Leap 1 and Nreal Light HoloLens 2, Magic Leap 1, Nreal Light, Snapchat Spectacles, and Vuzix Smart Glasses.

3. The future of digital classrooms

In the context of a modern and transformative society, it is obvious that education needs to adapt and integrate new tools that will allow teachers to create rich, interactive, inclusive, and engaging educational environments. The COVID-19 pandemic has forced a change from the physical to the digital

classroom for which many educators and students were not prepared and did not have the necessary knowledge and infrastructure. Although there were many negative effects of the imposed digitalization (Tadesse & Muluye, 2020), the lessons learned after almost 2 years of online education can be used to create a roadmap to virtual classrooms that are better designed to accommodate teachers and students alike. The Metaverse is considered to become an important aspect of Education 4.0, a concept that illustrates the shift to education in the Industry 4.0 era (Salmon, 2019).

It has already been shown that virtual worlds have the potential to improve learning, collaboration, motivation, and overall performance of students (González, 2013). In this sense, a new concept has emerged that revolutionizes the world of higher education, offering new teaching and learning methods: the virtual campus (Neoma). These 3D immersive environment platforms allow teachers and students the possibility to connect with each other, to socialize and to participate in different conferences, trainings, and interactive meetings. Also, students become active participants and acquire a certain amount of independence since they can be anywhere at any time. Moreover, they can be part of different events or locations without the need to attend all of them and all the materials and devices required to access the virtual classroom are at the user's disposal. Thus, the educational experience is completely individualized, and students acquire and improve skills and knowledge in their own time.

4. Conclusions

In the perspective of new technologies, the virtual participation in a classroom will be as effective as the physical presence or will even exceed it in some respects: deeper and lasting knowledge, telepresence, no geographical restrictions, and so on (Mystakidis, 2022). Thus, teaching and learning is taking another step forward and this is the scenario where the interaction between students, teachers and other learning-facilitating entities are all connected. In this scenario, students acquire and learn by interacting with each other, while teachers learn to better manage their work.

Acknowledgements

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DIDACTICS FOR STATISTICAL DEVELOPMENT IN PRIMARY EDUCATION

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Abstract

Didactics is a concept which leaves space for the learner's thinking not to be interrupted, and that unnoticed takes a good direction (Tierno Galván, 1986). With this in mind, this panel presents two instances in which didactics have contributed to the statistical development of fifth and sixth year primary school pupils. On the one hand, the methodological and didactic orientations of an implemented statistical proposal are detailed; in this block, didactic principles to be taken into account for statistical improvement in primary education are indicated. On the other hand, data on the results obtained after the didactic proposal are presented; data on the graphic reading developed and the mathematical language used in the communications will be presented. This panel provides significant data derived from a more complete investigation in which 312 primary school pupils participated, and where a quasi-experimental study with a control group was carried out.

Keywords: *Didactic statistics, statistical literacy, primary education, mathematical teaching.*

1. Introduction

Statistics in today's society are of great importance. On a daily basis, their presence in the media and other spaces leads citizens to implement comprehension strategies in order to extract the information proposed. The graphs that appear in newspapers or television programmes serve as verbal and numerical photographs of reality, a reality that needs to be interpreted (Kosslyn, 1985). The educational proposals around the world of statistics try to lead to an improvement in statistical literacy, with comprehension and graphic reading being key to this literacy. The present study is part of a wider area of research, where different variables related to statistical communication are analysed. In this paper we present the main didactic lines developed in the didactic proposal "Little Brokers" for statistical improvement in primary education and the results obtained in graph reading and mathematical language.

We understand graphic reading to be the ability of readers to interpret the meaning of graphics created by others or by themselves (Fiel, Curcio and Bright, 2001; Curcio, 1989). We consider four levels of graphic reading, the passage from one level to another being a complex process. The first level is data reading, which translates into a literal reading of the data on the graph. Next, level two is reading between data, where connections are established between the data. Reading behind the data is the third level, where the reading is advanced. Reading beyond the data goes beyond critical appraisal, and the processing and conclusions drawn lead us to point to an important reading and understanding of the statistical information.

Analysing the graphic reading level of primary school students and developing training plans thereon is important since, as indicated by different studies (Guimaraes, 2002; Pagan, Leite, Magina and Cazorla, 2008; Evangelista, 2013 or Cruz, 2013), there are aspects that can be enhanced. These studies indicate that, generally, at this educational stage students are in the first levels of reading when they work with graphics. This research coincides with other studies related to the didactic and methodological proposals that are carried out in the classroom (Díaz Levicoy et col, 2015; 2016; 2016; 2018; 2020). Furthermore, the studies agree that there are other conditioning factors in the development and outcome of graphic reading, such as teacher training and approach (Alsina, 2020; 2021) or the type of graphic chosen.

Regarding mathematical language, it should be highlighted that communications based in graphical data require elements specific to statistics. A correct development of the particular mathematical language will help with the accuracy of the communication. The concepts worked on in class take on meaning when they are used in a communication to explain and argue the interpretation of the graph presented. In the present study, this variable is assessed through the statistical-mathematical language and terminology used by the students. This language coincides with that proposed in the Fifth and Sixth Grade primary school curriculum: terms such as mean, mode, variables, or trend, among others. The assessment of these terms is based on a quantitative approach.

2. Design, objectives, and methods

This research was carried out using a quasi-experimental pretest/posttest design with a non-equivalent control group with a sample of 312 primary school pupils. In the experimental group, the didactic proposal "Little Brokers" was developed.

The elements of this didactic proposal are varied, highlighting the change in the educational purpose of the statistics block. The first aspect is the methodological one, based on PBL (Project Based Learning) through ten sequenced sessions organised with the aim of improving statistical communication. Throughout these sessions, we worked on statistics using oral and written expressive resources, which represents an important variation to the traditional methodological proposals of constructing graphs and statistical-descriptive calculations.

Conversely, the theme of the proposal was financial. The economic and financial topic appears subtly in the curriculum in the subject of social studies. The graphs that are traditionally worked on in primary school are decontextualised, despite the fact that dealing with graphs with real data brings importance and significance to didactics (Rodríguez-Muñoz, Alsina, 2020) and despite the curricular indications in this sense.

The most important component of the "Little Brokers" approach is the inclusion of uncertainty and variability in the classroom. Generally, mathematical didactics is associated with concrete, closed and exact answers. In my opinion, valuing the subjective component has been key to the performance of the proposal. The presentation of a graph can go hand in hand with the analysis and communication of the maximum or minimum values presented. The communication of ideas is very open and connections can be made between values, sharing and communicating a part of the graph, even predicting the trend of the scores reflected in the graph. The materials worked on led to this type of interpretation. Specifying the curriculum proposal in communicative educational actions, Alsina (2000) indicates that the manuals offer a potential curriculum proposal, halfway between the official regulations and the dispositions, ideas and beliefs that teachers develop through the hidden curriculum.

Before starting the didactic proposal presented, the data obtained in the study sample indicated that it was necessary to intervene. Of the total population, only six students used a mathematical term in their communications. In addition, the level of Graphic Reading was 1.27, a level close to the first level of classification, which was identified as Data Reading.

3. Discussion and conclusions

The results show that the "Little Brokers" proposal produces a statistically significant improvement in Reading Graphs and in the development of accurate communications derived from a significant advancement in the use of Mathematical Language.

There are no research results related to writing in maths. Financial education has not been worked on in this line.

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TRAINING OF EDUCATION PROFESSIONALS WITHIN THE FRAMEWORK OF THE SUSTAINABLE DEVELOPMENT GOALS (SDG)

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Abstract

Faced with the current diverse and complex realities, this contribution includes the international and national bases that establish the conception of inclusive education today to train education professionals. From the International Convention of Persons with Disabilities (UNESCO, 2006); the World Education Forum (2015) in which the Incheon Declaration (Korea) was approved; the Sustainable Development Goals (SDGs) and the 2030 Agenda, together with the Declaration and the Convention on the Rights of the Child (1989), documents that establish inclusion, equity and access to quality education with impact on learning outcomes, from a lifelong learning approach.

The European Agency for Inclusive Education and Special Needs (2015) promotes the improvement of students' educational opportunities, taking as principles the equity, effectiveness, efficiency and increasing the success of all interested parties (students, families, education professionals and community representatives).

In our context, Organic Law 8/1985, regulating the right to education, develops the Constitution, initiates the guarantee and recognition of the right to a basic education that guarantees comprehensive training and allows the full personality development, looking for a quality education for all students. Organic Law 2/2006, on education (LOE) and its recent modification (Organic Law 3/2020, LOMLOE), collects educational equity.

For this reason, we start from the contents of the subject we teach on inclusive education, together with the methodologies used (cooperative learning, Universal Learning Design, diversity of motivations, teaching methodologies and Sustainable Development Goals -SDG-), with the aim of training to our students as future professionals in the face of changing, diverse and complex realities.

Keywords: *Inclusive education, initial training, education professionals, diverse and complex realities, Sustainable Development Goals (SDG).*

1. Introduction

Faced with the current diverse and complex realities, this contribution includes the international and national bases that establish the conception of inclusive education today to train education professionals. From the International Convention of Persons with Disabilities (UNESCO, 2006); the World Education Forum (2015) in which the Incheon Declaration (Korea) was approved; the Sustainable Development Goals (SDGs) and the 2030 Agenda, together with the Declaration and the Convention on the Rights of the Child (1989), documents that establish inclusion, equity and access to quality education with impact on learning outcomes, from a lifelong learning approach.

The European Agency for Inclusive Education and Special Needs (2015) promotes the improvement of students' educational opportunities, taking as principles the equity, effectiveness, efficiency and increasing the success of all interested parties (students, families, education professionals and community representatives).

Education must be linked to social problems and reality, from approaches such as equity, educational quality, democracy, citizenship, participation, environmental problems and sustainability. The training of our students and the service to the community must continue using the social networks, platforms and applications that we have.

The Sustainable Development Goals (SDGs), link global needs with participation and education (SDG 4), and through the key cross-cutting skills to achieve all the SDGs for this, the Service-Learning

(SL) methodology can collaborate with the service function of the University to Society, since it links the educational and the social with the idea of providing changes and improvements to the community.

In our context, Organic Law 8/1985, regulating the right to education, develops the Constitution, initiates the guarantee and recognition of the right to a basic education that guarantees comprehensive training and allows the full personality development, looking for a quality education for all students.

Organic Law 2/2006, of May 3, on education (LOE) and its recent modification (Organic Law 3/2020, LOMLOE), collects educational equity, and from the principle of inclusion, guarantees the development of all people and favors the equity and quality of education for all student body. In the Valencian Community, Decree 39/1998 stands out, for the management of education for the attention of students with special educational needs; Law 11/2003, of the Generalitat, on the Statute of Persons with Disabilities; Law 8/2017, of the Generalitat, on the recognition of the right to identity and gender expression in the Valencian Community; the Valencian Plan for Inclusion and Social Cohesion, and Decree 104/2018, which develops the principles of equity and inclusion.

For this reason, we start from the contents of the subject we teach on inclusive education, together with the methodologies used (cooperative learning, Universal Learning Design, diversity of motivations, teaching methodologies and evaluation systems and instruments), with the aim of training to our students as future professionals in the face of changing, diverse and complex realities.

2. Methods

Qualitative sociocultural, participatory and dialogic methodology, Action-oriented Transformative Pedagogy, to achieve training in inclusive education as a fundamental area in the professional performance of future pedagogues. We start from the knowledge of pedagogy students, from a questionnaire on the subject, 50 students in the subject Social Pedagogy. Through a training process, it is intended that students acquire the foundations of inclusive education, establishing the relationship between the subject matter of study and their professional task. Among the tools, research procedures, we highlight the questionnaire, the field diary, the record of theoretical-practical sessions, and the content analysis of international legislation and reports (UNESCO, 2017). Training is carried out in different theoretical-practical sessions on fundamental concepts, reflection of basic international and national documents and reports, and application activities, including Service-Learning (ApS). Finally, the students answer the questionnaire again, observing the differences found, verifying that the learning has been carried out was raised.

3. Results

Inclusive training is essential to achieve professionals committed / involved with the aspects of equity, educational inclusion and education for all. It is necessary to establish measures for the protection and training of people and groups that are in a situation of greater vulnerability and at risk of educational and social exclusion.

4. Conclusion

To educate in diversity is to recognize that each student has unique needs that may require support at different levels of breadth, intensity and duration. Inclusive centers require the application of multiple resources of a different nature, functional, organizational, curricular or personal, to address situations in which the recipients require some type of support, temporarily or throughout their training. We are faced with a group of quite heterogeneous university students, with complex characteristics where there is a great diversity of learning rhythms and lacks important study habits. Collaborative learning is presented as an effective alternative for this. The final results of the questionnaire show that the students have achieved the stated objectives.

The training of education professionals is a priority to achieve the aforementioned objectives, encouraging reflection on equal opportunities in access, permanence and promotion, forming in the adoption of educational intervention actions necessary to respond to their needs, in collaboration / coordination with all the necessary socio-community resources, developing policies of inclusive education, which start from the principles of universal accessibility that are reflected in adequate / effective and efficient educational intervention actions for the educational achievement of all in non-discrimination and full participation.

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TRAINING IN OPEN SCIENCE FOR PHD STUDENTS: THE STUDENTS' PERSPECTIVE

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Abstract

Studies in recent years from around the world have shown that between 15 to 50% of PhD graduates go on to work in Higher Education (depending on the cohort studied and how “work” is defined). These figures have led to the “PhD crisis discourse” (Cuthbert & Molla, 2015). A key feature of the PhD crisis discourse is that universities are producing too many PhD graduates compared to the number of academic jobs available, and that graduates lack skills that render them employable in jobs outside academia. Thus PhD education has been moving towards a pro-skills development agenda, with a particular focus on transferrable skills. This poster presents work undertaken as part of an EU funded project – “Opening Doors”. The goal of this project is to shape more innovative, socially aware and integrative research graduates, ready to meet the challenges of the future through a training module in Open Science - the design of which was informed through stakeholder interviews and a co-design workshop. This was a for-credit, online, interdisciplinary, intersectoral and international learning experience that consisted of challenge-based learning with external organisations, lectures and activities about open science and open innovation, and included facilitated work on career planning. Course participants were invited to take part in entry and exit interviews and submitted a written reflection at the end of the course. Their perspectives on this training are presented here where issues around career prospects, communication in collaboration and a new understanding of impact were to the fore.

Keywords: *Open science, PhD education, research impact.*

1. Introduction

The “OPENING DOORS”¹ project funded by the European Commission under the “Science with and for Society (SWAFS) mechanism in Horizon 2020, developed a 10 ECTS, open, online challenge-based educational course in Open Science and Open Innovation for international PhD graduates and post-doctoral researchers, entitled: “Opening Your Research to Collaborative Futures”. Its ultimate goal was to shape more engaged, innovative, socially aware, entrepreneurial and employable doctoral and post-doctoral researchers, prepared to meet the challenges of the future. The learning objectives of this course were as follows:

1. Build awareness of, and practice using open innovation frameworks and tools to facilitate co-creation and innovative thinking with stakeholders to increase the societal value of research.
2. Build awareness of, and practice using a selection of open science tools and approaches including ethical considerations such as research integrity and data management.
3. Design and implement collaborative projects with other researchers (from different sectors, disciplines and geographies), with other industry or community groups, understanding the importance of process as well as outcomes.
4. Communicate and open research up to a variety of international stakeholders including researchers from other disciplines, community organisations, governments, businesses, and civil society.
5. Articulate and explain knowledge, worldview, methodologies and research goals and be able to respectfully engage on these topics across sectoral and disciplinary boundaries.

¹Opportunities and Education in Networked Innovation for New Graduates with PhDs using Open Online Resources

6. Create a plan for professional development and the development of a professional network to support traditional and/or non-traditional career paths that align to student values, talents and interests.

Students undertook short-term intersectoral projects with external organisations as a challenge-based learning” experience. A personalised instructional design was integrated with the flipped classroom (Hung et al., 2019) and student motivational learning spaces (social interaction/networking) (Zhu, 2022). This course can now be accessed as an open educational resource at <https://open-tdm.au.dk/blogs/openingdoors/>.

2. Research design

Over 60 PhD students signed-up to the course who were registered to doctoral programmes in EU countries Ireland and Denmark in the Spring Trimester 2022. Over half of the students registered attended most of the course sessions and submitted coursework for academic credit, while others attended only certain sessions that they felt were relevant to them. Thirteen participants gave their consent to participate in a semi-structured online exit interview over Zoom once the course was completed. They were invited to discuss a) their perceptions of the course as a learning experience and b) their reflections on the course as a career development activity/practice. These interviews were transcribed and the transcripts were coded according to Braun & Clarke’s (2006) framework for thematic analysis. Ethical approval for this study was granted by University College Dublin’s Ethics Board.

3. Results

This poster presents preliminary themes following a semantic thematic analysis of the transcripts.

Four themes were created as follows:

1. Course participants valued the opportunity to collaborate on a “real-world” interdisciplinary project where they were challenged to apply their skills in a new way. This juxtaposes a PhD experience that can sometimes feel isolating.

The opportunity to work in teams with an external organisation to help address an authentic challenge within that organisation was considered by the students to be a “novel” learning experience and a “privilege”. Students cited “working and dealing with people from diverse backgrounds and cultures” as being an “excellent opportunity”, and one that they sought to extend to their PhD experience outside of the Opening Doors course:

“I became very much aware that other fields can contribute to my very specialized field. And I started asking outside my field for feedback. And...I invited some people just doing lunch with me to talk about the project, from their point of view, without being specialists”.

Students also grew in confidence in their ability to apply their skills to problems that were unrelated to their research field:

“I have no background in transportation, neither marketing. But then I was in the Smart Mobility group. ...that was way outside of my comfort zone. So it was important to just really know, firstly, that you are capable of doing anything, and then knowing that there is, you know, a network of people who, once you decide on the way [to do] particular tasks, working as a team, you can achieve a targeted goal”.

This collaborative experience was a change from many students’ solitary PhD experiences:

“I met really, really wonderful people, and not being a part of any network during the PhD, working alone... it was kind of like a change, a good change from that. And meeting people from different countries and from different universities, in different working styles within academia.”

2. Career development exercises undertaken in the course opened new perspectives for participants on their future careers in relation to careers outside academia, though an academic career remained a prominent goal.

Students explained how the course prompted them to make new connections outside of academia as part of their career development efforts:

“[I should] not only look at developing into academia, because it's so competitive... I sent in an internship CV, as one of the activities and they said, Well, we actually have a position .. for a year contract. Well, here's a good opportunity to have a career...but I may not be able to continue the PhD. So that really created a conflict in one way. But it also opened up my eyes to other opportunities. I think that was really important”.

Networking within the course also opened some opportunities for students:

“In my group that there was this one participant, and he is working for a company that I'm very interested in. So that was an opportunity during the course, to network with him. And I've been invited to some meetings at his workplace, in this networking with him and he's introducing me to a lot of people”.

3. Communication training the students received was readily applicable in their lives and should be integral to PhD curricula

Communication training on the course included how to pitch their PhD in 3 minutes to a non-specialist audience; how to collaborate in a team through effective listening and empathy, among other things. Students were able to apply these skills directly following the course in important ways:

“I found that really, really helpful ... just trying to focus down on exactly how to explain [in 3 minutes] what I was doing to people that aren't in optometry. So that was really helpful”.

“There was one guest lecture who said, “if you don't know anything, stop someone, ask, because the other person will not know what you are going through. Or what it is you're not able to understand”. So I recently used that in my one of the areas. I felt that was very good”.

“And the section on conflict resolution, I've used as well. That's great”.

4. Course participants developed a deep understanding of principles that underpinned open science that went beyond technical knowledge of tools

As well as exploring the use of open science tools and frameworks, students demonstrated the capacity to reflect more deeply on substantial matters:

“What interested me about open science when I heard it initially, you know, of course, one wants to share your article and your work. But the data, I had not thought about that. And guess what, if you're sharing data, it has to be very well collected, and it has to be very good quality. And I would put in a higher level... you'd be paying more attention to it than if you're just gathering it yourself. You lock it in a box. But if you're opening your data, then that is a real protection against bad practice creeping in, because it can't be there for everybody to see.

“Open access to research, open collaboration, like open innovation, this will also benefit areas ...beyond Europe. This is also benefiting others, especially, I would say, underprivileged, developing countries, etc. Because I'm sure they would benefit a lot more from these [open research] outputs, even through participation in collaboration in this kind of a programme. But this is something which can be looked into if the resources permit”.

4. Conclusion

This preliminary analysis suggests that PhD students reported a positive learning and relational experience on the “Opening Your Research to Collaborative Futures” course, particularly based around working with external organisations and students from diverse disciplines and cultures. Students integrated diverse learnings towards concrete actions for their professional development.

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INITIAL TRAINING OF TEACHERS OF SOCIOCULTURAL SERVICES AND THE COMMUNITY: STREET ART AND SUSTAINABLE DEVELOPMENT GOALS (ODS)

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Abstract

Urban Art emerges in the public context as a cultural manifestation of social problems. It can be used as an example of communication and claim. Through it, the recipients are able to see beyond the artistic representation and even the message that the author wants to convey and relate it to day-to-day situations, with images and current problems. The technological and information oversaturation can be favorable, since, being aware of the current social, political, economic and climatic reality, it facilitates the development of the activity and the creation of interesting and innovative discussion groups.

This educational proposal establishes the relationship of the use of Urban Art as learning measure based on a cultural journey through different murals, artists and countries with the aim of working also from the point of view of the Sustainable Development Goals (SDG), the importance of knowing our social, political, cultural and environmental reality. It seeks that the future teacher reflects on the meaning and value of current Art, expanding the usual space of great museums, beauty and perfection to enter the streets of cities full of singularity, criticism and irony and, where the people who experience it become the main character of the work, integrating and forming part of it.

It is used as a resource in the training of teachers of Secondary Education of Vocational Training, of Sociocultural Services and the Community, through the knowledge of outstanding murals throughout the world and in our own city, with the realization of an itinerary formative.

Keywords: *Initial teacher training, educational intervention, urban art, sustainable development goals (ODS), educational itinerary.*

1. Introduction

Urban Art emerges in the public context as a cultural manifestation of social problems. It can be used as an example of communication and claim. Through it, recipients are able to see beyond the artistic representation and even the message that the author wants to convey and relate it to everyday situations, images and current problems.

This educational proposal establishes the relationship of the use of Urban Art as learning measure from a cultural journey through different murals, artists and countries with the aim of also working from the point of view of the Sustainable Development Goals (SDGs), the importance of knowing our social, political, cultural and environmental reality. It is intended that the future teacher reflect on the meaning and value of current art, expanding the usual space of the great museums, beauty and perfection to enter the streets of cities loaded with singularity, criticism and irony and, where the people who experience it become the main character of the work, integrating and forming part of it.

It is used as a resource in the training of Vocational Training Secondary Education teachers, of the Professional Family of Socio-Cultural Services and the Community, through the knowledge of outstanding murals throughout the world and in our own city, with the realization of an itinerary formative.

Considered an artistic movement very close to underground culture, as social currents that emerged to combat repressive regimes. Urban Art or Street Art is characterized by wanting to awaken society from the political and collective daze in which they found themselves, using art as the only communication tool (Ganz and Manco, 2010).

In urban art, the location of the work is one of the most important factors since what the author is looking for is the greatest possible visibility with the intention of getting the attention of the passer-by. Increasingly complicated action because, today, society is not capable of paying attention to small details (Fernández, 2018).

Through urban art, artists want to convey a claiming or critical message to society. For this reason, it is very common to see that these works are loaded with messages whose purpose is to make us reflect on social reality. Given this, the most common themes in Street Art are those that accompany us daily on television, internet, advertising or awareness campaigns, such as: climate change, consumerism, deforestation, new technologies, etc. It seeks to make the viewer aware of the reality that is hidden behind our actions.

2. Methods

The use of Education for Sustainable Development (ESD) helps to achieve the cognitive, socio-emotional and behavioral learning outcomes, as well as the key transversal competencies for sustainability that are needed to achieve all the SDGs (Ibidem, 2017).

For this reason, the Didactic Proposal that is proposed here is to generate awareness in the recipient of the situation of vulnerability in which some people live, the need to protect the environment and to know that our actions have consequences. Hence, the use of murals as an example of social reality and, as a link between the SDGs, the competencies and objectives established during the Educational Intervention. With these murals, it is sought that the future teacher relates the mural with the Sustainable Development Goals because, in the end, each of them can be worked on from different points of view, objective and competence.

UNESCO has established different recommendations to promote education based on the Sustainable Development Goals (United Nations Organization for Education, Science and Culture, 2017), starting from education in the key skills for sustainability, which They are: systemic development, anticipation, normative, strategic, collaborative, critical thinking, self-awareness, and integrated problem-solving competency.

To this end, it establishes the importance of educating in the Sustainable Development Goals from the three basic domains: the cognitive domain (knowledge, understanding tools, challenges...), the socio-emotional domain (collaborate, negotiate, communicate, self-reflection...) and the behavioral domain (focused on action competencies). As educators we have to work together the three domains.

3. Results

The use of murals in the training of future teachers of the Professional Family of Sociocultural and Community Services can encompass different training topics (elderly people, women, functional diversity, groups at social risk, families, etc.) and associations.

This work shows the use of Urban Art as a learning measure. Through the murals the recipients have acquired basic concepts of artistic representations. Through the murals, an approach to social reality has been made from the political, cultural, environmental and collective point of view and, therefore, the use of the SDGs as a didactic methodology, because in this way debate and reflection can be generated.

4. Conclusion

This Educational Intervention can be proposed through other murals, artists, messages and themes. The approach of this Educational Intervention facilitates its adaptation to different groups and contexts. It is possible to carry out an intervention focused on the realization of a large mural, where the participants feel free to express themselves and communicate, but without abandoning the essence of Urban Art: criticism and irony.

Urban art is a movement of the street and evolves at the same rate as society, its main objective is to attract the attention of the passer-by or spectator through its designs, which go beyond a pure and balanced aesthetic. Street Art makes, in a different way, that society reflects on the message and theme that is hidden behind the mural.

Finally, the contribution of this work is the use of murals as a method of discussion and learning. This is due to the use of these artistic representations as sources of vindication and social awareness. This activity seeks to make future teachers aware of the artistic, cultural and social value of Urban Art and the role it has in today's society.

It is possible to use Street Art as a teaching model and didactic resource, the use of murals as a means of communication of social reality, the relationship between the Sustainable Development Goals (SDG) and the theme of the worked murals and employment. of Urban Art as an element of debate and reflection. With the selected murals, the aim is to develop social and civic skills, bearing in mind the Sustainable Development Goals, to create awareness and criticism in future teachers.

In short, this proposal seeks to emphasize that it is important to change the concept of Art and Street art, which can collaborate in reflection and understanding that the decisions that are made can have negative consequences in the future.

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EMPLOYING WHITENESS AS PROPERTY: LEADERSHIP IN HIGHER EDUCATION AND THE SIGNALING DIVERSITY WHEN YOU ARE WHITE

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Abstract

Academic leaders in the United States are tasked with establishing university strategic plans that facilitate a holistic educational experience in order to meet the needs of our diverse student populations. A holistic education includes the academic, social, emotional, and spiritual (meaning of life, finding purpose) necessities of our students. To this end, let us consider the leaders accountable for upholding this ethical imperative. This autoethnography examines the concept of Whiteness as Property (WaP) (Harris, 1993) to identify how the distribution of power amongst educational leaders maintains whiteness in a space of racialized privilege while using people of color to signal their commitment to establishing a diverse university culture.

Using the WaP lens, allows for the analyses of the practices, behaviors, and other social performances administrators engage in to construct their leadership identities in relation to the current sociopolitical milieu concerning inclusion and diversity. Autoethnography illuminates these leadership practices in unique ways—the narratives are from the perspective of the non-traditional leader. We serve to collectively lead our universities in the right direction to meet our strategic goals and provide equitable education for all students. As a working-class Latina occupying educational leadership roles, autoethnography permits the theorization of my liminal perspective to underscore the interconnected role of universities as apparatuses assisting in capital accumulation, legitimation, and production. The narratives provide an analytical and profoundly humanistic understanding of the experiences that shape our conscious behaviors, actions, and thoughts in our workplace.

Keywords: *Whiteness as property, critical race theory, autoethnography, Latinx issues, leadership in higher education.*

1. Introduction

The movement to integrate diversity and multiculturalism into the fibers of American universities is a trending topic, so to speak. As a minoritized female academic and autoethnographer in the United States, I am at the epicenter of a trajectory that has slowly been evolving over the course of my now twelve years in a diverse Southern California large public four-year university. Hence, my unique position allows me to observe how leaders, and recent aspiring leaders, in higher education are advancing this responsibility. This autoethnographic study examines the concept of Whiteness as Property (WaP) (Harris, 1993) to identify how the distribution of power amongst educational leaders maintains whiteness in the space of racialized privilege while using people of color to signal their commitment to establishing a diverse university culture.

Whiteness as Property came my way during graduate school, a concept that continues to intrigue me for its convincing premise: racial identity and property rights are never mutually exclusive concepts. In her seminal study published in the *Harvard Law Review*, Harris begins by tracing the historical construction of racial identity since the early 1600, positing that whiteness, as a property interest protecting political, cultural, and economic systems, continues to be centered on the right to exclude for those who fall outside the white racial markers established by the law. In this study, addressing the ways in which whiteness as property is performed by leaders in higher education, at the tipping point of systemic changes related to diversity initiatives, permits the discovery of how property interests are protected at the university.

The advantage of my unique frame of reference stems from the following statistics: consider that only 0.13% of the Latinx US population hold a Ph.D. (Semega J. L., Fontenot, K. R., & Kollar, M. A., 2017). Bearing in mind that there is a very small percentage of Latinx professors and academic leaders in American universities, at the same time that the demographic shifts in American schools show increase in underserved minoritized student populations, imposes upon universities to establish resources that

effectively support our current student population. The increase in minoritized student populations has impacted many universities to consider how best to retain and successfully serve all students in order to close equity gaps. While admitting diverse students to the university is only one aspect of diversity initiatives, it has been challenging to retain them. Recent studies demonstrate that only 51% of Latinx and 40% of African American first-year, first-time college students graduate within six years compared to 62% of whites (Museus, Yi & Saelua, 2018). There are numerous reasons for this. However, the most prevalent studies emerge from deficit perspectives, who limit their claims on the lack of appropriate academic skills on the part of the students. More recently, however, studies have acknowledged that a lack of inclusive university environments contribute to students' disengagement and lack of sense of belonging.

Fortunately, universities are seeking to change. One way this is manifesting, is through the language in university mission statements and strategic plans across the United States. A university's mission statement demonstrates its values and expectations, naming specific strategies that guide its mission towards accomplishing their goals. A study analyzing the language of a sample of university mission statements found that 75% of these universities included the concept of diversity in their mission statements (Wislon, Mayer & McNeal, 2012). While the advancement to indicate a commitment to diversity as a priority and a sense of purpose for the university is a step in the right direction, the conclusions reached by Wilson's study must be considered. They motivate us to consider the following, "If one believes that diversity is an essential obligation of all public higher education institutions, then these figures are disappointing as they imply that 25% to 35% of public institutions do not include diversity issues in their primary documents, (p.137). While we cannot hypothesize why institutions chose to include or exclude diversity, it may be enough to suggest that institutions reflect on whether their statements accurately describe their values or if they do not and then explore why that may be so (p.138)."

2. Design & Methods

The increasing sociopolitical accountability on the universities' to develop just, equitable, and inclusive spaces that accommodate the diverse student body's holistic needs has created a driving impetus for leaders to be, at the very least, eloquently versed in such settings. This autoethnography examines the concept of Whiteness as Property (WaP) (Harris, 1993) to identify how the distribution of power amongst educational leaders maintains whiteness in a space of racialized privilege while using bodies of color to signal their commitment to establishing a diverse university culture. Using the WaP lens, allows for the analyses of the practices, behaviors, and other social performances administrators engage in to construct their leadership identities concerning inclusion and diversity mandates across higher education.

Examining these acts within the theoretical lens of WaP, allows for this study to analyze specific acts that signal how whiteness establish their commitment to diversity while maintaining ownership and control of their existing racial dominance. This study considers how academic leaders engage in situations where they employ whiteness as a property right engaging in what is known as reverse passing—attempting to be reclassified and aligned with people of color in order to strategically signal their role within diversity for the purpose of being seen as inclusive. I maintain that educational leaders must be open to examining how they participate in such acts so they may be unearthed, and therefore, interrupted. Autoethnography is a methodology I use as it was initially conceived, that is, "cultural-level studies by anthropologists of their 'own people,' in which the researcher is a full insider by virtue of being 'native,' acquiring an intimate familiarity with the group, or achieving full membership in the group being studied" (Ellis, 2004, p. 38). Using autoethnography is my deliberate stance against the highly operationalized and measured studies that positivist research support, speaking against the false objectivity normalized in traditional published research. In autoethnography, the author purposefully establishes their positionality. I deliberately use my educational experience, as called upon by critical race theorist (CRT), to uncover inequality in education. CRT is centered on the following tenets: the intersectionality of race and racism with other forms of subordination; the deliberate challenge to dominant forms of ideology, a commitment to social justice, the positioning of marginalized voices at the center of knowledge; and the interdisciplinary approach to understanding race and racism (Yosso, 2005). Moreover, using storytelling to speak to theory, Neumann (1996, p.189) contends that "autoethnographic texts...democratize the representational sphere of culture by locating the particular experiences of individuals in tension with dominant expressions of discursive power." As a critical race theorist myself, I am situated in the margins of these elite spaces, a prime location to think about how best to create authentically inclusive spaces. Together with an autoethnographic design, I draw on my unique perspective to contribute to areas of research that strive to understand how multicultural progress is debilitated by ideological acts of racism that normalize dispositions and behaviors in whiteness who employ WaP rights.

3. Discussion

This is only the beginning of my research. This discussion will be fully elaborated during the conference.

Academic leaders in the United States are tasked with establishing university strategic plans that facilitate a holistic educational experience to meet the needs of our diverse, and traditionally underserved, student populations. A holistic education includes our students' academic, social, emotional, and spiritual (meaning of life, finding purpose) necessities. To this end, let us consider the leaders accountable for upholding this ethical imperative.

As a working-class Latina occupying leadership roles in higher education, autoethnography permits the theorization of my liminal perspective, underscoring the interrelated role of universities as apparatuses assisting in capital accumulation, legitimation, and production. Using the WaP lens, this study reveals the practices, behaviors, and other social performances administrators engage in to construct their leadership identities in relation to the current sociopolitical milieu concerning inclusion and diversity.

Autoethnography illuminates these leadership practices in unique ways—the narratives are from the perspective of the non-traditional leader who has identified the ways in which white academics engage in reverse passing in order to climb the administrative ranks. This autoethnography provides an analytical and profoundly humanistic understanding of the experiences that shape our conscious behaviors, actions, and thoughts in our workplace.

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An illustration featuring several graduates in black gowns and yellow stoles, each appearing within a separate, tilted rectangular frame. The graduates are shown in various celebratory poses, such as holding up their caps or raising their arms. The background is a light, hazy blue with soft, white clouds. The overall style is clean and modern, representing a virtual graduation ceremony.

VIRTUAL PRESENTATIONS

EDUCATING FOR MODERN CLOUD TECHNOLOGIES IN A PLATFORM-AGNOSTIC FASHION

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Abstract

It is essential to provide computing students with hands-on exposure to modern techniques and technologies such as cloud computing. To this end we engaged with industry to co-design a curriculum for modern cloud computing to meet the industry needs for graduates. Vendors do provide access to cloud computing but their academic programs often leave much to be desired, with limited credits and features or a requirement to buy-in to their platform entirely. In the resource-constrained university sector simply buying vendor credits for students would be expensive but also wasteful as there is no capital investment. Having engaged with industrial partners to identify core theoretical skills and a subset of topics in which specific platform experience would be desirable we co-designed learning outcomes and assessments. To provide financially efficient platform-agnostic experience a private cloud was built using open-source tools which allowed a new large final year module. Having run this module for two full years and had excellent student feedback we reflect on the strengths and weaknesses of this approach and how industrial engagement cannot be a one-off, in a changing field it must be continuously performed to allow the curriculum to be refreshed and support emerging topics.

Keywords: Cloud computing, co-design, curriculum, curriculum refresh.

1. Introduction

The area of cloud computing is one that has seen significant growth and use in industry often categorized as “using someone else’s computer” i.e. rather than running code on your own equipment it is deployed to the cloud and runs on a vendors service (such as Amazon Web Services or Google Cloud Platform). This can be seen as a “utility computing” model i.e. you only pay for what you use rather than acquiring and maintaining expensive infrastructure. Use of cloud computing technologies allows businesses a quick route to market, much more efficient use of resources and agility in responding to changes in demand, making it a key factor in the growth of many organisations (DeStefano et al., 2020). Consequently, skills in cloud computing are much in demand by employers (Haranas, 2021) and so an area where Higher Education may choose to focus as industry alignment (Plice and Reinig, 2007; Benamati et al., 2010) is an important factor in delivering the workplace-ready graduates for the computing sector.

For us to deliver education in this area a curriculum review needed to be undertaken and new content devised. Given the drivers behind this requirement and the importance of curriculum alignment (Plice and Reinig, 2007; Benamati et al., 2010) a co-design approach was taken whereby industrial partners had direct input into how the learning outcomes, activities, and assessments would be defined as well as providing expertise and masterclasses as appropriate throughout the academic year. Early on it was also identified that given the domain and the difference in how students learn (Schmeck, 2013) with many favouring “learning by doing” i.e. kinesthetic learning (Ayala et al., 2013) there should be a substantial elements of hands on applied computing included.

In this paper we will focus on the co-design of the curriculum in section 2 and then how we provided access to cloud environments in section 3 and the student experience in section 4. Finally, we will discuss and reflect on how the process has worked after two full years of delivery (section 5) before reaching conclusions and identifying future work in section 6.

2. Co-design of curriculum

Co-design of a curriculum with expert parties is not in itself new and is widely adopted in many domains such as healthcare (Sbaiti et al., 2021) and can be defined as “a highly-facilitated, team-based process in which teachers, researchers, and developers work together in defined roles to design an educational innovation” (Penuel et al., 2007). Having identified both the need for cloud computing skills and a desire for strong industry engagement a series of events were held to co-design a final year computing module covering these topics. Working with 1 existing industrial contacts a series of small meetings were held starting with a blank page and beginning to draft possible topics and assessments. The intention of these, building on existing good relationships, was to define some draft structures which could be used to inform wider discussion, it being easier to get feedback on a plan than start with a blank piece of paper. The output from this stage was taken forward and a draft module outline with several options for assessments were generated by academics.

The process culminated in a large “coffee and cloud” event hosted at the University where a large number of employers in different fields were invited (these ranged from SMEs to multi-nationals) to help shape the curriculum. This event was held under “Chatham House Rules” and generated lively debate and engagement. Split into groups and each with a facilitator from the University a series of guided discussions were undertaken asking open questions around general issues and the proposed module draft in particular. Following each group discussion a wider inter-group discussion was held where the conclusions of each group were read out by the facilitator and other groups invited to comment or challenge.

The headline findings of the “coffee and cloud” event as the final consultation of the co-design were as follows:

- **Generic skills more important than platform experience** - employers would value generic hands on experience with any cloud techniques and technologies, especially for graduate roles, rather than expecting any particular technology or vendor although some experience of different vendors would be useful to see differences in offerings.
- **Distributed computing theory is very relevant** - focusing on the platforms and technologies must not be at the expense of key theoretical concepts. The challenges of distributed computing (Liu et al., 2012) are ever present in large cloud systems and should be thoroughly understood.
- **Processes and ops skills are important** - to fully utilise cloud computing efficiently understanding and exposure to processes such as continuous integration (CI) and operation skills such as shell scripting are needed.
- **End to end engineering** - students should be expected to understand the process of engineering a cloud system from end to end, including architecting a modern system and a good understanding of relevant software engineering principles to make effective use of technologies such as microservices.
- **Metrics and monitoring** - students should be aware of how and why services are monitored, how reliability can be measured and improved, and the type of modern metrics gathered from distributed cloud systems.

Ultimately two things occurred; a drive to implement certain concepts important to “cloud engineering” throughout the curriculum at different stages and a specialist new module was implemented with topics and learning outcomes based on the co-design output. Assessments for this module were finalised following discussion at “coffee and cloud” and then distributed for any further comment to the participants resulting in only positive comments.

3. Access to cloud environments

Recognising it is essential to provide hands on applied skills in this area it was necessary to consider how provision to cloud environments and infrastructure could be facilitated. While most cloud vendors do offer some form of educational grant or academic access we found this far from plain sailing, with students being rejected from academic programmes despite providing ID, or just running out of provided credit before completing their work. Of course it would be possible to ourselves utilise “utility computing” and simply pay for access to vendor systems but this was not a serious option in the resource constrained world of UK higher education, something some providers did not seem to understand (being highly US-centric in their education programs where financial resources are more readily available). Another restriction on buying service was the transient nature of the spend, at the end of the year the

students would move on but no long-term investment would have been made in the university facilities and would require ongoing financial commitment year-on-year.

However, many of the technologies used are actually freely available, mostly based on free open-source software. The vendors may charge for use of their computing resources and storage but in many cases the actual technologies and stacks can be implemented on hardware by anyone. A plan was therefore formed to build a private internal cloud (called our “cloud in a cupboard”), a state-of-the-art cloud computing lab facilitating hands on learning but using resources which represent a long-term capital investment rather than an ongoing utility cost.

3.1. Solution design of the private cloud

To facilitate the delivery of a modern cloud syllabus the following functional requirements were defined for the private cloud:

- **Latest industry practice** – the latest industry practice in cloud deployment should be implemented as far as possible.
- **Open access architecture** – students should be free to interact with the resources directly in user interfaces or through APIs to allow open expansion and access from third-party tools such as Terraform.
- **Shell access** – students must be provided remote Unix shell access to allow for command-line use and execution of tools within the environment.
- **Pipelines** – students must have access to pipeline systems to facilitate CI.

Additionally, some non-functional requirements were defined representing the constraints within which any system must operate:

- **Secure** – the system should provide a minimal security risk to the internal network.
- **Immediate creation pending further investment** – given the funding and budgetary cycles of the university the system must be able to deliver a minimum viable product using only reused/repurposed hardware in the interim.
- **Robust** – as a critical component to a module the system must be robust enough to handle any minor issues without compromising performance.
- **Scalable** – the system must have the capacity to scale in future should this be required.
- **Evolvable** – the system should have the general design characteristics to allow the evolution of specific technology platforms deployed upon it.

The private cloud was then implemented during summer 2019 using repurposed hardware as an initial proof of concept before being scaled up with dedicated equipment procured in 2020 and 2021.

4. Student experience

The first student cohort took the module in 2019/20 and it has been in consistent high demand ever since, such that in 2020/21 it was run twice to satisfy all requests while still procuring hardware to scale. As of 2020/21 it is the most chosen optional module in our computing pathways and scores consistently highly in student satisfaction. Student comments at the end of the module have included the following:

- “Very relevant for industry.”
- “It is relevant to what I was doing on Placement, it’s getting exposure to modern technologies and it’s interesting.”
- “Teaching style, the practicals were very useful for the project, industry relevant and up to date.”
- “Variation in type of assessment allowed to use different skills.”

These comments, and scores, reflect positively on the impact the co-design process and open architecture provided have on student experience, allowing what are clearly relevant real-world skills to be taught and assessed as part of the HE curriculum. Returning graduates who are now working in industry have commented that this was “the most relevant module” and “should be essential for all future developers”.

5. Discussion and reflection

While the need to include cloud concepts, engineering and hands on experience was clear from industry input how we should approach this was initially uncertain. Our decision to choose co-design, involving industry right from the start in shaping the module rather than asking for an opinion post hoc, was novel in our school and required significant up-front effort to make contacts and arrange meetings or events. Once the group was setup however the input proved invaluable helping to remove some assumptions (for example we had assumed specific vendor experience would be an essential component while the industry input was the opposite) and build learning outcomes and assessments from the ground up based on real world projects, experience, and needs. This alignment was clearly felt and acknowledged by students, many of whom would have just returned from an industrial placement, giving them a very valuable educational experience.

The financial model, seeking capital investment to procure hardware to build a private cloud rather than paying for utility computing, was made through a business case which included alternative costing models. The expected take-up of the course showed that a hardware investment model would pay for itself within three years (i.e. by year three the cost of hardware would be less than the cost of utility cloud computing for the same period) and this was then supported by our faculty. In fact the demand for the module was higher than expected and the point of return on investment was within two years not three. The ability to use re-purposed hardware initially also meant that we could show such a system was possible and allow staff and administrators to upskill to support the private cloud before any significant investment was made. The ongoing success of the module, both in terms of numbers and student satisfaction, has allowed further business cases to be made to expand the hardware capabilities. This approach did however require significant amounts of staff time, support, and re-skilling which purchasing utility credits from a major vendor (or even using a vendor's pre-packaged courses such as AWS Academy) would not. The emphasis of maintaining, updating, and managing the hardware and service also falls within the school which provides further risk and challenges that a utility model would avoid.

Although specific platform experience was identified as not needed it was felt some exposure to different vendors was important more to see the differences in offerings rather than any specific technology. To this end the academic programmes of major vendors were used to provide access but as this wasn't essential to the assessments there was no risk with credit use or access changes, offering a best-of-both approach.

One other aspect of industry engagement was the use of guest speakers. Taking offers to talk gathered during the co-design events a range of speakers were invited in on weeks aligned to the topic they would be covering, adding extra depth and detail to the academic and practical content of that topic. Speakers in this context had a mixed reception with some students clearly preferring talks which were directly related to coursework rather than the wider context of the subject. This feedback, combined with the strictures of COVID-19 remote learning, meant that for 2020/21 guest "talks" actually were in the form of pre-recorded discussions between academic staff and industry experts which could then be optionally viewed in full by the students or used in part (for example a specific question and answer) as video content in a particular topic. This approach was very well received and will continue post COVID.

6. Conclusion and future work

In the time since the curriculum review and the new module it is clear that both have been positively received by both students and industry. The co-design process was an excellent way to engage more effectively with industrial partners while maintaining academic control and quality assurance, and a process we hope to repeat in other topic areas for the future.

Like any modern technology cloud computing is constantly evolving and this co-design and implementation cannot be seen as a one-off activity. Ongoing industrial engagement and regular (we are targeting three year cycles) root-to-branch reviews are important taking a frank and honest look at content to see if it is still relevant as well as identifying any new emerging topics which are now key. Making constant small changes combined with this review cycle should mean the content remains fresh and relevant and responses to emerging technologies can be agile, something it is perceived the University sector has failed to be in the past.

Our next steps with the module, beyond reviews mentioned above, is to look how we could further create industrially-aligned projects seeking to embed industrial partners in the setting and mentoring of project delivery. We will also continue to expand the private cloud capabilities adding both capacity and new features.

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RESEARCH GIRLS – A JOINT PROJECT OF THE TECHNICAL UNIVERSITY OF DORTMUND AND THE OTTO- FRIEDRICH- UNIVERSITY OF BAMBERG, GERMANY

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Abstract

The abstract refers to the category Projects and Trends and fulfils the criteria in the fields: Pedagogic innovations, new learning and teaching models, inclusive and special education, educational projects.

The presentation shows ways that make it possible to sustainably provide gender-sensitive and gender-appropriate educational opportunities in early childhood in order to subsequently be able to prepare girls for changed educational paths. The starting point is a project submitted to the Federal Ministry of Education and Research (BMBF Germany), in which a structured programme is to be developed that allows educational professionals to be won over for gender-sensitive and gender-appropriate educational offers in child day care, and to strengthen and further develop their competences. Already in early childhood, important foundations are laid for independent participation in society in adulthood. The aim of the project is to address science as a field of work for girls in which they meet role models (female scientists). First of all, existing educational offers are identified and in a further step, the testing of possible gender-sensitive and gender-appropriate educational assignments for professional practice is scientifically accompanied and evaluated. The guiding research questions are:

- How do educational or research motivations arise in girls?
- How can girls be prepared for their future tasks in science?
- Which competences of girls should be perceived, communicated and positively evaluated in order to change gender-specific (role) expectations and individual creative spaces?
- How can educational professionals act in a gender-sensitive and gender-appropriate way and through which competences is early gender-sensitive and gender-appropriate education made possible?
- How can female scientists raise their profile outside the scientific community and thus become role models for girls?

The basis of the research design is an ethnographic observation of pre-school girls in different day-care centres in order to identify their ideas about later careers. Based on the results, female researchers from the corresponding domains are to be specifically acquired to serve as role models for the girls and to describe their life paths. At the same time, educational professionals will be trained as multipliers in order to implement the project permanently.

Keywords: *Gender, early childhood, visibility of women in science, research girls, role models.*

1. The project – framework, aims and content

The project presented here is currently being applied for at the Federal Ministry of Education and Research and is a joint research project between the Technical University of Dortmund and the Otto Friedrich University of Bamberg.

Female-read scientists are underrepresented in the public sphere, only every fourth professorship is held by a woman. Women are disadvantaged in terms of realising scientific career opportunities and scientific publication, "their career ambitions are "linked to masculinity"" (Deutschlandfunk 26.10.21). One of the essential tasks in the debate on "strategies to implement equal opportunities for women in education and research" is to change the pedagogical approach to gender already in early childhood. Despite the educational policy claim to realise "gender equality" in early educational institutions, current educational studies (KMS 2019; BiKS; IQB-Bildungstrend 2019, cf. Anders et al. 2020) show a clear discrepancy between the self-assessment and the skills or competences of girls. The project "Forsche Mädchen" (ForMae) aims to make role models visible in early childhood and to provide gender-sensitive identification and orientation opportunities. The limited perceptions of women's "scientific career ambitions" can be attributed not only to the hierarchising strategies of the "scientific community" or the "leaky pipeline" (exit from the science system, e.g. through the one-sided allocation of parenthood to women), but also to gender role expectations for young girls. While projects such as "MINT-Bildungsstart" or "Arbeiterkind" point out to all children and adolescents, regardless of their gender from lower secondary school onwards, the possibility of being active in STEM fields and discovering a course of study as an enabling space for themselves, there are comparable projects neither for the target group of early education nor explicitly for

girls of kindergarten age (Schlemmer/Binder 2020). Role models play an important role in explaining life plans and career choices to be made in the long term, not only from a fundamental gender perspective, but also through direct exposure to and acquaintance with female scientists directly in the children's living space (Hannover et al. 2013).

It has been proven that gender-specific assignments are already made in early childhood, which manifest themselves in different interaction, relationship and role offers, such as expectations with regard to certain behaviours, the form of relationships, etc. (Focks 2016; Andrä 2019). (Focks 2016; Andrä 2019; Hubrig 2019; Rohrmann et. al. 2018). At the same time, this raises the question of the extent to which existing gender-specific expectations can influence the individual spaces for girls to shape and act with regard to the concrete design of educational processes (Kubandt 2016; 2000). The aim of in-depth research on the topic "Research girls*!" should be to focus on the so-called "precursor competences" for later school and professional career decisions (Henschel 2000, p. 103). Previous findings show that both the pedagogical actions of the professionals in the day-care centres and the composition of peer groups are relevant for the perception, attribution and promotion of specific competences and consequently for the development of the different potentials of girls (Kubandt 2020; Focks 2016).

The research project aims to create new design approaches and the possibilities for reducing gender barriers by initiating, monitoring and evaluating the local projects "Forsche Mädchen" (ForMae) as places for gender-sensitive education and collective biographical experiences for girls. Against the background of the accentuation of children as social actors (Betz/Esser 2016; Moran-Ellis 2020, p. 175), who themselves intervene structurally in their life worlds, questions arise about the significant factors for the reduction of gender barriers in the shaping of social participation in early childhood and how these are interconnected (Kubandt 2020; Rohmann 2018). Thus, the heterogeneous possibilities of gender-conscious perspectives and potential compensatory interventions can be explored through pedagogical action in early childhood institutions. If it is assumed that children's lives, in addition to socio-political and familial influences, are predominantly structured and constructed by gender-specific setting work and segregation mechanisms, which in turn are socially mediated, the multiple institutional arrangements of care, upbringing and education are to be examined with regard to the possible strengthening of early childhood educational motivations.

The aim of this research project is to identify ways that make it possible to provide gender-sensitive and gender-appropriate educational opportunities in early childhood in a sustainable manner, in order to subsequently be able to prepare girls for changed educational paths. With the cross-location and cross-state research concept, a structured programme is to be developed which will allow educational professionals to be won over for gender-sensitive and gender-appropriate educational offers in child day care and to strengthen and further develop their competences. Already in early childhood, important foundations are laid for independent participation in society in adulthood. It is important to use this to address science as a field of work for girls at an early stage and to prepare them for changing career and life paths. From the perspective of childhood and gender research, the barriers and spaces of opportunity associated with the establishment of gender-sensitive and gender-appropriate educational opportunities in early childhood will therefore be identified and changed. In a further step, the testing of possible gender-sensitive and gender-equitable educational mandates for professional practice will be scientifically accompanied and evaluated in order to be able to sustainably implement practice-effective concepts for the educational professionals in child day care. The guiding research questions are therefore:

- How do educational and research motivations arise in girls?
- How can girls be prepared for their future tasks in science?
- Which competences of girls should be perceived, communicated and positively evaluated in order to change gender-specific (role) expectations and individual creative spaces?
- How can educational professionals act in a gender-sensitive and gender-appropriate way and through which competences is early gender-sensitive and gender-appropriate education made possible?
- How can female scientists raise their profile outside the scientific community and thus become role models for girls?

The research programme is divided into five phases over 36 months. In order to be able to investigate the educational and research motivations of pre-school girls in the respective day care centres, the logic of action of the research field of early childhood is followed and a methodological triangulation of ethnographic participant observation, biographical expert interviews and group discussions with a scientifically accompanied practice phase is aimed at. Eight day-care centres in four federal states (North Rhine-Westphalia, Lower Saxony, Saxony and Bavaria), which already have a pre-school programme, will serve as study settings. The cross-location and cross-regional research concept is intended to explore the various dimensions of future-oriented development scenarios and options for action for the implementation of gender-sensitive and gender-appropriate educational offers in child day care. At the same time, a scientific exchange of the results across the federal states is to be made possible. It is assumed that different regional and supra-regional infra-structures as well as the heterogeneous qualification offers and learning backgrounds of the pedagogical staff are decisive for the reflected mediation of gender-sensitive and gender-appropriate educational offers in early childhood. In order to be able to follow the organisational

structures of the field of action of early childhood, the educational professionals from the same day-care centres are interviewed by means of a group discussion.

2. The theoretical basis

The previous research findings on the topics of gender-conscious or gender-sensitive and gender-equitable upbringing and education in the German-speaking area point to a long tradition of this research focus (Rabe-Kleberg 2003; Kuger/Smidt/Sechtig (2014); Röhner 2007; Kubandt 2020:7; Kaiser 2020). The expertise of the German Youth Institute "Gender in Child Day Care Facilities" (Rohrmann 2009) and also the thematic focus "Gender" developed this year in the journal *Diskurs Kindheits- und Jugendforschung* (2020) illustrate the - albeit restrained - but unbroken research tendencies. Nevertheless, it cannot be said that there are sufficient findings and well-founded insights into the research field of gender in early childhood. In the German-language research discourse, studies and analyses have long been oriented towards the theoretical paradigms of gender-specific socialisation research, which focus on the study of developmental processes and conditions in early childhood (e.g. differences between boys and girls (Kubandt 2020:7). Similarly, although diagnoses of the status and condition of early gender inequalities and exclusions are highly relevant in early childhood research contexts (Kuger/Peter 2019), questions about renewed restabilisations of gender relations are not clarified (McRobbie 2016; Lenz 2017; Kalicki/Quenzel 2020:3). This finding is clearly visible in the results of social reporting (World Vision studies, child and youth reports, LBS child barometer, DJI child panel, BikS, K2ID-SoeP, NEPS; NUBBEK). The topic of educational motivation in early childhood is dealt with here, but not the "new maps of gender relations" (McRobbie 2016; Lenz 2017). Although the incorporation of gender-conscious education in the educational plans for early childhood or in the many projects to establish research opportunities in childhood (e.g. Haus der kleinen Forscher) (Röhner 2021) point to the high relevance of the topic of gender differences in early childhood, these research preferences have not led to a particular recognition of hierarchical gender relations becoming the subject of the projects or the training of professionals in early childhood (Schutter 2017; 2020).

Therefore, the long-standing debate about research results of empirical gender research on early childhood in the Anglo-American area (UK and USA) (Lareau 2000; 2011; Warin/Adriany 2015) should be taken up. In close connection with the research results of childhood studies and early childhood education, these should enable an examination of the educational and research motivations of girls in early childhood (Henschel 2020). This puts the question of the importance of successful conditions for gender-sensitive pedagogy in early childhood institutions to prevent gender selection on the agenda (cf. Magnuson/Kelchan et al. 2016). Evidence-based projects in Germany so far show good success in supporting offers for gender reflection in relation to everyday communication and interaction in day-care centres (Manning-Chechowicz et al. 2010; Rohrmann/Wanzek-Sielert 2018). However, it must also be noted that local studies in particular show the extent to which gender differences are replicated through the institutional selection and segregation mechanisms of early childhood education and guidance (Rohrmann et al. 2018; Kalicki/Quenzel 2020:3). Although these analyses have started a systematic discussion about which girls are reached by which offers, there is still a lack of research results on how changes in the composition of gender-specific expectations can sustainably change the individual spaces of girls and thus their early educational motivations.

Therefore, it can be stated that in German research, an analysis of the pedagogical contexts and strategies, mechanisms and potentials that can lead to the development of gender-sensitive educational motivations in early childhood, especially with regard to the development of "precursor competencies" for later participation in educational and academic cultures, has not yet been sufficiently carried out.

3. Single hypothesis and expected results

The aim of the research project is to analyse the significance of gender-sensitive interactions and constructions in the practices of professionals in child day care in terms of their effects on children's educational motivations and the possibilities of children's perception and shaping of their living environments.

It is based on the assumption that the central categories of social classification and differentiation in the conditions of growing up have not yet been conclusively analysed, which explain the interplay of institutional structures (here using the example of day care), potentials (children's agency, professionals' opportunities and strategies for action) and female academics' educational careers. Disparities due to asymmetrical gender relations in early childhood are an extremely complex phenomenon. Making female research achievements in early childhood visible also raises the question of the extent to which the cultures of early childhood institutions produce and perpetuate gender-differentiated behaviour. Based on the assumption that the gender role expectations conveyed by professionals strongly influence children's behaviour and the development of self-concepts, the tensions between authenticity and situational appropriateness in particular must be examined in terms of their effects on children's possibilities for action.

Based on the further assumption that researching women as role models and impulse givers can make statements about the interrelationships of the diversity of gender dimensions of meaning in their effects on the external conditions and internal forms of everyday pedagogical design in day care facilities for children, girls are to be given the opportunity to become acquainted with ways of making professional decisions in direct interaction and communication. Therefore, activities are to be developed that enable girls and professionals in child day care to interact in a gender-sensitive way in the context of their positive relationships. By making female research achievements visible already in early childhood, it should be possible to change the cultures (gender-specific interactions, contexts of action, social production processes) of the institutions. The aim is to sensitise the pedagogical staff to the construction, perpetuation and replication of gender differences in the long term.

Therefore, in this project proposal, the lack of visibility of the unequal distribution of life chances through gender practices is to be countered with practice-oriented intervention offers (local communities of responsibility for gender-sensitive promotion of educational motivation).

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ACADEMIC AND SOCIAL CHALLENGES ENCOUNTERED BY IRANIAN STUDENTS IN FINLAND: A PHENOMENOGRAPHIC STUDY

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Abstract

This study aims to examine the experience of international students studying in Finland based on a phenomenographical approach. Due to the nationality of the researcher Iranian students were selected as the research sample and 25 tertiary-level students from various Finnish universities were interviewed through semi-structured interviews. The collected data were assessed and interpreted based on the theory of Anxiety-Uncertainty Management (AUM). The results showed that the Finnish academic system, such as teaching/ learning strategies, assessment methods, and university facilities, reduces participants' anxiety/uncertainty. The participants noted fundamental differences between characteristics and teaching style of Finnish and Iranian teachers in universities. However, this unexpected situation not only did not make them anxious, but also made them feel more comfortable than when they were studying in Iranian universities. In contrast, Finnish culture, and communication issue associated with language barriers and lack of job opportunities increase participants' anxiety/uncertainty. Many participants did not consider themselves members of Finnish society, and some felt they were strangers. The findings highlighted the important role of communication as an AUM thematic principle and propose a set of axioms to AUM theory that focuses more on the different dimensions of communication in an intercultural context. Given the importance of context in the study of communication issues, further studies are recommended to understand the intercultural issues of students of other nationalities in different contexts.

Keywords: *International students, intercultural challenges, Finnish culture, anxiety-uncertainty management theory.*

1. Introduction

International students are defined as “those who are not residents of their country of study or those who received their prior education in another country” (OECD 2013, p.1). In 2019, there were more than 6 million international students, and this number is expected to increase worldwide. This growth has made higher education a major driver of economic competition in a knowledge-based global economy. The United States (U.S) and the United Kingdom (UK) with the top 10 universities in the world are the top 10 attractive destinations for international students. Countries attempt to improve employment skills and reduce the anxiety and uncertainty of the educated by increasing the quality of teaching and providing better conditions in educational institutions and society.

International students often face different social and academic challenges in the new environment, especially students from Asian and African countries. The United States is the first destination for international students. International students there, however, experience adjustment problems such as culture shock, homesickness, loss of social support, discrimination, language barriers, loneliness, depression, anxiety, and academic adjustment (Almurideef, 2016). Likewise, In the UK, which is the first attractive country for international students in Europe, English language proficiency and financial difficulties have been reported as the initial issues for international students (Khanal & Gaulee, 2019). Non-academic challenges included homesickness, feeling isolation, stress, depression, cultural shock (Cowley & Ssekasi, 2018; Alloh, Tait & Taylor, 2018). Even in Asia, Widiasih and Hermayanti (2020) after analysis of the six articles found that international students studying in Indonesia encountered such challenges as cultural adaptations, language problems, and differences in the education system. Finland is known for its educational system. However, it is not among the top destination countries for international students. Living in Finland poses some cultural and geographical challenges for international students (Hosseini & Kotilainen, 2021). Understanding the challenges of international students is crucial to their academic and social success (Li, Chen, & Duanmu, 2010). Accordingly, the aim of this study is to investigate the social and academic challenges of international students in Finland.

1.1. Finnish transnational space

Finland is located in northern Europe with a small population (less than 6 million people) with a relatively homogeneous ethnic community. It is one of the northernmost countries in the world to be exposed to severe climate. Finnish language is one of the most difficult languages to belong to the Baltic-Finnic branch of the Finno-Ugric languages. Finland is known for having the best education system and recognized the happiest countries for four years. However, the latest Global Competitiveness Report 2017-2018 ranks Finland 10th (and third category) in the world after Switzerland and the United States (Global Competitiveness Report, 2018). Although Finland itself has been on the list of brain drain countries for many years (Zaraf, & Kantola, 2019; Juvonen, 2020), many international students are studying in Finland. According to Statistics Finland (2020), the number of incoming students in Finland is higher than the number of students going abroad, and 75% of incoming students use the Erasmus+ program of the European Union. While the total number of students in education leading to a qualification or degree was 1.29 million (in 2018), the number of international students in Finland was higher than the OECD average (in 2017). One in four international students in higher education is from the European Union/ European Economic Area and the rest are from other countries (ICEF, 2017). International students face challenges in their education and life, and the present study examines the challenges those Iranian students encounter as part of international students, both in academic and non-academic settings in Finland.

1.2. The context of the study

Due to the Iranian nationality of the researcher, Iranian students in Finland are selected as a sample to study the challenges of international students. Iran, with a population of more than 82 million, is located in the Middle East. The literacy rate for the adult male population is 91.19%, and 82.52% for females which is assumed significant among the Middle East countries. In 2014, Iran ranked first in brain drain in the world. The Financial Tribune (2016) reported that according to a survey conducted by the Islamic Association of the University, out of 232 students, about 64% of students thought they might leave Iran for any reason and only 14% were 100% sure they would stay. It seems that many Iranian students studying abroad are thinking of migrating to the host country after graduation. The sample of this study includes Iranian students who have enrolled in various universities in Finland in the 2017-2018 academic year.

1.3. Theoretical framework

This study examines the challenges of Iranian students in Finland based theory of Anxiety-Uncertainty Management (AUM). William B. Gudykunst (2005) introduced AUM to explain how humans communicate effectively based on their anxiety and uncertainty in social situations. He assumed that at least one person in an intercultural encounter is a stranger that experiences both anxiety and uncertainty; they do not feel secure, and they are not sure how to behave (Griffin, 2006).

The format of AUM includes 47 axioms, which in turn converge on one another, moving in the direction of effective communication. These axioms are defined by various variables (e.g., self-concepts, motivation, reactions to strangers, social categorization, situational processes, connections with strangers, ethical interactions, anxiety, uncertainty, mindfulness, and effective communication). They are responsible for effective communication. AUM focuses on interpersonal and intergroup levels of communication. Based on AUM mindfulness is the optimized level of communication in which ingroup members and strangers can reduce their uncertainty and anxiety (Griffin, 2006). In this study, the axioms of AUM are employed to analyse the intercultural challenges of Iranian students in Finnish society.

2. Methodology

A phenomenological approach has been employed to understand the experiences and perspectives of Iranian students in the university environment as well as in Finnish society. According to the researcher's nationality, Iranian students from different universities in Finland were selected by snowball sampling method until saturation was achieved. Participants were interviewed in semi-structured interviews in Persian language, because the same language in data collection reduces any cultural bias and the risk of misunderstanding between the interviewer and the interviewee (Neyer & Harzing 2008). The participants included 14 males and 11 females. The questions provided data on immigration background, participants' perceptions, and experiences of Finnish society. The data were transcribed, coded, and categorized, and in the next step, the themes were defined accordingly, and the results of study are classified into academic and social challenges.

3. Results

3.1. Academic challenges

Participants' views on the university system and the teaching and learning process in Finland are summarized in Table 1. The data showed that many participants believed that their universities had good facilities. The participant 21 noted that *"everything is well designed. The university is always open, the accommodation is good, the gym is available."* Some participants were satisfied with their access to scientific resources. In contrast, lack of jobs and funding along with complexity of the content on university websites and access the right information of the university and also many Finnish language emails were annoying. *"The websites here are very complicated. To know anything, I must send an email and ask someone and then they send me the link to that webpage. There is definitely a way to make that site more usable"*. Participant 16 stated.

Table 1. Challenging and Comforting Factors in Finnish Academic System.

Categories	Factors	Participants	
Academic system	Studying Facilities	21, 23, 18, 17, 11,10, 9, 8, 6 ,2, 23	Comforting
	Digitalization	20, 7, 5	Comforting
	Less Censorship	18, 1	Comforting
	Less stress	16, 2	Comforting
	Helpful Staff	16	Comforting
	Fund Opportunities or Students' work	22, 16, 6, 3	Challenging
	Information issues	18, 7, 16	Challenging
Learning and teaching process	Flexibility in Courses	5, 3, 6	Comforting
	Teacher-student relationship	19, 15 ,12, 11, 19, 4	Challenging
	Student centered teaching	23, 20, 22, 19, 12, 2	Comforting
	Research-based teaching	7, 1	Comforting
	Poor lecture quality	15, 5, 2, 12, 4, 2, 21, 17, 1	Challenging
	Teachers' knowledge and skills	19, 23, 17, 13, 7, 6, 10, 7, 2.	Challenging
	Less stress in examination	1, 12, 11, 3, 25	Comforting
	Assignments are helpful	21, 25	Comforting

Since all participants had experience studying at universities in Iran (and other countries), they were constantly comparing their experiences at Finnish universities with the previous ones. Some participants believed that the relationship between students and teachers is cold in Finnish universities. Participants 23 and 18 believed that this relationship is closer between the supervisors and their PhD students. They found that the Finnish education system is mostly student-centered and research-based, that Finnish lectures are very weak (15, 5, 2) and that they mainly teach reading on PowerPoints. (12, 4, 2). They believed that the content they had received in Iranian universities was richer (17, 1).

Many participants criticized the quality of Finnish teachers and their teaching style because they avoid being challenged (23) and are not responsible for answering questions (19, 23). They are not motivated (17) or are not active enough (13). Finnish lecturers usually have a monotone voice (7, 6) and only transmit information (10, 7, 2). However, some participants noted that Finnish teachers although do not have extensive knowledge (13) and their knowledge is limited and narrow, professional (23, 3) and deep (13, 10). Sometimes Finnish teachers know more than Iranian teachers (2). Iranian teachers know the generalities (13) and are like encyclopedias (19). One PhD student (16) compared her experience in Iranian university with Finnish university and said: *"In Iran, the content is very theoretical. I think I was suffered in the 4 years of my bachelor's degree, but in the 2 years of my master's degree I learned more. But I think we need more theory here"*. The participants saw less stress due to the number of exams (12), especially compared to Iranian universities (12, 1, 21, 25).

Overall, the results showed that in the Finnish academic system, although there are cases of dissatisfaction with Finnish teachers and their teaching methods, none of them causes anxiety or uncertainty, but rather reduces the anxiety / uncertainty of international students in Finland.

3.2. Social (non-academic) challenges

Language is important for communicating, making friends, and finding a job. Most of the participants had some Finnish language courses but only two participants could speak Finnish. Some of the participants believed that learning the Finnish language is necessary if someone wants to have a non-academic job or stay in Finland because most Finns can speak English. In contrast, some other participants found it difficult to obtain correct information due to language inadequacy, which is presented as a set of axioms based on AUM theory. For example, participant 12 stated: *"In most places,*

Finnish is spoken. Even at international conferences where we expect to hear English. *"I do not understand much of the news I receive"*.

Language can be a problem for making friends. But participants were confused if the communication problem was due to the Finnish language or culture. Uncertainty increases due to the inability to predict and explain one's own and others' behavior, and according to AUM theory, mindfulness occurs when people are conscious of their own and others' behaviors and are less likely to misunderstand. However, many participants are confused about some behaviors in communicating with Finns. For example, participant 9 states: *"We work together one day and the day after that when we see each other it is as if we don't know each other"*. Sometimes a cold reaction can lead to misunderstandings and doubts. Three PhD students who have previously lived and studied in other European country were confused about the meaning of some Finns' reactions. *"I still don't know what they mean in their talks or their actions. When I say something and my colleague leaves the room, how does he feel? He is upset with me or not"*, participant 18 said. Participant 24 states *"I always criticize my behaviors because I get suspicious looks"*. Similarly participant 25 said, *"I feel I should only appreciate things. I have seen when the food or service in restaurants is very bad, and the customers understand that they are angry, but they are silent and even appreciate it. It is as if they are afraid of questioning things. I think there is a hidden pressure on me to remain silent to be looked as a polite person"*. Participant 18 believes that the Finnish culture is affecting on foreigners' behaviours: *"I tried many times to make a community of international students to make more friends but unfortunately, what I see here is that the foreigners who come here become finnished... as if they have changed"*.

Many of the participants did not feel part of the Finnish society due to lack of suitable job, language skills and communication with the Finnish. Only three of the 25 participants were satisfied with their relationship and friendship in Finland. According to AUM theory, effective communication and mindfulness is the result of consciousness, which means awareness of stranger perspectives. Most participants seem to be conscious of Finnish culture and respecting privacy and silence, but this awareness is not enough to reduce their skepticism and uncertainty. They were stressed because they felt strangers and outsiders. Feeling as an outsider reduced the effectiveness of communication between the two cultures. In addition, darkness and cold in Finland and the lack of job opportunities, along with the feeling of homesickness and missing Persian art, poem, and talk, nostalgia for the streets of Iran, friendship, relationship, and foods were other factors that made the participants feel lonely in Finland.

4. Discussion

This study shows a smooth and comfortable Finnish education system for Iranian students. Although many participants had obstacles in finding a job or making friends, they were not stressed by the lack of Finnish language skills due to their English skills and those of the Finns. This result supported the claim of Acioly-Regnier et al. (2014) that conflicts and misunderstandings are not only because of insufficient knowledge of language, but inadequate cultural knowledge. Further misunderstanding between the two cultures increases uncertainty and decrease satisfactory intercultural interaction (Rajan et al., 2021). While a previous study indicated the effect of lecturer to reduce uncertainty and increase intercultural adjustment in international students (Chan et al., 2021), the teaching and relationship of Finnish teachers with students is not satisfactory for Iranian students. In addition, access to information on Finnish university websites does not seem to meet the needs of international students, however none of them causes students concern because of the possibility of asking others (Hosseini et al., 2020). The issue of access to information is found on other Finnish websites else than university websites (Hosseini & Hytonen, 2022). Many of the participants did not identify themselves as members of Finnish society and felt outsiders. This finding is consistent with the situation of US and British students at Japanese universities, who orient themselves to intercultural rather than intercultural contact because host nationals react to them as foreigners (Taniguchi, 2022).

5. Conclusion

The findings of this study highlighted the important role of communication as an AUM thematic principle. Lack of local language and communication skills acts as a link between international students and foreigners, thereby increasing their anxiety. The study recommends another set of axioms for AUM theory that focuses more on the different dimensions of communication in an intercultural context. Indeed, further studies focusing on communication aspects are suggested to provide a broader perspective on the lives of international students. Conclusively, a set of axioms for AUM theory with a greater focus on different dimensions of communication in an intercultural context is proposed.

It is noteworthy that educated people are the human capital of any country. Informal tracking of participants by the author shows that most of the PhD researchers interviewed in this study left Finland

for other European countries after graduation, including those who expressed their satisfaction with living in Finland. Reasons can be geographical reasons, language issues, job opportunities and cultural issues or unconscious self-censorship in responding to the interview. Hence, further studies are suggested to understand the reasons for the migration of international students not only to Iranian students but also to other nationalities in Finland. It is noteworthy that attracting educated people from Asian and African countries can help the Finnish economy.

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KNOWLEDGE NUGGETS INSTRUCTIONAL DESIGN V2.0 AND TESTING STRATEGY

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Abstract

Currently, the education sector is undergoing profound changes and, in parallel, making digital teaching formats essential. One of these upcoming formats is the so-called "Knowledge Nugget". Knowledge Nuggets are digital learning materials that are designed for self-directed learning. They are organized within small, defined topics and vary depending on their scopes and sizes. Differentiation goes along with the way learning material is prepared and conveyed but does not provide information about the amount of content or the shared knowledge's difficulty. Based on a paper at END2021, the next step sheds light on general design aspects to reduce the extrinsic cognitive load during learning. Hence, it is necessary to which kind of Knowledge Nuggets has been prepared and how the different nuggets are structured. How the information is prepared must be taken into account not to harm the students in their learning process. This paper aims to further develop the previous form of instructional design, adding general design factors and providing a well-planned testing strategy to verify the explained model.

Keywords: *Knowledge nuggets, testing design, self directed learning, cognitive load, online teaching.*

1. Introduction

Teaching and learning have changed not only since the world started dealing with the Corona pandemic but also plays a significant role in everybody's life. That is because since classes were shifted to the digital environment due to the pandemic, the ongoing discourse on the value of traditional teaching methods reignited around the questions: "Do these teaching methods still reflect the spirit of the times?" and "Do they encourage learning?". Digital teaching, for example, loses value through traditional teaching methods, such as face-to-face teaching, as social interaction between teachers and learners via a video conferencing system is challenging to establish. A new teaching method that enables fast and sustainable information intake in the digital and analog world, suitable for today's fast and global world, is the design of so-called Knowledge Nuggets.

Knowledge Nuggets are self-contained didactical materials divided into small topics and prepared for self-directed learning. Usually, they are designed in a multimodal and creative way to enable students to consume knowledge easily and with satisfaction. Knowledge Nuggets can be created in various ways and thus differ in scope, size, and presentation. (Ploder et al., 2021). Knowledge Nuggets are therefore conducive for teaching students essential content in a proper amount of time through an original design. Although there are many creative ways to design Knowledge Nuggets, certain principles should be followed to ensure their success which is presented in this paper.

The theoretical background is outlined, with a brief introduction and the underlying literature. This study's focus is to define further and extend the elaborated Instructional Design provided in the paper "Instructional Design of Knowledge Nuggets" (Ploder et al., 2021). Knowledge Nuggets should not exclusively include the mentioned factors within the provided framework but should be expanded by general design principles.

This new adapted framework, Instructional Design 2.0, is presented in section three. Section four illustrates a possible procedure to verify this framework and the effect of its factors in an empirical setting. This procedure can be tested by running an empirical study. In the final section, five limitations are highlighted, and possibilities for further research are suggested.

2. Theoretical background

From March 2021 to April 2021, a literature review using Google Scholar and other scientific databases was executed to identify qualified publications. Following the guidelines of writing a literature

review by Snyder (2019), a deep understanding of the study field through relevant contributions and discussion was established. Keyword search terms included “multimedia learning AND design principles AND extraneous load”, “Learning from text and video AND instructional design AND multimedia learning,” and “Self Directed Learning AND Cognitive Load AND Online Teaching”. This search identified around 300 contributions. After duplicates were removed, the titles and abstracts of all remaining hits were screened for potentially relevant impacts. The full texts were read and critically appraised; 18 papers matched all criteria and were included for analysis.

2.1. Online teaching

Online teaching has gained increasing attention due to a fundamental transformation of traditional knowledge transfer, from books with text and images to computer-based multimodal media such as narrated animations, instructional videos, hypertext with printed text and illustrations. At this point, digital competence, in particular, becomes relevant to use digital media as productively as possible (Ehlers, 2020). Online environments allow many innovative approaches to support learning, but the challenge is deciding how best to use them by applying the instructional design. The cognitive load theory (Sweller & Chandler, 1991), which emerged in the 1990s and is constantly evolving, relates to the instructional design of online learning and will be used for measurement.

2.2. Self-directed learning

Digitalization in higher education institutions is leading to significant changes, and new skills in self-directed learning have become essential. Ehlers (2020) calls these "Future Skills". One skill mentioned by Ehlers and should be fulfilled by students is self-competence, including independent motivation and planning of learning content. Additionally, students should have the ability to manage their own time to organize the learning content successfully. Thereby, students have a great deal of personal responsibility to benefit from the learning content in the best possible way (Douglass & Morris, 2014). Students should work through the topics independently using the materials provided. To make this possible, it is necessary to clearly define the content of the Knowledge Nuggets and organize it in small chunks. The tasks must be comprehensible and fit in with the learning material (Ehlers, 2020).

3. Instructional Design 2.0

In the Instructional Design of Knowledge Nuggets (Ploder et al., 2021), three different levels of Knowledge Nuggets were named: (i) text within a document, (ii) slideshow with an added audio podcast, and (iii) video tutorials, and the factors which distinguished the three different levels were identified. By combining visual content with audio, two senses are addressed in parallel. The slideshow contains graphics or diagrams that are explained by additional keywords, and in video tutorials, the visual senses are additionally discussed by animations. However, it is essential to note that all Knowledge Nuggets share the relationship to practice, reproducibility, and a manageable processing time, which are particularly relevant in the field of education (Ploder et al., 2021).

Collective findings extend the basis from the systematic literature review in this paper. Some general design factors help to reduce the extrinsic cognitive load during learning. Hence, how the information is prepared and how the different nuggets are structured should be considered. Certain multimedia learning factors are implemented in the structure of those Knowledge Nuggets to improve the success. Table 1 shows an overview of all crucial factors, including the design principles. The highlighted design principles are discussed in detail in the following paragraphs. A detailed description of the first four factors can be found in (Ploder et al., 2021).

Amount of provided information - The following graph in figure 1 outlines the most distinct factors organized into three categories to illustrate their shift among the three levels. The y-axis represents the amount of information provided, and the amount of information does not vary from one level to another. The textual share represents the number of words written. However, there is no differentiation between continuous text, bullet points, and headings. The pictorial amount applies to the visual elements used for the individual level. Correspondingly, the auditive share refers to how audio files or a podcast supplements the level. In conclusion, this overview explains how the levels differ and indicates that this may significantly change the learning experience.

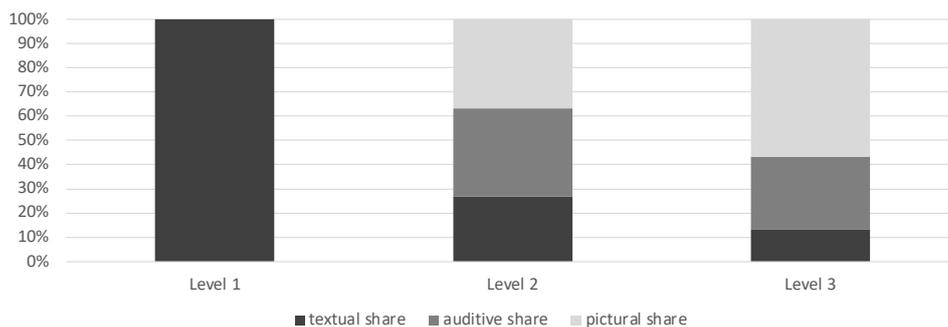
Signaling - One example of these design principles is signaling. The signaling principle states that people learn better when highlighting important content (Mayer, 2001; Richter, Scheiter & Eitel, 2016). These signals do not contain new content but show the learner what content is essential and relates to (Mayer, 2002).

Table 1. Relevant factors for the Instructional Design.

Factors	Level 1	Level 2	Level 3
Visual Elements		Static images	Dynamic images/animations
Recipient engagement	Self-regulated	Self-regulated	Controlled
Language Style	Formal Style	Conversational style	Conversational style
Sensory Modalities	Visual sense	Auditory + visual senses	Auditory + visual senses
Visual Elements		Static images	Dynamic images/animations
Recipient engagement	Self-regulated	Self-regulated	Controlled
Amount of provided information	Textual share	Textual, auditive + pictural share	Textual, auditive + pictural share
Signaling	Font formatting + structured headings	Font formatting, static graphics + stronger linguistic emphasis	Font formatting, dynamic images + stronger linguistic emphasis
Split attention effect		Spatial contiguity + Temporal contiguity	Spatial contiguity + Temporal contiguity
Coherence principle	Avoid irrelevant text fragments	Avoid irrelevant text fragments, visual and auditory elements	Avoid unrelated text fragments, visual and aural elements
Length and Quantity	Divide the text into short chapters, avoid long sentences	Appropriate time and amount (approx. 6 minutes)	Proper time and amount (approx. 6 minutes)

The aim of highlighting relevant information is to reduce the extrinsic cognitive load of the learners (Mayer, 2008). This principle can be applied at all three levels but in different ways. Based on Mayer (2008), signaling can emphasize specific words when creating texts. That can be done by another font formatting, for example, choosing a different font size or writing in bold or italic. The listed techniques can be incorporated in all three levels. In addition, structuring individual text sections with thematic headings can influence the processing of the subsequent text (Niegemann et al., 2008) and thus achieve advantages.

Figure 1. Differentiation of Knowledge Nuggets.



Important information can also be emphasized with the help of static or dynamic graphics (Richter et al., 2016). When learning content addresses auditory senses, the principle can be applied through stronger linguistic emphasis of critical terms. However, this type of signaling can only be applied in levels 2 and 3.

Split attention effect - The integration of related content or information from disparate sources can impair students' learning, the so-called split attention effect. In this case, the recipient must divide their attention between the contents and cognitively relate them. Divided attention and the mental work of bringing them together increase the cognitive load and consequently should be avoided (Chandler & Sweller, 1992).

Concrete examples are Spatial contiguity and the Temporal contiguity principles (Mayer, 2002). Both can only be applied in levels 2 and 3. The two principles assume that the formation of connections between ideas, events, or other elements depends on their spatial or temporal proximity. According to the Spatial contiguity principle, people learn better when words and images are presented close and not far apart (Mayer, 2018). Thus, it is advisable to place text close to related graphics.

In contrast, the temporal contiguity principle implies simultaneously presenting language and graphics. In this way, words and images enter the working memory simultaneously. That makes it easier to integrate the information into working memory instead of presenting them separately. (Mayer, 2018)

Coherence principle - Another principle that should be considered when designing Knowledge Nuggets related to the amount of content of a nugget is the coherence principle. Following this principle can also help minimize the extrinsic load. The coherence principle aims only to use visual and auditory elements essential for the context and thus for knowledge when designing nuggets. That avoids irrelevant information, such as text fragments, illustrations, or audio tracks, inhibiting learning. "Less is more" can be used as a guideline (Clark & Mayer, 2011; Mayer, 2005).

Length and Quantity - A key role when designing Knowledge Nuggets of any kind is played by the factors "length of the nugget" and related to this, "the amount of content". A Knowledge Nugget should enable learners to adopt the critical content quickly. The learners' capacity to adapt is limited, and an overload of information or learning units that are too long inhibits their adoption. For this reason, the length of the Knowledge Nugget should be limited, and the amount of information should be chosen wisely. When designing a Knowledge Nugget, it helps to ask the question: "What information is important for the recipient and how can it be conveyed in a comprehensible way?" However, there are no exact guidelines that specify an appropriate time and amount for all Knowledge Nuggets, as it depends on the type of Knowledge Nugget. In general, however, a length of approx. six minutes is recommended as the most appropriate time for instructional videos (Brame, 2016) since videos too long reduce the student's engagement, whereas short videos are more captivating. For the slideshows, a similar length is aimed. When structuring texts, especially the quantity should be kept in mind. It is advisable to divide the text into short chapters to simplify reading.

Furthermore, a chapter can be divided into smaller paragraphs. In addition, long sentences should be avoided, as they are more challenging to read. Generally, a sentence should consist of less than 20 words.

4. Pre-study procedure

In the future, an empirical study is planned to be conducted to test the three different levels of Knowledge Nuggets. The factors and design principles mentioned in the paper are the basis for further research in this field. With the help of empirical research, it can be determined how the students perform, and the cognitive load will change depending on the individual level. The framework can be provided digitally on Learning Management Systems (LMSs), as shown in Table 2.

Table 2. Study procedure Agenda.

Agenda	Description
Introduction + Briefing	Study description, procedure
Demographic data + expertise query	Demographic characteristics, interest, prior knowledge
Knowledge transfer through Knowledge Nuggets	Three different levels of Knowledge Nuggets Level (Text, Slideshow, Video)
Assessment	Multiple Choice Questions
NASA Task Load Index	Measuring cognitive load

The participants are instructed to refrain from any additional aids to carry out the study and distort the results. They are advised not to use any other tools to survey or falsify the results afterward. In addition, demographic characteristics are requested to assess the sample size better. Moreover, it should be determined whether the participants have prior knowledge regarding the respective subject area. This is a relevant factor since participants with specific prior knowledge in the related topics are expected to perform better.

In the third section, the knowledge is transferred with Knowledge Nuggets. The test persons are randomly assigned a certain level of Knowledge Nuggets. In the empirical study, a text, a slideshow, or a learning video on the same topic is provided for every participant.

With the help of a questionnaire, the recorded knowledge is checked. With multiple-choice questions, comprehension and reproducibility are evaluated. Subsequently, the participants' stress levels can be measured using the Nasa Task Load Index (Hart, 1988).

5. Future research and limitations

The study procedure presented in table 2 can be tested within an empirical pre-study for further research, and the process can be tested with selected participants. Moreover, a more extensive study can be conducted based on these findings to get a more detailed view. Before interpreting the study, some limiting factors should be taken into account. As no empirical research has been conducted yet, the findings from this article are derived exclusively from underlying literature. Therefore, the instructional design should be tested in practice to get a more detailed result.

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TEACHING ENGLISH LANGUAGE AND CULTURE THROUGH PBL AT THE TERTIARY LEVEL

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Abstract

Research has shown that language and culture are closely related (e.g., Brown, 2007; Kramsch, 1998; Kuang, 2007; Savignon & Sysoyev, 2005) and are best acquired together (Schulz, 2007). This paper aims to demonstrate how project-based learning (PBL), one of the main innovative approaches in the current educational landscape, can be useful for teaching culture in the English language classroom at the tertiary educational level. PBL is a teaching approach in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge (Kingston, 2018). According to different studies in the field (Kavlu, 2017), this approach can be more engaging and motivating for English language learners than traditional methods. First, the language is being used for an authentic purpose, which gives the language relevance. Further, learners develop content knowledge as well as critical thinking, creative thinking and communication skills. This study will focus on the implementation of PBL in the English language classroom in different degree programs: Primary Education, Infant Education, Hispanic Philology and Humanities. Students created an authentic final product that explored cultural aspects of English-speaking countries in combination with different subjects such as geography, history, literature and economy. The findings are based on a questionnaire that measures tertiary students' motivation levels and expectations in relation to this pedagogical framework.

Keywords: *Project-based learning, English culture, English language, foreign language, tertiary education.*

1. Introduction

This paper aims to integrate culture into the English language classroom at the tertiary educational level. With this purpose in mind, the project-based Learning (PBL) approach will be used in courses of different subjects. PBL is a pedagogic framework for learning and teaching a subject through a project (Thomas, 2000). In English language learning, this approach involves students completing a project by choosing a topic, solving problems, and generating products in the form of meaningful solutions (Sanatullova-Allison, 2015, p. 7). PBL can take place inside or outside the classroom. PBL has been chosen because “its utilization in EFL classrooms may serve as one of the appropriate methods to incorporate culture into language contexts” (Sanatullova-Allison, 2015, p. 1).

PBL has its origins in Dewey's initial proposal (1938), *Learning by doing*. PBL is described as students “driving their own inquiry, working collaboratively to seek viable solutions, using advanced technology, and communicating their findings to the related audience” (Bell, 2010, p. 40). This approach can be more engaging and motivating for English language learners than traditional methods. It is a learner-centred approach in which students acquire key knowledge and 21st-century skills – critical thinking, collaboration, communication and creative thinking – within a meaningful project.

The main objective of this paper is to implement the use of PBL as an innovative approach through which students in different fields create authentic final products that require exploring cultural aspects of English-speaking countries in combination with different transversal subjects such as geography, history, literature, music, economy, and so forth. This project seeks to increase the motivation of foreign language students and improve communication, participation, interaction, cooperation and collaboration among them. Didactic resources such as storytelling, songs, videos and materials produced using Information and Communication Technologies (ICTs) will be used in the foreign language university classroom to integrate culture into the subjects involved in this study: (1) Sociocultural

competence as an element of programming in the teaching of a foreign language (Degree in Primary Education), (2) English teaching as a foreign language in infant education (Degree in Infant Education), (3) English III (Degree in Hispanic Philology), (4) English II (Degree in Humanities) and (5) English for Academic Purposes (Degree in Hispanic Philology). To achieve this general objective, the following specific objectives have also been set: to promote the autonomous learning of students and the application of acquired knowledge in a transversal way; to promote the use of ICTs and their application in different contexts; to investigate the advantages and disadvantages of PBL in the university context, specifically in English as a foreign language subjects; and to assess the performance of PBL through a pre-questionnaire. This will measure students' motivation levels and expectations in relation to this pedagogical framework at the tertiary level. Finally, this study will make it possible to determine whether the use of PBL is equally applicable to different foreign language subjects at the university level or whether, on the contrary, it is more effective in a particular degree or subject.

2. Applications, advantages and disadvantages of teaching English language and culture through PBL at the tertiary level

Culture and language are intimately linked – they coexist and they nurture each other (Bryam, Nichols, & Stevens, 2001). Learning culture, therefore, is essential; otherwise, language learners may lack the necessary tools to fully understand the ways of thinking of native speakers of the target language: their ideas, customs and traditions (Gandía, 2012). Project-based learning is an interactive strategy that enables foreign language educators to teach culture through language and vice versa. PBL is based on constructivism, and it allows students to actively access and build new knowledge about a specific subject or topic related to the target language (Krajcik & Blumenfeld, 2005) while promoting creativity, autonomous learning and intrinsic motivation.

Active and inquiry-based learning are the foundations of PBL. Over an extended period of time, students must deploy knowledge and skills to inquire on a given question, problem or challenge. In its purposes and procedures, PBL pays special attention to what Bloom (1956) termed higher-order thinking skills (HOTS) and subskills: applying (executing and implementing), analysing (differentiating, organising and attributing), evaluating (checking and criticising) and creating (generating, planning and producing). Thus, PBL contrasts harshly with paper-based rote memorisation and more traditional teacher-led instruction.

The major purpose of PBL is to ask students to design, plan and carry out a project that results in an authentic final product. The product is elaborated by investigating a problem, question or challenge. Students take the theoretical premises of different subjects of the curriculum as their starting points and base their investigations on previous schemata or knowledge. Therefore, PBL is an application of transversal teaching, as it establishes clear connections with different fields of study such as history, geography, arts, mathematics, economy, sociology, music or literature, to name just a few. The wide spectrum of approaches that appeal to students with different interests and tastes boosts students' motivation to investigate and share knowledge. The tasks and the final product consolidate and show evidence of the learning results, and student participation is enriched by the elaboration of the product and assessment of the work (Boyd, 2016).

Prieto (2006) comments that project-based learning represents an effective and flexible strategy that can improve the quality of university learning in many ways. First, PBL allows students to develop various skills, including problem resolution, decision-making and teamwork (de Miguel, 2015). Each student is part of a team that works together to put together knowledge. This activates students' deductive thinking as they discuss decisions and overcome the challenges that unfold while carrying out the project. Individual creativity, resourcefulness and communication skills are triggered. Since PBL integrates language skills, students increase their fluency and practice oral communication through argumentation, negotiation, presentation of information, discussion and refutation of peers' ideas and comments in the foreign language. These interpersonal and social abilities strengthen peer relationships, benefiting lessons and other group activities by improving the atmosphere and positively impacting class management and dynamics.

Moreover, PBL triggers the development of positive attitudes and values, such as critical thinking, thanks to the process of gathering information. In this way, it transforms students' ability to discriminate between reliable and unreliable sources, as they learn to make precise and selective choices and to condense information and display it for others. Furthermore, by reading, students assimilate new vocabulary and learn grammar in context, while written comprehension and production is improved by students' collaboration in presenting knowledge for the final product.

The disadvantages of this innovative approach are the same pitfalls common to learner-centred methodology in general. In the traditional class, students have to listen to the educator; in PBL, they have to communicate. While before, they received clear notions and explanations, now they have to investigate, look for information, evaluate its reliability and decide upon its inclusion in the final product according to relevance. Therefore, the first disadvantage is precisely this switch in the roles of teacher and learner, which may at times be problematic. In this learning panorama, the teacher is relegated to the role of mentor, guide and facilitator who provides instructions to help students find and understand information and process it into a final product. The teacher is also in charge of scaffolding the tasks while allowing students to study the possible use of authentic materials in the process. This is how sessions become learner-centred and how students achieve agency, leaving behind the role of mere receptors of knowledge and accepting responsibility for completing the assigned tasks and pursuing them with persistence. Nonetheless, it is precisely here where problems may occur since, if students are uninvolved or disoriented or if they lack proper guidance, learning will not occur and the method of PBL will not work.

Concerning the difficulties or disadvantages related to the figure of the educator, it is worth mentioning the significant amount of time one must invest to conceptualise a project that reflects a class's necessities, objectives, and contents. However, despite being time-consuming and tedious, this downside of PBL is somewhat mitigated by its dynamic nature. The produced materials are adaptable and reusable and can be extrapolated for other class activities and for groups of different educational levels. It is also relevant that PBL's transversality requires greater coordination between curricular subjects; otherwise, students might feel lost, as new knowledge has no foundation to build upon.

As for difficulties or disadvantages from the learner's perspective, it is important to mention that students may resist participation in many class and group activities. Moreover, because of its multi-layered nature, at the beginning of its implementation, students may have the impression that PBL requires an increase in their workload. The fragmentation of the content into different sessions represents a distribution of objectives and tasks that uses different premises to approach the content.

After evaluating the advantages and disadvantages of PBL at the tertiary educational level, the present article finds that the disadvantages fall short compared to the benefits offered by this valuable approach to language and culture. This affirmation of PBL is supported in the following pages.

3. Method

This study was conducted at a state-run university of Andalusia (Spain). The sample consists of 110 undergraduate students (20 male and 90 female) who volunteered to participate in this project. The students were enrolled in English language-related courses from the following degree programs: Infant Education, Primary Education, Humanities and Hispanic Philology. Out of the 110 participants, 62 (56.4%) were local (Spanish) students and 48 (43.6%) were international (exchange) students.

Data were gathered from the participants' responses to an anonymous online questionnaire completed at the beginning of the academic year 2021–22. The questionnaire was designed via Google Forms. It included items of demographic classification and up to 20 closed- and open-ended questions related to 1) students' previous experience and knowledge about PBL and 2) students' perceptions regarding the expected advantages and drawbacks of PBL in higher education.

Students' responses were analysed both quantitatively and qualitatively through a frequency analysis of the close-ended items, including yes/no and Likert-based questions, and through categorisation and coding of the open-ended questions.

4. Results

Regarding students' previous experience and knowledge of PBL (Table 1), the majority of the participants recognised having previous experience with PBL in the EFL classroom and acknowledged knowing what PBL was. Indeed, some students provided relatively accurate definitions of PBL: "It is a teaching method that allows the student to acquire knowledge and skills through the development of a project that responds to a specific problem in real life" (Student 26); "It is a teaching method in which students gain knowledge and skills by working for an extended period of time to respond to an authentic question" (Student 34).

Table 1. Student responses about previous experience and knowledge of PBL.

Item	Students % (N = 110)	
	Yes	No
Previous experience with PBL in EFL	69.1	30.9
Knowledge about PBL	70	30

As for the students' perceptions regarding the expected advantages of PBL in higher education (Table 2), most students reported that PBL could help them better understand the course subject and that they could learn more practical and useful content through PBL than through traditional teaching methods. Additionally, the majority of them believed that this approach would allow them to be more autonomous in learning, show greater initiative and organise and plan their work more appropriately. Similarly, they deemed PBL a potential approach to becoming more actively involved in tasks and activities in their working groups and developing and improving their communicative skills in the foreign language. Furthermore, most students reported that PBL would allow them to use resources and materials differently from their habitual methods and help them improve their digital communicative abilities. Finally, most participants believed that this approach would enhance their critical-thinking and creative skills and provide an opportunity for higher levels of amusement while learning, thus increasing motivation.

Table 2. Student responses about potential PBL advantages.

Item	Students % (N = 110)				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Better understanding of practical and useful content	–	0.5	14.5	54.5	30.5
Being more autonomous and having better organisational and planning skills	0.5	1.7	14.1	51.8	31.9
Being more actively involved and developing communicative skills	0.5	0.7	9.4	55.4	34.0
Using different resources and materials and improving ICT skills	–	3.7	30.5	65.8	–
Thinking critically and being creative	–	3.6	20.0	76.4	–
Having fun and increasing motivation	–	3.6	23.6	72.8	–

Apart from the potential benefits described above, students reported further expected advantages, such as cultural enrichment and developing intercultural competence by working in groups with members from different countries and sociocultural backgrounds: "I think this will help me to know more about the culture of other countries while improving my intercultural and communicative skills" (Student 21); "This experience could allow people to learn more about other cultures" (Student, 67).

As for disadvantages, students reported few perceived shortcomings of the PBL approach. Students made only a few comments concerning potential working-group management issues and the expected higher workload compared to traditional teaching and learning approaches: "It can be complicated to work in [a] group when we don't know the other members. Moreover, it also can be difficult to work together when we have different schedules" (Student 44); "If somebody in your group doesn't work well you may find yourself doing all the work" (Student 59); "This methodology demands more much time than the traditional methodology" (Student 71).

5. Conclusions

PBL is an innovative educational approach in which students simultaneously achieve communicative skills and develop content knowledge, while learning to think critically and to be more creative by completing a meaningful project. This study has shown that PBL is useful in the English

language classroom at the tertiary level, demonstrating that learning through projects is more motivating, encouraging, and engaging for English language learners than traditional learning methods. This study has focused on the implementation of PBL for a total of 110 undergraduate students (local and international) from the degree programs of Infant Education, Primary Education, Humanities and Hispanic Philology. These students participated as volunteers mainly through a pre-questionnaire that measured students' motivation and expectations related to PBL in higher education.

The resulting data were obtained from the participation of these students through an anonymous online questionnaire. The responses were analysed qualitatively and quantitatively. First, the responses showed students' previous knowledge and experience of project-based learning: students acknowledged knowing about and having prior experience with PBL in the EFL classroom. Second, the questionnaire showed students' perceptions of PBL and its expected advantages at the tertiary level. Most students reported that this approach would allow them to be more autonomous while learning, and they expected that PBL would help them plan and organise their work more appropriately. They also indicated that they would learn more useful content through PBL than through traditional teaching methods and that PBL would allow them to develop their communicative skills in EFL and improve their digital communicative abilities. Students showed further expected advantages such as cultural enrichment from working in groups with people from different countries and sociocultural backgrounds. Finally, comments about the disadvantages of using this approach were scarce and referred to potential working-group management issues and expected higher workloads compared to traditional approaches.

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ELABORATION OF AN INTERACTIVE ELECTRONIC BOOK OF MEASURES OF CENTRAL TENDENCY

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Abstract

These are the advantages of technology: multimedia presentation, interaction, personalization, etc. Within this context an interactive digital book of the characteristics of the information was realized. In a data set, the following characteristics are usually of paramount importance: 1. the center, 2. the variation, 3. the distribution, 4. the atypical values and 5. The characteristics of the data that change over time. It is important to understand the standard deviation values using tools such as the general rule of rank.

Because technology allows us to get many of these statistics automatically, it is not so important to memorize formulas or perform complex arithmetic calculations by hand on the other hand, so that the students can concentrate on understanding and interpreting the values that are obtained from them.

The interactive digital book of measures of central tendency contemplates that each chapter indicates prerequisites, learning objectives, written development of the subject, videos with explanation, interactive exercises, widget (html 5. Interactive galleries, interactive images, etc.) review questions.

The interactive digital book will provide students with full-screen experience with galleries, videos, interactive diagrams, 3D objects, and math expressions and more; these books give life to the content in ways that a printed page cannot do. Students will no longer be limited to static images that illustrate traditional texts, but can now immerse themselves in an image with interactive subtitles, rotate a 3D object or make an answer come to life in a chapter review. You can flip through a book with a single finger on the screen. They can also highlight text, take notes, look up content and find definitions in a glossary very easily. In addition, they can take them wherever they go, which will allow students not only to learn between the walls of the classroom, but also in the virtual space that make up these books.

Keywords: *Interactive eBook, measure of central tendency, html 5.*

1. Introduction

Statistics help transform numbers into useful information for decision makers. It allows you to know the risks associated with making a business decision. And it also helps to understand and reduce variation in the decision-making process. Descriptive statistics include methods that help gather, summarize, present, and analyze data. Within the descriptive statistics are the measures of central tendency, which are developed in the electronic book elaborated.

Within the characteristics of the information we have the measures of central tendency, variability, position and form. Central trend measures indicate the extent to which data values are grouped around a typical or central value. Most data sets have a distinctive tendency to cluster around a central value. When people talk about an average value, about the intermediate value or about the most frequent value, they refer from informal to informal to average, median and fashion, three measures of central tendency.

The variability is the amount of dispersion or spread of the values from a central value. A simple measure of variation is the range, the difference between the largest and the smallest value. However, in statistics, it is more common to use standard deviation and variance. This statistic measures the average dispersion around the mean, that is, the way the larger values fluctuate above it and the way the smaller ones fluctuate below it.

The form is the pattern of the distribution of values, from the lowest to the highest. A distribution is symmetric or skewed. In a symmetric distribution the values that are below the mean are distributed in exactly the same way as the values that are above this. Thus the high and low values are neutralized. In a

biased distribution, the values do not distribute symmetrically around the mean. This skewed produces an imbalance between high and low values.

This interactive e-book was designed to help capture the sense of measures of central tendency, variability, position and form, this is how and when to apply statistical techniques in situations in which decisions are to be made, and most importantly how interpret the results obtained. Since it was not written for professional statisticians, our text is adapted to the knowledge and needs of college students who may accept the fact that statistics can be of considerable utility to their professional performance.

With the content of the book the student will be guided throughout the learning process through reminders of what he should already know, through a gallery widget, interactive images or images in html, as well as examples that can be identified and processes developed step by step or with a video using specialized software in statistics.

2. Development

The contents of the interactive book are as follows: Introduction video, Chapter 1 Introduction, Chapter 2 Measures of central tendency, Chapter 3 Measures of Variability, Chapter 4 Measures of position, Chapter 5 Other descriptive measures, Chapter 6 Form, Chapter 7 Activities 1, Chapter 8 Activities 2, Chapter 9 Activities 3 and Chapter 10 Internet Resources.

The videos are gaining more attention every day by the teachers as a tool of contents and information, within this context the digital book was made a video of introduction of the characteristics of the information, in which it is described the measures of trend, variability and form. In addition to the calculation, application and interpretation of each of the measures and the use of the software to obtain it. Figure 1 shows the introduction video.

Figure 1. Introduction video.



In each chapter the theoretical part was developed in the form of questions and answers, in order to make the students easier to understand each of the topics. Widgets were added to support the content of the book. The "widgets" tool consists of small applications that allow you to integrate interactive content into the digital book. The widgets that are used in this book are the following: gallery, multimedia, review, interactive image, HTML, scrollbar and popup.

In the image gallery instead of seeing a single image on the page, the student can walk through an entire collection with his finger, including the notes in the photo. The galleries that were used can be seen using thumbnails or photo by photo. In the subject of measures of variability, a gallery of images was performed, in which the percentage of observations for different intervals in the normal distribution is shown, this is shown in figure 2.

Images say a lot more when they are interactive. And with the zoom capabilities and labels, any information can have a better description of the image, since you can point out important parts of an image and get a better understanding of the subjects. For the item of measurements of position was realized an interactive image of a box graph in which the characteristics of this graph are shown, which is seen in figure 3.

Figure 2. Image gallery in the subject of measures of variability.

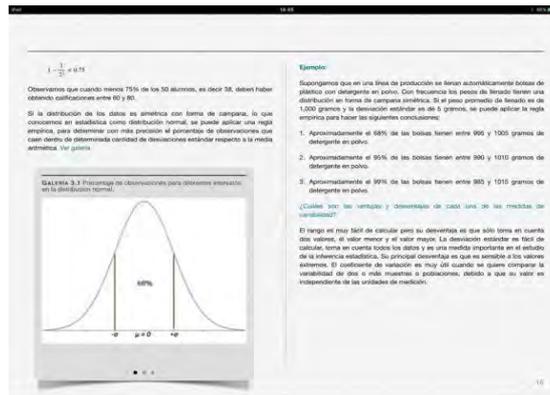
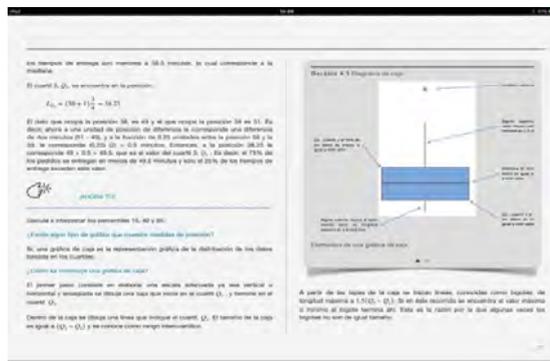
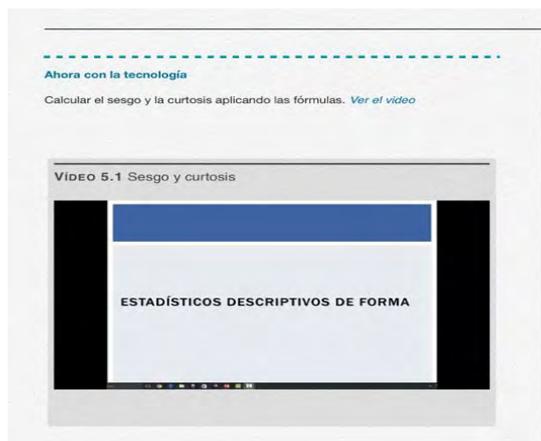


Figure 3. Interactive image of the box graph.



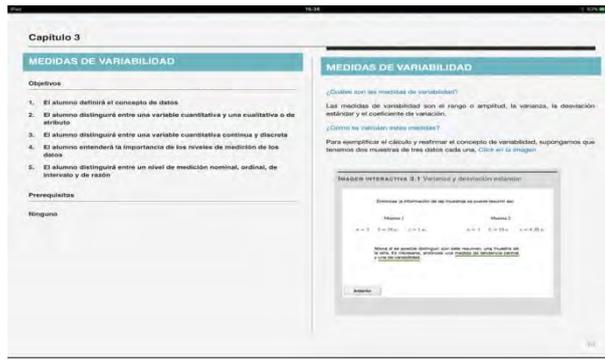
Audiovisual content gives life to any topic anywhere on the page. It is no longer just about seeing and reading: it is now possible to interact with text and images. Videos can be automatically reproduced, or as many times as the student wants, in order to better understand a topic or to see how a practical exercise with the use of software is solved. In chapter 5 a video was produced on an example of bias and kurtosis, as shown in Figure 4.

Figure 4. Video of bias and kurtosis.



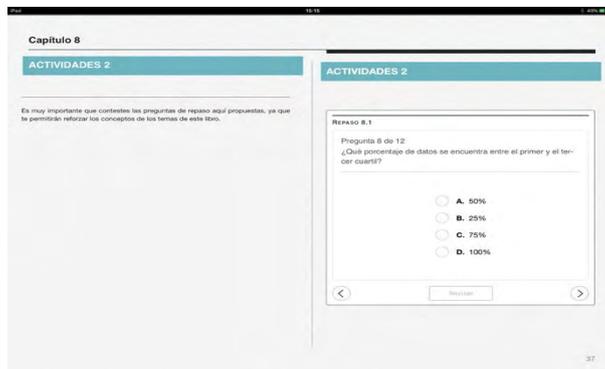
iBooks Author has a number of tools that allow us to make a highly interactive eBook in a very easy way, but the most powerful and flexible tool of all is the HTML Widget, with which we can basically add any animation / interaction you can imagine. In most of the chapters the HTML widget was used, since with this tool you can make all kinds of animations, interactions, web pages, banners, GIFs, etc. In this book they are used to explain better the theoretical part or in the resolution of an exercise. Figure 5 shows an html widget which was made in order to explain the variance and standard deviation of two samples.

Figure 5. HTML variance of variance and standard deviation.



To evaluate their knowledge, readers can do review activities: answer a multiple selection questionnaire, choose the correct photo, name a picture or a mix of all. In Chapter 8, concerning activities 2, 12 questions were asked to review the topics of measures of central tendency, variability, position and form. In Figure 6 we can see the review questions.

Figure 6. Review questions.

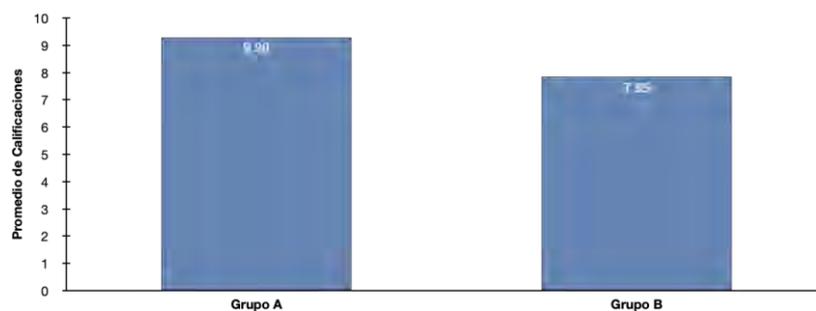


In chapter 7 of activities a video was realized in which all the measures seen in the previous chapters are obtained making use of a statistical software. The contents of chapter 9 are proposed exercises, with the purpose of putting into practice the knowledge acquired in the subjects seen. Chapter 10 proposes that the student make use of the available resources in internet. Since each exercise has access to a web page with data file in which it is proposed to obtain different measures.

3. Results

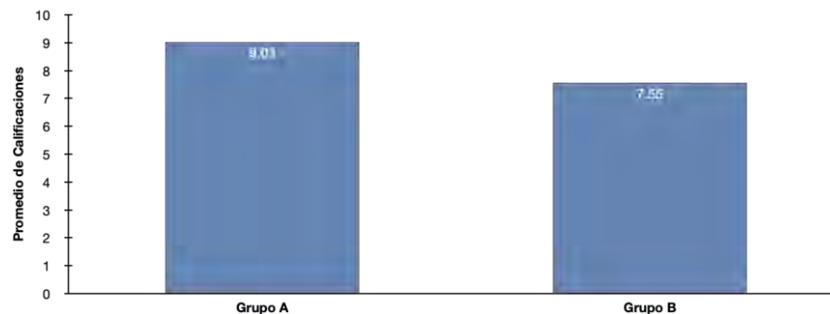
The resources of the multimedia book of the subjects measured of central tendency and variability were used, in a pilot group (group A), the results of the examination corresponding to the subjects of measures of central tendency: mean, median, and mode, which were compared with another group that did not use it (group B). In addition, the groups that were compared were groups of the same professor and in the same degree. Figure 7 shows us the results of the examination of the topic of measures of central tendency of both groups.

Figure 7. Average ratings of the topic of measures of central tendency.



The grades of group A correspond to the students who used the resources of the multimedia book as a complement to what was learned in the classroom, these students were provided in .pdf format so that they could use it from any electronic device (PC, Laptop, tablets, iPad, etc.) and that they had free access. Figure 8 shows the results of the exam corresponding to the theme of dispersion measures: variance, standard deviation and coefficient of variation.

Figure 8. Average ratings of the variability measures topic.



It is important to mention that in the exams that were carried out for each group, apart from the exercises to be solved, they were also asked questions about concepts and interpretation of the results obtained.

4. Conclusions

The technology that has been integrated into the educational process is changing teaching paradigms. We can see this even in low-income schools. The changes are in general, good. Thanks to technology books are also changing the way of teaching. We consider that the student, when making use of the developed electronic book, will have a better way of learning when considering the book as a complementary material for the subjects of the normal course.

It is also considered that in making use of the electronic book the student can focus on the interpretation of the results and the understanding of the topics, rather than memorizing formulas; since with the use of software the results are obtained in a faster way and the student should focus on the interpretation of these with a critical thinking that helps decision making.

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FROM FACE TO FACE TO REMOTE LEARNING: A PRIMARY EDUCATION TEACHING SCENARIO IN DIGITAL CLASS

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Abstract

Environmental protection and its utilization, taking account of sustainable development, becomes a necessity in today's rapidly changing era. In the schools' surrounding environment there are resources which could be integrated in the students' everyday life, within the frameworks of sustainability and with respect to their existence and their characteristics. Students take up an active role by implementing STEM methodology in remote learning, with a combination of synchronous and asynchronous learning.

The aim of the paper is to present the design of a teaching scenario about mathematics, in the field of geometry, and specifically the teaching of angles, via STEM methodology and utilization of e-me digital classroom. Students are asked to solve the problem of designing paths in the school garden and also to recognize the angles in their home and at the work of arts. If and how a math teaching scenario using the digital environment of e-me and Web 2.0 applications and applying modern and asynchronous distance learning with STEM methodology, could lead to understanding and knowledge acquisition. The estimated duration of the teaching scenario was three teaching hours in synchronous and asynchronous learning. It was designed and implemented in 5th grade students of a primary school in Athens. Students worked individually or in groups, depending on the task assigned to them in the digital learning environment, cultivating their critical thinking and problem solving.

The involvement of students in synchronous and asynchronous learning and the results of their activity, showed that the students cultivated their critical thinking and problem-solving skills. They took pleasure through creativity. Their critical thinking was encouraged via STEM methodology, where the e-me environment favored students' navigation and the co-construction of knowledge.

Keywords: *E-Me, STEM, remote learning, mathematics, scenario.*

1. Introduction

The learning approach, according to the curriculum of primary schools, needs to be exploratory- inquiry based, interdisciplinary, active, combining Information Communications Technology (ICT), implementing team-cooperative teaching, so as to cultivate students' social and cognitive skills (Αλαχιώτης, 2002). The syllabus of Primary Education is based on the theories of constructivism, inquiry learning, the implementation of cooperative teaching (ΔΕΠΠΣ, 2003), being oriented towards the 21st century skills and sustainability (Brundiers et al. 2020).

In recent years there has been noticed a strong interest in designing teaching scenarios via STEM methodology which contributes to the development of programming, observation, critical thinking and problem solving skills (Komis & Misirli, 2016). STEM education refers to Science, Technology, Engineering and Maths. The main goal is to solve problems through student participation, through experimentation and questioning, in conjunction with everyday life and based on pre-existing knowledge and experiences of the student in an appropriate educational environment (Hwang & Taylor, 2016).

Cooperative teaching combined with new technologies is implemented in Primary Education in the framework of STEM methodology and it requires an appropriate digital environment for cooperation, communication and outcome presentation (Fragou et al., 2019). An educational teaching scenario is an activity plan that deals with the content, the course flow, the roles of the participants, the learning theory on which it is based, the digital resources that are used in the teaching practice in order to achieve the students' interaction (Σπυράτου & Γουμνάκης, 2008).

1.1. e-me and digital educational applications

The utilization of ICT in the context of collaborative activities with the use of appropriate digital applications offers to the student immediate results. The intervention of each student is immediately

visible and mobilizes all members of the group. By utilizing the digital environment students organize their prior knowledge and contribute to a common project. The results are immediately visible to everyone.

A variety of digital environments is available for use by the teacher as the digital environment of e-me and Web 2.0 applications. e-me (<https://auth.e-me.edu.gr/>) is a Greek digital educational environment for students and teachers in primary and secondary education and the connection of its members is done through the Panhellenic School Network. Provides a secure learning place for students and teachers in which they communicate, collaborate, create and share content. e-me aims the students to have active involvement in a secure environment where members have the opportunity to utilize common files and applications in the area of the Hive, as is called each digital classroom.

e-me has the Wall, which functions as a forum for interaction, collaboration and feedback between students and teachers. The e-me Wall allows and enhances the interaction of the members of the Hive and it is a space for collaborative learning and innovation in a Web 2.0 environment (Megalou et al., 2015). On the Wall it is possible to share links and integrate Web 2.0 applications, such as the mindmeister mind maps (<https://www.mindmeister.com/>) and a synchronous communication application link, such as the Cisco WebEx digital classroom (<https://www.webex.com/>).

Digital mind map is especially utilized in every educational grade as it offers a visualization of the subject of negotiation, collaboration and the possibility to intervene at any time (Arulselvi, 2017). Coggle mind map was used by Arulchelvan et al. (2019) in an English language class, with students of Primary and Secondary education, for the improvement of the English language and the enhancement of participative learning, with positive results.

Photodentro is the National Accumulator of Educational Content (<http://photodentro.edu.gr/aggregator/>) in Greece for Primary and Secondary Education, part of the central e-service of the Ministry of Education for the free distribution of digital educational content for any interested.

The blog is used for students' activity to publish their opinion, comments and upload their work. Students interact through the posts and work collaboratively to complete the assignments have assigned to them (Montagud-Romero et al., 2020; Alsubaie & Madini, 2018).

The digital environment of RunMarco! (<https://runmarco.allcancode.com/>) utilized by the students to learn the programming language through experimentation with immediately visible results and to connect the tool with the STEM methodology (Giannakoulas & Xinogalos, 2019; Meftah et al., 2019).

The aim of the paper is to present the design of a teaching scenario about mathematics, in the field of geometry, and specifically the teaching of angles, via STEM methodology and utilization of e-me digital classroom. The basic question is:

- If and how a math teaching scenario using the digital environment of e-me and Web 2.0 applications and applying modern and asynchronous distance learning with STEM methodology, could lead to understanding and knowledge acquisition.

2. Methodology

This action of designing the digital teaching scenario was applied to 25 students, 12 boys and 13 girls, aged 10 years old, of a 5th grade Greek school, who had knowledge of collaborative learning from the beginning of the school year. The scenario was implemented in remote learning, synchronous and asynchronous learning, through the WebEx meetings and e-me digital platform respectively during the pandemic. During the action in the digital environment of e-me were implemented:

- A. Student's prior knowledge investigation.
- B. Implementation of the teaching scenario and consolidation of the angles and planning, to solve a problem of school everyday life, ie the design of paths in the school garden
- C. Qualitative analysis of individual and group student assignments.
- D. Recording by students in Poll of e-me of the satisfaction they got from the in the digital environment.
- E. Observation by the teacher.

The implementation was carried out in 3 lessons exclusively in remote learning, lessons synchronous -1 lesson asynchronous (30 minutes each lesson and 40 minutes each lesson respectively). Students were involved individually and in groups in asynchronous distance learning. Also they worked in groups of 5 people or in plenary in synchronous learning.

The initial exploration of the students' prior knowledge which constituted the initial assessment was achieved by the Wall of the e-me utilizing digital classroom and introducing a conceptual mapping link. The activity of the students during the implementation of the scenario and the e-me content questions constituted the formative evaluation. The final evaluation consisted of the individual and group assignments of the students in the e-me applications. The evaluation of the educational scenario was

carried out throughout its implementation, through the students' activity, their cooperation and participation, as well as the e-me Poll in which students expressed their satisfaction by using all these digital environments.

2.1. Design - Implementation of a teaching scenario

The activities were designed and implemented to achieve the aims of STEM. In order to decide the students how they will design the school garden's paths, after their return to school, they should have been taught the angles.

The activities of the scenario were related to:

- Activity of psychological and cognitive preparation: evaluation of existing knowledge and detection of representations and cognitive difficulties.
- Teaching activities of the angles (oral speech development, exploration, cooperation, challenge-conclusions in groups and in plenary).
- Implementation-expansion activity (work submission, creation of posts on the Hives' e-me blog)
- Cognition activity (RunMarco! - programming)
- Scenario evaluation activity

The students had worked again in the specific e-me environment and they had an account in the Hive. They also knew how to browse the internet safely, to use some Web 2.0 tools and they knew basic programming commands.

The following capabilities of synchronous learning in WebEx meetings were utilized:

- Break out sessions
- annotate
- student presenter
- chat

The following capabilities of e-me asynchronous learning were utilized:

- Wall (course information / links for safe navigation / exploration /comments)
- e-me content (flash cards, Drag Text), e-me assignments (submission of assignments)
- e-me Blog of the Hive (collaborative writing)
- Poll (scenario evaluation by the students)
- Other digital tools that had links on the Wall of e-me:
- Mindmeister mind map (collaborative writing / prior knowledge)
- e-book of 5th Grade Maths (visualization / students' book)
- Photodentro (Geogebra/experimentation)
- YouTube (teaching of the angles)
- RunMarco! (metacognition / code / gamification)

The flow of the scenario follows.:

In the 1st lesson in synchronous learning via WebEx (30') were implemented:

- Activation, collaboration and communication of students through the mind map Mindmeister, as a pre-organizer, where students recorded where they located angles in their home. The teacher watched the recordings and then shared the result in plenary.

- In the initial presentation of the topic the issues were raised and the students made hypotheses. «How to design paths in the school garden?». «We need to know the angles.». So the teacher was connected to e-me and used the link of the math e-book (Είδη γωνιών (ebooks.edu.gr) which concerned the angles lesson and shared his screen for teaching. This was followed by the presentation of a video regarding the design of the angles (<https://youtu.be/sxdZi-4A7v8>). The students drew angles on the Webex board. The formative assessment was made with e-me content/flash cards and Drag Text, which are .H5P files and the students shared the results in plenary. The students came to conclusions through group activity and exploration, with experimentation and hypotheses, in Break out sessions utilizing Geogebra (Μέτρηση και σύγκριση γωνιών | ΦΩΤΟΔΕΝΤΡΟ (photodentro.edu.gr)

In the 2nd lesson in asynchronous learning via e-me:

- Individual and group consolidation of knowledge / cultivation of critical thinking / extension of concepts in everyday life. The students submitted individual work from the e-book to e-me assignments. They worked as a team with the links that led to painters' works Χατζηκυριάκος Γκίκας, PabloPicasso. Robert Delaunay. The students had to find angles in the paintings, paint with the influence of painters and create articles in the Hive's e-me blog by sharing their work. The instructions were posted on the Wall.

In the 3rd lesson in WebEx:

- Evaluation, feedback, metacognition, individual and group activation through gamification. Mutual evaluation of the articles of the blog. Individual assessment of students with e-me content which

concerned the knowledge that students gained about the angles. Scenario evaluation by students with the e-me Poll. Metacognition and gamification via the game RunMarco! and sharing of students' results in plenary.

3. Conclusions

This paper presents the design of a teaching scenario about mathematics, in the field of geometry, and specifically the teaching of angles, via STEM methodology and utilization of e-me digital classroom. The basic question is how a mathematic teaching scenario was designed using the digital environment of e-me and Web 2.0 applications, applying synchronous and asynchronous remote learning with STEM methodology.

A. The investigation of the students' prior knowledge in the mind map showed that the students perceived where there were angles in their home.

B. Through the e-me content questions as formative assessment it was seen that most students acquired the knowledge during the implementation. Also the activity of the students during the synchronous education, their communication and cooperation, the content that was sharing by the students has constituted the formative evaluation. The results of the implementation were shared during the synchronous communication through the digital classroom where the students could comment on content and experiment with digital applications in synchronous teaching. In addition, the results were shared by the students on the Wall of e-me and at the e-me blog.

C. Qualitative content analysis of students' individual and group work during synchronous and asynchronous learning has showed that students understood the meaning of the angles and realized how to use this knowledge in their immediate environment in everyday life. Through the programming activity they gained ideas for completing their STEM work.

D. All the students said in the e-me poll that they felt satisfied while they were working in the digital environments.

E. The observation by the teacher was an important point of the qualitative analysis because in this case the researchers became observers as well. The teacher discreetly noticed the students' spontaneous activity during the lessons (Richards, 2001).

The digital environments of synchronous and asynchronous learning offered to students the possibility to build their knowledge remotely. The synchronous and asynchronous learning environments as safe educational environments favored the interaction of students enabling the continuation of teaching under adverse conditions such as those of the pandemic. In conclusion, remote learning has proven to be useful in enhancing students' critical thinking and problem-solving skills.

4. Discussion-limitations

The combination of synchronous and asynchronous education favored the design and implementation of the mathematics teaching scenario via STEM methodology with utilization of other digital applications. The students have understood the connection of science, mathematics and technology with everyday life and a pleasant atmosphere of cooperation and communication was created between them. They cultivated their critical thinking and problem solving skills. Digital environments had enhanced their interest and increased their active participation. The paper supports studies on the use of of the above learning environments in Primary education (Brundiers et al. 2020; Fragou et.al., 2019; Σπυράτου & Γουμενάκης, 2008; Megalou et.al., 2015; Arulselvi, 2017; Arulchelvan et.al., 2019; Montagud-Romero et.al., 2020; Alsubaie & Madini, 2018; Giannakoulas & Xinogalos, 2019; Meftah et.al., 2019) contributing to learning through a pleasant atmosphere of student creation and collaboration.

In this research, students were familiar with technology and the internet, but not with the implementation of educational scenarios in remote learning. The students were more restrained at first, but then they felt more creative as they got involved in the scenario and became more active. There was concern from the teacher about the adequacy of the time of completion, but there was a response from the students and the scenario completed. In addition the students had not posted again on the blog and there was relative difficulty in posting. The problem was overcome in synchronous teaching with a presentation by the teacher. This teaching scenario was designed to support the students' distance learning in situations such as the one we are experiencing due to the pandemic. The students were familiar with computers and had the necessary infrastructure. It would be interesting to investigate the involvement of the students in a blended-learning scenario or in experiential learning scenario in order to draw comparative conclusions.

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SAROPAS: A COMPETENCY-BASED PERFORMANCE TASK DESIGN MODEL

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Abstract

The Organization for Economic Cooperation and Development (OECD) published the learning framework 2030 which depicts students' competency for future demands as three intertwined currents of knowledge, skills, and attitudes and values. Student's knowledge can be observed when it is mobilized as skills in solving problems, and the use of knowledge and skills is mediated by attitudes and values. In other words, a student's competency can better be observed and assessed when they respond to real situations and exercise their knowledge and skills to resolve problems.

In educational practices, performance tasks are designed to mimic complex demands and challenges in real life that require students to apply their knowledge, skills, and attitudes and values in actions. For K-12 educators, the call for clear guidance of designing competency-based performance tasks is urgent. Wiggins & McTighe (2005) in their seminal work *Understanding by Design* suggested framing performance tasks using elements of authentic assessments — GRASPS (Goal, Role, Audience, Situation, Performance, Standards). GRASPS provides well-organized facets in designing assessments. However, considering the other side of the coin, curriculum design, GRASPS may be short for laying out the details of the design process. We refined GRASPS into SAROPAS (Setting/Scenario, Aim, Role, Observer, Products, Actions, Standards), a model with finer granularity in designing the curriculum and assessment which made the design process applicable and easier.

A survey was conducted to verify the strengths of SAROPAS in designing performance tasks. One hundred and seventy-one in-service teachers participated in the survey. Three tasks were given to the participants asking for their review on what skills can possibly be assessed in resolving the tasks. The result showed that the task designed by the SAROPAS model obtained the highest ratings and agreement in mobilizing six types of skills which could really demonstrate students' competency. Implications and suggestions about designing competency-based performance tasks were provided in this study.

Keywords: *Competency-based performance tasks, curriculum design, assessment design.*

1. Introduction

The Organization for Economic Cooperation and Development proposed learning framework 2030 (OECD, 2018). In the learning framework, students' competency for future demands were depicted as three intertwined currents of knowledge, skills, and attitudes and values. The required knowledge for the future, from specialized to broad, encompassed disciplinary knowledge, interdisciplinary knowledge, epistemic knowledge, and procedural knowledge. A broad range of skills, including cognitive, metacognitive, emotional, social, physical, and practical skills, were also needed to apply knowledge in real circumstances surrounding us. The attitudes and values, which can be manifested at personal, local, societal, and global levels, mediated the use of knowledge and skills. While one's knowledge and attitudes and values are mostly invisible and intangible, the mobilization of skills is observable and assessable. Thus, skills demonstrated in resolving tasks can be regarded as the evidence of learning.

A performance task is a task that "uses one's knowledge to effectively act or bring to fruition a complex product that reveals one's knowledge and expertise" (Wiggins & McTighe, 2005, p. 346). In educational practices, a performance task is often constructed to evaluate students' knowledge, skills, and attitudes and values. It was designed as an authentic, real-world problem, characterized with contextual features resembling situations in everyday life. Students demonstrate their skills by resolving the task and output tangible products or visible performance for target audience. The products/performance will also be evaluated by the criteria which are appropriate to the task.

The purpose of this present study was to propose a new model — SAROPAS — as a guideline for designing performance tasks, and to verify the effect of this model in developing performance tasks.

2. The model for designing performance tasks

Wiggins and McTighe (2005) proposed a model GRASPS to design performance tasks. GRASPS stands for the goal, role, audience, situation, performance, and standards of a task. The *goal* is the purpose for completing the task, or the problem/challenge/obstacles to be resolved. The *role* is the character who is responsible for carrying out the task. The *audience* refers to the target recipient, audience, client, or who needs to be convinced or to evaluate the outcome. The *situation* refers to the context which the actor acts in, or the challenges to be dealt with. The *performance* refers to the product/outcome to be created or produced to reach the goal. The *standards* are the criteria for success.

Designing a performance task and applying the task as an assessment tool are two sides of a coin. The assessment of skills should be consistent with what the goal was set for. Suggested by Wiggins and McTighe (2005), the GRASPS model provides the elements to create a well-organized performance task, and the six facets of understanding (i.e., explanation, interpretation, application, perspectives, empathy, and reflection) can be used as a blueprint for the assessment.

3. SAROPAS: A refined model of GRASPS

Although GRASPS offered a good framework for designing tasks, finer details about each task element are still needed to facilitate task designs. Based on GRASPS, the SAROPAS model re-organized task elements and posited each element a concise function that contributes the performance task. There are seven elements of the SAROPAS model, including setting/scenario, aim, role, observer, product, action, standards.

The *setting/scenario* is the context or circumstance in which the task is to be completed. The setting is like the scenario of a story, which provides the contextual information for solving the task.

The *aim* refers to the goal of the task, indicating what is to be accomplished or dealt with.

The *role* is the character which the students are going to play in the scenario.

The *observer* is the one in the scenario who judges whether the outcome is satisfied or successful. The observer can be the client, customer, supervisor, or anyone who made the final decision.

The *product* is the tangible outcome produced or created by students. A product can be a poster, a card, a craft, or anything that is *static* and can be evaluated by the observer.

The *action* is the visible performance acted out by students. An action can be an oral presentation, a talk, or anything that can be performed and evaluated.

Finally, the *standards* are the criteria for success. Scoring rubrics for the *product* and *action* outcomes are suggested as the rubrics may contain specific descriptions about the product and action.

The task elements of SAROPAS were wrapped in a storyline, so resolving the task may resemble what adults usually encounter in real situations. Narrative in the description provides the basis for learning and understanding (Hokanson & Fraher, 2008). The discrepancy before and after completing the task may help move students forward to solve problems (Cook, 2020; Hartmann, 2020).

4. Analysis of task descriptions using SAROPAS

Three types of task descriptions were collected. As shown in Table 1, Task 1 represents a type of task description which mentions about an upcoming lab activity without much emphasis on what is expected to be done. Task 2 is a type of description explaining a hands-on activity in a community fair in which students perform magic tricks. This description characterizes the kind of task which expects students apply what had learned in the class and present them in practice. Similar to the description of Task 2, Task 3 is about performing magic tricks in a school fair but with finer details.

The descriptions of Tasks 1 and 2 are typical ones given to students in the class; Task 3 is an example task showing the strengths of the SAROPAS model. Three task descriptions were analyzed using the elements of the SAROPAS model. Each sentence of the description was parsed, numerically labeled, and categorized into the corresponding element(s). Table 2 is a summary of the labels found in three task descriptions. For Task 1, the information about the setting, aim, actions, and possible products of the task were identified. In the description of Task 2, the role of students and the observer were found, but no product was clearly specified. The description of Task 3 is the lengthiest among the three. Comparing with the other two, the description of Task 3 provided all the elements of SAROPAS, including the standards of the actions/products, which were missing in Task 1 and 2. The description of Task 3 contains complete elements of SAROPAS.

Table 1. Three task descriptions.

Task	Description
Task 1 An Experiment on Acids, Bases, and Salts	Next week this time, ^{○,1} you will conduct an experiment on the properties of acids, bases, and salts in groups. Because you are going to learn the properties of acids, bases, and salts, and run through an experiment in class, ^{○,2} you will perform an experiment with regular food items on your own. For this purpose, ^{○,3} you will discuss in groups what to bring to class for the experiment. During the class next week, you will receive a worksheet where you can find instructions of procedures and questions for the experiment in groups. After the experimental task, ^{○,4} you are to complete the worksheet and hand it into the basket on my desk.
Task 2 Community Fair	^{○,1} The exciting yearly Community Fair will take place in the mid of this semester. Because you have learned about the properties of acids, bases, and salts, ^{○,2} you are to set up a booth in the Fair in groups. ^{○,3} You will make use of common food items in daily lives, ^{○,4} apply the knowledge of acids, bases, and salts, and ^{○,5} perform magic tricks in front of the public.
Task 3 Magicians at the School Fair	^{○,1} The Yearly School Fair is in the mid of the semester. ^{○,2} You will set up a stand at the Fair where ^{○,3} you will act as magicians in groups applying the knowledge of acid, bases, and salts learned in class and ^{○,4} perform magic shows using daily food items in front of Fair attendees. ^{○,5} You will perform tricks including the invisible scriptures, spitting red wine, and dripping blood soap that you learn in class. Additionally, ^{○,6} you are encouraged to research and develop more magic items yourself. The standards for successful performance are: 1) ^{○,a} explaining the pH ranges and colors corresponding to the acid-base indicator, 2) ^{○,b} explaining the meanings of pH values, 3) ^{○,c} citing the pH values of common food items in daily lives, 4) ^{○,d} comparing the difference between food items of strong acid-base and weak acid-base, 5) ^{○,e} explaining how to prepare and come up with a weak acid and a weak base solutions, 6) ^{○,f} giving an example of how to come up with a salt using a weak base or a weak acid, and 7) ^{○,g} paying attention to safety during performances.

Table 2 Analysis of task description using SAROPAS.

Task	Setting/ Scenario	Aim	Role	Observer	Products	Actions	Standards
Task 1	1	1, 2			4	3, 4	
Task 2	1	2	5	5		3, 4, 5	
Task 3	1	2	3	4	5	4, 5, 6	a, b, c, d, e, f, g

5. Methodology

A survey was conducted to understand in-service teachers' opinions about how different task descriptions may help mobilize students' skills. A questionnaire was designed for the survey.

Based on the OECD learning framework, six categories of skills were set as the outcome performance for students. In this study, the cognitive skills were further classified into two levels (Anderson & Krathwohl, 2001): lower-level cognitive skills (remembering, understanding, and applying) and higher-level cognitive skills (analyzing, evaluating, and creating). Therefore, there were seven skills to be investigated, including lower-level cognitive skills, higher-level cognitive skills, metacognitive skills, emotional skills, social skills, physical skills, and practical skills.

A total of 34 question items were developed in the questionnaire: six for lower-level cognitive skills (remembering, understanding, applying), eight for higher-level cognitive skills (analyzing, evaluating, creating), seven for metacognitive skills, five for emotional skills, four for social skills, two for physical skills, and two for practical skills. A five-point Likert scale was used, from 1 indicating the least likely to 5 the most likely to demonstrate that specific skill in completing the task.

One hundred and seventy-one in-service teachers participated in the survey. A total of 171 valid questionnaires were collected.

6. Results and findings

Descriptive statistics of the survey are presented in Table 3. The average rating for Task 1 is 3.11, Task 2 is 3.91, and Task 3 is 4.57. The result suggests that most teachers regarded the design of Task 3 can most likely help students cultivate seven types of skills. On the contrary, Task 1 received the

lowest rating among the three, on each category of skill. For Task 1, the metacognitive and emotional skills obtained the lowest ratings, which suggests that most teachers did not agree that students could exhibit their metacognitive and emotional skills in completing Task 1. However, students may be able to show their lower-level cognitive skills (remembering, understanding, and applying) in Task 1.

It can also be observed in Table 3 that, for each category of skill, the ratings become higher from Task 1 to Task 3, which suggests that as more elements of the SAROPAS model were added to the task description, the higher possibility the students may demonstrate that specific skill in accomplishing the task. Also, the standard deviations of Task 3 are the smallest among three tasks, which implies that teachers came to an agreement that students will be able to show their respective skills in completing Task 3. The standard deviations in Task 1 suggest that teachers' opinions were diverse toward exhibiting the respective skill in resolving the task. Observing the shrinking standard deviations of each type of skills from Task 1 through Tasks 2 and 3, it can be suggested that teachers' opinions came to an agreement that task elements become clearer and transparently specified.

Table 3. Descriptive statistics ($N = 171$).

Mean (Std.dev)	Cognitive Low	Cognitive High	Meta- cognitive	Emotional	Social	Physical & Practical	Average
Task 1	3.82 (.79)	3.11 (.96)	2.81 (1.02)	2.31 (1.07)	3.39 (1.14)	3.23 (.99)	3.11 (.99)
Task 2	3.98 (.80)	3.73 (.83)	3.82 (.87)	3.96 (.90)	4.04 (.91)	3.94 (.83)	3.91 (.85)
Task 3	4.57 (.59)	4.53 (.57)	4.54 (.56)	4.64 (.57)	4.57 (.59)	4.59 (.53)	4.57 (.57)

7. Implications and conclusion

This study reported a new model — SAROPAS — for designing performance tasks. SAROPAS contained the elements of a task, including setting/scenario, aim, role, observer, product, action, and standards. To verify the strengths of this design model, a survey was conducted. Three types of task descriptions characterizing different amount of task information were collected. A questionnaire was developed, which consisted of 34 questions asking about if the aforementioned task could help students demonstrate corresponding skills. One hundred and seventy-one in-service teachers participated in the study and completed the questionnaire. It was found that the task containing most elements of SAROPAS obtained the highest ratings with the smallest standard deviations. The task description with the fewest elements the lowest rating but with highest deviation.

These preliminary findings suggested that the SAROPAS model did provide useful guidelines for designing performance tasks. As each task element was clearly specified in the description, students could easily follow the instruction and complete the required tasks. Relevant skills can thus be observed in completing the task items.

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EDUCATION-TO-GO IN THE FUTURE IN DEVELOPING COUNTRIES?

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Abstract

Many typically good paying jobs have not yet recovered to the pre-pandemic level in many countries. On the other hand, due to the use of many digital technologies to order, store and deliver goods during the pandemic, many professionals were and are still needed for creating computer applications, data management and in analytics (aside from blue collar workers needed in call centers, warehouses, and delivery services). However, not many people are qualified because there were not many careers created in those fields mainly in developing countries. Despite that, the current demand for this type of talent is high. Therefore, many higher education institutions and small colleges may take the opportunity and offer the essentials of basic higher education and training needed for some of those jobs. Some younger individuals might not want to go back and be confined in a classical classroom after having tasted the “freedom of virtual education” which could even be accessed through a cell phone anywhere and at any time. This could be the beginning of Education-To-Go schools all around the world but mainly in underdeveloped countries, an education which would be affordable, quick, and very specific and aiming to certify some professional skills. This education would be tailored to fit the needs for the vacancies that are urged for the market to fill. Mainly the schools which would prepare those young adults could hire fewer teachers who would prepare or assemble the course materials and make them available on the school websites. This practice on the other hand will contribute to the “uberization of education” and drastically change the number of teacher-to-student ratios. In this paper the possibility of Education-To-Go in Mexico is analyzed considering the economic sectors which could possibly grow in the coming years matching them with the competencies needed. The analysis is carried out using quality control tools such as Ishikawa and Pareto Diagrams. There are scenarios in which it is a possibility, and the country could even export some of the trained people, mainly to the United States. Specialization through the teaching of specific competencies could be possible in some countries like Mexico in the post-pandemic era.

Keywords: *Competencies, engineering, tools, uberization.*

1. Introduction

In some countries during the pandemic, several truckers resigned which caused problems in supplying fuels, food, medicine, and other goods to the population. People working in medical services got exhausted, sick, or even died. Many older populations also unfortunately died. Other workers are still part of the great renounce in search of better working conditions, salaries, and benefits. So, many specialized workers were not or are not available yet for many reasons. Robots are not yet “competent” to replace the many workers to fill the vacancies (Dominguez-Perez et al, 2017). The pandemic changed in many ways how we buy, educate, work, have fun, and communicate. Therefore, other professionals are needed for the post-pandemic world in many countries; most of the professions will remain necessary and many pre-pandemic jobs are still essential. But the question is if we are prepared for another catastrophe in which we might need workers who should be available in the short term, to replace a segment of the population that could not be available in a certain economic sector or to prepare them in new jobs which might surge in the future. Future catastrophes could be originated by climate change, pandemics, or wars if many people die. Although, it is not necessary for a catastrophe to try to have better educated people for higher paying jobs. It is also necessary that women have access to high skilled jobs in order to reduce the salary gap between men and women and it will be also necessary to train migrants from the south to the north as the population of countries in this last region becomes older. Some governments would desire for their minorities to be trained for high paid jobs which require high skills.

Therefore, it is important to design education systems to prepare professionals in the short term. Currently, there is an opportunity to attempt it because there is a demand for many professionals with special skills, but the offer is not comparable, in part because graduates in university careers spend a few years being educated and the ordinary universities cannot prepare people in a short time. Besides that, if for any circumstance many workers with a specific university training are needed it could not be possible to prepare them because not many can afford to pay for an expensive career in a university in countries like the United States of America (USA). Currently, many families due to the COVID-19 pandemic might have depleted their savings for the higher education of their children in places where higher education is expensive. In the USA university fees and tuition have increased around 120% during the last 20 years. Many people with specialized training could be needed in a future crisis caused for example, by climate change, pandemics, or wars. Currently, The Intergovernmental Panel on Climate Change and its Working Group Impacts of Climate Change, Adaptation and Vulnerability, advert the possibility of severe crises due to climate change in a very near future and even mass extinctions of some species.

The reasons explained above lead to explore quick ways to affordably educate people in specific branches of science, engineering, medicine, administration, law, architecture and in many other fields. So, it is necessary to start designing ways to “urgently” prepare the necessary people to occupy some high skilled jobs. We should design ways to fill the current job market but not only of the productive sector but also of other sectors of society in order to advance towards a more equal society. For example, searching for new non-predatory economic systems far from the rampant consumption of capitalism, or just to design cooperative economic systems for the betterment of some communities, such as, distributed generation, storage and commercialization of energy from clean renewable energy sources in rural communities or to just prepare communities for surviving the upcoming global climate change disasters. Obviously if students study very narrow fields of knowledge, are trained in very specific abilities and develop a few special aptitudes they will not have a “universal” knowledge that the formal and classic universities provide, and perhaps the teachers to teach them may not be the most prestigious in research, so the students might receive a “reduced” education because the “best” professors in the universities are those who not only teach but research and apply the skills they teach and some of the knowledge they create are transferred to students through their teachings.

Trying to rush the preparation of the needed professionals may cause the creation of schools or redirecting some of the already existing schools to the uberization of education in which, older teachers are forced to retire to reduce costs and hire younger teachers with scarce benefits and low salaries. This could also be the result of the current economic situation due to the pandemic. Nowadays, many private schools have closed because many of their former students could not continue paying for their education and the public schools have a budget increased only by the inflation of the last year but the inflation, in some countries, has doubled at the onset of the current year, and therefore they have less economic resources. In this bleak economic situation, some schools reluctant to reduce their upper bureaucracy might start firing older teachers and other workers or force them to retire.

2. Why could Education-To-Go be feasible?

Education-To-Go is a possibility in the next years. This is concluded by using a decision tree which is shown in Figure 1. We start with the question: why Education-To-Go is a possibility? And the answer is: because of the technological change in the organizations, wars, global climate change or pandemics. Then we asked why are some new systems of education needed to face these issues? The answer is because there are less economic resources, teachers, and infrastructure in universities as well as the organizations need professionals with new skills. Afterwards, we ask the question: why is that the situation in universities and organizations? The answers are that old people retire, people flee in case of wars and that there is no good economic growth. At the same time there is high inflation and also due to the digitalization and the onset of new ways to conduct businesses.

Nowadays we observe that organizations are adopting new technologies, they are becoming digitalized, and are adopting text, image and voice processing, internet of things connected to devices, cloud computing, big data analysis, e-commerce and digital trade, artificial intelligence (machine learning, neural networks, natural language processing and others), encryption and cybersecurity, augmented and virtual reality, 3D and 4D printing and modeling and robotics (industrial automation, drones, and others) (WEF, 2021). Therefore, industry and other sectors of society need people who dominate these technologies (not for creating them, just to used them). They also need that their employees are proficient in emerging skills (including soft skills) (Dominguez-Vergara et al., 2021), among these are complex problem-solving, active learning and learning strategies, analytical thinking and analysis, technology design and programming, reasoning, problem-solving and ideation, creativity, originality and initiative, emotional intelligence, troubleshooting and user experience, service orientation,

resilience, stress tolerance and flexibility, technology use, monitoring and control, leadership and social influence (WEF, 2021). Among the job roles in high demand are artificial intelligence and machine learning specialists, data analysts and scientists, big data specialists and information security analysts (WEF, 2021).

Figure 1. Decision Tree of why there is the need of Education-To-Go.



Recent conflicts in the world could trigger the creation of Education-To-Go universities. Nowadays the prices of oil have been above 100 dollars per barrel for some time, which is causing more inflation, on top of the one caused by the disruption of productive chains due to the COVID-19 pandemic. The effects of the Russian-Ukrainian war and high inflation are impacting negatively the budgets for education in many countries of the world. And because of the war many countries in Europe and in other parts of the world (like China) will allocate more money to their armies in detriment of resources for education, this is also a reason for the feasibility of Education-To-Go. Some European countries are being rearmed and this means less money for education. Rearming could cost much more than education; some countries will be financing violence instead of education.

It is then possible that in the coming months the demand for oil is destroyed which might lead to recession or to no economic growth in a few countries which would result in less production, which could lead to less jobs and therefore to the dismissal of workers in several organizations including schools. On the other hand, because of the European war there will be a few million migrants spreading in the world searching for jobs and not speaking the language of the countries they flee to. The migrants have a non-homogenous education and might not integrate completely and quickly to the economic and social sectors of their destination countries. This could stress the economic, health and educational systems of these countries, because they would not increase the number of jobs, social security, and the educational coverage overnight. On top of that, new epidemics could surge in the future. Therefore, there will be the need to prepare professionals relatively quickly of those people who have different and non-homogenous educational backgrounds from the standards in the hosting countries. The solution in some parts of the world, could be the Education-To-Go but avoiding unfair or discriminatory practices in its implementation and including in the new schemes of education migrants of all the world, not just the Europeans.

The characteristics of the Education-To-Go could be identified in the Ishikawa Diagram of Figure 2, which would be: urgent, affordable, accessible, quick for reskilling or retraining people, tailored to the market or society needs and competent (schools equipped with high technologies and appropriate curricula).

Due to the COVID-19 pandemic face-to-face education was abandoned for many months and replaced with virtual education, which is technology based. In the new world in which the job market needs skilled people in some special disciplines, the universities could have three paths as it is shown in Figure 3, nowadays some universities do not have them, but just one. One of the professional paths could be to study a traditional career face to face, a second path could be to study a traditional career online based on the experience received during the pandemic and the third path would be The Education-To-Go path, to prepare students to acquire skills in a narrow set of competences the job market or society need.

Depending on the university, the students would not necessarily be prepared to help corporations in the private sector but in the social sector; that is, Education-To-Go should not be only aimed to help corporations but the whole society. In the non-traditional third path the students could be prepared at distance except for labs (in some professions) which would be taken physically and in this case the students could take the labs at “any time”, so the labs would have to function “permanently”, as much as possible (open the most hours during the day and with free access to the enrolled students). The part of

the labs, in some cases, could be accredited with the time working in an organization of the sector the students intent to work in the future, if they are not already working in it. The students in the Education-To-Go path would complete their education with certain certifications. After the certifications, the students would hunt for a job (those who were not working during their studies), and after graduation they could go back to school at any time and complete a career online in the second path.

Figure 2. Characteristics of Education-To-Go.

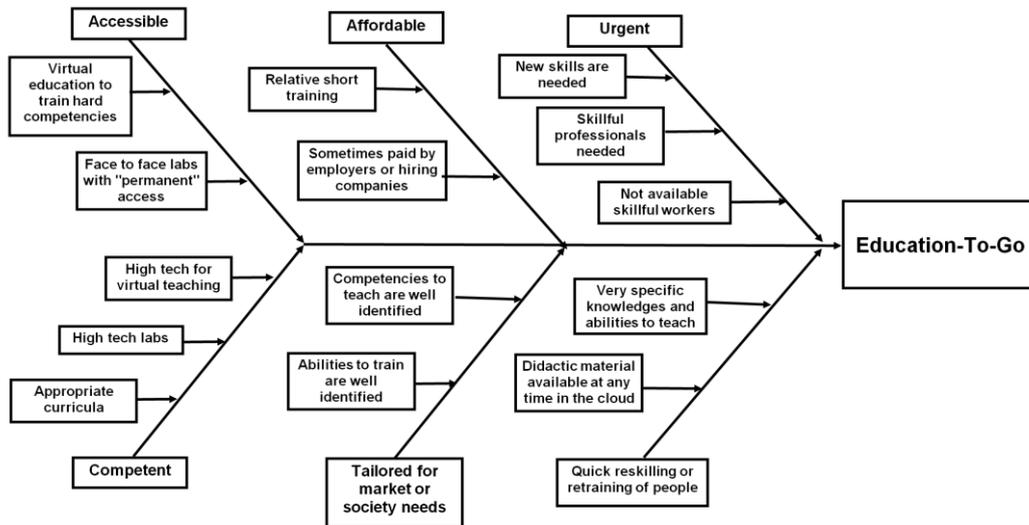
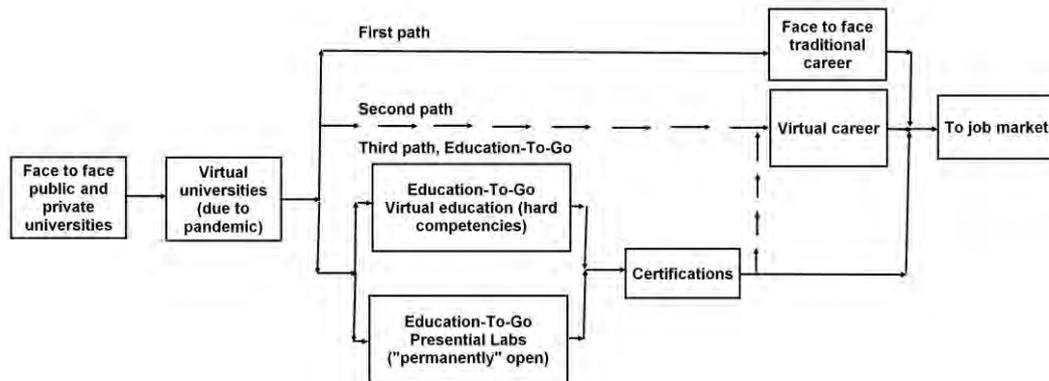


Figure 3. Face to face education, virtual education and Education to go.

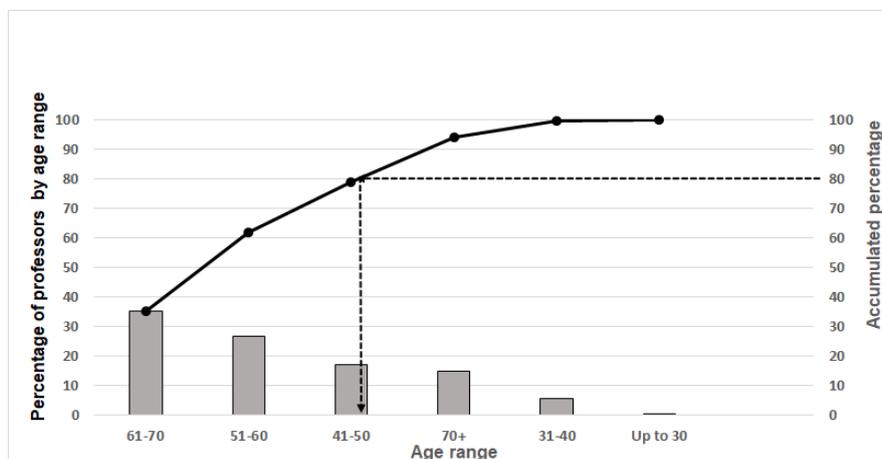


Many careers could be taught in the second path, for example those in social and humanities sciences. In engineering and in other fields only the theoretical part would be taken online in the second path. In fact, all the online material could be put into packages for students to download and study at their own pace, with online evaluations. But it would be necessary to go further because these courses should not have schedules, but rather students could review the information at the time they wanted at their own pace, without using the university facilities, which would expand the coverage of the schools without the school increasing the physical enrollment. The laboratory courses would be scheduled at all hours depending on demand. Students on the Education-To-Go path do not always have to take classes, they could self-study and pass the certifications without the “hassle” of attending classes, presenting partial and final term exams. However, these exams should be designed to ensure that the students’ study process was not exclusively focused on memorization and should have abstract problems that require critical thinking and problem solving based on the information of the study material. Students in paths one and two who are at risk of not finishing their careers could transfer to path three; nowadays in some schools if students for any reason do not finish their careers, they go out of school empty handed. Governments of all levels, higher education institutions, the interested employers and other interested sectors of society would have to be involved in the design of Education-To-Go.

3. Possible negative effects of Education-To-Go

Older teachers might be fired with the excuse that there is no money to pay their high salaries because of their labor seniority and also because they might not be skillful with the technologies to teach. For example, at the Mexican Universidad Autónoma Metropolitana (UAM) the average age of the tenured professors is of 59.2 years (UAM, 2021); and as it is shown in the Pareto Diagram in Figure 4 tenured professors older than 60 years account for more than 50% of the tenured faculty. Therefore, young people would be hired as it has been done in the years of the pandemic during which some public Mexican higher education institutions paid low salaries to young teachers and did not even offer contracts for many months to temporary workers. For the third path many schools would have few teachers because virtual courses for students might consist of assembled teaching materials from diverse places. There are many experiences in the world in the creation of small technological universities and other universities spread in several regions of the developing countries and in the community colleges in USA. The experiences of those schools could be used for the creation of Education-To-Go in universities to help develop the countries during the period between the end of the COVID-19 pandemic and the first big global climate change crises, other pandemics, and probable wars. If some countries are successful, they could generate professionals needed in USA and other countries which are currently affected by the war between Russia and Ukraine. Or for the future, as the population of some countries grows older.

Figure 4. Pareto Diagram of the percentage of tenured professors by age range.



7. Conclusion

Due to current and future global events, Education-To-Go could emerge in several countries of the world to solve the problems of the education of migrants, many women, poor people, minorities and others who could help to fill out jobs in industry and other sectors of society. It could be feasible because it could be cheap, competent, and quick to reduce unemployment in some countries and increase the skills of unemployed people or retrain people in their current jobs. Society should be attentive to participate in the creation of this education if it is considered useful. Although traditional schools should continue because top notch scientists and engineers are always needed because they are the main inventors or innovators of the information and communication technologies which are changing the world, as well as other technologies and new knowledge. Education-To-Go could be a good solution to employ people to develop the countries, if its implementation does not lead to unfair or illegal hiring and precarious retirement practices.

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UTILISING ICT TO ADDRESS LANGUAGE CHALLENGES IN LIFE SCIENCES CLASSROOMS

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Abstract

Language is not everything in the teaching and learning process, but without language education becomes worthless. A normal classroom in South Africa consists of learners of different cultures thus having different home languages. Previous studies showed that teaching has become a complex task for Life Sciences teachers who are responsible for meaningfully teaching linguistically diverse learners in public schools using English, a second or third language for learners. With the advent of the Fourth industrial revolution (4IR) and the technology use in science education, the current study sought to determine how teachers utilise ICT tools to address language challenges in Life Sciences classrooms. The use of ICT provides multiple representations which are pertinent in the teaching and learning of Life Sciences - a subject with many languages (e.g. Greek, Latin and English). In an explanatory mixed method research design, 42 Life Sciences teachers were purposefully selected from public schools in Johannesburg to take part in the study. Data was collected first through administration of questionnaires to the 42 teachers to establish their beliefs about the role of technology in mitigating language challenges and also their ICT competencies. Secondly, three teachers who had shown to be more digitally literate based on the analysis of questionnaire data, were selected for lesson observations. Nine lesson observations were made in total to investigate how teachers use ICT tools to mitigate language challenges. The observed teachers were interviewed once to provide them with an opportunity to explain and elaborate on some of the episodes observed in their lessons. Data analysis involved computation of descriptive statistics from quantitative data and thematic analysis of qualitative data. Findings of the study indicated that 97.62% of the teachers believed that technology can be useful in solving language problems in the Life Sciences classrooms and 95.24% indicated that they were confident in using technology when teaching Life Sciences. Teachers used PowerPoint presentations, YouTube videos and tutorials amongst others when teaching. However, in the interviews two of the teachers failed to explain how these tools helped in mitigating the language challenges learners encounter during the teaching and learning process. Another important aspect that came out is that the lack of access to appropriate technological devices thwarted teachers' efforts to use ICT tools. These findings have implications on resource distribution in schools to ensure quality teaching and learning occurs within the disadvantaged communities where the language of teaching and learning is problematic and also development of teachers' technological pedagogical content knowledge.

Keywords: *Life sciences, language challenges, ICT tools, technological pedagogical content knowledge.*

1. Introduction

Language has a huge influence on how effective the teaching and learning of Life Sciences can occur in a classroom where learners are not proficient in the language of learning and teaching (LoLT). A normal classroom in South Africa consists of learners of different cultures thus coming from diverse linguistic backgrounds. The teaching of Life Sciences does not accommodate learners whose home languages are different from LoLT (Owen-Smith, n.d.). In most township schools in South Africa teachers are also English second language speakers hence they struggle to explain and engage learners meaningfully in their classrooms. These challenges include difficulty in understanding the concepts, spelling and pronouncing Life Sciences terminologies (Smith-Walters, Mangione & Bass, 2016), which may include terms from Greek and Latin.

A point to note is that a child taught in a 'foreign language' is least likely to swiftly progress to upper grades because "language is not everything in education, but without language, everything is nothing in education" (Alidou, Boly, Brock-Utne, Diallo, Heugh & Wolff, 2006, p. 6). To this Moore (2007) bemoaned that whether oral or written, language remains a gatekeeper to learning. Teaching

becomes an even complex task for teachers who are responsible for classrooms of linguistically diverse learners. Teaching becomes an even complex task for teachers who are responsible for classrooms of linguistically diverse learners. A recent study by White-Clark, Robertson and Lovett (2017) has shown that ICT can be useful in a classroom to bridge the language gap provided it is used appropriately. The current paper reports on a study which determined how teachers utilise ICT tools to address language challenges in Life Sciences classrooms. The study sought to address the following research objectives: 1. To identify the ICT tools teachers can use to address language challenges in a Life Sciences classrooms. 2. To investigate how teachers use ICT tools to address language problems in a Life Sciences classrooms. 3. To assess whether Life Sciences teachers' have the capacity to utilise technology meaningfully in their teaching.

2. Literature review

The language challenges in science classrooms are widely considered as gate keepers to learning (Moore, 2007), which means that language can either give learners access to education or may hinder them from attaining their full potential in terms of performance in science assessments. One of the objectives as stipulated in the Life Sciences Curriculum and Assessment Policy Statement (CAPS) document is to ensure that learning is accessible and attainable by all learners from different backgrounds (Department of Basic Education, 2011). However, the language challenge in classrooms makes it almost impossible for the objective to be met. Because South Africa has 11 official languages, most South Africans are multilingual (they are able to speak more than one local language), which makes English a third or fourth language to most teachers and learners speak (Msimanga, Denley, & Gumede, 2017). Science subjects are well-saturated with science jargon, some which are neither easily spelt nor pronounced, which makes teaching a challenging task for most recently graduated teachers who are not native speakers of the LoLT (Smith-Walters, Mangione, & Bass, 2016). On the other hand learners struggle to understand to the science content as learning science is synonymous with learning a new language (Brown & Ryoo, 2008).

Researchers have highlighted the following as solutions to mitigate the language challenges in a Life Sciences classroom which include: (a) using practical work and investigations to clarify concepts that may not be easily understood by the learners, (b) using analogies to further explain the biological concepts, and (c) code switching to ensure that the content is understood by the learners (Motloung, Mavuru & McNaught, 2021). Research has shown that the usage of ICT in a classroom makes teaching a less complex task as it improves the learning environment by making it more conducive to learning, thus improving the quality of education that the learners receive (Zehra & Bilwani, 2016). The use of technology attracts the attention of the learners which motivates them to engage with the learning materials and activities. Recently, studies have shown that the integration of ICT in teaching and learning bridges the language gap in the classrooms (White-Clark, Robertson, & Lovett, 2017).

The issue however is whether Life Sciences teachers have the capacity to integrate ICT tools that allow meaningful teaching and learning, and at the same time whether they can identify appropriate ICT tools to teach specific concepts and specific learners. In the US, Kajder (2005) found that 66% of teachers in the US felt very ill prepared to incorporate ICT in their lessons and by 2010, Hutchison and Reinking still found that 82% of teachers believed that they lacked proper training that would enable them to integrate ICT with the curriculum. A point to consider is that ICT integration should take into cognisance the school, its setting and environment because the integration should be context-based since these factors have implications for implementation (Rabah, 2015). This applies to the South African context where availability of ICT facilities, especially in disadvantaged communities matter (Denoon-Stevens & Ramaila, 2018). When ICT is integrated in this way, it has the capacity to develop social capital in learners and empower them in their communities (Ismail, Jomezai, & Baloch, 2020).

The current study is underpinned by technological pedagogical content knowledge (TPACK) (Koehler & Mishra, 2009) as the conceptual framework. Such a framework is pertinent in the current study considering that the ability of teachers to select the right ICT tools to teach particular content and also how they integrate ICT when teaching that content can be analysed through TPACK lens.

3. Methodology

This study employed an explanatory mixed methods research design (Creswell, 2013). Each of these methods of researching (qualitative and quantitative), could not answer the research questions independently, hence there was a need for mixed methods research. Using purposeful sampling technique (Patton, 2002) 42 Life Sciences teachers were selected from schools that had embraced the use of technology in their classrooms and had English as their LoLT. Data was collected first through

administration of a 4-point Likert scale questionnaire to the 42 teachers to establish their beliefs about the role of technology in mitigating language challenges and also their ICT competencies. Secondly, three teachers who had shown to be more digitally literate based on the analysis of questionnaire data, were selected for lesson observations. Nine lesson observations were made in total to investigate how teachers used ICT tools to mitigate language challenges. The observed teachers were each interviewed once to provide them with an opportunity to explain and elaborate on some of the episodes observed in their lessons. Data analysis involved computation of descriptive statistics from quantitative data collected through questionnaires. Interviews and lesson observations were audio- and video recorded respectively with permission from the participants. After transcription, qualitative data from lesson observations and interviews were subjected to thematic analysis (Bowen, 2009) and emerging patterns obtained.

4. Research findings

Table 1 shows the participant teachers' beliefs and competencies in using technology in their Life Sciences lessons. The 42 teachers who responded to the questionnaire items indicated that they were competent and they were motivated to integrate technology in their teaching.

Table 1. Teacher beliefs and competencies in using technology in their lessons.

Description of item	Strongly Agree/Agree (%)	Disagree/ Strongly Disagree (%)
I am very confident in using technology in my lessons.	95.24	4.76
I believe technology integration is useful.	97.62	2.38
I think technology fits my beliefs about teaching and learning.	92.85	7.15
I have no problems managing the classroom when learners are working on computers/devices.	21.43	78.57
I know how to use technology in my lessons.	92.86	7.14
I think technology is reliable.	90.48	9.52
I understand how to integrate technology into my literacy instruction.	90.47	9.53
I think internet text is easy for learners to read.	66.67	33.33
I know how to incorporate technology and teach content meaningfully.	83.33	16.67
I know how skilled my learners are at using technology.	57.14	42.87
I am motivated to use technology in my lessons.	76.19	23.81
I can control what information my learners access online.	45.24	54.76
I know how to evaluate or assess learners when they work online.	73.81	26.19
I think I have time to integrate technology for preparing learners in high stakes assessments.	76.19	23.81
I have time to teach learners the basic computer skills needed for them to learn more complex tasks.	59.52	40.48
I think I have enough time to prepare for teaching using technology.	14.28	85.72
There is enough technical support at my school.	35.72	64.28
I have received professional development on how to integrate technology.	83.33	16.67
There are adequate technological tools and equipment at my school.	30.95	69.05
I select appropriate technological tools for teaching and learning.	52.38	47.62
Average	57.00	42.00

From table 1 it shows that in as much as the teachers indicated that they were competent to utilise technology in their teaching (95.24%) since they had received professional development on how they can integrate technology (83.33%), they however indicated that time was a limiting factor. The majority pointed out that they were pressed with time as 85.72% indicated that they hardly have adequate time to prepare for their teaching using technology. Whilst teachers were technologically equipped, a worrisome proportion of teachers (40.48%) clearly indicated their lack of capacity to equip their learners with the necessary technological skills for effective learning. Only 21.43% of the teachers indicated that they could easily manage what happens in their classrooms when learners are using technology during their lessons, which relates to more than half of the participants (54.76%) who indicated that they had no control over the information their learners could access during the teaching and learning process. An important aspect to note is that the teachers indicated that their schools were well equipped in terms of the appropriate technologies for teaching, a success attributed to the efforts of the Gauteng Department of Education in providing technological resources in township schools.

Although English is deemed an international language and the language of learning and teaching, the observed Life Sciences teachers sometimes struggled to teach in English strictly, as per the policy and

also to engage their learners in meaningful discussions. When asked why they had such challenges, the participant teachers regarded Life Sciences as a language on its own which meant that teaching Life Sciences in English was like teaching two foreign languages to learners. When observed teaching, the three teachers used their laptops and projectors. Their teaching was aided by the use of PowerPoint slides displaying of notes and visuals, YouTube videos, animations, and voice over notes. The learners' attention was captured by the colourful diagrammatic representations typical of the Life Sciences diagrams and illustrations. Teachers unfortunately took this as an opportunity not to explain the concepts further. When asked how technology aided in making concepts accessible to the learners, the teachers mentioned the ability to offer multiple representations as an advantage of using technology. They considered the use of technology as replacing their voices, a weakness which rendered the use of technology ineffective in mitigating the language challenges learners had.

Teachers identified WhatsApp messenger as a useful tool in dealing with language problems between the teacher and the learner as the learners could type messages to their teacher in their preferred language as long as the teacher could understand the language. They indicated that they also used WhatsApp messenger to share the slides and notes that were displayed during the lesson hoping that learners would understand the content. The teachers attributed learners' lack of understanding of the content to the poor foundation that may have been laid down by teachers who taught the learners at lower grades. In the three schools that were visited for lesson observations, the majority of the learners spoke English as their second language. This was evident in the teachers' and the learners' usage of code switching during the lessons.

An important observation was when learners answered teachers' questions in their home languages, which showed that they had an understanding of the content taught or displayed on the board. They however failed to converse fluently in English though it could be inferred that there was some level of understanding learners had attained from the short videos or illustrations teachers used in the lessons. Unlike situations where teachers explain concepts without displaying the slides with visuals afforded by technology, in these observed lessons, learners could see the spellings of the Life Sciences terminologies, which are problematic to them when not displayed. In a way videos also helped them in terms of pronunciation, which teachers also struggled in considering that the terminologies may be Greek or Latin. The teachers showed appreciation of the use of technology in reducing language problems in their classrooms though they failed to identify the intricate affordances of the technologies they used in that respect.

5. Discussion

The findings of the research showed that language challenges indeed existed amongst the teachers and learners in Life Sciences classrooms. With English being an additional language for most learners in public schools, it is challenging for teachers to strictly teach in English. The participant teachers regarded science as a language which corresponds with the suggestion Brown and Ryoo (2008) made that teaching of science should be regarded as teaching a language. The teachers supported the use of code-switching as a teaching strategy which they all referred to as 'translation to a local language' in the interviews. This practice has also been found in previous studies as an effective method of making concepts accessible to the learners who are English second language speakers.

An important feature that was noticed in the observed lessons was the use of notes in the form of PowerPoint slides and elaborate diagrammatic representations typical of Life Sciences as a subject, which captured learners' attention. Though teachers lacked the TPACK (Koehler & Mishra, 2009) to meaningfully utilise this affordance to advance the reduction of language challenges in their classrooms, learners could engage with the content, which normally is not possible if teachers use explanations only. Technology has been found to be important in ridding some of the language challenges in the classroom as it has the power to represent real-life objects in a virtual space, thus making learning authentic (Hollenbeck & Hollenbeck, 2009). The teachers however showed inadequacy in TPACK development as evident in the interviews where they failed to explain different ways in which technology helped them and the learners in mitigating language challenges. As such the teachers failed to explain what they consider when selecting the technology tools to use for teaching and learning of specific Life Sciences concepts, a weakness which defeats the purpose of utilising technology in the classrooms.

6. Conclusion and implications

Though the findings from analysis of questionnaire data showed that teachers understood how to use technology and were confident to integrate it in their classrooms, they however failed to meaningfully utilise it in the classrooms when observed. This shows that there can be a mismatch between teachers'

beliefs and what they practise in the actual teaching and learning process. Whilst teachers indicated that they were knowledgeable and skilled to teach using technology, it should be noted that teachers still required professional development when it comes to selection of appropriate ICT tools for use in teaching specific concepts and in alleviating specific challenges for example language challenges. The findings have implications for both pre-service and in-service teacher professional development on the effective integration of ICT tools in science classrooms.

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“MATERIAL DEMO LAB” PROCESS - TRAINING PROCESS FOR BUSINESS MODEL & DESIGN METHODS FOR MATERIAL SCIENTISTS

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Abstract

Up to 70% of all new products are based on new materials and there is considerable scientific and economic potential in combining different material and technology domains in particular. Former research projects have shown that material scientists face several challenges in the later stages of the innovation process, especially in market placement meeting the needs of business customers and other stakeholders. Problems are e.g. too complicated communication of their work, missing understandable business cases, and uninspiring demonstrators. These developing issues could already be prevented in an early TRL level by using and combining product design and business modeling methods.

The paper presents the design of the innovation process of competence acquisition of business model development and design development methods for material scientists. The innovation and training process is designed to overcome the "Valley of Death", i.e., the unsuccessful transfer of research results to the to market maturity. The goal of the process for the material scientists is to a) reflect and structure own competencies b) to make unique selling propositions comprehensible and c) to generate and strengthen impact. In addition, the observed limitations are described, which were observed during the implementation of the process in two test groups composed by scientists from three different institutes and research areas in materials science to further refine the field. The findings are based on a) literature reviews and b) observations during the design, implementation and evaluation of the process.

Part of the core findings is the increased acceptance of the methods applied in the innovation process, if they primarily address technology development. A more challenging acceptance in the field of research communication is the development of commercial business models. During the development and testing of the innovation process, the stages of the Delft Design Guide as one popular handbook in the field. The development phases were used as a guidance and orientation.

Keywords: *Business model development, science communication, prototyping, material science innovation process.*

1. Introduction

Companies are already cooperating and collaborating with partners and customers along the value chain and nowadays in early stages of the innovation process in order to increase the market potential of new products. In fundamental scientific research, especially in research institutions, the development for potential business models and the design are downstream processes that start at later stages of the Technology Readiness Levels (European Commission, 2014). There is considerable scientific and economic high potential in combining different material and technology domains (BMBF, 2015). To unfold the potential the innovation process in material science needs to be rethought, so that material scientists can make their research and its application understandable in early stages for the industry and targeted users that are not experts in basic research. Within this research project "SIMPROMAT2", which is coordinated by the Leibniz Institute of Polymer Research Dresden and also involves the Fraunhofer Institute for Ceramic Technologies and Systems IKTS, the Leibniz Institute for Materials Research Dresden (IFW), the Fraunhofer Institute for Chemical Technologies (ICT) and the

Fraunhofer Institute for Microstructure of Materials and Systems (IMWS), started in 2019, the Chair of Technical Design at the TU Dresden and the Chair of Business Administration, in particular Marketing and Event Management of the University of Applied Sciences Dresden (FHD) started the conception by designing the training sessions for the participants. The sub-study, which is presented in the paper, is part of the research project SIMPROMAT2 which is funded by the Federal Ministry of Education and Research, the so called Material Demo Lab (MDL). In the so-called MDL, workshops using design and business design methods take place with the material scientists. The focus of the paper is the introduction and presentation of the innovation approach and process.

2. Background

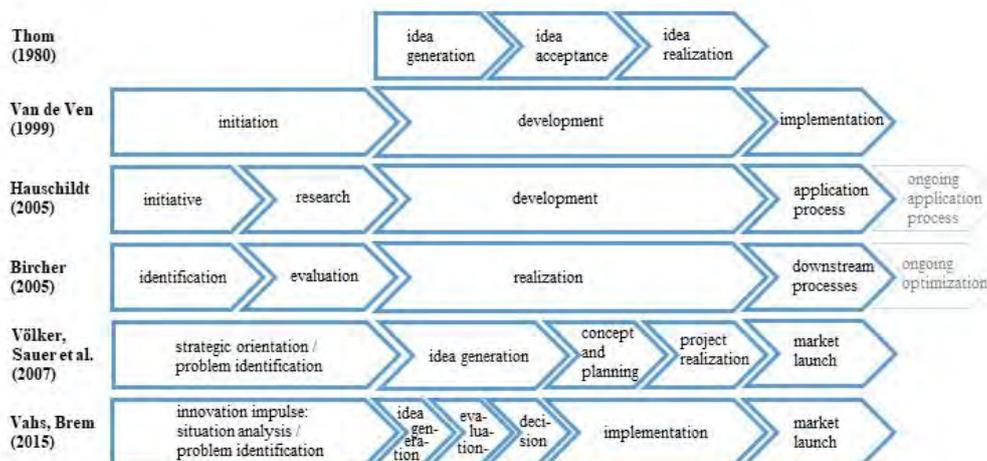
Due to its early position in the value chain and their proximity to basic research, the commercialization of materials research more hampered. Wessner shows that only a few research results reach marketability (Wessner 2005). Between the research performance and market application, according to Markham, there are still steps of concept development, potential transfer and formal development steps must take place (Markham 2002). In theory, these development steps are described as the "valley of death", because only a few research projects successfully pass through these and reach market maturity (Wessner 2005, Livesay 2006, Minshall 2007). To this end, researchers often a lack of experience in the economic field and knowledge about the market itself (Würmseher 2017). The commercialization and transfer of scientific work plays only a strongly subordinate role in the performance evaluation (Markham 2002). Furthermore, the qualification of researchers is often exclusively focused on scientific work with interfaces to other scientific work with interfaces to other scientific and technological disciplines, but does not consider interdisciplinary cooperation with economics, social sciences or social sciences. This type of interdisciplinarity is of great importance in the of commercialization of research results is essential, because it also requires skills of marketing, design, and product manufacturing are also necessary (Eppinger and Ulrich 2015).

The innovation process is sometimes distinguished from the (product) development process. However, in certain literature, all of them are interleaved and combined. Feldhusen equates the innovation process with the product development process (Feldhusen and Grote 2013). Bircher, in contrast, provides a different approach in which the three processes interleaved. According to this, the product development process is embedded in the product development process. This process in turn is a part of the innovation process (Bircher 2005). This paper follows the approach of Birchner and, in addition to innovation, places a strong emphasis on continuing training during these processes.

2.1. Phase models proposed by literature

In the scientific literature, there is a large number of different models of idealized innovation processes and implementation recommendations. The following figure (Figure 1) provides an overview of the models and basic schemes of common innovation processes with the corresponding authors.

Figure 1. Overview of the basic scheme of the innovation process (own representation based on Thom 1980; Van de Ven 1999; Hauschildt 2005; Bircher 2005; Völker et al. 2007; Vahs and Brem 2015)-



By illustrating the different approaches through a comparison, it shows that the basic content structure of innovation processes differs very little from one another. Nevertheless, all approaches include the following phases: 1. problem analysis 2. generation of ideas 3. evaluation 4. implementation.

2.2. Process design

Innovations can only be successfully implemented with a qualified, structured, transparent and target-oriented innovation process can be successfully implemented. In each phase of the innovation process, further decisions are made with the help of various methods and techniques. These methods transform the innovation process into a training process. These techniques are tailored to the goal of each phase. The chosen methods are taken from the popular Delft Design Guide (Boeijen, 2014). This popular handbook proposes as well the following stages for the process:

1. Discover 2. Define, 3. Develop 4. Implement 5. Convey

The structure of these phases is also consistent with the identified phases described in the basic schemes. In a schematic model, the Material Demo Lab Process would be outlined as follows in Figure 2:

Figure 2. Material Demo Lab process (own representation based on Delft Design Guide (Boeijen, 2014)).



This process provides the basis for the innovation and training process.

3. Objectives

The literature highlights the following challenges faced by researchers in general and materials scientists in particular, in achieving a higher degree of innovation and degree of innovation as well as relevance into the market:

1. overcome the "Valley of Death" through the creation of business models (Mesa, Thong, Ranscombe, and Kuys 2019),
2. communicating and conveying understanding to other audiences of their research competencies (BMBF 2019),
3. creating a demonstrator by using product design and business modeling methods in the development of a new technology can mimic its potential for future application in terms of meeting mimic commercial needs (Moultrie 2015).

These identified challenges are to be solved or improved through the process. The core objectives of the process are to introduce methods of economics and technical design for an improved transfer of research results with the help of a technology demonstrator. Materials scientists train and apply beyond their technical methods the knowledge and drive the development of technology demonstrators as boundary objects (Star and Griesemer, 1989) for science communication. The concept of boundary objects, first introduced in 1989 by Susan Leigh Star and James Griesemer, is a very useful theoretical tool that has been adopted by many disciplines. The consideration complex situations through the perspective of boundary objects can help to understand how the various stakeholders involved can work together on a project despite their different and often conflicting interests (Freeman 1984). The single scientist is expected to learn during the process to

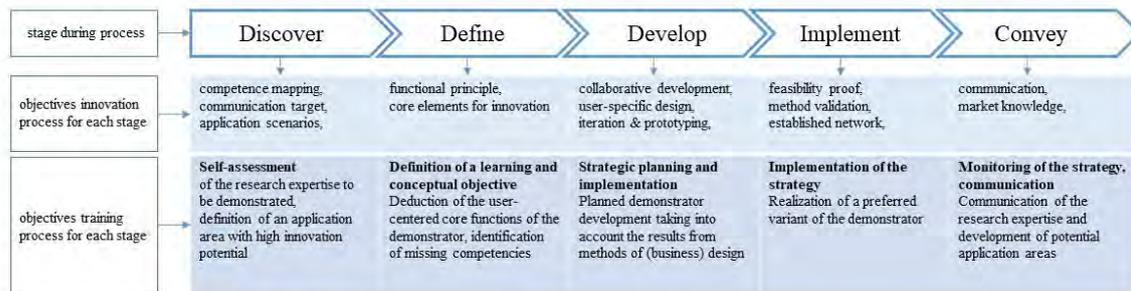
4. reflect and structure own competencies,
5. to make unique selling propositions comprehensible and
6. to generate and strengthen impact (Schöne et al. 2022).

4. Methods and approach

As already described in section 2.1, there are different approaches, but constantly recurring phases in the innovation process: 1. problem analysis 2. generation of ideas 3. evaluation 4. implementation. As the "Material Demo Lab" process is also a training process, methods and techniques of the Delft Design Guide are applied (Boeijen, 2014). This means that these aspects are combined to create the process. As presented in Section 2.2, the "MDL" process for the innovation approach is divided into the following phases: 1. Discover 2. Define 3. Develop 4. Implement 5. Convey

The following overview shows the process with all phases as well as the explanation of the goal of each stage to better explain the training approach.

Figure 3. "Material Demo Lab" Process - Innovation and Training Approach.



5. Discussion and conclusion

The process was already applied in two different test groups, which consisted of material scientists from three different institutes. The observations and findings are the result of these runs. Fundamentally, it could be observed that the material scientists were able to achieve or partially achieve the objectives 4. -6. in both test groups. The objectives 1. - 3. cannot yet be evaluated due to the temporal component of the complex process. By using design and business design methods, the scientists were able to learn new ways of driving product development forward. One of the central observations is the interest in principle in the facilitation techniques and in transdisciplinary collaboration. This can be seen as positive, as the training approach works here. This is inhibited by reticence on the part of the participants, if they are asked to comment or perceive work steps that are outside their professional their professional expertise. The expertise provided in the area of design and business model development provided by the framework program is used only hesitantly. The added value of the methods themselves, which is a part of the whole process, seems difficult to convey. Interest and initiative always increase when the participants' own technical expertise is required in detail, which is closest to their familiar day-to-day business of the participants. There are no behavioral differences between groups, group size, gender, or age. A special point may be the position of the participant. The more strategic responsibility the participant has, the more he understands the importance of the process. However, this hypothesis still needs to be evaluated, since two test groups do not allow for certainty. In order to stabilize the process, it is recommended to repeat it as often as possible in different groups as often as possible in order to adapt it in the sense of a continuous improvement.

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FOSTERING THE DEVELOPMENT OF 21ST CENTURY COMPETENCIES THROUGH TECHNOLOGY IN YOUNG CHILDREN: PERCEPTIONS OF EARLY CHILDHOOD EDUCATORS

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Abstract

This study explored early childhood educators' perceptions of technology in facilitating the development of 21st-century competencies in young children in South Africa. This study employed a qualitative, exploratory case study design which was informed by two established frameworks: the technological pedagogical content knowledge (TPACK) and the framework for 21st-century learning. Data were obtained from four preschool educators in different Early Childhood Development centers in the inner-city of South Africa using classroom observation, field notes, and semi-structured interviews. The collected data were interpreted and categorised into codes using content analysis. Findings reveal that the technology tools used by sampled practitioners include video games, learning applications, and robotics construction kits. It was found that educators integrated these technological tools in the practical lessons using play (game)-based activities. The use of these technology tools assisted educators in fostering 21st-century competencies such as creativity, critical thinking, collaboration, communication, and technology literacy in young children. However, educators were concerned that the effective use of these technologies with efficient instructional strategies to promote 21st-century learning is constrained by limited access to reliable content, updated soft wares, internet connectivity, level of administrator support, and lack of training. It is recommended in this study that the relevant stakeholders in the early childhood sector encourage educators to attend training and professional development that will enhance their knowledge, practice, and confidence in using technology to transform learning experiences and foster the development of 21st-century skills in young children.

Keywords: *21st century competencies, early childhood development, educational technologies, technological knowledge.*

1. Introduction

21st century competencies majorly classified as communication skills, collaborative skills, individual learning approaches, information communication technology, and digital literacy have been in high demand globally to meet the change in societies due to the rapid spread of technology, increasing globalisation and internationalisation (Joynes, Rossignoli & Amonoo-Kuofi, 2019). In South Africa, communication and technology skills are identified as being in demand and are highly valued because they are seen as necessary for the 21st century (Care et al., 2017). Also, the South African Curriculum Assessment Policy Statement (CAPS) place a high emphasis on 21st-century skills as learners are expected to identify and solve problems, make decisions using critical and creative thinking, work effectively with others, critically evaluate information and communicate effectively ((Department of Basic Education, 2014). Nevertheless, Voogt and Roblin (2010) claim that technology can assist in the development of these 21st Century Skills, thus, recognizing the value of technology as a tool for developing 21st-century competencies in learners.

Research has shown that the use of technologies as productive instructional strategies in early childhood supports young children's ways of thinking and development of competencies required for success when entering the formal school environment and become adaptable in a digital work environment (Darling-Hammond, Flook, Cook-Harvey, Barron & Osher, 2020). However, most early childhood educators seem to lack the skills and knowledge required to facilitate the effective use of technology in developing the 21st-century competencies of young children (National Research Council (NRC, 2015). This study sought to explore and understand how early childhood educators use technology to facilitate the

development of 21st century competencies in young children in South Africa. The research questions to achieve this objective are “How do South African early childhood educators incorporate technology into their teaching practices?” and “How does the use of these technologies enhance the development of 21st century competencies in young children?”

2. Theoretical framework

This study is underpinned by the Technological Pedagogical Content Knowledge (TPACK) framework of Mishra and Koehler (2006) and the partnership for 21st-century skills (2011). The TPACK framework, which focuses on technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) is a tool for examining the pedagogically sound ways in which educational technology can support educators’ knowledge while keeping pace in the technology, content and pedagogy contexts in their classrooms (Mishra & Koehler, 2006; Kihzoza et al., 2016). This study aimed at exploring educators’ perceptions on the use of technology in facilitating the development of 21st-century competencies in young children in South Africa. This study will focus on the Technology knowledge component of the TPACK framework. According to the TPACK framework, TK focuses on educators’ understanding of how to use various technological tools and emerging technologies (computers, tablets, mobile phones, hardware, software, applications, associated information literacy practices, etc.) to instruct and guide students toward a better, more robust understanding of the subject matter (Cox & Graham, 2009; Mishra & Koehler, 2006).

The continuing advancement in technology has changed the way people work, live, play, and learn (Kruger, 2014). The use of technology is becoming an important instructional tool in many schools. Hence, educators should be able to use technology as a catalyst for the development of new competencies required to create playful learning environments, as well as skills that young children will require in future jobs and careers (Joynes et al., 2019). These new competencies are associated with important knowledge, skills, character traits, and work habits such as key subject skills, life, and career skills, media and technology skills, learning and innovation skills also referred to as the 4 Cs: creativity, critical thinking, collaboration, and communication (Partnership for 21st Century Skills, 2011). According to Krishna (2010), technology encourages sharing of thoughts and diversity of thinking that characterizes a 21st-century creative knowledge economy. As young children become more technically literate and connected, they are encouraged to think with the future in mind and to confront the issues of our times. Hence, developing 21st century skills become a critical component of early childhood education because it will prepare children to continue their education anywhere in the world while also giving them the confidence they need to enter the world of work and civic life. And as such, technology allows educators and students to access a wide range of instructional tools that encourage creativity, critical thinking, communication, and teamwork.

3. Methodology

Since the study aimed at exploring early childhood educators’ perceptions on the use of technology in facilitating the development of 21st-century competencies in young children, we employed case study research methods (Creswell, 2014). Our study involved four preschool educators in three Early childhood Development centers located in the inner-city of South Africa. In this study, three ECD centers were selected because of the availability of resources. The data in this study was collected through observations, field notes, and individual semi-structured interviews. The choice to use multiple data collection methods afforded us the opportunity to review and analyze lesson observations; and then tailor the individual interview protocol to make further clarifications and follow-up on significant responses and observations (Corbin & Strauss, 2015). Data collected from participants were coded and categorized through content analysis (Williams & Moser, 2019).

Table 1. Biographic Information of participants.

<i>School</i>	<i>Participants (Teacher)</i>	<i>Age</i>	<i>Qualification</i>	<i>Teaching experience (Years)</i>
S1	T1	32	Diploma in Grade R teaching	9
	T2	40	Diploma in Primary education	10
S2	T3	37	Diploma in Office Administration	13
S3	T4	53	National Diploma in Educare (N6)	20

4. Findings

The findings of the present study were classified into three categories that emerged from the data and representative examples of educators' answers for each of the themes are given. These categories are technology tools and integration strategies employed by early childhood educators, development of 21st century competencies using technology, challenges in using technology in the early childhood classroom.

4.1. Technology tools and integration strategies employed by early childhood educators

During the interview, educators indicated that they usually have specific times during the day and week when children are allowed to use technology in their classrooms. In addition, educators mentioned that they use technologies such as video games, learning applications, robotics, and construction kits to enhance their teaching activities. For instance, T2 said *"We have a room with this interactive whiteboard, speakers, and a computer already installed. Luckily, there are some interactive video games such as Khan Academy Kids that have been downloaded on it which makes it easy to engage the children in counting, matching, and ordering numbers using Smartboard. Children are always happy that they can touch the board and see things move in the direction they press. And one thing I like about these interactive video games is that one can access them either by downloading them directly from the web or downloading the application and sometimes the school also try to purchase some of the software programs for teaching"*. The type of technology used was also identified when T1 mentioned that she gives them building kits and dolls, so the children imagine what they want to build and the character of what they are building/imitating. In addition, T4 indicated that she went for a program where she was introduced to how a simple programmable robot called Bee-Bot works, and ever since then, she has been personally using it with the children in her class to teach them the concept of counting forward and backward in mathematics. More so, T3 explained how she uses media technology in her class when she said *"In this school, the Grade R educators are provided with an iPad that contains some colour learning applications for kids. So, what I do in my class is divide the children into groups of 5 and each group will work on the app on different days, but the concept must be completed within the week. The app allows children to learn what different colours look like, their names, and common objects from their environment that have this colour. The app also gives children the opportunity to learn how to draw and create their own pictures"*. However, classroom observations revealed that the use of these technologies improved educators' ability to promote a playful learning experience for their students. This was evident in all of the classrooms where educators were observed structuring the children's learning around the prescribed topic (a theme that was taught) without removing all control from the children's hands.

4.2. Development of 21st century competencies through technology

Evidence from the interview and classroom observation showed that the use of technology help to facilitate the development of 21st-century competencies such as creativity, problem-solving, critical thinking, collaboration, communication, and technology literacy in young children. For example, this was observed when Teacher 1 said *"We teach transportation as one of the prescribed themes in the curriculum. So, what I do is that after explaining the definition of transportation and the various modes of transportation. I also allow them to provide me with examples and state their characteristics. Then I have them participate in a class activity that is similar to a team project in which each team constructs different vehicles using the building kit (blocks) and tell me what they are used for and how they work. Sometimes, I take pictures of what each group has constructed and try to bring up a discussion in the class. So you realise that it becomes very easy for them to solve problems and I believe that working in a team helps them develop their collaborative skills while also encouraging them to be creative and that discussion aspect is to help them communicate their thoughts and ideas."* This remark reveals that the use of building with blocks provides opportunities for creative play experience and also enhances children's interaction with each other, creativity, and collaboration skills. This was also noted during the classroom observation when children individually created a model and gathered in groups to explain what they have created and its importance. Furthermore, Teacher 1's perception of the use of technology as a tool in enhancing the development of collaboration and communication skills in young children was also emphasised by Teacher 4 when she mentioned that when using Bee-Bot in her class, the children socially interact, communicate and engage with other. *"To them, they are playing but to me, they are learning from one another without even knowing and they were even providing answers to some of the questions asked, I mean solving problems without difficulty"*. Teacher 3 mentioned that using the learning apps is an additional resource for enhancing children's imagination, creativity and also developing their visual-spatial skills. Further explanation on how the use of technology enhances the development of 21st-century skills revealed that only one of the educators integrated an aspect of technology/digital literacy in her classroom. This was observed when Teacher 4 said *"apart from teaching them how to identify different parts of a computer and using the word*

interface, I also try to let them know the dangers of using technology and the precautions they need to take....something like how to be safe while using the internet and how to identify contents that are not good when accessing YouTube". Evidence from the classroom observation and educators' responses further showed that kind of activities educators implemented were play-based activities that support inquiry learning, increase students' interaction levels and innovation, inspire curiosity, confidence, creativity, and continuity.

4.3. Challenges in using technology in the early childhood classroom

It was evident from the interpretation of interview responses that all participants believe that using technology as a facilitating tool in early childhood settings helps to encourage young children to learn in various ways and also aids the development of basic 21st-century competencies. However, participants expressed concern about the effective use of these technologies in promoting 21st-century learning in young children. Participants cite problems with limited access to reliable content, updated software, internet connectivity, level of administrator support, and lack of training as challenges associated with the effective integration of technologies in the respective early childhood classrooms. For example, T2 said *"Hmm...there are some days that I just get sick of this technology thing...especially when there is no internet access and when updating software. Those technical glitches are just a different frustration on their own. And the most annoying thing is that you can do an update now and all of a sudden you just realise that everything has wiped out...the children's work and mine...So I start again when I feel like"*. The issue of internet connectivity and administrator support was also emphasised by T3 when she said *"they just give me the iPad, I have to download most of the app myself. And I sometimes find it stressful doing this because there is no regular support from the centre on the purchase of data and even when I buy data you realise that some of the good and reliable content that can be used for teaching with the app is not free"*. This was an issue was noted during the classroom observation in T3's classroom when she was unable to use the iPad for teaching for the first 30 minutes due to an inconsistent internet connection. Additionally, all the educators indicated that though they have little experience in the use of technology, they need adequate training programs that can help them to better connect these technologies with the content outlined in the prescribed curriculum and to how the children are learning.

5. Discussion and conclusion

TPACK is the basis of good teaching with technology and requires an understanding of a number of separate but interrelated aspects of teaching such as the representation of concepts using technologies; teaching techniques that use technology to teach content; knowledge of the concepts which are difficult to learn and how technology can be used to assist young children with developing a conceptual understanding of these concepts; knowledge of young children's prior knowledge (conceptions and misconceptions) and how technology can be used to address misconceptions where relevant. Findings revealed that all the educators demonstrated a good level of technological knowledge and technological pedagogical knowledge domain of the TPACK framework. According to the findings of this study, all participants used available technology to improve young children's participation and learning with peers. According to the findings of this study, teachers were observed using the available technology to enhance children's ability to manipulate objects, participate in daily educational activities through active play, communicate and interact with others. According to the National Association for the Education of Young Children (NAEYC, 2012), It is believed that the use of technology tools helps to connect on-screen and offscreen activities with an emphasis on co-viewing and co-participation between adults and children and children and their peers, in order to bring them together for a shared experience, rather than keeping them apart. Thus, participants in this study were able to use the available technology in an active and engaging way to improve young children's participation and learning with peers.

While participants revealed that the use of technology itself has unique features that are beneficial to the development of 21st-century learning competencies in young children if used appropriately (Beschorner & Hutchison, 2013), they all mentioned a lack of professional training on how to use available technologies to teach the prescribed curriculum as a major concern that is central to the process of understanding the integration of technology into early childhood education. Thus, Early childhood educators need guidance to make informed decisions about how to support learning through technology and interactive media, which technology and media tools are appropriate, when to integrate technology and media into an early childhood setting, how to use these tools to enhance communication with young children, and how to support digital and media literacy for children (NAEYC, 2012:10). In conclusion, the research findings were limited by the inherent limitations of the sample size since only four ECD educators from three different schools participated. Since the results of the study do not represent all of the ECD centres in South Africa, the results of this study cannot be generalised beyond the centres that participated

in this study. However, the findings may be of use in providing novice ECD educators with effective models to integrate technology into their teaching and learning styles. However, to further encourage the use of technology in early childhood development within the South African context, findings from this study suggest that relevant stakeholders in the early childhood sector should encourage educators to continuously attend training and professional development that will enhance their knowledge, practice, and confidence in using technology to transform learning experiences and foster the development of 21st century skills in young children.

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A TENTATIVE PROPOSAL FOR INCLUSIVITY EDUCATION TRAINING FOR JAPANESE SCHOOL TEACHERS BASED ON THE NEEDS OF MIGRANTS AND RETURNEES

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Abstract

Although Japan has not traditionally been considered a multicultural nation or possesses anything resembling an open immigration policy, it is rapidly becoming more and more diverse. Events like modifications to the nation's immigration regulations in April 2019 and the recent proposed scrapping of the 5-year term limits on accepted "temporary" foreign workers (Category 1 Specified Skilled Workers) have ostensibly led to a quiet opening to unskilled foreign workers for the first time in the nation's modern history. While Japan's hand may have been reluctantly forced by serious labour force shortages in many sectors of the economy, it is undoubtedly the beginning of the creation of an even more 'multicultural Japan'; providing further impetus to the pressing challenge of creating a society where diverse peoples can live together in harmony. Yet, despite these changes and the obvious implications they have for the future, very little consideration has been given to allowing for - and accommodating - greater diversity into the nation's schools. There is a great risk that without preparation now, the already emerging signs of distress in the education sector (language problems, truancy, drop-out rates, bullying, etc.) will only escalate. In other words, in order for Japan to prepare to accept even a modest increase in the number of newcomers, teachers and education officials need to undertake greater training to enable them to understand and assist in the successful integration of future migrant children. Based on interviews, literature and a review of the recent educational situation in the light of these changes, this paper aims to ascertain whether greater inclusivity training is required, and if so, what it should entail. To allow for greater support of non-Japanese students into Japan's education system, it concludes with a tentative proposal for what future educational training courses should consider, how they could be incorporated into teacher training curricula and the overall potential benefits for society in general.

Keywords: *Japan, inclusive education, immigration, multicultural society, diversity.*

1. Introduction

When discussing the concept of multiculturalism or situation of multicultural nations, it is unlikely that many people would think of Japan. Yet while Japan has neither traditionally been considered a multicultural nation nor today possesses an open immigration policy, it is rapidly becoming more and more diverse. Recent events, like modifications to the nation's immigration regulations in April 2019 and the recent proposed scrapping of the 5-year term limits on accepted "temporary" foreign workers (Category 1 Specified Skilled Workers), ostensibly point to a shift towards a quiet opening to unskilled foreign workers for the first time in the nation's modern history. Moreover, with the revised immigration law (*Nyukanho*) it has become possible for such workers to bring their families. While Japan's hand may have been reluctantly forced by serious labor force shortages in many sectors of the economy, we are undoubtedly witnessing the beginning of the creation of an even more 'multicultural Japan'¹; providing further impetus to the pressing challenge of creating a society where diverse peoples can live together in harmony.

However, despite these changes and the obvious implications they have for the future, very little consideration has been given to allowing for - and accommodating - greater diversity into the nation's schools. There is a great risk that without preparation now, the already emerging signs of distress in the education sector (language issues, truancy, drop-out rates, bullying, etc.) will only escalate. In other

¹A number of researchers have already written about the extent of Japan's diversity. See, for example, Maher, J. & Macdonald, G. (Eds.) (1995). *Diversity in Japanese Culture and Language*. London: Routledge; Denoon, D. et al. (Eds.) (2001). *Multicultural Japan*. Cambridge: Cambridge University Press.

words, in order for Japan to prepare to accept even a modest increase in the number of newcomers, teachers (and education officials) need to undertake greater training to enable them to understand and assist in the successful integration of future migrant children. Based on interviews and a review of literature of the recent educational situation in light of these changes, this paper aims to ascertain whether greater inclusivity training is required, and if so, what it should entail given the diversifying needs of migrants and so-called ‘returnees’. It concludes that such training will likely become inevitable and suggests a brief tentative proposal for what future educational training courses could look like, how they could be incorporated into teacher training curricula and the potential benefits for society in general.

2. ‘Elusive’ inclusive education in Japan

Generally, the term ‘inclusive education’ has been used to focus on specific groups, notably students with disabilities and special needs (Hayes et al., 2018), and their placement in mainstream schools. However, this paper applies UNESCO’s broader definition which sees inclusive education as “a process of addressing and responding to the diversity of needs of *all* learners through increasing participation in learning, cultures and communities, and reducing exclusion from education and from within education.” (Global Education Monitoring Report, 2020, Emphasis added). Simply put, the whole education system facilitates learning environments in which both teachers and learners embrace and welcome the challenge and benefits of diversity (Global Education Monitoring Report, 2020). This means that all young people are engaged and achieve best through being present, participating and belonging. The definition of inclusive education training used here, therefore, covers far more than just that of traditional ‘special education’ and education for ‘others’. It includes the enormous array of diversity represented by humanity including (but not limited to) disability, culture, socio-economic disparity, gender, sexuality, religion, experiences, etc. and acknowledges that education for *all*, means precisely that.

Despite the importance and increasing necessity of inclusive educational training for teachers, it still isn’t that universally widespread. According to the 2020 Global Education Monitoring Report, of the 168 countries surveyed, 61% claimed to provide teacher training pertaining to inclusion (Global Education Monitoring Report, 2020). Further, in a 2018 international survey of 49 mainly middle and high income countries, 35% of lower secondary school teachers reported that teaching in multicultural and multilingual settings was a part of their pre-service training (OECD, 2019). In the same survey, Japan stood out as the country in the survey whose teachers reportedly seek more opportunities for professional development in inclusion. Clearly, therefore, this is an important topic and as Rouse and Florian (2012) state, inclusive approaches should be a core element of general teacher training rather than a specialist module or something only applying to a select few in so-called ‘special’ schools. However, the reality in Japan is considerably far from this approach at present and still limited to accommodating disabled students.

To obtain a teaching license in Japan requires successfully completing a course of study at university which fulfils the credit requirements stipulated by law as well as completing a brief practicum and short period of time in voluntary work (usually in a nursing home or disabled persons facility). With regards to inclusive education training, only a one credit course relating to ‘understanding of infants and students who need special support’ is compulsory, although the contents of such classes are left up to the discretion of the teaching faculty at the institutions offering such courses. Consequently, while universities do offer inclusive education related classes, they usually fall under the subject title *tokubetsu shien kyōiiku* (special needs education) and are predominantly focussed on issues pertaining to physical (and sometimes developmental) disabilities. This is hardly surprising given that, as Forlin et al. (2015) write, “[I]nclusive education in Japan refers to a system in which students without disabilities and those with disabilities learn together in a general education system in their local community” (p. 315). It should also be noted that the content depends on the university/department or teacher involved; there is no uniform curriculum and therefore no guarantee that nationwide all students are actively covered. In fact, feedback from 15 students presently enrolled in teacher training courses at 2 universities in Japan revealed none reported any such inclusivity training. In a focus group discussion with 18 in-service junior and senior high school teachers, only two mentioned that they had had meaningful exposure to inclusive education related pre-service training and only one had experienced in-service training (related to one of the so-called cities with high levels of foreign residents). In terms of what training they mentioned they most desired now, learning how to respond to students’ ethnic and cultural backgrounds, such as those of immigrant children, was the most common response, followed by language issues (including the need for translators), and academic support including caregivers. This resonates with similar findings other researchers have found (Takahashi, 2020). Clearly, the growing diversification of Japan’s student population is increasingly putting pressure on teachers who are ill-prepared to deal with it.

A review of previous studies relating to formal inclusion training for pre-service teachers in Japan reveals that again the focus is extremely narrow; predominantly how to engage with disabled students (Takahashi, 2013; Ree, 2015, Moberg et al, 2020, Forlin et al, 2015). This is hardly surprising given – as mentioned above – the notion that inclusion equals ‘special’ education in Japan and the prevalence of similar ‘misunderstandings’ about exactly what it does/should entail (Sanagi, 2016). Further, a lack of adequate preparation in training courses has been reported as another factor contributing to Japanese teachers’ anxiety with regards to inclusive practices (Forlin et al., 2015, Fujii, 2014). What is needed, therefore, is something more encompassing, less restrictive, and able to accommodate the somewhat unique situation in Japan. In short, “inclusive education training used in Japan should be improved” (Yada & Savolainen, 2018, p. 353).

3. Needed: A future plan for the growing needs of migrants and returnees

The ‘unique’ situation pertaining to Japan is that, as mentioned, the nation is slowly embarking on a period of increased immigration, albeit more a result of necessity than design. With the nation’s population falling year-on-year since 2011 and glaring gaps in some sectors, increasingly today Japan’s manufacturing and service industries are relying on foreign workers. But migrants alone are not the only ones in need of more inclusive-friendly educational support. For decades *kikokushijo*, or ‘returnees’ (students who studied abroad for family or other reasons and then returned to Japan to re-enter mainstream schools), have struggled with social, cultural, psychological (Kanno, 2003) and other pressures during their ‘(re)acclimatization’ process. According to the Ministry of Education, Culture, Sports, Science and Technology (MEXT), in the two decades since 2000 roughly 12,000 such students each year have started or returned to Japanese elementary, junior and senior high schools representing a significant total number. Apart from these two groups, however, it should also be noted that while Japan’s education system does an outstanding job and ranks almost at the top of major international surveys, it has been found wanting in terms of acceptance of forms of difference. Put another way, the push or pressure for conformity has been pointed to as an area in need of attention. With acceptance of the UN Sustainable Development Goals (SDGs), Japan has committed to ensure inclusive and equitable quality education before 2030 (SDG number four).

It is against this background of an increasing need for teacher trainees to be prepared for changes in their nation’s demographic make-up, it’s increasingly international-experienced domestic population as well as the fundamental benefits to be obtained through educational reform open to *all* that the following tentative plan is proposed. It must be reiterated that this proposal is not necessarily specific to Japan, but given the lack of such policy at present, it covers some of the best practice ideas deemed immediately applicable there.

4. A Tentative proposal

Interest in inclusivity programs and their content for trainee teachers has gained considerable interest in recent years, especially in North America and Europe (Mule, 2010). Consequently, there are many plans and programs available focusing on differing content, but they all share “a desire to develop in teachers the knowledge that will allow them to be effective teachers of all students (Mule, 2010, p. 12). This is the core that should drive any new program agenda for Japan. Overseas, one of the recently raised concerns is the need to move away from the model of preparing different teachers for different students (Florian & Pantić, 2017). However, given Japan’s history of offering as unified an educational experience as possible to all students, this can be seen as a strength to build upon (Semuels, 2017). In other words, the very basis of educational equality in Japan means that accepting and treating all students in the same manner is already a fundamental, the main exceptions being those from different linguistic and/or cultural contexts (i.e. returnees and foreign nationals).

It is beyond the scope of this introductory paper to outline in detail what such a course might look like (nor is this possible, given that a ‘one course fits all’ program is in itself inherently counterproductive to this very topic), but since Japan’s teacher training courses presently contain very little inclusivity content (other than related to physical disability), a broad outline is possible. A useful starting point is the framework of core values and competencies created in 2012 by the European Agency for Development in Special Needs Education. It outlines support for learners (academic, practical, social and emotional), working with others (parents and families), valuing learner diversity and being involved in professional development. Of these four, the first two are already well established throughout Japan’s education system. However, with regards to the latter two, there is a need for development. Consequently, a course of education for pre-service teachers to verse them in knowledge and skills applicable for

enabling inclusivity in today's diversifying world would need to apply the following four broad approaches.

Firstly, and perhaps most importantly, the content would need to be wide-ranging (not limited solely to physical or mental disabilities although specialist training would still be required for certain teachers involved with students requiring high-level care) and mainstreamed into the curriculum. Finland provides a good example where teachers are given a wide variety of knowledge and skills that they can apply in various settings and situations (Savolainen, 2009). As is the case at present, institutions should be free to adapt their content to suit their philosophy and teaching strengths but should be required to cover multiple topics relating to inclusion and diversity (ethnic, religious, socio-economic, linguistic, gender, sexual, etc.) so as to reflect social reality as well as to prepare teachers for the different types of students they are increasingly likely to encounter. This could be covered in one or two core classes specifically tailored to topics of inclusion and diversity which students would be required to complete as a prerequisite to graduation.

Secondly, the teaching method and delivery of such classes should be developed to be as practical and active as possible. In general, Japanese university classes have been criticized as being unappealing due to their heavy reliance on one-way lecture style delivery (Sakakibara, Yamamoto, & Kobayashi, 2005), a sentiment shared by the subjects interviewed in this research. When discussing teaching methods, pre-service teachers were unanimous in their criticism of a lack of practicality, real-life situations and general lack of appeal of the teaching styles employed. One student commented: "There isn't much point attending lectures, the teacher just talks at us and there is almost no interaction" (Toshi). A 'hands-on' notion of practicality is particularly important because most trainee teachers come from non-inclusive educational backgrounds and therefore often lack the personal experience. As Ballard (2003) writes, teacher trainees "need to understand the historical, socio-cultural and ideological contexts that create discriminatory and oppressive practices in education. The isolation and rejection of disabled students is but one area of injustice. Others include gender discrimination, poverty and racism" (p. 59).

Thirdly, training should be ongoing, provide feedback and be linked to performance indicators (a topic for further research). As the make-up of society changes so too will the needs of learners in the classroom. Similarly, as teachers mature, their skillsets require updating and the opportunity to transfer experiences and wisdom to instructors in other regions or stages of their careers. Furthermore, the importance of collaborative skills and the ability to problem solve to assist students' changing needs (Smith & Leonard, 2005) must be considered a key component of any program and this can in part be obtained through an all-of-school approach to professional development.

Finally, it should be embedded into the ethos and culture of the entire education system. As the need for the acceptance of greater diversity increases, so too does the need for an educational system that is flexible and open in order to meet the needs of all Japan's present and future, foreign and local learners.

5. Summary

The UNESCO Policy Guidelines for Inclusion in Education (2009) outline three main justifications for teaching all students together, namely: educational, social and economic. The initial impetus and focus of this paper was on introducing training for inclusivity of foreign children and returnees (two subsets of society seemingly overlooked in education as well as being important for the future social and economic prosperity of Japanese society). However, as mentioned, inclusive education should encompass as much diversity as possible. Future research should explore in greater depth the attitudes and opinions of pre- and in-service teachers towards the present training system and its implications for Japan's schools in terms of dealing with all forms of difference in the coming years. Furthermore, as society does diversify more, in addition to training programmes and their content, it will most likely also be necessary to incorporate a variety of teachers themselves and to assign as wide a array of coordinators as possible to reaffirm and contribute to the goals and ideals of society at large. In short, the teacher training courses implemented now will guide the next generation of teachers and create and shape society for the future. Deciding what kind of society we want, who can participate in it and how are enormous questions that need to be addressed. This in turn requires making a distinction between diversity and disparity (OECD, 2010); one being an inevitable reflection of the richness of humanity the other associated with different outcomes and differential treatment. This is the social debate that needs to be had now for the status quo is fast becoming an ineffective obstacle to social growth and prosperity.

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USE OF RESEARCH EVIDENCE TO IMPROVE TEACHING PRACTICES RESULTS FROM CATALONIA (SPAIN)

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Abstract

The European, national, and local educational policy is experiencing an increasing interest in using research evidence to inform educational practices. The use of research evidence is associated with multiple benefits at the political, organizational, and personal levels. Despite the known benefits, it seems that teachers make unconscious or irregular use of research evidence. This paper examines the beliefs and perspectives of primary and secondary teachers of Catalonia (Spain) about the use of research evidence to inform their practice. To analyze the teachers' beliefs, we use a survey designed ad-hoc for this purpose. 652 primary and secondary teachers from Catalonia (Spain) comprised the final sample, mainly working in public schools (91%). Discussions with colleagues, information obtained in professional development training, and websites/social media, are the main sources of knowledge used by teachers to support and inform their practice, making little use of academic journals and/ or professional publications. Research evidence is mostly used to make personal decisions, as teachers consider that research evidence can help them expand, deepen, and clarify their understanding of teaching and pedagogy. Although, they identify mental and time costs that can be barriers to the use of research evidence. Despite Catalan teachers having a positive view of research evidence, they make little use in their daily practice, and, in consequence, the Evidence-Informed Practice perspective (EIP) is not assumed at the school level, being necessary to promote the vision for evidence-use in the school context.

Keywords: *Evidence-Informed practice, research use, teaching practice, school teacher.*

1. Introduction

The European Educational Systems are experiencing an increasing interest in using research evidence to inform educational practices. The use of research evidence is associated with multiple benefits at the political, organizational, and personal levels. At the political level, research evidence informs the educational policy, improving the quality and the governance of the educational systems. At the organizational level, research evidence can contribute to making the schools more effective, improving organizational development, and enriching the educational practice. At the personal level, research evidence can impact positively the teachers' professional development.

Focusing on the organizational (schools) and personal (teachers) levels, some of the benefits linked with the use of research evidence are related to teaching/learning practice improvement, school development, and better school achievement (Mills & Saunders, 2019; Nelson & Campbell, 2017; Slavin & Madden, 2018). Those are possible because, as the studies conducted by Judkins et al. (2014) and Brown (2018) reflected, the use of evidence encourages reflection, stimulate the adoption of new pedagogical approaches and innovative pedagogical practices, improve teacher confidence, and inform professional development.

Despite the known benefits, it seems that teachers make unconscious or irregular use of research evidence, and the evidence-inform approach is not assumed by the schools. Teachers find it difficult to search, access and use research data without practical support (Brown, 2015; Cain, 2015), as, for example, they found the language used complex and incomprehensible for them (Murillo & Perines, 2017). Schools report problems to effective time use and spaces for interaction and collaboration, both key elements to stimulate reflection and engagement with research at the personal and school level (Ion, Díaz-Vicario, & Suárez, 2021). Also, the scientific community experiences difficulties in transferring efficiently and managing the knowledge created, generating an impact on educational practices (Ion & Castro, 2017; Lillejord & Borte, 2016), not making research accessible and understandable for teachers. As Brown (2015) states, the use of research evidence to inform the practice depends on the perception of the cost-benefit and factors linked with the personal characteristics of the teachers, the school organization, and the research

culture itself. In this sense, it is important to identify teachers' attitudes towards research and the extent to which educators use research as a source of knowledge to inform their teaching practices.

With the forementioned objective, this paper examines the beliefs and perspectives of primary and secondary school teachers of Catalonia (Spain) about the use of research evidence to inform their practice. The purpose is to gain insights about the use that teachers made of educational research as a source of knowledge to know what the current situation is and take decisions. In the framework of this study, we understand "research evidence" as information based on academic studies, for example, research evidence obtained from an article in an academic journal or a website (such as the Education Endowment Foundation and the Learning Toolkit).

2. Methods

We apply the survey "Research use survey" to analyze the teachers' beliefs. Based on the work of Baudrillard (1968, cited by Brown, 2015), the survey design assumes that any educator's use of research will be a function of some combination of three factors: the benefits, the cost, and the signification associated with using academic research. The survey includes 97 items grouped in five dimensions of analysis (research use, kind of resources used to inform the practice, the benefits, costs, and significations of research use). Depending on the dimension, the items need to be evaluated in a four, five or six-point Likert scale. Also, the survey includes a final section to obtain information about the teachers' and schools' profiles (non-mandatory response).

The survey was sent by email to all primary and secondary schools of Catalonia (Spain). The participation was voluntary, the data was collected anonymously, and the teachers were informed of the objectives of the research and how the data would be used.

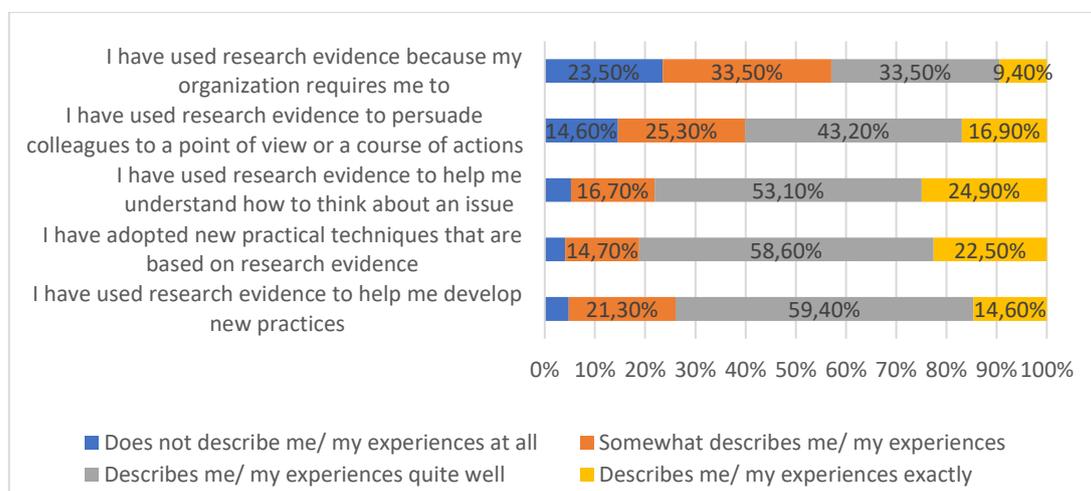
The final sample was comprised of 652 primary and secondary teachers. Only 52% of the teachers ($n = 343$) answer the profile questions. Those were teachers mainly working in secondary schools (57%) of public titularity (91%) and characterized by a middle-high social complexity (63%). The 72% were female of 45 years old ($M = 44.58$; $SD = 9.863$), with a postgraduate/master's degree (45%). 48% have a full-time contract, and 24% are leaders or middle leaders in their school.

Using IBM Statistical Package for the Social Sciences (SPSS v.20) we performed a descriptive analysis.

3. Results

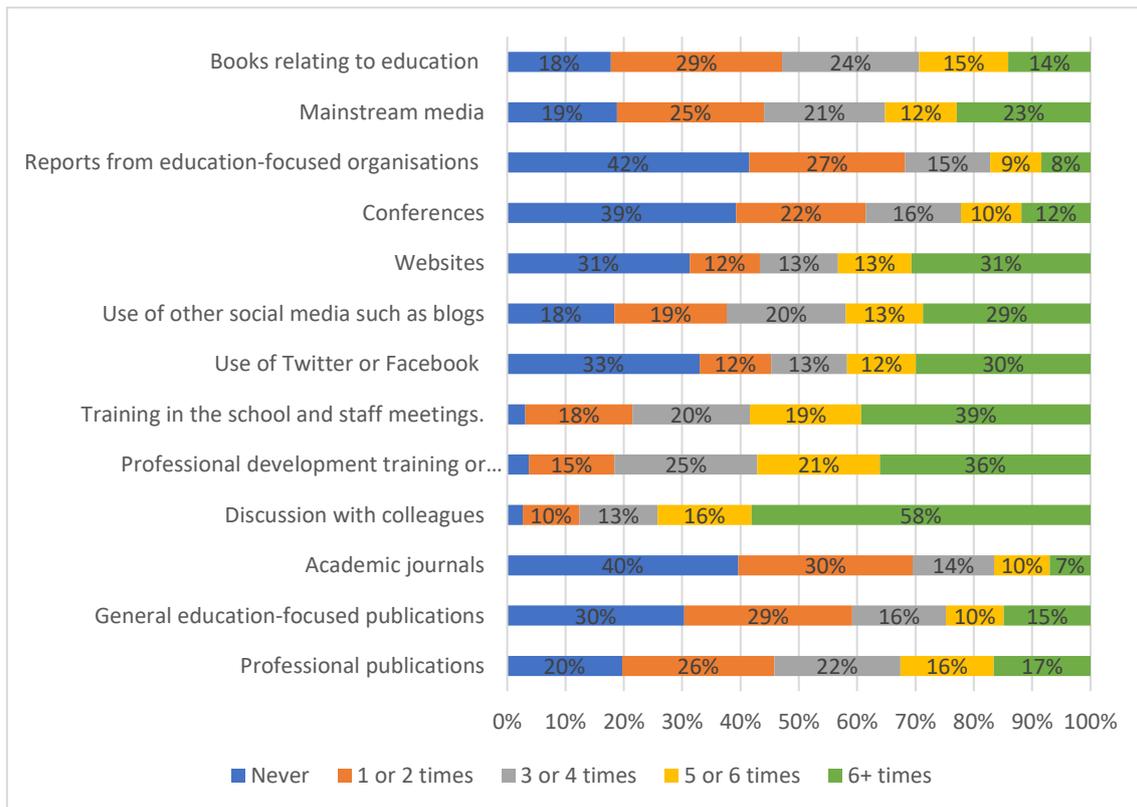
Research evidence is mostly used to make personal decisions (see Figure 1), as teachers consider that research evidence can help them to adopt new practical techniques (81,1% describes their experience quite well or exactly), to understand how to think about an issue (78% describes their experience quite well or exactly), to develop new practices (74% describes their experience quite well or exactly) and to persuade colleagues to a point of view or a course of actions (60% describes their experience quite well or exactly). They use less research evidence because their school organization requires them (only 43% describes their experience quite well or exactly). Even though, they inform that in their school experiments new ways of working (86% describes their experience quite well or exactly), value new ideas (81% describes their experience quite well or exactly) and share information about the effectiveness of programs or practices (66% describes their experience quite well or exactly).

Figure 1. Research use.



The main sources of information (see Figure 2) that teachers used to support their practice and/or their professional learning are discussions with colleagues (58% of the teachers used more than 6 times in the last year), information obtained in professional development training or training at school and staff meeting, and websites/social media/Twitter or Facebook. They make less use of academic journals (30% used one or two times in the last year), professional publications, and books relating to education as common sources of information. In all the cases, teachers think that all those resources need to be research-based.

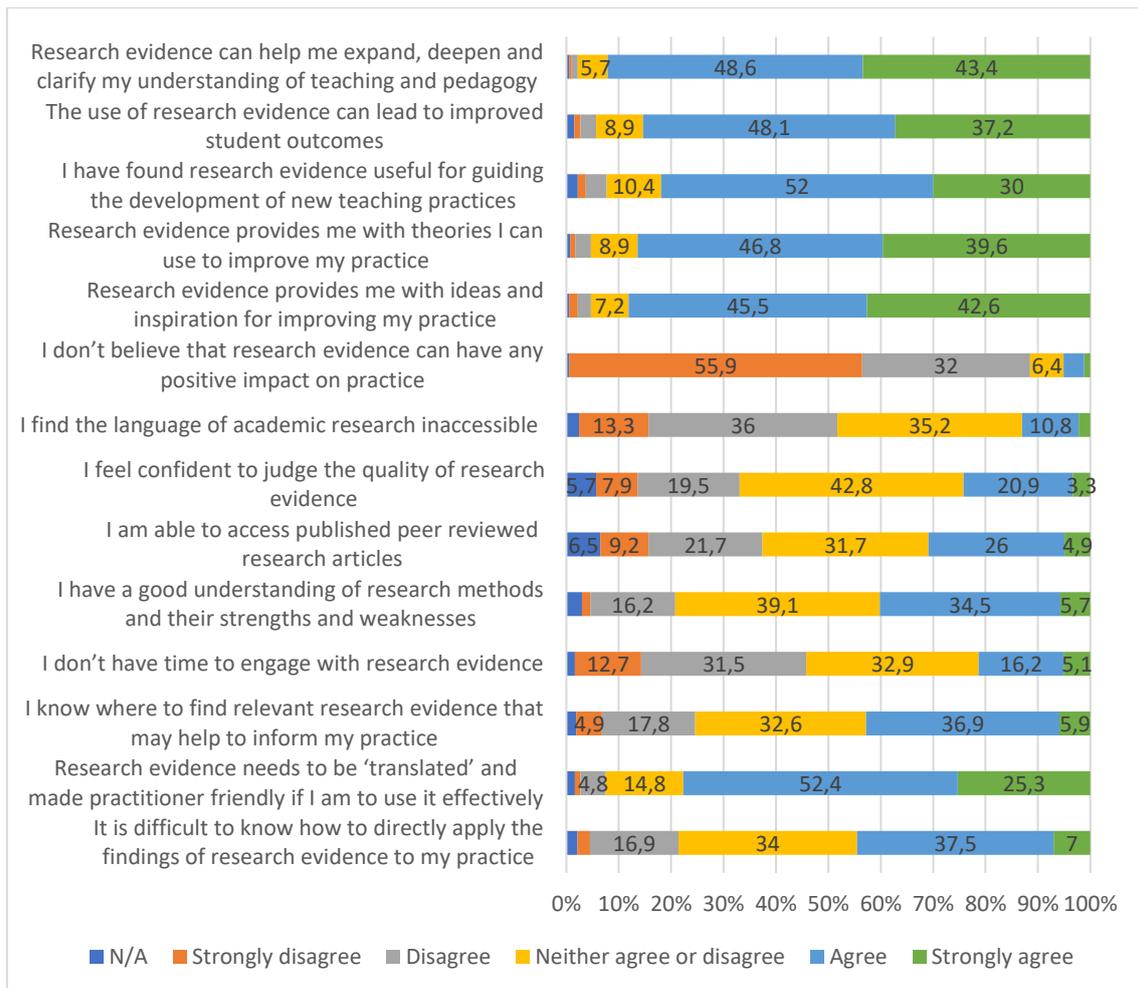
Figure 2. Source of information used to support the practice or the professional learning during the last 12 months.



Related to the benefits (see Figure 3), teachers considered that research evidence can have a positive impact on educational practice (88% of the teachers disagree or strongly disagree with the item “I don’t believe that research evidence can have any positive impact on practice”). Also, they perceived that research evidence: “expand, deepen and clarify their understanding of teaching and pedagogy” (92% agree or strongly agree), “provides ideas and inspiration for improving their practice” (88% agree or strongly agree), and “provides theories that they can use to improve their practice” (86% agree or strongly agree). They consider that “the use of research evidence can lead to improved student outcomes” (85% agree or strongly agree).

About the costs of research use (see Figure 3), 43% of the teachers agree or strongly agree that they “know how to find relevant evidence that may help them to inform their practice”. Also, 40% agree or strongly agree that they “have a good understanding of research methods”, being 24% how “feel confident to judge the quality of research evidence”. Moreover, 44% agree or strongly agree with “it is difficult to know how to directly apply the findings of research evidence to their practice”. For that reason, they consider that research evidence needs to be “translated’ and made practitioner friendly for using effectively” (77% agree or strongly agree) and that need to be “combined with educators’ practical knowledge to be professionally useful” (74% agree or strongly agree).

Figure 3. Perceived benefits and costs of research use.



Finally, about the signification of research use, 75% of the teachers agree or strongly agree that the use of research evidence “enhances the schools’ reputation and their attractiveness as a place to work”, and 59% agree with the statement “learn is the hallmark of an effective profession”. They express that are more inclined to engage with research evidence when it is aligned to the school improvement priorities (78% agree or strongly agree) and the needs of their class (83% agree or strongly agree). Also, 61% agree or strongly agree that they are more inclined to participate in educational research when it is a requirement of their performance management target and when their colleagues are also using research evidence (65% agree or strongly agree).

4. Discussion and conclusions

The study provides more evidence about the beliefs and perceptions of teachers towards research evidence use, informing about teachers’ dispositions to apply the findings of educational research in their practice and the obstacles that they can confront.

The preliminary findings show that Catalan teachers have a positive view of research evidence, considering research evidence to inform and take decisions about their own practice and contributing to their professional development. Even though some mental and time costs are perceived, those can act as enablers for the extensive use of research evidence to inform educational practice. Our results are in line with previous studies conducted in the European Context (i.e., Joram, Gabriele, & Walton, 2020; Malin et al., 2020) identifying the same opportunities and barriers.

We agree with Farley-Ripple et al. (2018) that increasing the use of research evidence in teachers’ practice is complex, as involve an impact on the teachers’ belief, attitudes and dispositions, and the research culture of the school and the educational system in a comprehensive way. Therefore, increasing the use of research evidence in teachers’ practice involves impacting the school culture and leadership, promoting time and spaces to interact with the research evidence, enabling access to the research evidence and increasing the teachers’ research literacy.

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TOWARDS AN ECLECTIC APPROACH IN AUTISM SPECTRUM DISORDER (ASD)-SMARTS (SEQUENTIAL MULTIPLE ASSIGNMENT RANDOMIZED TRIALS-SMARTS)

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Abstract

The need for evidence-based therapy is a reality in contemporary therapeutic approaches. The most studied approach in autism spectrum disorder (ASD) is the ABA therapy (Applied Behavioral Analysis), among other 27 validated programs Hume & al. (2021) and Steinbrenner & al. (2020). Even if ABA is well known and strongly scientifically studied, in almost 30% of the cases it does not lead to developing the desired verbal communication abilities ((National Institute on Deafness and Other Communication Disorders, 2010; Kasari, Sturm, Shih, 2018). In this context, speech and language therapy can be an alternative to this approach, its use being combined with the usage of different other psychological and psycho-pedagogical techniques and programs for enhancing children and families with the target abilities. This mixture of therapies, known as eclectic approach is often compared with ABA approach and criticized due to its lack of scientific proof. In order to ensure the evidence based approach we propose the implementation of SMARTs (Sequential Multiple Assignment Randomized Trials-SMARTs). The SMARTs approach offers the possibility both to collect measurable data based on the established goals and to tailor possible intervention programs adjusting the approach to participants' needs. In our research the SMARTs structure include: a sequence of decisions (it applies if participants do not respond positively to the intervention and it is used at each three months' reevaluation stage), a set of intervention decisions (in this research SLT is combined with kineto-therapy, oral-motor myofunctional therapy, psych-pedagogical programs and programs for sensory integration), elements/factors that indicate change in the established approach (it refers to factors that prove that the intervention program needs to be changed, in our research these are: regression and a plateau in speech and language development acquisition longer than one month) and a sequence of decision rules able to link the other sequences (these decision rules are based on the evaluation and reevaluation results and on reaching or not the established goals in speech and language development area). Participants in the research are 9 children with severe ASD (N=9), with ages between 6-9 years' old. The starting point of our SMARTs approach implementation was a comprehensive general assessment of speech and language development based on ISD (Integrated Scale of Development), MLU (Mean Length of Utterance) and SIR (Scale for Intelligibility Rate). The intervention period was January 2021-december 2021. Results demonstrated relevant gains in speech and language development of 6-9 months (based on ISD) and of 3 points based on SIR (from 2 level-just of words intelligible, till 5 level-all words intelligible). Very poor results were obtained at the MLU level, due to the fact that grammar approach is difficult to implement. In conclusion we can underline the fact that SMARTs can be a reliable way in individualizing and in collecting scientific proof about speech and language development in ASD context, based on eclectic intervention programs. Further research will be developed in order to tailor the morphological and syntactical aspect in speech and language development.

Keywords: Eclectic approach, speech and language therapy (SLT), autism spectrum disorder, SMARTs (sequential multiple assignment randomized trials-SMARTs), evidence based therapy.

1. Introduction

Autism Spectrum disorder (ASD) is a neurodevelopmental disorder diagnosed based on the following criteria according the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders, or DSM-V elaborated by American Psychiatric Association and worldwide used:

- **A. Persistent deficits in social communication and social interaction across multiple contexts** (based on this diagnosis criterion ASD signs are: the child is not interested to be with other children, is most of the time alone, and he likes to be isolated; the child is inattentive or has no interest in others; he does not focus on the others, has no joint attention; has difficulty in sharing and in getting involved in social activities; he is not able to interpret one's wishes, feelings or communication intentions; has difficulty in following a conversation; in having friends; has significant communication disorders).
- **B. Restricted, repetitive patterns of behavior, interests, or activities** (based on this criterion ASD signs are: communication is characterized by stereotypes, echolalia is present; the child with ASD is not able to adapt to different and new environments; he has stereotyped or repetitive motor movements, he often dislikes physical contact; has lots of sensorial difficulties in adapting and he is quickly upset by visual or aural stimulation that is too intense or too numerous: too much noise, too many movements can rapidly bring on unappropriated behaviors; shows anxiety and disruptive behaviors when changes in routine, unexpected events or the non-respect of rules appear; cannot handle transitions in terms of space or time; often has specific repetitive interests that can become obsessive).
- **C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities or may be masked by learned strategies in later life).**
- **D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.**
- **E. These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay.**

ASD diagnostic criteria underline the fact that communication disorders are an important aspect to be followed within this pathological context (Mattila, Kielinen, Linna, Jussila, Ebeling, Bloigu, Joseph, & Moilanen, 2011). Unfortunately, many researches are centered in proving the impact behavioral based therapies have and less evidence-based practices are to be found in relation with the speech and language therapy in ASD context.

The most studied approach in autism spectrum disorder (ASD) is the ABA therapy (Applied Behavioral Analysis), among other 27 validated programs based on Hume & al. (2021) and Steinbrenner & al. (2020) research. Even if ABA is well known and strongly scientifically studied, in almost 30% of the cases it does not lead to developing the desired verbal communication abilities ((National Institute on Deafness and Other Communication Disorders, 2010; Kasari, Sturm, Shih, 2018).

In this context the need to implement speech and language therapy programs in ASD is of extreme relevance. ASHA (2022) states the following areas a SLT covers in working with ASD in order to reach the final objectives, to improve communication and social interaction skills:

- using appropriate communication behaviors in different social contexts;
- developing pragmatic communication skills (to start, continue, end a conversation; to establish; communication-based relations with people);
- improving speech sounds production in relation with accepting different types of food textures and expanding eating abilities as well as strengthening voice production;
- improving reading and writing skills.

2. Objectives and research methodology

Based on the following data our research was developed based on the following **objective**: to implement SMARTs trials in approach to the SLT services we deliver for children with speech and communication disorders secondary to ASD.

We started from the assumption that SMARTs can be a useful method in order to offer evidence-based data for organizing the SLT sessions in the ASD context.

The SMARTs approach offers the possibility both to collect measurable data based on the established goals and to tailor possible intervention programs adjusting the approach to participants' needs. SMARTs approach is considered a very adequate possibility to conduct an experimental approach in order to build adaptive intervention programs in such a fluid area as SLT in ASD context (Ghosh, Nahum-Shani, Spring, & Chakraborty, 2020; Lavori, & Dawson, 2004; Murphy, 2005; Nahum-Shani, Ertefaie, Lu, Lynch, McKay, Oslin, & Almirall, 2017; Pfammatter et al. 2019).

In our research the SMARTs structure include:

- a sequence of decisions (it applies if participants do not respond positively to the intervention and it is used at each three months' reevaluation stage),

- a set of intervention decisions (in this research SLT is combined with kineto-therapy, oral-motor myofunctional therapy, psych-pedagogical programs and programs for sensory integration),
- elements/factors that indicate change in the established approach (it refers to factors that prove that the intervention program needs to be changed, in our research these are: regression and a plateau in speech and language development acquisition longer than one month),
- a sequence of decision rules able to link the other sequences (these decision rules are based on the evaluation and reevaluation results and on reaching or not the established goals in speech and language development area).

3. Participants and instruments in the research

Participants in the research are 9 children with severe ASD (N=9), with ages between 6-9 years' old. They were assessed at the beginning of the experimental period in January 2021 with the following tools:

- MLU (Mean Length of Utterance) - this assessment was conducted based on an interest topic for communication for every child and the SLT tried to collect as many autonomous speech productions (examples of conversation topics: animals, food, visits etc.) (Hațegan, 2010),
- SIR (Speech Intelligibility Rating Scale) - the SLT appreciated children's speech intelligibility level based during the first assessment session, this scale appreciates speech intelligibility on a Likert scale from 1-5 points, 1 meaning unintelligible spoken production and 5 meaning intelligible in all context spoken production, even for people unfamiliar with child's speech,
- ISD (integrated Scales for Development) - ISD supports the monitoring and tracking of the child's development from birth to 48 months in the areas of; Listening, Receptive Language, Expressive Language, Speech, Cognition and Pragmatics. From the six developmental areas two areas were being assessed in this research: receptive and expressive language (Anca; Bodea Hațegan, 2012).
- a short qualitative description of speech and language production is being made, with focus on the vocabulary level and on the ability to use just words or also utterances and sentences while speaking and communicating.

Table 1. Initial assessment results.

Diagnosis	Age	MLU	A short qualitative description of their speech and communication abilities	SIR	ISD receptive language	ISD expressive language
M.A.	6 years old	1	has less than 30 words produced just by imitation	3	30 months	18 months
E. G.	8 years old	2.4	is able to express two words sentences	2	48 months	30 months
E.C.	6 years old	1.8	is able to produce independently approximately 50 words, sentence is emergent	2	37 months	24 months
M.P.	8 years old	1.5	he is able to produce around 30 words independently, he has just 2-3 contexts in which he is able to produce a two words utterance	3	24 months	18 months
D.B.	7 years old	2	he has 50 independent words but has no longer utterances than two words combinations	2	40 months	24 months
A.P.	6.5 years old	2	she started to combine words in small sentences, has more than 50 independent words	3	34 months	27 months
E.P.	7 years old	1.5	she is able to reproduce words by imitation and has few two words utterances	3	30 months	24 months
I.P.	8 years old	1	he is able to imitate just a few words, less than 30 words	2	28 months	18 months
P.A.	8 years old	3.4	he is able to speak in sentences but without using the grammatical connectors, has more than 250 independent words	4	48 months	37 months

The experimental trials were adjusted at a three months' period of time, based on the results children obtained. The SLT intervention program we implemented in these 12 months of experimental therapy was organized on the following areas:

1. Basic concepts (with focus on respiration ab phonological awareness)
2. T⁵⁰ Technique (this is a new technique elaborated by Bodea Hațegan, 2016, focused on developing articulation strategies based on imitation. Therapists articulate words and children repeat them. This technique is applied daily even with parents' help. The list of words is changed weekly based on the semantic development of the children.)
3. Orofacial myofunctional mobilization (orofacial massage, Castillo Morales massage and Z- Vibe tools were used)
4. Program for voice training
5. Program for building the utterance (two words combination)
6. Program for building the sentence
7. Program for developing communication skills

Final results demonstrated relevant gains in speech and language development of 6-9 months (based on ISD) and of 3 points based on SIR (from 2 level-just of words intelligible, till 5 level-all words intelligible). Very poor results were obtained at the MLU level, due to the fact that the grammar approach is difficult to implement.

Table 2. Final assessment results.

Diagnosis	Age	MLU	A short qualitative description of their speech and communication abilities	SIR	ISD receptive language	ISD expressive language
M.A.	7 years old	2	has more than 50 independent words, uses two words utterances, can imitate even long and unfamiliar words	4	38 months	24 months
E. G.	9 years old	3.4	is able to express two words sentences on a regular basis and stereotypic sentences are also present	5	48 months (his understanding abilities improved a lot but this scale does not cunt them more than 48 months level)	48 months
E.C.	7 years old	3	is able to produce independently approximately 100 words, sentence is easily used	3	42 months	30 months
M.P.	9 years old	2	he is able to produce around 50 words independently, he is able to produce stereotypic two words utterance	3	30 months	24 months
D.B.	8 years old	3	he has around 100 independent words, uses independently two words utterances on a regular basis, long sentences are emergent (with three and more than three words)	3	48 months	30 months
A.P.	7.5 years old	3	she uses independently sentences with more than three words combinations, has more than 100 independent words	3.4	42 months	37 months
E.P.	8 years old	2.5	she is able to reproduce words by imitation and has two words utterances independently used	3	40 months	27 months
I.P.	9 years old	1	he is able to imitate just a few words, less than 50 words, two words utterances are used just in 5 contexts	2	30 months	24 months
P.A.	9 years old	3.4	he is able to speak in sentence using some grammatical connectors on a regular basis, has is also able to sustain a small conversation	5	48 months (his understanding abilities improved a lot but this scale does not cunt them more than 48 months level)	48 months

4. Conclusions

Speech therapy in the context of ASD and in all the context must follow evidence-based practice. The SLT's decisions based on SMARTs approach, during intervention phase had a positive impact on the children's progress recorded in this study.

In conclusion we can underline the fact that SMARTs can be a reliable way in individualizing and in collecting scientific proof about speech and language development in ASD context, based on eclectic intervention programs. Further research will be developed in order to tailor the morphological and syntactical aspect in speech and language development.

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TECHNOLOGY IN TEACHING AND LEARNING IN ROMANIA

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Abstract

The pandemic caused by the novel Coronavirus has forcibly introduced digital technologies in the teaching and learning process all over the world. Even if teacher and students preparation for this way of teaching has not sufficient, all participants have succeeded in a rather short amount of time to adapt to online teaching and use the myriad of applications, websites and online teaching and learning platforms. The present article evidentiates the impact of digital technologies in education, therefore the study area that incorporates it is education technology.

The idea from which this study originated is the way and rapidness that teachers managed to integrate digital technologies in teaching and to adapt their methods and strategies so that they combine all the advantages offered by online teaching with the contents to be taught.

The main objective of the article has been the identification of the main applications, websites and platforms that the teachers consider useful, the level of usage during exclusive online teaching or hybrid teaching and the advantages and disadvantages of using digital resources on short-term and long-term. The research method is based on the teachers responses to the online questionnaire, on a qualitative research.

The present study is structured in four main sections. The first section presents the context of introducing technologies in the teaching-learning process caused by the Covid-19 pandemic. The second section consists of a list of applications, platforms and educational websites used by Romanian teachers during exclusive online teaching and learning and developing opportunities offered to students and teachers. The third section presents the opinions of teaching staff in a private school from Romania regarding the positive and negative impact of digital technologies over the teaching and learning process. The last section comprises conclusions & recommendations for the main stakeholders.

The main results obtained following the research show that the teachers have used and continue to use a series of apps, websites and educational platforms in teaching, even if the teaching is hybrid or with physical presence. Using digital resources has advantages such as class interaction, high interest in children, but also disadvantages (such as limited resources, internet connectivity, increased time in preparing lessons).

Keywords: *Online school, Covid-19 pandemic, educational applications, education digitalization, Romania.*

1. COVID-19 pandemic debut

In December 2019, the first case of Coronavirus was discovered and very soon was going to affect the entire world. In Romania, the first case was confirmed on February 26th 2020. Not long after, panic installed around the whole world and shortage supplies caused by excessive shopping occurred even for basic food products. Only a few weeks after, almost a global quarantine was installed, which has helped the planet by reducing pollution also. From the moment when national quarantine was instated in Romania, all domains have suffered alterations in organisation and activity running. The introduction of technology and the internet have changed the people’s life from many perspectives. (Hossain et. al. 2021)

First of all, the work-from-home practice, not very often met in our country, was adopted by most of the companies and the results indicates that 65% of employees have worked from home and 40% says that they were more efficient. (Vasile et. al. 2020)

Second of all, different industry sectors (e.g. tourism, retail) changed their leadership, business strategies and aspects related to employees or consumer behaviour. Many businesses were forced to close their doors and others were on a win (e.g. sales, online marketing). (Donthu, 2020).

The devices that help in activities by using digital technologies have been in high demand and there were times when manufacturers did not have enough stock to fulfil the great demand. According to some results based on a GfK’s annual sales data from 70 countries, the sales of smart products were with 24 percent bigger than the sales from the previous year. (Richter, 2021)

And not lastly, the flexibility and creativity in schools of all the educational parties has been the starting point for the organisation and sustaining of online teaching activities because the teaching staff was not prepared for such a challenge. (Bell et. al., 2021) Although, in recent times, various practices and forms of integrating technology into the teaching process have emerged, in the case of the Covid-19 pandemic, “online teaching is no longer an option, it is a necessity” (Dhawan, 2020, p. 7) Worldwide, 1.2 billion students could not attend school or university because of the COVID-19 pandemic. (Li and Lalani, 2020) Many teaching institutions have been closed and the right to education has not been ensured equally to all students, due to the fact that there are factors that negatively influence their participation through digital technology. Even before the pandemic, many children could not exert their right to education due to social context and limited financial possibilities so they had to make concerted efforts to maintain learning through the internet, television or radio. (Shleicher, 2020).

2. Applications, platforms and educational websites used by Romanian teacher

The sudden transition to online teaching and the pressure on the teachers' shoulders has led to the emergence of two categories. The first has been constituted by teachers that chose to conduct their classes with the simplest and most reachable version and the second category were the teachers that have come out of their comfort zone, learned and developed their digital abilities to try and continuously perfect for the most efficient process of teaching learning evaluating. Teachers had to adapt their methods and use new technological concept to face the new way of teaching. (Shleicher, 2020)

According to a study by Forbes Romania in which 603 students, teachers and parents have participated the most used communication platforms have been Zoom (21%), WhatsApp (23%), Google Classroom (13%) and Facebook (11%). (Barbu, 2020)

The open educational resources educational, websites, online libraries, virtual museums in other applications that are used during teaching activities have been used only 2.82%. The specialise platforms in e-learning have been underused also. Only a percent of 2.6% of teachers claim that they have carried out their teaching activity through platforms such as Google Classroom, Moodle etc. Another percent of 2.8% of teachers claim that they used applications such as Zoom, Meet, Teams or Skype. To the total of applications, learning instruments such as Kahoot, padlet, wordwall etc. are added. (Botnariuc et. al., 2020) According to an article posted on the website www.clasaviitorului.md, based on data collected from teachers during the conference technology makes the difference the most used instruments and digital applications have been: Kahoot, Mentimeter, Padlet, Canva, LearningApps, Wordwall, Livresq, Liveworksheet, Quizizz and Google extensions.

Table 1. List of applications, platforms and educational websites used by Romanian teachers.

Platforms		
1.	Microsoft Teams	Platform designed for business communication.
2.	Google Meet	Video-communication service developed by Google.
3.	Zoom	Program for video teleconference.
Educational websites		
4.	Twinkl	British online educational publishing house.
5.	Krokotak	Educational website with free printable materials.
6.	Didactic	Educational website where teachers can download and upload materials for free.
7.	Emalascoala	Educational website with articles, printable materials and ideas for teachers.
8.	Livresq	Educational website and interactive platform where teachers can create, upload or download materials, lesson plans, or teaching ideas.
9.	Digitaliada	Digital and interactive program that help teachers to use digital educational content in their lessons.
Applications		
10.	Wordwall	Digital instrument based on a collection of words organised in different ways: wall, bulletin board, match up, missing word, random wheel etc.
11.	Skype	Telecommunication application.
12.	Kahoot	Ideal for recaps and evaluations.
13.	Mentimeter	It's an application through which the teacher may present content and also receive feedback in real time.
14.	Padlet	Perfect for presentations and teamwork.
15.	Canva	A platform dedicated to graphic design used to create media content presentations, posters, documents, worksheets or charts.
16.	Thinglink	Ideal for virtual tours, using digital objects or to combine different images/links/words.
17.	Imapuzzle	It's a perfect instrument for math lessons. The teacher can easily create a puzzle and add some math exercises to it.
18.	Edpuzzle	Ideal for music lessons, communication or any teaching material based on a video.
19.	Liveworksheets	Application for creating digital worksheets.
20.	Quizizz	Application for online quizzes.

3. The opinions of teaching staff in a private school from Romania

For a better understanding of the teaching staff's perspective on the digitalization of education in Romania, during online exclusive teaching but also in present times when teaching is carried out with physical presence of hybrid, data have been collected on the way of teaching that is mediated by technology from the perspective of teaching staff in a private school from Bucharest, Romania.

The present study is based on data collected through a questionnaire form meant for teaching staff in Bucharest. The research is qualitative and its purpose is to fully and deeply understand the concept of digitalization in the educational field, and the questionnaire is the best method to achieve it (Bird, 2009). The questionnaire has been emailed and also distributed through social networks. The extension Google forms was used for a more efficient, faster and more organized data collection of the received answers. The number of teachers that filled out the form was 86. The questionnaire contained 8 questions. The first two were meant to collect data on the teacher's profile and the following questions were meant to collect data on the impact of digital technologies introduction in the instructive-educational process. Most teachers that filled the forms teach in primary teaching (70%) and the rest in pre-school (10%), middle school and high school (20%). Regarding teaching seniority, it was observed that 40% of teachers have more than 10 years seniority, 30% have between 6 to 10 years, 20% between 3 to 5 years and 10% under 3 years.

Question number 3 had as purpose the collection of data regarding the most used digital apps during exclusively online teaching.

Table 2. Apps, educational websites and platforms used by teachers.

Online apps	Educational websites	Platforms
Wordwall, Kahoot, Canva, Nearpod, Genially, Learning Apps, Baaboozle, Pinterest.	Twinkl, Emalascoala, Krokotak, Didactic.	Microsoft Teams, Zoom.

In order to evidenciate the impact that the sudden introduction of technology has had over teachers, the answers to the question "Would you still use digital resources after returning to the classroom?" were that 90% of the teachers have continued to use digital resources even after online school was over. On the other side, 10% of teachers have given up the integration of digital resources in the instructional-educational process once the return to face-to-face teaching has occurred. In hybrid teaching 90% of the teachers have stated that they use digital resources almost on a daily basis and 10% have stated to no longer use this type of resources. It is worth mentioning the fact that's the current student generation has grown alongside technology and they are very familiar with all kinds of devices (Bhasin and Rajesh, 2021).

The following questions had open answers as every teacher had the opportunity to list the advantages and disadvantages of using digital resources in class:

Table 3. Advantages and disadvantages of using digital resources.

Advantages	Disadvantages
motivation and interest grow in students	weak internet connection that interrupts lessons
the lessons become more interactive	longer time spent to create teaching materials
supplementing activities that are difficult to be carried out in the classroom	insufficient training for teachers
immediate feedback	technology cost

4. Conclusions for the main stakeholders

The purpose of this study was to evidenciate the importance and usefulness of the digitalization of education in Romania and not only. Therefore, using digital resources in online teaching hybrid or face to face is starting to become more commonly used, according to the results of my research and if they become aware of the benefits and also the disadvantages they can achieve interactive lessons and modern teaching, of course with the help of other entities that influence teachers and students lives. A study by Shivangi Dhawan in 2020 presents a SWOT analysis of online teaching with its advantages and disadvantages and specifies that, over time, online teaching can be a real success. (Ayeni-Arthur, 2017).

The applications, sites and platforms listed by teachers in the questionnaire were diverse and this indicates that they have adapted their teaching methods and strategies to the online or hybrid model. This idea is also written by Eduard Edelhauser and Lucian Lupu-Dima who stated that "A mix-and-match of

these tools with a variety of delivery methods, such as interactive e-learning courses, live and recorded lectures, and collaborative documents for group work, can work well to provide a comprehensive learning experience, but this also creates some difficulties for students and teachers." (Edelhauser and Lupu-Dima, 2021).

4.1. Recommendations for the main stakeholders

Due to the fact that there has been enough time since the first contact of teachers and apps on digital platforms it is recommended that they choose a set of apps they find useful and that their students reacted well to. This way everything becomes routine for teachers and students and the wanted results are achieved. This does not mean that teachers should not experiment keep learning and searching constantly for resources that are useful and that may help in fulfilling the proposed objectives. From my own experience I can state that the even if there were problems linked to Internet connexion and lack of means to help in the optimization of the online or hybrid teaching I have always found solutions and try to focus on the advantages and the great results of my students. Also from my perspective I can state that with more time passing and the more frequent use of digital apps the time spent in creating necessary materials for the classroom has become shorter because I've learned and perfected myself in using them. If you give yourself enough learning time and enough patience the digital apps become a must have making your work much easier.

Therefore, most teachers use digital resources in the teaching process in Romania despite the disadvantages and even though the preparation for technology mediated teaching was somehow very sudden due to the pandemic caused by the novel coronavirus. If teachers will continue to perfect (on their own or through organisations and institutions that offer classes) the Romanian teaching system will only have benefits.

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THE SENSORY PROCESSING AND INTEGRATION IN ASD: IMPACT ON EDUCATIONAL OUTCOMES

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Abstract

Autism spectrum disorders (ASDs) depict a large class of conditions that manifest in a variety of displays and particularities. The number and type of symptoms can differ drastically from one person to another and array from mild to severe. Symptoms fall into a range of categories; dysfunctions in perceptual and sensory processing are present with impact in communication, in neurological functioning outcomes and in various functional behavior limitations (Pfeiffer et al., 2005). In school settings and in everyday life the sensory processing and integration of the stimuli may impact the acquisition of new information and sometime, in particular situation the educational process itself.

Sensory information and atypical behavioral responses are common to people with this diagnostic, with over 96% of children with ASD having hyper or hyposensitivity in several areas. Particular processing of sensory stimuli can cause aggressive and self-harming behavior, especially for those who are non-verbal and cannot communicate their difficulties in an adequate and functional manner. Among the most affected senses are the proximal senses, such as taste, smell, and touch, but new studies report that disruption of auditory and visual processing pathways is becoming more common (Marco, E J et al, 2011). Due to these particular hypersensitivities daily activities are disturbed. This is a factor that limits the participation of these individuals in certain events and activities, and in school itself. Most preschoolers had difficulty with sensory processing, which was associated with behavioral changes such as irritability, lethargy, or hyperactivity.

In this research we evaluated the sensory processing difficulties layered by age and interaction plans: tactile, vestibular, proprioception, auditory, olfactive, taste and visual. The participants (N= 43) report data for themselves (N=9), for babies(N=5), for kindergarten age (N=15) and for school age (N=14). Preliminary data indicate for tactile sensory processing the M= 1.9, for auditory sensory processing the M= 2.49, for vestibular sensory processing the M= 2.1, for proprioception sensory processing the M= 1.72, for visual sensory processing the M= 2.07, for taste sensory processing the M= 1.74, for olfactive sensory processing the M= 1.97. The most reported disturbance on sensory processing was on the auditory, vestibular and visual part. The affected sensory processing area interferes with the educational process that is based mainly on auditory, visual and vestibular. These preliminary results are in concordance with others reports from literature and could explain the hypersensitivity for auditory and visual stimulus and the odd behaviors displayed by ASD persons, like tiptoes walking. Further research and analysis will be developed in order to tailor these aspects of sensory processing in ADS, with impact on education and everyday living.

Keywords: *Sensory processing, autism spectrum disorder, sensory integration, educational challenges, hyper and hyposensitivity.*

1. Introduction

Autism Spectrum Disorder is a neurodevelopmental disorder characterized by social, communication and behavioral impairments. ASD can be diagnosed at any age, but early signs appear in the first two years of the child's life. Autism is known as the 'spectrum' because there is a wide variety in the type and severity of symptoms that these people experience.

According to the American Psychiatric Association's Guide to Diagnosing Mental Disorders (DSM V, 2013), people with ASD present:

- Difficulties in communicating and interacting with others
- Repetitive behaviors and a narrow range of interests
- Symptoms that affect the patient's ability to work, work and other aspects of his life
- Excessive response to sensory stimuli

Based on epidemiological studies conducted in recent years, the prevalence of people with ASD seems to increase globally. There are several possible explanations for this increase, the main ones being increased awareness, better and more accurate diagnostic tools, as well as improved reporting.

Data published by the WHO in 2017, estimates that worldwide 1 in 160 children has one of the disorders of the autism spectrum (WHO, 2017). This estimate is an average figure, as the prevalence of these diseases is still unknown in underdeveloped countries. Recent studies in the EU suggest that autism affects around 1% of Europeans, representing over five million people (Elsabbagh et al., 2012). A 2005 report by the European Commission on the ASD underlined the difficulty of getting data due to poor common health information and the difficulty to access health surveys (Montserrat, 2005).

The difficulty in obtaining prevalence data is that there is no medical test to determine in an absolute way whether a person has autism or not. The diagnostic is done mainly on clinical observation and psychometric tests. But based on the new CDC data, published in the USA, an increased number in the ASD is seen (CDC, 2022; NIMH, n.d.) This is highly relevant due to the impact on medical and educational systems.

Autism spectrum disorders (ASDs) depict a large class of conditions that manifest in a variety of displays and particularities. The number and type of symptoms can differ drastically from one person to another and array from mild to severe. Symptoms fall into a range of categories; dysfunctions in perceptual and sensory processing are present with impact in communication, in neurological functioning outcomes and in various functional behavior limitations (Pfeiffer et al., 2005). In school settings and in everyday life the sensory processing and integration of the Sensory information and atypical behavioral responses are common to people in this spectrum, with over 96% of children with ASD having hyper or hyposensitivity in several areas. Particular processing of sensory stimuli can cause aggressive and self-harming behavior to those who cannot communicate their difficulties. Among the most affected senses are the proximal senses, such as taste, smell, and touch, but new studies report that disruption of auditory and visual processing pathways is becoming more common (Marco et al., 2011).

Sensory processing problems in children with autism can be described as a combination of defensiveness and apparent insensitivity. These people may be hypersensitive to some sounds, but they may appear deaf to others, or they may become attached to certain stimuli and ignore others, for example, they may focus on an accessory while not being aware of the person who wears it. Research on this subject suggests that individuals with autism process information differently from typical children, but this improves over time (Kern et al., 2006)

Due to these particular hypersensitivities, daily activities are impaired and atypical sensory integration is a factor that limits the participation of these individuals in certain events and activities and it definitely impacts on school setting and academic achievements. Studies found that most preschoolers had difficulty with sensory processing, which was associated with behavioral changes such as irritability, lethargy, or hyperactivity (Kern et al., 2007).

Several theories have been formulated to explain this phenomenon, but they all have one thing in common, that these abnormalities are not related to the severity of autism and the variability of intellectual capacity. Some authors argue that sensory changes originate in inappropriate integration and fragmentation, and another theory is based on differences in adult neuronal plasticity, which can cause an atypical connection between the anterior and posterior regions of the brain. Another suggestion is based on the current theory of autism which has identified an imbalance of arousal and neuronal inhibition that could be the cause of this condition. Genetic studies have identified abnormalities in areas of the genome associated with synaptic development, myelination, and transmission. Also, imbalances between neurotransmitters such as glutamate and GABA, which contribute to synaptic instability. Inhibitions may manifest as a low response in cortical activation patterns, and inconsistent neural processing may be the cause of both secondary and underlying symptoms. Atypical neural responses in the sensory and motor cortex may explain why most people with ASD have low sensory sensitivities, clumsiness, and even balance disorders. (Behrmann & Minshew, 2015). In terms of secondary symptoms, unsafe neural networks have an increased susceptibility to epileptic seizures, which is one of the most common comorbidities in autism. This also impacts everyday activities and educational outcomes.

Excessive response to sensory stimuli has recently been added to the DSM-5 diagnostic criteria, so it is not yet sufficiently studied. Criteria for this symptom include adverse reactions to stimuli, such as noisy environments, uncomfortable clothing or touch, signs that do not elicit these responses in typical

individuals. Electroencephalography studies have shown deficits in sensitive areas, selective attention to sensory input, suggesting that people with ASD may become easily overwhelmed by irrelevant and multiple stimuli, but this condition is extremely heterogeneous, with symptoms appearing only in some people.

The variety of sensory characteristics reported in children with autism are described as different response patterns, these being: decreased reaction, hyperreactivity, atypical sensory interests, repetitive behaviors and increased perception. Such a sensitive heterogeneity of this disorder is a challenge both for understanding the pathogenesis and for planning the therapeutic and educational intervention (Behrmann & Minshew, 2015; Bodison et al., 2008).

2. Design and methods

This study implies an exploratory and observatory design. The sensory integration deficit was evaluated using a form that approach specific integration based on the age and each sensory domain: tactile sensory processing, auditory sensory processing, visual sensory processing, taste sensory processing, olfactive sensory processing. The questionnaire was developed based on others presented in the literature for adults such as Sensory Processing Disorder Symptoms Test for Adults (Behrmann & Minshew, 2015) or for children. The form was set and the design was created using Google form. The form has 7 different sections with conditional set-go to specific section based on the answer they chose. The form collects the approval of the participant to take part in the study and comply with the GDPR Data Protection. Demographic data such as age, level of education, socio-economic status was collected through responses. The participants fill the form for themselves, for their babies, for toddlers, and for school age children as they chose. For each category the question was similar in difficulty or the target information they provide in connection with sensory processing and integration. Example of such question are: "I am very sensitive with the stimuli around me, I don't like to be touch"; "I am sensitive to light", "I collide with different object and I have bruises", "I can't focus during work time/ school time, etc", "I avoid some foods because of the texture. I would rather go hungry than eat a mushy banana", "When I'm in a car with other people, I'm always asking, "Can we turn down the radio volume?" etc. For each age category the affirmation was adapted such as "your baby is sensitive with the stimuli around he", "your child doesn't like to be touched" etc.

The invitation to participate in the study was sent individually to parents of children with ADS, but also distributed to different subject mailing lists and posted on different social media platform.

The data for this study were exported from the Google form in an Excel format and analyzed with the Excel Analysis ToolPak.

3. Objective and results

In this research we evaluated the sensory processing difficulties layered by age and interaction plans: tactile, vestibular, proprioception, auditory, olfactive, taste and visual. The sensory integration disturbance is particularly important in connection with work and education because this process is based on the integration of all senses in order to display a proper outcome and to have a functional status.

3.1. Results

The demographic data indicates that 13.6% of the participants live in the rural area and 86.4% comes from the urban area. For socio-economic status 36.4% have a high status and 63,6% a mean status. No participant reported poor socio-economic status. For health and medical out-come 22.7% have a formal diagnosis and 77.3% have no diagnosis. For the addressability 40% fill the form for themselves, 41,8% for their school-age children, 13.6% for toddlers and 4.6% for babies. For gender self-reported data on adult/adolescent age the results indicate that 16.7% were male and 83.3% female and for education 11.1% are during high school and 88.9% at high education.

In this research we evaluated the sensory processing difficulties layered by age and interaction plans: tactile, vestibular, proprioception, auditory, olfactive, taste and visual. The participants (N= 43) report data for themselves (N=9), for babies(N=5), for kindergarten age /toddlers (N=15) and for school age (N=14). Preliminary data indicate for tactile sensory processing the M= 1.9, for auditory sensory processing the M= 2.49, for vestibular sensory processing the M= 2.1, for proprioception sensory processing the M= 1.72, for visual sensory processing the M= 2.07, for taste sensory processing the M= 1.74, for olfactive sensory processing the M= 1.97. The most reported disturbance on sensory processing was on the auditory, vestibular and visual part. The affected sensory processing area interferes with the educational process that is based mainly on auditory, visual and vestibular.

For the adults and the adolescents the question with the highest score for the tactile sensory "I collide with different object and I have bruises" - M= 3.05 and the integration sensory "I often feel tired

and start my day slowly” – M = 3.05. Visual and sound sensory record high mean in the question “I am sensitive to sounds or visual stimuli” – M= 2.77. The mean for adult and adolescent checklist was M=2.36. The results for sensory processing for this group are: The tactile sensory processing M= 1.78, for auditory sensory processing the M= 2.27, for vestibular sensory processing the M= 1.94, for proprioception sensory processing the M= 1.53, for visual sensory processing the M= 1.93, for taste sensory processing the M= 1.93, for olfactive sensory processing the M= 1.06. A list with the data collected for each age group are display in table nr. 1.

Table 1. The mean for sensory processing based on the age group stratification and sensory domain.

Sensory processing type	Overall score	Adults and adolescent	Babies	Toddlers/Preschool age group	School age group
Tactile	M= 1.9	M= 1.78	M= 2.55	M= 1.6	M= 1.7
Auditory	M= 2.49	M= 2.27	M= 3.42	M= 1.7	M= 2.6
Vestibular	M= 2.1	M= 1.94	M= 3.83	M= 1.71	M= 1.3
Proprioception/ Kinesthesia	M= 1.72	M= 1.53	M= 2.8	M= 1.35	M= 1.2
Visual	M= 2.07	M= 1.93	M= 2.2	M= 2.32	M= 1.9
Olfactive	M= 1.74	M= 1.93	M= 1.16	M= 2	M= 1.83
Taste	M=1.97	M= 1.06	M= 2.5	M= 1.9	M= 2.42

3. Discussion

These preliminary results are in concordance with others reports from literature and could explain the hypersensitivity for auditory and visual stimulus, for kinesthesia and the odd behaviors displayed by ASD persons, like tiptoes walking, self-harm or specific stimulation.

The results indicate that the most sensitive sensory processing areas are the auditory, vestibular and visual. This is in concordance with others results reported in literature which underline that disruption of auditory and visual processing pathways is becoming more common (Marco et al., 2011) and proximal senses, such as taste, smell, and touch are not as affected as it was previously thought.

The design and result of this study does not cover a direct correlation with academic performance but poor visual, vestibular, proprioceptive and auditory sensory processing definitely impact the educational outcome. This idea is discussed by Bodison et al, 2008. The authors “*the school readiness skills that are influenced by sensory integration include ability to sustain attention to task; follow directions, visual tracking, and visual praxis skill, use postural control*”.

4. Conclusions

Sensory processing is an important and significant topic in relation to ASD. This study underlines the areas of sensory processing that are more sensitive. Teachers and therapists can use the results of this study to develop the students’ intervention educational plan and to select the best strategies for each student. Because each student is different, it is important to identify as soon as possible the most sensitive sensory processing areas and to include this information in therapy and everyday life. Further research and analysis should be developed in order to tailor these aspects of sensory processing in ADS, with impact on education and everyday living.

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THE IMPACTS OF MENTORSHIP ON DUAL ENROLLMENT HIGH SCHOOL STUDENTS

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Abstract

Dual enrollment programs enable high school students to take community college courses and earn high school and college credits, saving two years of college expenses. However, many dual enrollment students lack a robust support system for success in college-level coursework and environment. The authors created an interdisciplinary mentorship program that pairs a volunteer dual enrollment senior student with a dual enrollment junior student in a longitudinal mentoring relationship to address this. This study examined mentors' and mentees' long-term evaluation of the program and its impacts. Thirty-nine mentors and mentees were randomly matched with a waitlist control group, and mentoring relationships lasted for a full academic quarter. Participants later completed an anonymous online feedback survey (based on the Likert Scale), with a response rate of 67% ($n = 26$). Mentees reported an average 1.37 Likert scale increase in their comfort in dual enrollment; mentors reported an average 2.43 Likert scale increase in confidence in teaching others. Mentees' comfort in the college environment increased with the frequency of meetings ($p < 0.05$); the number of meetings did not correlate to their grade point average (GPA) ($p > 0.05$). Change in dual enrollment comfort was more significant among matched students than waitlisted ($p < 0.05$). Notably, many dual enrollment programs have a ~10% student academic probation rate (GPA < 2.0) each quarter; none of the mentees experienced academic probation, but this was not significant. Among mentees, 79% reported interest in being a mentor the following year. These results indicate that peer mentorship is crucial for dual enrollment student success and presents a self-sustaining model for the future.

Keywords: *College, dual enrollment, mentoring, learning.*

1. Introduction

Dual enrollment programs allow high school students, typically those in 11th and 12th grade, to take community or technical college courses to earn both high school and college credits (Allen, 2010). Students have the opportunity to obtain an Associate's Degree and/or transfer to a 4-year college after graduation, therefore saving two years of college expenses. Running Start (RS), the focus of this study, is USA Washington State's flagship dual enrollment program that allows high schoolers to take college courses at the state's 34 community and technical colleges.

The benefits of dual enrollment programs such as RS are well researched, but the weaknesses are less known. Participation in dual enrollment has been associated with a greater likelihood of attending college, gaining credits faster, and a higher GPA in college (Allen & Dadger, 2012). However, many students report struggling. High school students enter an unfamiliar environment to take classes with adults, creating a sense of being isolated from their college peers due to age and knowledge differences (Huntley & Schuh, 2002). Dual enrollees also report feeling unwelcome and judged by their professors and classmates and experiencing "feelings of a chilly classroom" (Huntley & Schuh, 2002). Lil et al. (2018) report that some students face anxiety due to community colleges' overwhelmingly larger student bodies. Academic challenges are also common due to adjusting to a faster-paced curriculum and receiving less personal support from instructors and staff (Lile et al., 2018). These factors may contribute to the lower percentage of RS participants graduating from high school relative to their non-dual enrollment counterparts (Cowan and Goldhaber, 2015). There is a clear program-wide need for a stronger support system that addresses all dual enrollees' interpersonal and educational barriers.

Prior research on the benefits of mentoring as a reciprocal relationship is numerous. We define mentoring as a unique relationship in which a more knowledgeable and experienced mentor guides a less experienced mentee to promote learning (Castanheira, 2016). Gershenfield (2014) identified the greatest need addressed by college mentorship programs was academic support, then psychosocial/emotional support, then role modeling. Although significant research has been conducted on the effects of mentorship programs in college and high school separately, none have been done on dual enrollment to the authors' knowledge.

This study examines the impacts of a peer mentorship program between first and second-year RS students at Bellevue College (BC), the largest dual enrollment college in Washington. In early 2021, the authors, comprised of a team of RS students, teachers, and program directors, collectively felt that incoming RS students needed a more robust support system for the transition to college-level coursework and environment. First-year RS students face many obstacles in their new environment, ranging from less support from teachers to a faster-paced course schedule. As such, the authors created a Running Start Mentorship Program (RSMP), which pairs a second-year dual enrollment student with a first-year dual enrollment student in a mentoring relationship. The primary goals of the RSMP were to facilitate academic success through advice on navigating stress coping strategies and time management, serving as on-campus guides, and, most importantly, providing a support system to navigate the new college environment. The principal objective of the present study was to evaluate both mentors' and mentees' long-term assessment of the RSMP and its role in influencing mentees' adjustment to college.

2. Methods

Mentors and mentees were recruited from the 2021-22 BC RSMP cohort by email at the beginning of the pilot launch. Recruitment questions asked students' emails, mentor's GPA, high school name, career goals, and logistical/introductory questions. Mentors and mentees were chosen randomly, but match pairs were made based on similarities in career interests and other factors. The program had limited spots for mentors since this was a pilot. Mentors were required to undergo two training sessions prior to starting mentoring relationships, covering mentoring guidelines, academic concerns & expectations, BC counseling resources, LGBTQ+ awareness, cultural competency, and Title IX.

Throughout the program duration, mentors and mentees were encouraged to meet virtually over Zoom or in-person on the college campus. In-person meet-ups were restricted due to the ongoing COVID-19 pandemic. Mentors submitted personal reflections after each meeting describing the meeting's location, meeting duration, preparation duration, and discussion topics. This was used to determine volunteer hours and identify mentees' strengths and weaknesses. The first meeting with a mentee required the development of a "SMART RSMP goal," an acronym that stood for "Specific, Measurable, Achievable, Relevant, and Time-based." This goal enabled mentors to provide definitive progress updates after each following meeting.

The data for the study was collected via Google Forms, and Institutional Review Board approval was obtained from Bellevue College. The Bellevue College Survey and Evaluation Department revised the survey before IRB approval.

At the end of the pilot quarter, an anonymous and voluntary feedback form was sent out to all mentors and mentees to assess the quality and impacts of the RSMP on dual enrollment students. Results were analyzed from forms to which the respondent consented to have the survey used for research purposes. Questions consisted of the role of the subject in the program (mentor or mentee), long answer feedback on the program, eight questions for mentees, and five questions for mentors. Questions were a mixture of short answers, yes/no, and multiple-choice questions based on the Likert scale.

A separate feedback form was sent out to the randomly waitlisted mentees to eliminate confounding factors such as natural student adjustment in Fall Quarter and accurately assess the impacts of having a mentor versus not having a mentor. The statistical analysis was conducted using t-tests.

3. Results

We received 58 mentee applications and 53 mentor applications. The intended GPA cutoff for mentors was 3.0, but the lowest reported GPA was 3.52, meaning all applications were eligible. Ten mentors were selected; one did not respond, leaving nine mentors. On average, three mentees were assigned to each mentor, with thirty mentees total, and twenty-eight were placed on a waitlist. Seven out of nine mentors responded to the feedback form, providing a 77.8% response rate. Nineteen out of thirty mentees responded, providing a 63.3% response rate.

Mentees provided one to two SMART goals in the introductory meeting, with the results displayed in Table 1.

Table 1. Mentee's goals after first meeting.

Mentee Goals:	Strong Academics	Better work/time management	Join more clubs	Make friends in college	Other
Frequency (percent)	20 (66.7%)	11 (36.7%)	8 (26.7%)	4 (13.3)	3 (10%)

The results of the mentors' and mentees' feedback surveys are displayed in Table 2.

Table 2. Mentor/Mentee Feedback Survey results.

Question	Result
<u>Mentors</u>	
How likely are you to recommend this program to others? (1-5 scale)	4.53
Did you enjoy being part of the program? (Y/N)	7 (100%)
How comfortable were you with mentoring others BEFORE being assigned a mentee(s)? 1 = Very uncomfortable, 2 = Somewhat uncomfortable, 3 = Neither uncomfortable nor comfortable, 4 = Somewhat comfortable, 5 = Very comfortable	2.14
How comfortable were you with mentoring others AFTER being assigned a mentee(s)? 1 = Very uncomfortable, 2 = Somewhat uncomfortable, 3 = Neither uncomfortable nor comfortable, 4 = Somewhat comfortable, 5 = Very comfortable	4.57 (change = 2.43)
Did being a mentor in the program help with your career/professional development? (Y/N)	7 (100%)
<u>Mentees</u>	
How comfortable did you feel about Running Start BEFORE being assigned a mentor? 1 = Very uncomfortable, 2 = Somewhat uncomfortable, 3 = Neither uncomfortable nor comfortable, 4 = Somewhat comfortable, 5 = Very comfortable	3.16
How comfortable did you feel about Running Start AFTER completing Fall Quarter with your mentor? 1 = Very uncomfortable, 2 = Somewhat uncomfortable, 3 = Neither uncomfortable nor comfortable, 4 = Somewhat comfortable, 5 = Very comfortable	4.52 (change = 1.37)
Did you enjoy being part of the program? (Y/N)	18 (94.7%)
Did being a mentee in the program help with your career/professional development? (Y/N)	17 (89.5%)
Approximately how many times did you meet with your mentor?	3.79
What was your Fall Quarter GPA?	MEAN: 3.48 RANGE: 2.80 - 4.00
How likely are you to recommend this program to others?	4.71
Are you interested in being a mentor next year? (Y/N)	15 (79.0%)

In total, 10 of 28 waitlisted mentees responded to their feedback form, with a response rate of 35.7%. The results of the waitlist feedback form are displayed in Table 3. A one-tailed t-test on the change in comfort among waitlisted and matched mentees found that having a peer mentor significantly increased comfort in Running Start ($p < 0.05$).

Table 3. Waitlist Survey Results.

Question	Result
How comfortable did you feel about Running Start when you applied to be assigned a mentor before the start of Fall Quarter?	3.00
How comfortable did you feel about Running Start after completing Fall Quarter?	3.60 (change = 0.60)
Would you have preferred being matched to a peer mentor for Fall Quarter? (Y/N)	9 (90.0%)
What was your Fall Quarter GPA?	MEAN: 3.38 RANGE: 2.50 - 4:00

Further analysis suggests a correlation between the number of mentee/mentor meetings and the mentees' change in comfort with R-S, Figure 1. The $p < 0.05$ demonstrates a significant relationship between the two variables.

Figure 1. Quantity of Mentorship Meetings vs. Change in Comfort with RS.



Regression analysis did not indicate a significant correlation between mentees' Fall Quarter GPA and the frequency of mentor/mentee meetings ($p>0.05$). In addition, there was no significant difference between the Fall Quarter GPA of waitlisted and matched mentees ($p>0.05$).

4. Discussion

Participation in RS is steadily rising; according to the Community and Technical Colleges Washington State Board, enrollment has increased by ten percent each year from 2006 to 2016 (Dupree, 2018). However, the challenges RS are numerous. By enrolling in RS, students typically leave behind their high school friend groups, as the program only enrolls 15% of high school students (Dupree, 2018). Finding a community and other friends in Running Start can be difficult, exacerbated by the popularity of remote classes during the COVID-19 pandemic (Ison et al., 2022). Mentors can provide academic advice, resources for joining clubs, and validation through listening and conversation - all of which can help immensely with students' concerns and needs.

Students who depend on frequent reminders and lenient deadlines may face difficulties adjusting to college. Accordingly, most mentees reported needing the most help in academics due to the more intense rigor of the college courses they were enrolling in. Furthermore, many mentees also wanted to learn better time management skills as many students transitioned from a semester to a quarterly schedule. This effect can be amplified by the decreased support given to students from teachers in college relative to high school. A similar number of individuals requested assistance in socializing in college and integrating themselves within the community.

None of the surveyed mentees (matched and waitlisted) were on academic probation in the Fall Quarter, despite a historical precedence of a quarterly 10% probation rate among Bellevue College RS students. However, no significant relationship between mentoring and GPA was found according to the analysis. In addition, there was not a strong relationship between the quantity of mentor/mentee meetings and the mentees' Fall Quarter GPA. This may be due to an emphasis on mentors to not provide academic tutoring, but rather refer mentees to the BC Academic Success Center, which is well known and used among BC students. Thus, most students will have equal access to help, but in their classes, regardless of mentorship. Other mentoring programs that encourage mentor tutoring may observe different results, but this study does not support the hypothesis that mentoring improves academic performance. Further research is needed to examine the relationship in more specific contexts, such as first-generation and/or low-income students.

There was a strong relationship between the frequency of mentor/mentee meetings and the mentees' change in comfort with RS. This study's differing impacts of mentoring on comfort with RS and Fall Quarter GPA imply that mentoring relationships of friendship and support have significant impacts on mentees' comfort in the program, but do not affect their overall academic performance. In this study, the frequency of mentee/mentor meetings was used as a proxy to determine the mentoring relationships' development and progression. Our research indicates that stronger mentoring relationships can lead to greater beneficial effects on mentees' mental health and overall wellbeing, as well as their sense of control and self-efficacy in learning in the new environment.

Additionally, more than three-quarters of mentees wanted to become a mentor the following year. Many new mentors will already have the experience of being mentored and will understand how to

best help their mentees. With a high level of interest among mentees, similar mentorship programs have the potential to be self-sustaining and continually improving.

The primary limitation of this study is the low sample size. Although the program had 30 mentees and 9 mentors, only 19 mentees and 7 mentors responded to the survey. Only 10 of 28 waitlisted mentees responded. Due to the low N of this study, its results and interpretations are limited; a larger study would be beneficial to solidify the power of mentoring in dual enrollment. Because 2021 was the first year Bellevue College started the RSMP, a smaller program was preferred due to its manageability. In the following years, steps will be taken to expand the program's reach. Additionally, focusing on populations such as first-generation and/or low-income students and improving the study's methodology with more objective assessments would enhance its validity (An and Taylor, 2015).

4.1. Conclusion

With the significantly earlier transition from high school to college in RS students, it is not only important but urgent to address their diverse needs. Students report a perceived lack of guidance and clarity throughout the process of placement exams, registering for classes, or even finding directions to classrooms. 15 to 16-year-olds are entering a foreign environment, leaving friends, and taking classes with adults. Some students face personal obstacles, such as lack of transportation, while others struggle with the rapid pace of college classes. This study highlights the need for a stronger support system for incoming students and demonstrates the impacts an interdisciplinary, peer mentorship program has on comfort and success in RS. Due to the program's impacts on mentees' comfort in R-S and other factors, incorporating similar programs in dual enrollment colleges across the nation has the potential to make a significant difference in their lives. Increased support through mentorship programs may attract more first-generation and low-income students, reducing a long-standing educational disparity (Lile et al., 2017).

Although the RSMP officially ended in December after Fall Quarter ended, the program staff encouraged mentors and mentees to stay in touch and continue the relationships informally. Creating a mentorship program infrastructure has the potential to contribute to lasting relationships within the college's community that will continue to impact students' educational trajectories.

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EXTENDING NATURAL SCIENCES LEARNING IN PRE-SERVICE TEACHER EDUCATION USING AUGMENTED REALITY-ENHANCED INQUIRY

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Abstract

As the world transitions to hybrid ways of working it is increasingly important that education is not left behind. The COVID-19 pandemic further exacerbated the need for teaching and learning to transition from face-to-face contact mode to remote, blended or hybrid modes of teaching and learning. In this study, a group of 32 pre-service Natural Sciences (NS) teachers engaged with *Jigspace*; a composite augmented reality (AR) application following an inquiry-based approach to learn identified NS concepts. The main aim of the research was to establish the usability of AR in PSTs' learning and the affordances of AR technology as part of a teaching and learning design that could improve achievement in content tests. In a quasi-experimental design, data was collected through pre- and post-intervention content tests followed by post-intervention focus group interviews with all participants. A paired sample t-test was employed to establish a significantly positive shift in content test achievement before and after AR-enhanced learning interventions. Findings from qualitative content analysis revealed that students were able to interact and learn more with AR learning models due to their semi-immersive attributes and the associated text mediation added to the application. Participants noted that just reading a textbook or written text was not usually enough for the formation of mental representations. Gesticular actions like *rotation, zoom in and out, animation, spinning, pulling and dragging* underpinned the main interactions with learning artefacts embedded in the AR applications. Some important 21st century skills, including collaboration, critical thinking and communication were enhanced as students spent time exploring concepts and addressing difficulties in chat groups and social media platforms. The research also contributes primarily to the role of mobile learning devices and AR in enhancing remote and blended learning of science concepts. Some implications of these findings for pre-service teacher education (PSTE) include: an urgency to transform NS teacher training to include technology-enhanced learning of science concepts: reforms in school policy to integrate mobile learning technologies like AR for the teaching and learning of science which will aid teachers to innovate when teaching science. Some recommendations for future research and practice are also covered herein.

Keywords: *Augmented reality, Jigspace, mobile learning, inquiry-based learning, pre-service teachers.*

1. Introduction

Innovations in technology and the rapid digitization of diverse spheres of life are becoming the “*new normal*” in the world today. As a result of these rapid changes in futuristic technology like artificial intelligence, robotics, augmented, virtual and mixed reality, educational environments from pre-school to universities are bound to adjust. This study as part of a broader study on the experiences of pre-service teachers (PSTs) on the use of Virtual and Augmented reality (VAR), examines the learning gains that are recorded post an intervention with the augmented reality (AR) application *jigspace*.

Simply put, augmented reality (AR) is defined as the overlaying of 3-dimensional (3D) digital images on a real or physical environment or image (Akçayır et al., 2016; Azuma, 1997)). Usually, a mobile device which is AR compatible, for example a smart phone or tablet is needed to host AR applications. AR applications can be *markerless* or *marker based*. *Markerless* AR applications use the scanning of a flat plain by slowly rotating one's mobile device then finger placing the digital object when it appears on the screen of the mobile device. On the other hand, *marker-based* AR explores the scanning of printed markers either on paper or textile to locate and use 3D virtual images.

Some of the benefits of AR in NS education include improvement in spatial reasoning, learning, motivation and skills (Ibáñez & Delgado-Kloos, 2018). Other researchers report enhanced cognitive engagement and hence conceptual understandings (Dunleavy & Dede, 2014, Ke & Hsu, 2015) and subsequently improved achievement (Chu et al, 2019). Similarly reported challenges range from poor connectivity issues, application flaws (Singh et al., 2019) and the cost of good quality mobile devices especially in the African context. Despite the benefit associated with the integration of AR in learning, some pre- and in-service teachers still find it a daunting task to incorporate these technologies in their own learning and in their teaching practice. In the South African context not enough has been reported on the affordances of AR in NS learning especially in teacher education courses. It is for this reason that the researchers examined how NS learning in PST education could be extended by asking the following research question.

- To what extent is achievement in Natural Sciences enhanced or not when AR applications are integrated as learning tools in PST education?

- How would PSTs describe AR-enhanced NS inquiry learning experiences?

The main aim of this study was to examine ways in which PSTs' natural Sciences learning could be extended with the use of AR applications. Based on this aim the following objectives were set:

- To design and conduct an AR Based learning intervention with pre-service NS teachers.
- To evaluate PSTs' learning experiences of AR-enhanced NS inquiry.

The significance of the study reveals for AR integration as a sound learning and pedagogical tool in PST training in order to enhance technological and content knowledge (TCK) in the subject natural sciences.

2. Theoretical underpinnings

The use of AR in education has its groundings in educational theories including constructivism, cognitivism and some sub-theories of both theories including the cognitive theory of multimedia learning (CTML), embodied cognition, situated learning theories and collaborative learning theories (Sommerauer & Müller, 2018). For the purpose of this study, cognitive constructivism was considered to tap into two profound principles of AR which include interactivity and knowledge construction. The theory suggest that cognition is enhanced through active construction of knowledge, based on the existing cognitive structures of a learner (Piaget,1967). Cognitive constructivism was preferred as it resonated with AR applications selected and supported the inquiry-based instructional approach embedded in the design of learning interventions as well as the learning outcomes. Based on Piaget's (1967) cognitive constructivism and Vygotsky's (1978) social constructivism which together shape the nature of inquiry-based instruction. Constructivism is a paradigm that assumes that knowledge is subjective, contextual, and inherently partial and has become particularly prominent in science education through the focus on Inquiry (Minner, Levy & Century, 2010). According to Piaget (1971), constructivism is a paradigm shift from behaviorism and underpins how learners as individuals adapt and refine knowledge. This theory is aligned with appreciating what the learners bring into the classroom as prior knowledge, this means that teachers must be aware that learners do not come to the classroom as empty vessels, but they bring along their own prior notions of concepts. Within the framework of constructivism, learners construct knowledge, in relation to pre-existing schemas of knowledge that developed by previous experiences or interactions.

2.1. Inquiry-based instructional approaches and cognitive constructivism

An inquiry-based instructional approach was preferred for scaffolding the learning of selected NS concepts. Students had to interact with the content using the 5E instructional model of inquiry by Engaging, Explaining, Exploring, Elaborating and Evaluating their understandings of concepts.

Underpinned by social and cognitive constructivism, the 5E instructional model presents 5 phases through which learners can engage, explore, explain, elaborate and evaluate scientific concepts (ByBee, 2014).

When learners learn through an inquiry supported approach, it contributes to their social, intellectual, and psychological development. Using the 5E model, PSTs were provided with an opportunity to reflect on their prior knowledge of the NS concepts, gain new experiences using AR, communicate their learnings and show understandings of concepts by completing a content test. Figure 1 below shows dimensions of the 5E model followed for this study.

Figure 1. 5E instructional model for AR integration (informed by: Bybee, 2014).

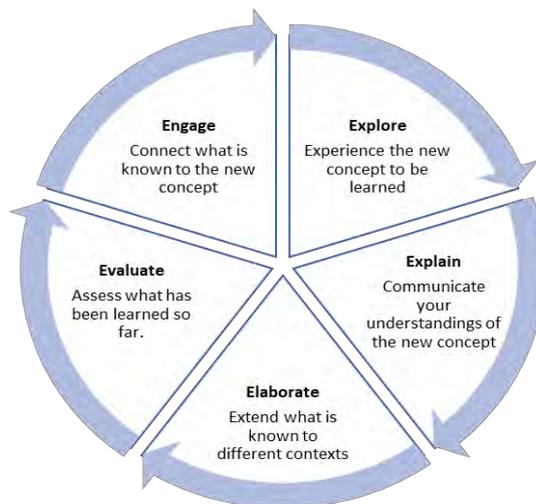


Figure 1 shows the five steps that make up the 5E cycle. This inquiry-based instructional approach is one easy to use approach for science teachers and provides the opportunity for students to co-construct knowledge in every learning scenario.

3. Method

A mixed methods case study design was considered for the research. Mixed methods case studies are particularly grounded in descriptive research of a case. This approach was preferred because the goal was to enact learning interventions with a specific group of PSTs in a particular educational setting.

Content tests and semi-structured interviews were used for the collection of data from 32 (n=32) pre-service NS teachers at a South African higher institution of learning. Participants included 21 males, 11 females and were third-year Bachelor of Education (Bed) students specializing in the Natural Sciences.

3.1. Learning interventions

Before commencing with learning interventions, PSTs were given a pre-content test on combustion reactions, specifically methane combustion and the movement of divergent plates based on the theory of plate tectonics. The aim of the pre-test was to establish their conceptual understandings and prior knowledge of the selected concepts as part of the engagement phase in the 5E cycle. In total, six steps were followed through the research process, from the identification of NS concepts to the administration of a post-test. The summary of two NS concepts reported in this paper is shown in Table 1 below.

Table 1. NS concepts covered in the course of learning interventions.

Application/device	NS strand	Topic	Learning Outcomes
Jigsaw AR: Methane combustion (App Store on IOS devices) in the case of this study, <i>Ipads</i> were used	Matter and material	Methane combustion and Plate tectonics	-Describe combustion reactions. -Discuss the law of conservation of mass. -Critically analyse the effects of excessive methane combustion on the environment.
Jigsaw AR: Movement of convergent and divergent plate (App store on IOS devices) in the case of this study <i>Ipads</i> were used	Planet Earth and Beyond	Plate tectonics	-Discuss tectonic plate movements. -Analyse the relationship between plate movements and earthquakes.

Table 1 summarises the AR application used during learning interventions, the NS topics, strands, and learning outcomes planned for participants to meet.

3.2. Data collection, analysis, and evaluation

Data was gathered by quantitative means (pre-and post-content test). Test were analysed by means of descriptive and inferential statistics using the statistical package for the social sciences (SPSS) version 27. After the analysis of pre- and post-content tests scores, semi-structured focus group interviews were conducted with participants, transcribed and analysed inductively using content analysis. These methods of data collection and analysis were preferred as they aided responses to the research questions posed.

All ethical dimensions were followed in collecting the research data. Collected data was triangulated and evaluated for accuracy using diverse techniques including, member checking and inter-coder reliability (100% agreement between 3 coders) for assigned codes on interview transcripts. Two NS subject experts content validated the administered content tests to ensure that they assessed what was intended in terms of the learning outcomes.

4. Results

This section presents the findings of the study in a manner that answers the research questions by firstly presenting the findings from pre- and post-content tests followed by the findings from semi-structured focus group interviews.

4.1. Extending achievement in Natural Sciences

Findings from quantitative data collected was aimed at showing variation in content test achievement pre and post-AR-enhanced learning. Table 2 below shows descriptive statistics and the results of the paired sample t-test in a comparative analysis of the pre-and post-test.

Table 2. Descriptive and inferential statistics.

Pairs	N	Mean	Std. Deviation	Std. Error Mean	t	p
Pre-test	32	61.44	9.72	1.72	-7.65	P< .01
Post-test	32	71.88	9.78	1.73		

As seen on the Table 2 above, the mean pre-test score was relatively lower at (M= 61.44%, S.D = 9.72) than the mean post-test score at (M = 71.88, S.D = 9.78). paired sample t-test $t(32) = 7.65$, $p < .01$ at 95% confidence interval indicated a statistically significant difference in achievement scores from pre- to post-content test. Due to the small sample size, it was critical to calculate the effect size of the difference and ensure that the reported shifts were strong and also based on AR-enhanced learning interventions. On SPSS 27, *Cohen's d (the effect size)* was estimated to be 1.33 which is considered very strong (Cohen, 1998).

4.2. AR-enhanced NS inquiry learning experiences

Findings from content analysis of transcribed follow-up focused group interviews revealed that PSTs found the 5E instructional approach useful for guided inquiry as they engaged with NS concepts. When asked of what would have improved their performance in the post-test, PST indicated that they were able to interact more within the AR application models due to their semi-immersive attributes and the associated text-mediation added to the *Jigspace (www.jigspace.com)* application. Participants noted that just reading a textbook or written text is not usually enough for the formation of mental representations. Five of the six focus groups indicated that hand gestures like pinching and rotation of AR models, zoom in and out, animation, spinning, pulling and dragging AR models were engaging, interactive and a fun way to learn, especially science concepts. Some important 21st-century skills, including collaboration, critical thinking and communication, were enhanced as students spent time exploring concepts and addressing difficulties in chat groups and social media platforms.

5. Discussion and conclusions

The findings of this study are indicative of the affordances of integrating AR in the teaching and learning of science concepts and correlate with the findings of other contemporary studies (Chu et al, 2019; Erbas & Demirer, 2019). One unique aspect from the findings is the positive effect of gesture in the cognitive process. Participants noted that hand interactions with *makerless* AR applications made all the difference when learning as they enhanced their enjoyment in the learning process. The 5E instructional approach and the level of interactivity in AR mainly accounted for content test achievement shifts, a

finding also concurrent with literature (Akçayır et al., 2016; Erbas & Demirer, 2019). Skills like collaboration, critical thinking and communication were developed in AR-enhanced learning.

For practice, we recommend that the science education fraternity integrate mobile learning devices in combination with AR applications as a means of enhancing learning achievement in both remote and blended learning settings. For higher institutions of learning dealing with pre-service teacher education (PSTE), there is a need for transformation in the way NS teachers are trained. Technology-enhanced learning of science concepts is no longer an option but an imperative in dealing with learning post the onset of the COVID-19 pandemic. Reforms in school policies to integrate mobile learning technologies like AR for the teaching and learning of science are critical to aid teachers innovate when teaching science. We also recommend that science education researchers conduct larger scale studies on different aspects of AR-enhanced science learning including, theories that underpin AR integration, Pedagogical approaches best suited for AR integration as well as the effects of AR-enhanced learning on the affective domain.

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THE IMPACT OF THE COVID PANDEMIC ON ONLINE EDUCATION FOR DIVERSE ENGLISH LANGUAGE LEARNERS

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Abstract

The global pandemic is significantly impacting students throughout the world. We are aware that education is vital for workforce development and economic prosperity (West, 2013). The Covid-19 numbers continue to skyrocket and it is estimated that over 300 million students worldwide are experiencing an education disrupted by this pandemic. Students and educators who are forced to rely on online teaching have even more challenges. Online teaching experts offer advice on designing support for students and point out resources to assist in the transition to remote teaching (McMurtrie, 2020). Parents and community members weigh in heavily on the impact and quality of transitioning coursework to an online platform. Children in earlier grades are often confused by the technology itself and have to rely on parents who may be working, or teachers on the other side of the computer monitor, to guide them. We must embrace new insights and take advantage of educational approaches offered in the online setting so that students can explore and expand their acquisition of knowledge as we move courses online. According to Darby, the design and sequence of content and learning activities in both realms should be methodical, systematic and purposeful (Darby, 2020). This presentation and manuscript will discuss the ways that an innovative curriculum takes on numerous dimensions with the ability to revolutionize the learning experience, captivate and empower learners and challenge them to excel. Creative examples are provided focusing on: 1) Connecting with all students 2) Addressing the challenges of remote learning 3) Information Communication Technology (ICT) and web-based resources 4) Ways to keep students motivated and challenged to high ideals. Covid-19 has created a digital divide that has left millions at a disadvantage and the internet is assuming a critical role in communicating with our students (Porumbescu, G. 2020). Particular concern has been expressed for English Language Learners (ELLs) who are faced with the challenges of learning English and simultaneously shifting to online instruction. Not only do these students, but also their parents, need clear and specific guidelines regarding the information and opportunities to strengthen their English skills and fully participate in the educational experience. Often translation of written communication in a variety of languages is needed to guide students in accessing technology and participate in remote learning.

Keywords: *Online education, pandemic, English language learners.*

1. Introduction

As one new variant of Covid after the other continues to lengthen the pandemic and extend the challenges to education, students, parents and educators are being continually tested to deal with the challenges that are coming their way and the unprecedented changes. This is even more significant for diverse English Language Learners who are doing their best to grapple with the multifaceted dynamics of learning English and tackling content area courses in the online environment. Students are often making up for lost time or spending considerably more time than necessary just trying to deal with the technology and access the material that is needed. For English Language Learners in the online environment, a multiplicity of challenges must be met and resolved in order for learning to take place. To sustain and increase knowledge and skills required to succeed, multiple strategies must be addressed to engage and encourage students and their families to take advantage of the learning opportunities available. In her article, "Pandemic Learning was Tough on Everyone: Bilingual Students Faced Additional Challenges," Tamez-Robledo points out that in a dual language school in Pharr, Texas, teachers are making up for months lost to the pandemic when students could have been making greater strides with their second language (Tamez-Robledo, 2022). Seventy-seven percent of the students in Graciela Garcia Elementary located close to the Mexican border are emergent bilinguals and many have missed valuable time from

their educational experiences. She further points out that “It’s an intricate dance to balance instruction with 7-year-olds’ attention spans. And it’s a dance that requires teachers to have control over the learning environment: something that was sorely lacking during virtual learning” (Tamez-Robledo, 2022).

2. Objectives

The objectives of this pilot study focus on addressing four key areas.

- 1) Connecting with all students
- 2) Addressing the challenges of remote learning
- 3) Information Communication Technology (ICT) and web-based resources
- 4) Ways to keep students motivated and challenged to high ideals

Each area will be considered individually along with its impact on online educational opportunities for English Language Learners. An innovative curriculum and strategic planning coupled with participation in remote learning will be presented and the outcomes revealed.

3. Four key areas

3.1. Connecting with all students

In order to reach out to all students in the online classroom, particularly English Language Learners, it is crucial to connect with them and relate positively. Often it becomes difficult to cultivate relationships and maintain connections in a virtual setting. Reach Out Schools from Australia (Anonymous, 2022) makes several valuable suggestions for educators including using video to keep virtual lessons engaging while adding a personal touch to demonstrate a sincere interest in the student. By building relationships and demonstrating your personal world and interests will help to engage students and pique their interest in learning. Some students may feel isolated and building a sense of community by involving all students and encouraging them to relate positively to their peers is extremely helpful (Anonymous, 2022). By making every effort to reach students and families with relevant activities and learning strategies, strong connections can be forged from the virtual classroom.

3.2. Addressing the challenges of remote learning

In the United States, and particularly in the State of Idaho, there is a shortage of teachers qualified to work with emergent bilingual students who can focus on English language development (Idaho State Department of Education, 2020). Educators need beneficial professional development to help them develop quality online curriculum and make informed decisions regarding the transition of coursework to the virtual platform. Depending on the age of the student and access to technology, the challenges can be even greater. Young students need considerable assistance staying on track and accessing the online material necessary to increase their achievement. Many educators are ill-prepared to address technology concerns and online methodology simultaneously. In order to learn English, it is beneficial for students to engage in conversation and collaborate with one another. Although there are online group activities and break out rooms for discussion, this is sometimes difficult for educators to accomplish with English Language Learners who desperately need peer interaction. Dedicated and energetic educators who devote additional time and energy while persevering to meet the needs of their students and the demands of online education are successful in spite of the many challenges that they are facing.

3.3. Information communication and web-based resources

A plethora of curricular materials for the online classroom has been developed at every grade and age level. All these materials require time and money to implement. Outstanding interactive resources exist to challenge students and motivate them to excel. Among these resources are videos, games, personal teacher websites and printable resources. Free lists of teaching tools are available to assist teachers transitioning to virtual classrooms. There is a wide variety of products that educators can access. Numerous web sites exist to support teachers in designing online classroom activities appropriate for the age and ability of their students. These digital resources are certainly accessible to help teachers stay efficient and reach out to their students with exceptional teaching tools, yet the advantages and disadvantages of the online classroom are still evident despite these learning materials.

3.4. Ways to keep students motivated and challenged to high ideals

The online learning environment presents a unique situation for many students, particularly English language Learners and their teachers. Teachers need to do all that they can to keep the classroom interactive and engage students in listening, speaking, reading and writing activities. By encouraging

collaboration, students are apt to feel more involved and part of the virtual classroom setting. When students are accountable through quizzes and challenging activities, they will tend to feel more ownership for their own education. By asking them for feedback and giving them a voice, they will have a vested interest in their educational outcomes. They should always receive feedback following a formative or summative assessment activity. Then students should be rewarded for their accomplishments and receive positive reinforcement as they demonstrate progress. Because parents and families are a crucial component of every child's learning experience, ongoing engagement and involvement with families is crucial. The situation with the global pandemic has had a tremendous impact on all of us. If students feel comfortable discussing these challenges, they can certainly be a part of the lesson plan and language learning. Students need to have a voice and feel comfortable discussing the situations that they are facing at school and at home.

4. Discussion

In order to increase the achievement of English Language Learners during this global pandemic, crucial strategies must be implemented in order to provide a quality education for online learners in a virtual classroom setting. Preparing educators to provide the best education possible for these students is tantamount to their success and the wellbeing of their families and the community. Simultaneously, educators need to be supported in numerous ways as they struggle to move their coursework to an online setting. Often, they do not have the technology skills to grapple with such a huge undertaking nor do their students have these skills. Therefore, the responsibilities are duplicated to become more than teaching and learning, but to expect that all of those involved will increase their technology skills to rise to the demands of the occasion. An innovative curriculum and support with creative teaching tools is extremely helpful a teachers struggle to implement best practices and encourage their students to excel. Prior to the pandemic, teachers had the opportunity to participate in professional development programs where collaboration, reflection, models and modeling provided the support that they needed to strengthen their instructional practices. As the situation with the global pandemic bombarded all of us, they did not receive the professional development required to address all of their concerns regarding online teaching and learning but were forced to adapt as best they could to the ongoing changes and move to online coursework. Their accomplishments are admirable and numerous educators saw this situation as an opportunity to support their students and make a difference in the life of each student and his or her family. Another critical aspect to the education of students relates to the affective filters that are challenging their learning. Certainly, there were myriad intervening variables impacting teaching and learning at all levels in each unique subject area and classroom.

5. Conclusion

Recent events linked to the global pandemic have had a tremendous effect on all of us and disrupted traditional educational experiences. Positive outcomes have surfaced through all of the tragedy and isolation and provide an overarching opportunity to impact success and serve as a catalyst for the expansion of learning. In an attempt to afford quality and equitable education for English Language Learners, educators have gone beyond the call of duty to meet the challenges of a quality curriculum coupled with the efforts required to transition classes to online learning. This experience has been life-changing for students, educators, and their families. Although there have been numerous concerns regarding lost learning time, students and their teachers can be encouraged by the student performance that was strengthened by the efforts of many to rise to the occasion and provide the best education possible for all students.

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DIGITAL EDUCATION IN HIGHER EDUCATION INSTITUTIONS IN PORTUGAL AND BRAZIL – CHALLENGES AND TRANSFORMATIONS

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Abstract

This Communication aims to promote a reflection on Digital Education in Higher Education Institutions in Portugal and Brazil, and the challenges and transformations perceived, when it is implemented, on the occasion of remote teaching during the pandemic of the new corona virus.

From this study, a greater exchange of experiences in terms of methodological proposals in relation to Digital Education could be a great positive differential. And yet, different ways of facing the different challenges to which the researched institutions were and are being submitted, tends to promote valuable cooperation between the researched institutions, promoting the necessary transformations, in the face of the adversities encountered.

In Higher Education, Digital Education is seen as a trend in education, as well as in citizenship. What reinforces the 2030 agenda of the UN (United Nations Organization), in its SDGs – Sustainable Development Goals, for a more inclusive world.

Digital Education, for some higher education institutions, was previously adopted as a beginner, today it is seen as a trend that allows broad access to higher education, expanding the notion of citizenship.

The challenges are numerous and need to be overcome, mainly because of its originality. And, as we are not in a controlled situation, neither in relation to the virus, technological conditions, nor behavioral, psychological conditions, efforts must be scaled in order to make cooperation between institutions the true legacy of this context.

In this way, it is believed that Digital Education will be increasingly fulfilling its transforming role of promoting a more inclusive society.

Keywords: *Digital education, higher education, challenges, transformations.*

1. Introduction

Digital Education has been seen as a strong trend towards a more inclusive Education. Reinforcing the UN 2030 Agenda, United Nations, which highlights in its SDGs – Sustainable Development Goals, the development of a better world for all.

It is quite certain that, for several higher education institutions (HEIs), Digital Education was adopted in a beginner way, only in some disciplines in certain courses, but nowadays, it is already contemplated in order to offer a more inclusive Education, being considered as a strong trend in the educational area, in addition to many others.

The numerous challenges, as well as the perceived transformations need to be overcome and analyzed, so that they become real opportunities for growth and development for the teaching-learning process. Even in a time where we are not yet free of this pandemic context, because many aspects are still being worked out. Both in relation to the virus and also the behavioral and psychological aspects of the teachers and students involved.

Thus, efforts should be directed in order to establish Digital Education as a facilitating factor for a more comprehensive, inclusive Education capable of fulfilling its role in developing people, transforming them into citizens.

2. Objective

This Communication aims to promote a reflection on Digital Education in higher education institutions (HEIs) in Portugal and Brazil. Through a better understanding of the challenges and transformations encountered by the agents involved, at the time of the implementation of remote emergency education, during the isolation imposed by the pandemic of the new corona virus.

It was believed that, from this study, it will be possible a greater and better exchange of experiences, mainly in terms of methodological proposals in view of the implementation of Digital Education, being this factor, considered a great differential in the scope of inclusive Education as a whole.

Also, the different ways of coping with the challenges encountered by higher education institutions in these two countries, as well as understanding the transformations that have occurred, will be of great value to promote the necessary co-operations, given this unprecedented context.

In this way, it is believed to be contributing to this UN 2030 Agenda, through the development of a Digital Education that can meet the needs for a more inclusive world, where partnerships and cooperation are the first for a more sustainable development.

3. Method

This research was carried out in the Postdoctoral Internship, at IE - Institute of Education of UL - University of Lisbon. And it involved Higher Education Institutions (HEIs) in Portugal and Brazil.

Ten interviews were conducted between professors of HEIs from these two countries. It is important to highlight the valuable contributions of these moments of the research, where one can better understand the context of these two countries that, despite having the same language, although with several peculiarities, have challenges now different, now convergent, enabling a relevant analysis in order to allow a better adaptation of Digital Education in the near future.

In Brazil, an analysis was performed on the different realities reported by the professors surveyed. Teachers from public and private institutions, in which they reported how the implementation of Digital Education was in their HEIs, in the context of the isolation of this pandemic.

In Portugal, interviews were also conducted, in addition to face-to-face visits in the different IESs, such as universities and polytechnic institutes, enabling a renewal of professional-academic ties, expanding the interest for future partnerships and co-operations, so that digital education can be better developed, as an added value for education itself in an integral way.

4. Discussion

Throughout the interviews conducted, it can be seen that the implementation of Digital Education was already expected by many, in the scope of Higher Education. Although in some institutions, digital education was already being practiced, since many institutions already adopted some subjects in the format of Distance Education, it was even, at the time of the pandemic that it intensified.

It was also observed in the interviews that the appropriation of new information and communication technologies - NTICs, methods and tools, brought closer to the agents involved, the possibility of expanding their knowledge, both in the academic area and in their work outside the classrooms. The same, with the students, who, although presenting many initial difficulties, understood the added value of these tools, in their future professionals, reported the teachers interviewed.

In the interviews, although the institutions surveyed were different, it was clear that, both in Portugal and in Brazil, the process of the implementation of Digital Education at the time, that is, remote emergency education, occurred with great similarity, gradually, as needs were emerging and, according to the available resources. Through your computer labs.

A peculiar detail was in relation to the training, as well as the trainings that were made available to students and teachers. That initially went on the teams platforms and zoom and later the meet platform. They also reported that computer labs, as well as IT professionals – Information Technology, provided the necessary support to teachers and students.

In the case of some institutions, many teachers were already familiar with remote education, adding more value to the institution. Even some of these teachers also supported their own colleagues and students who demanded more attention.

In most of the interviewees, the great difficulty was in relation to the camera. That is, students generally do not open their cameras, hindering better communication between both students and teachers. Having even reported that they seemed to "be teaching classes to no one", which turned into great discomfort.

About the opening of the cameras by the students in the classes, also revealed the need for a better appropriation of the use of available digital tools, so that all resources can be used for a better experience, experience during the classes, which certainly tends to facilitate the learning of the contents presented.

Also on the students' cameras, the teachers interviewed reported the need for clear institutional rules on their use, so that everyone who is inserted in the classes has more comfort for more efficient and effective communication. So that remote-digital teaching can be more inclusive, and also with the possibility of more and better interactions, even through screens / screens. Mediated by teachers who also respect and feel respected by their students, in an environment that favors the teaching-learning process, through more dynamic and relevant classes for all.

On the other hand, in most interviews, the experience of remote emergency teaching was configured in the first fruits of a Digital Education in fact, something long demanded. Being considered of great relevance, despite the numerous adversities experienced, such as difficulty in good equipment, as well as internet, in addition to preparation for the use of such resources.

Even so, most of them showed that they enjoyed having lived such experiences, believing in the future of the evolution of education itself, through Distance Education for example. A true digital and educational transformation, many expect. Wishing that such a moment is relevant for new processes, including pedagogical, to come on the agenda for a more consistent Education from now on.

Even though it was considered a positive period by the majority, only one of the interviewees considered the experience lived negative.

Mainly because of the issue that their subjects were almost unfeasible to be taught by remote education. This is because, such disciplines required, on the part of their teacher, a follow-up of the screens/ecrãs of their students. This proved unfeasible in the context of remote emergency education. However, he said he believed that in the near future, with more resources available, these challenges could be overcome.

All interviewees made it clear that, if necessary, a better follow-up of the agents involved in Digital Education is also necessary. So that institutional actions are envisaged, for the full use of the necessary resources. Whether they are human, technological (equipment, internet), training (varied platforms), training and even psychological for the monitoring of those who demand more institutional support. Improving the mental health of all those involved in this process of digital transformation.

5. Conclusion

With the analysis of the interviews conducted, it was perceived the need to implement a Digital Education not only emergency, which at the time was certainly the appropriate choice for the end of the school year, for example. However, from the face of these challenges and the clarity of this necessary digital transformation, it is believed that, from now on, a new perspective is installed in the educational environment, which is to obtain a Digital Education that meets the distinct needs of each country, of each IESs, through its agents involved.

It was clearly observed a great interest on the part of the teachers interviewed, in promoting a Digital Education capable of reaching more and better individuals who, in the near past, did not even imagine attending higher education. But that, with a Digital Education of greater and better scope, it can allow such individuals to enter higher education, in addition to enabling the appropriation of new information and communication technologies, the NTICs. This tends to improve the quality of these individuals when they enter the labor market.

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SCIENCE TEACHERS' PERCEPTIONS ON USING MOBILE-BASED FORMATIVE ASSESSMENT FOR INQUIRY-BASED TEACHING: BENEFITS AND CONSTRAINTS

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Abstract

The proliferation and use of mobile technologies in and outside the classroom has contributed to the rapid extensive implementation of mobile-based teaching and learning practices across the globe. In the 21st century, using mobile devices for assessment purposes has become the new and important phenomenon for researchers and teachers. This paper reports the findings of a qualitative case study of four science teachers' perceptions on the use of mobile-based formative assessment for inquiry-based teaching within their classrooms. Participant teachers were purposively selected from schools around the Gauteng Province, South Africa. Data was gathered through baseline questionnaire, classroom observations and stimulated-recall discussions. The findings from the baseline questionnaire indicated that all four participating teachers have adequate knowledge and understanding on using inquiry-based teaching, formative assessment, and technology. Challenges such as inadequate teaching and learning time, inadequate resources, no-cell phone school policy, unstable network connectivity and teachers' inadequate knowledge and skills were established from classroom observations and stimulated-recall discussions as common barriers to effective enactment of mobile-based formative assessment for inquiry-based teaching from all the four teachers. The four science teachers indicated benefits of implementing mobile-based formative assessment for learners such as enhanced learner engagement, participation, motivation, and learners having fun while they comprehend scientific concepts during the learning process. Although the use of mobile-based formative assessment was reported to be beneficial in the teaching and learning experience, science teachers also mentioned that the curriculum must be flexible in terms of time allocated, for mobile-based formative assessment to be effectively implemented during inquiry-based teaching.

Keywords: *Formative assessment, inquiry-based teaching, mobile-based formative assessment, mobile technologies.*

1. Introduction

The shift from traditional teaching and learning approaches towards inquiry-based teaching approaches has led to a critical consideration of technological tools that have great potentials of effectively supporting and promoting formative assessment practices in an inquiry-based science classroom. Trending technologies such as mobile technologies are developed and rapidly integrated in educational contexts to offer adequate support to teachers for effective enactment of formative assessment practices (Woolf, 2010). 21st century learners are regarded as technology-savvy generation that are eager to experiment and enjoy learning and assessments through educational applications such as kahoot!, Socrative and quizizz on their mobile devices as an approach to support and enhance learning and assessment process (Anamalai & Yatim, 2019). Research reveals that game-based formative assessment tools such as Socrative and Kahoot! have a positive impact on the learners' learning experiences, enhances learners' motivation and active engagement towards science learning (Ismali & Mohammad, 2017). It is accordingly important for science teachers to adopt and use mobile technologies to support effective formative assessment practices in an inquiry-based teaching and learning environment. Although mobile-based formative assessment is still at an emerging area in the mobile learning research context, mobile technologies have a great potential in facilitating formative assessment practices in an inquiry-based context (Nikou & Economides, 2018). Formative assessment is an important component in the teaching and learning process which supports learners in acquiring skills, knowledge and expertise that will help them to be critical and competent learners in the 21st century era (Nikou & Economides, 2018). There are numerous benefits associated with the effective use of mobile technologies for formative

assessment practices. To point out few benefits, firstly, mobile technologies enable easier administration of formative assessment activities (Bacca-Acosta & Avilla-Garzon, 2019). Secondly, formative assessment conducted through mobile technologies has a potential of enhancing learners' motivation and achieve the stipulated learning goals (Nikou & Economides, 2018). Thirdly, mobile technologies can further support wide variety of assessment practices such as formative assessment and game-based assessment (Sung et al, 2016). Fourthly, the effective use of mobile technologies can help teachers to successfully assess their pedagogical practices as well as the learners' competences related to 21st century knowledge and skills such as critical thinking, collaboration, creativity and problem-solving (Nikou & Economides, 2018). Fifthly, mobile technologies can be used to capture learners' performance and analyze the captured data to inform the next teaching and learning steps while providing appropriate support to learners according to their needs based on their formative assessment prior performance (Sung et al, 2016). Empirical research (Oyelere et al, 2016; Sung et al, 2016) have reported that mobile devices play a vital role in learners' academic achievement, providing adequate support to foster meaningful teaching and learning experiences, and improve engagement with the learning material, collaboration, enjoyment and interest in a science subject, promoting continuous interactions and can also facilitate innovative pedagogical strategies that will equip learners with higher-order thinking skills. Despite the numerous affordances associated with mobile-based formative assessment practices in the 21st century era, science teachers are experiencing numerous challenges that hinders successful enactment of formative assessment using mobile technologies. Lack of appropriate teaching and learning resources, adequate technical and management support, teachers' adequate knowledge and experience, and teachers' positive attitudes and beliefs towards mobile-based formative assessment are the main challenges that hinders the teachers from implementing mobile-based formative assessment (Nikou & Economides, 2018). It is noticeable that teachers receive arguably little or no guidance to select and implement mobile technologies for formative assessment when following an inquiry-based pedagogical approach. Grob et al. (2017) argues that teachers' lack of formative assessment literacy has been reported and professional development is suggested as an approach to develop teachers' formative assessment literacy.

2. Aims and Objectives

Despite global empirical research (Sung et al, 2016; Grob et al, 2017; Lee et al, 2011) that has reported the significant role of implementing mobile-learning technologies in an inquiry-based pedagogy, the teachers' experiences, and challenges on the use of mobile-based formative assessment, not many studies in science education have reported on the teachers' experienced benefits and constraints with the use of mobile-based formative assessment in a South African context. Thus, for this study, the overall aim was to investigate South African science teachers' experienced benefits and constraints with the use of mobile-based formative assessment for inquiry-based teaching. The following research question was posed to drive the inquiry;

What are science teachers' experiences benefits and constraints with the use of mobile-based formative assessment for inquiry-based teaching?

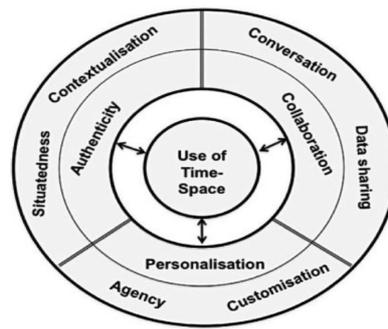
In answering the posed research question, we purposively and conveniently selected four science teachers from around the Gauteng province schools, which presumably had the resources for enacting mobile-based formative assessment and inquiry-based teaching to participate in this study. The objectives included to;

- *investigate science teachers' experienced benefits with the use of mobile-based formative assessment for inquiry-based teaching.*
- *explore science teachers' experienced constrains in the use of mobile-based formative assessment for inquiry-based teaching?*

3. Theoretical framework

The mobile learning pedagogical framework proposed by Kearney et al (2012) and constructivism by Vygotsky (1978) were adopted and deemed suitable to theoretically guide this study. Constructivism has two categories, namely social constructivism (Vygotsky, 1978) and the cognitive constructivism (Piaget, 1967) which both shapes the nature of inquiry-based pedagogy and provide explanations on how individual learners adapt and refine knowledge through active and collaborative participation. Aligning to constructivism learning theory, empirical research Ozdamli (2012) pointed out that the constructivist learning theory is the most significant learning theory for describing, guiding, and underpinning learning facilitated through mobile technologies. The mobile learning pedagogical framework proposed by Kearney et al (2012) shown in figure 1 below illustrates the effective pedagogical use of mobile technologies for constructive meaningful learning.

Figure 1. Pedagogical framework for mobile learning (adopted from Kearney et al., 2012).



As seen in figure 1 above, the key three features of mobile learning are surrounding the ‘time ad space’ concept, followed by a further breakdown of the three distinctive features into two sub-scale categories per each feature. The use of time-space feature considers the ‘organization of the temporal and spatial aspects of mobile-learning environments (Kearney & Mahar, 2012). This implies that the teachers need to clearly identify the learning environment, either virtual or physical, and synchronous or asynchronous incorporation of mobile technologies to enhance the teaching and learning process. Personalization feature takes into consideration the learners’ ownership, agency and autonomous learning that is specifically customized, tailored and appropriately designed mobile-learning experiences (Kearney et al., 2012). The authenticity feature comprises of the contextualization and situatedness as the sub-themes that emphasizes the significance of rich and contextual learning activities facilitated through mobile technologies (Kearney et al, 2012). Lastly, learning through collaborative socio-cultural perspective implies that learning takes place through social interaction, two-way conversations, and classroom dialogues whereby learners are actively engaging with their fellow peers to construct knowledge and enhance conceptual understanding (Kearney et al., 2012).

4. Research methodology

Creswell and Creswell (2018) define qualitative research methodology as an approach that gives the researcher the room to be descriptive and consider the social phenomena. Taking into consideration this definition, the qualitative research methodology was adopted and deemed suitable for gathering data that will help us answer the research question of this study. A case study design was adopted as it a design that allowed the researcher to follow participant science teachers over an extended period.

5. Data collection and analysis

Participants of this study included four science teachers’ pseudonyms as T_A, T_B, T_C and T_D from three different South African schools in Gauteng province. Three teachers had a 5 – 6 years’ experience of teaching science subjects such as Life Sciences and Physical Sciences, and the fourth teacher had a three-year experience of teaching Life Sciences. Data was collected in three stages namely, Stage 1 – open-ended questionnaires: Stage 2- classroom observations, and Stage 3- stimulated-recall discussions. Open-ended questionnaire data collected in stage 1 was collected with the aim of identifying participants’ perceptions on enacting mobile-based formative assessment for inquiry-based teaching. In Stage 2 of data collection, classroom observations were video-recorded with the aim of understanding the actual practices of the participating science teachers in terms of how they enact mobile-based formative assessment in inquiry-based teaching within a natural setting of their classrooms. The video-recorded lessons were approximately 45 – 60 minutes long per lesson. All open-ended questionnaire responses from stage 1 and video-recorded stage 2 data were transcribed and analyzed using thematic and deductive coding, in order to identify the correlation and differences between the science teachers’ perceptions and actual pedagogical practices of mobile-based formative assessment for inquiry-based teaching. Thereafter, the findings from the first two stages guided the formulation and administration of the questions for the stimulated-recall discussions for stage 3 of the data collection.

6. Results

Regarding formative assessment, findings from the open-ended questionnaire analyses revealed that the science teachers do practise formative assessment in a similar way, where they engage learners in traditional question-and-answer, short activities, and spot tests with the aim of testing learners' understanding of the taught concept, identify any knowledge gaps and help learners prepare for summative assessment. Participant science teachers have experienced that learners are more engaged and have deeper knowledge understanding when formative assessment was incorporated in their learning. They also indicated that they are not 100% competent and they experience certain challenges such as insufficient classroom time, limited knowledge on various forms of formative assessment and mobile technology integration to effectively enact formative assessment everyday throughout the lesson. From the classroom observation data, findings indicated that only 50% of the participating science teachers have experienced and know how to use mobile-based formative assessment platforms such as socrative and kahoot!, while the other 50% of teachers have no experience and knowledge on such platforms for conducting formative assessment. Following the nature of this study, this 50% of the participating science teachers were provided with guidance on how to conduct formative assessment using platforms such as kahoot! On mobile technologies. Thereafter, they were given an opportunity to implement the kahoot! Platform for mobile-based formative assessment. During the observations of these lessons, it was revealed that the inadequate knowledge and skills has impact on how teachers enact mobile-based formative assessment for inquiry. As it was clearly visible that these teachers do not understand the key significance of using formative assessment, instead to them it is just another approach for engaging learners, keep them active during the lesson. Overall, it was observed that all four participating science teachers could not complete their lessons within stipulated lesson time, they could not analyze, interpret and use learners' performances from the kahoot! And Socrative to inform the next teaching and learning step. Wi-Fi connectivity issues were observed and coherent teaching and learning process was affected. Accordingly, these findings were fully explained by the participating science teachers during the stimulated-recall discussions, where they indicated that school context and certain socio-economic factors contributes towards how teaching and learning takes place. For instance, in two schools learners do not normally bring mobile devices at schools for learning purposes and some learners cannot afford such devices, which hinders' full learner participation during mobile technology-enhanced teaching and learning. Secondly, the time allocated per lesson, which is ranging between 30 to 60 minutes is insufficient for teachers to effectively engage learners, ensure meaningful and constructive learning, as a results exploration, elaboration and even assessment time is very limited and thereafter, teachers tend to bend towards traditional, teacher-dominant teaching. Thirdly, there were noticeable differences between the teachers' use of game-based formative assessment, as one out four used Socrative while the other three used the Kahoot! Platform. Only 2 out of 4 participating teachers managed to use learners' responses to stimulate classroom discussions, ask follow-up questions with the aim of identifying knowledge gaps and enhance learners understanding before moving to the next quiz questions. Whereas, the other two teachers only administered the kahoot and Socrative at the end of the lesson with little to no interpretation and use of learners' responses to inform the next teaching and learning step.

7. Discussion

The findings from this study reveal that although the science teachers recognize the importance of incorporating mobile technologies and have adequate knowledge to effectively enact mobile-based formative assessment for inquiry-based teaching, their mobile-based formative assessment practices still require extensive guidance and development. These findings concur with research findings such as (Cochrane, 2014; Lee et al, 2011; Sung, Chang & Liu, 2016; Grob et al, 2017) that attests that mobile technologies can be successfully implemented and be more effective with pedagogies such as inquiry-based teaching and formative assessment, however, teachers are experiencing difficulties in implementing mobile technologies for inquiry-based teaching and formative assessment due to lack of adequate knowledge and skills, inadequate teaching and learning resources, large class sizes, insufficient teaching time. South African curriculum structure does not give teachers opportunities to be flexible and teach according to their classroom context as they must rush to complete the prescribed syllabus content on time, as a result the use of mobile-based formative assessment for inquiry-based teaching is not possible as this pedagogical approach requires time for preparing, administering and discussing learners' input during the learning process.

8. Conclusions and recommendations

Based on the findings of this study, it can be concluded that the enactment of mobile-based formative assessment can improve learners' interest and engagement in science classrooms. However, the effective enactment of mobile technology-enhanced formative assessment is still a challenge for South African science teachers. Taking into consideration the 21st century technology-savvy learners we have in science classrooms, the traditional use of formative assessment practices and non-inquiry-based pedagogies are no longer relevant and effective for teaching and learning. As a result, there is still a need for a meaningful development of in-service teachers in equipping them with adequate knowledge and skills to enact 21st century pedagogy like the mobile-based formative assessment. Based on these conclusions, we recommend that the science education fraternity including, department of education authorities, researchers and teacher educators provide intervention programmes for in-service teachers on the effective enactment of mobile-based formative assessment for inquiry-based teaching. Studies of this nature could help inform higher institutions and teacher-training programs about the gaps and the type of guidance and support required to equip teacher with adequate knowledge and skills to effectively enact mobile-based formative assessment for inquiry-based teaching.

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PERSONAL EXPERIENCES AND SUGGESTIONS FOR CREATING HIGHLY ATTRACTIVE MOOCS ABOUT ARTIFICIAL INTELLIGENCE

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Abstract

MOOCs have brought many possibilities for both learners and teachers. For learners, they can study from distances and search for courses that fit their professions. For teachers, a MOOC can fully demonstrate his/her research basis, personal charisma and versatile abilities. MOOCs also bring teachers new challenges that may be overlooked in traditional education processes, especially when they are creating highly attractive, high-quality courses.

In this paper, we first introduce the information about our courses that each has been attracting more than 10,000 learners at a rapid speed. Then, we recall our personal experiences of creating them. Personal experiences include surveying and implementing: we survey the related attraction/quality research in the MOOC education literature to stand us high in the beginning. The implementing experience is in chronological order, consisting of the planning-and-preparation, presentation, uploading and post-course interaction stages. And then, we summarize our suggestions for successful MOOCs, concretely: the comprehensive preparation, including content selection and learner estimation, is important; the teamwork is crucial to make decisions more reasonable and to progress faster; the third is the presentation of the courses and then the first-eye attraction tricks; the post-course interactions and course updates are also important, which are factors of a persistent course attraction; the last but not least is the MOOC and education research--- A good pedagogy understanding enables a teacher to outstand wherever in MOOC or traditional classroom.

Keywords: *MOOC, attractive, experience, suggestion, teamwork.*

1. Introduction

Nowadays, science and technology have developed rapidly and have profoundly changed our society. For example, the artificial intelligence (AI) wave this time since its beginning in 2012, has presented many new technologies such as deep learning (Krizhevsky, Sutskever, & Hinton, 2012), reinforcement learning (Mnih, Kavukcuoglu, Silver, & et al., 2015), multi-agent learning (Hernandez-Leal, Kartal, & Taylor, 2019), and changed the military and civil affairs. Interested in the development and required by their professional need, many youngsters of China's workforce are eager to learn the recent developments and the applications. However, they rarely have the opportunity to re-enter the schools to learn since they have graduated from campus for a long time. Therefore, e-learning can be very helpful to meet their demand and improve their knowledge, which will both be beneficial to their individuals and to the professions they take.

As a type of e-learning, massive open online courses (MOOCs) have deeply changed the traditional education forms and brought many possibilities as a new form. Since its beginning (Pappano, 2012), it can give people from thousands of miles away a chance to learn high-quality, attractive and useful courses that are provided by high-level organizations and charming teachers with a very cheap cost.

MOOCs also pose new inspirations and challenges for traditional teachers. Many teachers in universities do state-of-the-art research and teach courses that incorporate the newest developments. These teachers would applaud to broadcast their insights and new findings, make their research and teaching applied to verify the performance in real world and gain benefits from the applications. MOOCs can satisfy their longings--- MOOCs can fully demonstrate teachers' insights into the new science and technology on courses, a broad understanding of the new developments, teachers' personal charisma, and versatile abilities in conveying knowledge. Nevertheless, the largest new challenge is the lack of

face-to-face interaction between the teachers and the learners, which will mislead the teacher's judgment. Therefore, MOOC teachers should do pre-work for creating highly attractive MOOCs.

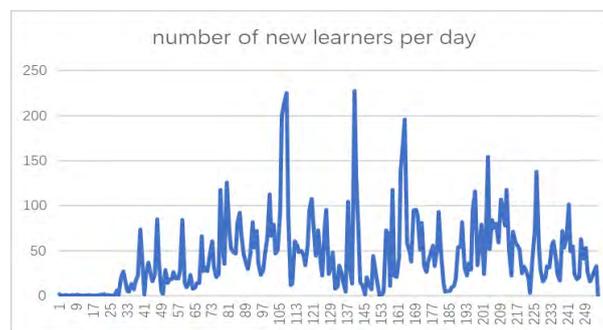
Aiming to help youngsters in China and to gain our academic impacts, our team has planned and implemented two MOOCs about artificial intelligence. Each course in about 200 days has attracted over 10,000 people from the specific community since course uploading. The basic information of the two course is in Table 1.

Table 1. The basic information of the two MOOCs.

	Course 1	Course 2
Name	Domain-specific artificial intelligence and unmanned system	artificial intelligence: concepts, perspectives and challenges
Difficulty	medium	elementary
Length	6 lessons, average 20 min long	11 lessons, average 20 min long
Uploading date	2021.08.13	2021.06.02
Studied learners	11235	12823
Team member number	4	3
Team composition	age>45, 1; age<35, 3	age>45, 1; age<40, 2

Figure 1 depicts the number of new learners every day since the uploading. The course was uploaded into one specific MOOC platform in China where there exist over three thousand courses. Among them, our course outstands with high attraction, ranking top 100. Hereafter, we mainly use Course 1 as illustrations.

Figure 1. The running data of Course 1.



2. Literature review

Before making our course, we searched the scholarly literature to survey and better understand how to create highly attractive MOOCs, as we are completely newcomers of creating MOOCs. We tried to stand ourselves on the shoulders of previous people. We aim at two types of work: the attraction measure (including techniques used) and findings of previous highly attractive MOOCs.

The literature has revealed many investigations on high attraction, high-quality MOOC production. Work (Hood & Littlejohn, 2016) summarizes the need for measuring MOOC quality and gives much importance to presage, process and product, which inspire us to spend much time on the process. For the evaluation of MOOC success can be net promoter score (Palmer, & Devers, 2018). There are some techniques to improve the MOOC, for example, dropout prediction (Dalipi, Imran, & Kastrati, 2018), using machine learning with recurrent neural networks and decision trees and many other AI technologies are used to develop MOOC. (Xie, 2019b) used basic technologies from information science to analyze the log data of viewing behavior provided by the MOOC. And it uses network to represent the learning path and sheds light on the application of network navigation and link prediction to the MOOC education to make effective education MOOC. One paper (Xie, 2019a) assesses MOOC attraction with scientometrics adapted from academies such as impact factor and h-index to assess course attraction. It also analyzed the limitation of the provided indicators and shed potential practionability.

Work (Najafi, Rolheiser, & et al, 2015) surveyed eight instructors to understand their motivation, MOOC instruction suggestions, and perceptions of MOOCs' implications. It summarizes common motivations. The work from University of Hong Kong (Doherty, Harbutt, & Sharma, 2015) has given

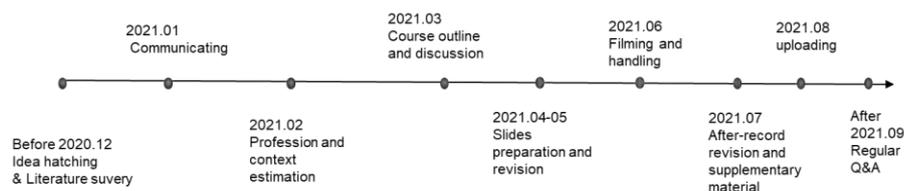
complimentary tips for high quality, that are: informed choice, plan for success, reduce risk, bring in experts, etc. Another work (Lowenthal, Snelson, & Perkins, 2018) reported findings from about 200 teachers in the front line of MOOC. The findings indicate that instructors were motivated to teach MOOCs for interest and passion, publicity and marketing, benefits and incentives. Contexts counts (Hood, Littlejohn, & Milligan, 2015): The learners contexts influence learning in a MOOC. Significant differences were identified between learners with and without similar real-world contexts to their MOOC learning. So connected learning in a MOOC to real-world contexts makes learning more accessible. In (Kruchinin, 2019), the researcher categorizes the courses into several parts and found no difference in popular in each university type with a top university or other platform, however, the number of students who really completed the course was much higher for the MOOCs created by top universities complete rate enrollment and accomplishment. The effective teaching is also important (Wong, 2016). It summarized the factors leading to the effective teaching: The first impression, detailed introduction trailer, etc.

We learned in literature that the contexts of learners are vital and teachers should devote much time before, during and after the MOOC. Teachers can also do pedagogy and education technology research to gain the attraction of MOOCs.

3. Experience process

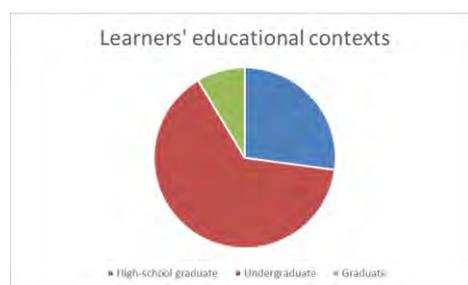
In view of the demand for AI knowledge and applications, and our inner motivation, we propose building such AI MOOCs. As newcomers of MOOC production, we first did deep planning and surveying. After surveying, we comprehensively prepared the course for several months, and the experience process is shown in Figure 2:

Figure 2. The experience process of Course 1



We proposed our MOOC **plan** in December 2020 to our institution, and received full support. We then **communicated** with different people, including MOOC experts, librarians, video studio workers, in January 2021. With the survey and communication, we learned that learner's **professions and contexts** are very important for a MOOC. So, we turned to our colleagues for their MOOC statistics and statistically estimated the portion of professions and the contexts. For the context, we envisaged most are high-school undergraduates and then undergraduates. For their professions, we thought some are technology institution administrators, some are AI users, and some are interesters. Their aims are to gain their knowledge about recent developments and potential applications. Therefore, our course content should align with the conditions of these learners. The final contextual data log from our MOOC course is shown in Figure 3. It can be seen that the estimation fits the reality well.

Figure 3. The contexts of learners of Course 1.



After the deep survey and the estimation of the learners, we make an **outline** of the course and discuss it several times within our team. After discussion, we began to **make slides**. The slides are from courses that we recently taught with in our physical classes. Slides are interesting and self-illustrating,

easy to understand and natural. The slides were also discussed and revised in several rounds. After that, the teachers are enthusiastically **filming** the video. After the filming, the video was added subtitles and iterated several rounds to make the quality as high as possible. At the same time, preparing the other **affiliated materials**, such as cover video (eye-attraction video). The cover video is short, but astonishing. Also prepares the quizzes, exams and some other supplementary materials for further reading. Table 2 shows the information of our affiliated questions.

Table 2. The test question of the MOOC.

test question types	total number(total score)	quiz(quiz score)	exam(exam score)
Sum of quiz and exam	77 /154	26/52	51/102
T/F questions	38/76	14/28	24/48
single-choice	8/16	5/10	3/6
blank-filling	3/6	2/4	1/2
multiple-choice	28/56	5/10	23/46

However, the above stages are not all. Teachers also regularly checked and navigated the course forums to answer learners' questions and to discuss deeply into the questions. Teachers should also reupload to improve the videos. Only by these can keep the MOOC persistently attractive. Below is the word frequency of our course forum. Learners cared much about research, application, approaches and books&articles.

Table 3. The word frequency in the course forum.

research	application	approach	publishing	UAV	system	learning	AI	article	based
17	16	15	13	11	10	10	9	8	8

4. Suggestions

Our suggestions for creating high-quality, highly attractive courses are that:

Comprehensive preparation. It includes the content preparation and requirement engineering. The content should have the possibility to help people at different levels to improve their knowledge. In the content, one should add positive energy to it slightly and implicitly. The content should have a good logical order and is tightly related to the professions of the learners, while teachers should be familiar with this field and have deep insight into this field. This stage needs much time, but "sharpening your axe will not delay your job of chopping wood". During the preparation, spend much time to consider the current trends, and the contexts of learners. After preparing the content, including the subtitles into the videos, and the supplementary reading materials. Discuss it several times and listen for the suggestions from different interest of partners, colleagues and institutional administrators and students, etc.

Teamwork, teamwork and teamwork. The more teamwork devoted, the better quality of your MOOC. The team members can have different missions, some can prepare the content, someone presents the content. Moreover, someone do the forestage and backstage preparations. Also, teamwork can find out implicit errors that otherwise would be hard to find because one person would always think a similar way. Extensive teamwork will make content average people acceptable. They would work out a way to convey the knowledge easy to accept by most people.

Detailed and attractive information page. Pay attention to the first impression and attraction tricks. The first impression determines what goes next. So, the cover video can be made fascinating and attracting. Several seconds video would be attractive and convincing. It also reveals the main content in several seconds: What the course would like, the chapters and the section title, the teacher's information, the basic knowledge that learners should have, etc.

High-quality presentation. The teachers should be confident with the content. The video quality should be high, and duration for each video should not be long, because people's concentration would not last long. Terminology would not be hard to understand, which will make them tired instead of relaxed. The slides should be beautiful and should not be too crowded nor too simply. The teacher also should be enthusiastic and with a freeze smile. Accents should be avoided. Speed should be medium with the standard gestures not awkward. Hand gestures should represent the emotion of the teacher's inner thoughts. Representation also can combine with some tools and several cameras. The person can disappear for a long-short time.

Post-course interactions and updates. They are critical for a persistent long time cause attraction. It is not in one-time bargain. One should track the statistics regularly to improve the MOOCs and fix some errors. The discussion/forum section leaves some questions mostly from the learners. It can help to understand where the learners have difficulties. So, it would help if the teacher answered typical questions in detail and directly related to the questions into the video content. The answer could be within a short time. If for a long time, students would have learned the whole content and left away. The interaction also brings what in the following part from the discussion, then this will make your next version of MOOC More attractive.

The last but not least is the **pedagogy research** for education. A good pedagogy has leveraged the teacher high on other people's shoulders. Moreover, it can help avoid traps, which will make progress fast and good.

5. Conclusions

In this paper, we showed our experience of creating highly attractive MOOCs and summarized personal suggestions for future creators. Our experience and suggestions may not be that generalizable for all teachers because of different spatio-temporal conditions. Nevertheless, we think some suggestions are persuasive and can be followed and referenced. In the future, we would like to apply these suggestions to create MOOCs about other fields and to promote knowledge across the world fast and broadly.

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DATA-DRIVEN DIFFERENTIATION

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Abstract

The heterogeneous classrooms of today require teachers to differentiate effectively. Effective differentiation however is a very time-consuming process. Teachers are faced with the challenge of first identifying the students in need of differentiated content, be it in the form of more support and easier exercises for struggling students or more challenges for high-performing students. Once these needs are identified, the teacher still needs to come up with the differentiated material that best suits the needs of each student. The identifying of differentiation needs and the delivery of differentiated content should preferably happen as the need arises, not as a delayed reaction based on observations from an exam for example. This trifecta of identifying needs, providing suitable content, and doing it all at the right time is what makes differentiation so difficult. In this article, we present a study where a digital learning platform called Eduten was used to provide automated suggestions for differentiation to teachers. The participants (N=757) were divided into two groups based on whether the teacher followed the suggestions or not. According to results, the differentiated students increased their accuracy significantly, while in the other group the accuracy remained the same. The number of completed exercises also increased more in the differentiated group, suggesting a raise in motivation. Based on the results, automated suggestions for differentiation can be highly useful but only, if the teacher follows them.

Keywords: *Differentiation, learning analytics, digital learning, technology, data-driven.*

1. Introduction

Vygotsky's Zone of Proximal Development (ZPD) is a theory commonly applied to help us understand how people learn. The fundamental idea behind ZPD is that students have an optimal zone when learning new concepts, where the task at hand is neither too easy nor too difficult. With support from a more experienced person, typically a teacher, a student can expand this "zone" and work on tasks outside of their own level. With time, the student will learn and be able to do this work without the added support. (Vygotsky, 1978) Kurvinen (2020) explains how technology enhanced learning (TEL) can help ensure that students are kept in their ZPD and provided with the needed support through differentiated exercises while working in a digital learning environment. The need for differentiation is evident in the heterogeneous classrooms of today (Asim, 2020; Tomlinson, 2014).

While differentiation can be traditionally be seen as a difficult and tedious process, according to Kurvinen (2020) technology can make the process easier. Tomlinson (2014, p. 17) states that formative assessment provides teachers of differentiated classrooms with a steady stream of information about how their students are performing. This in turn helps the teacher to understand how they should modify upcoming instruction to better suit the needs of their students. With TEL, we have the ability to gather formative assessment data about students as they are working and analyze that data through the process of learning analytics. This data can be used to provide teachers with recommendations for differentiation.

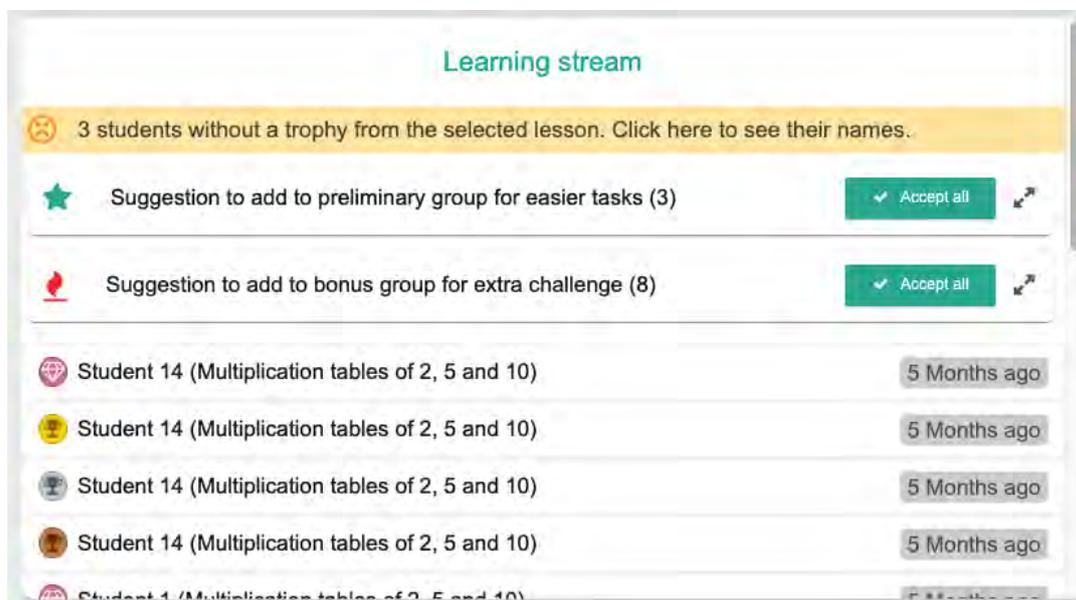
Some studies (Burns, 2012; Haelermans, 2013, 2015;) seem to suggest that differentiation with digital online tools can have positive effects on learning outcomes and that technology is especially suited for differentiation (Haelermans, 2015). Furthermore, several studies suggest that digital learning tools can have a positive effect on mathematics learning outcomes (Cheung & Slavin, 2013; Pilli & Aksu, 2013; Laakso, 2018; Kurvinen, 2020). Similar to Haelermans (2015), we found that the field of study looking at how using digital technology for differentiation affects learning outcomes is still quite limited, furthermore in the context of mathematics.).

2. Eduten

Eduten is a gamified, digital platform with a focus on mathematics education. It contains several different exercise types ranging from traditional math exercises (such as multiplication tables or long division) and math games to versatile and more complex problem-solving exercises. All exercises are automatically assessed and provide immediate feedback. Randomized parameterization means that students can answer the exercises immediately again if they fail at the solution. There is existing content for K-12 teaching supporting different curricula around the world. In total, Eduten contains more than 19 000 different exercises. For teachers, the system provides multifaceted learning analytics to help in tracking student progress and reveal potential problems in learning. A comprehensive description of the platform can be found in Kurvinen (2020).

For this study, a new mechanism supporting differentiation was designed and implemented. The mechanism uses automated learning analytics to detect students who might benefit from the easier or more difficult tasks. Instead of differentiating students automatically, the system provides the responsible teacher suggestions for this. Hence, the teacher is the one making the final decision, as suggested by Asim (2020). An example of such a suggestion is provided in Figure 1.

Figure 1. Suggestion for Differentiation presented on the teacher dashboard in Eduten.



The content in Eduten is divided into *courses* which are further divided into individual *lessons*. Each lesson consists of 20 to 40 exercises. Differentiating for students in demand of easier tasks means that the students are provided easier exercises (also referred to as *warm-up exercises*) which are designed to prepare them for the lessons' standard content. By completing the exercises the students collect virtual trophies. A bronze trophy is awarded when 50% of tasks is completed, a silver trophy for 75% percent, a gold trophy for 90% percent and finally a diamond trophy for completing 100% percent of all available points. Students can decide by themselves which exercises to complete and in which order. Even the differentiated exercises are not forced on students.

3. Method

In this paper, we compare results from students who were differentiated with easier tasks by the teacher to those students to whom the platform suggested to be differentiated with easier tasks but the suggestion was not applied by the teacher. The data was gathered automatically by the students using Eduten. The following criteria was applied when filtering for the data:

- The student account must have been created before January 1st, 2022.
- The differentiation decision must have been made or the differentiation suggestion given in February
- The data collected during January 2022 was used as pre-treatment data.
- The data collected during March 2022 was used as post-treatment data.

The user interface for suggestion was redesigned mid December 2021. Hence, we selected data from early 2022 to only include suggestions after the redesign. We analyzed the data from students who used the platform both in January and March. A total number of 757 students were included (N=757). This sample represents all the students in the system who fulfill the above requirements for the data. The students range from 1st grade to 9th grade (6 to 15 year olds, depending on the country and curriculum). The students were divided into two groups based on the differentiation status in the system: out of the 757 students, 331 were differentiated and 426 students were suggested to be differentiated but the differentiation was not applied. In the usage data we observed the average accuracy of students' answers and number of submitted answers: accuracy was calculated by dividing the number of correct answers with the number of total answers. The research setup is displayed in Figure 2.

Figure 2. Research setup.

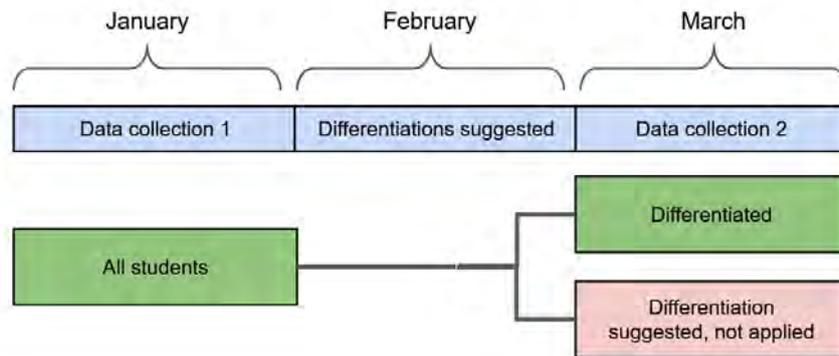


Table 1 describes how the students fulfilling the criteria are distributed in different grade levels. 95.1% of the differentiated students are in grade levels 2-6. The respective value for suggested, not applied students is 88.7%, hence the students are slightly more spread out within the latter category.

Table 1. Distribution of differentiated students and suggested, not applied students along grade levels.

Grade level	Differentiated		Suggested, not applied	
	N	%	N	%
1	9	2.31%	23	4.78%
2	68	17.48%	52	10.83%
3	76	19.59%	123	25.68%
4	90	23.26%	75	15.69%
5	62	16.06%	100	20.96%
6	72	18.70%	74	15.55%
7	7	1.82%	25	5.26%
8	3	0.78%	5	1.05%
9	3	0.79%	4	0.85%

The grade levels are defined by the content used by the students, not their actual age. The school age varies from country to country and the grade level is considered as a suitable way to compare the similarity of these two groups.

4. Results

Accuracy for the both groups was calculated in two points: first in January (before the decisions for differentiation) and second in March (after the decisions). Median and mean accuracy and the standard deviation was calculated for both groups, respectively. In addition, a difference between January and March points was calculated. In addition to accuracy, number of submissions during January and during March was calculated. The results are displayed in Table 2.

Table 2. Student activity and accuracy data before and after differentiation decision or non-applied suggestion.

		Differentiated		Suggested, not applied	
		Accuracy	Submissions	Accuracy	Submissions
January	Median	81.68%	58.00	79.40%	62.00
	Mean	80.81%	83.10	77.27%	77.60
	St. dev.	12.16%	84.89	13.52%	66.11
March	Median	87.93%	76.00	81.19%	64.00
	Mean	86.11%	90.62	78.43%	92.82
	St. dev.	9.71%	76.92	14.58%	96.92
Difference	Median	4.63%	11.00	0.48%	5.00
	Mean	5.30%	7.45	1.21%	15.17
	St. dev.	13.03%	85.15	15.88%	91.30

The *difference* row displays the calculated difference for each student from January to March. A two-tailed T-test was used to find out if there were statistical differences in accuracy between January and March data. For differentiated student, the difference was statistically significant ($p < .001$). For the suggested, not applied group, the difference was not statistically significant ($p = 0.13$, $p > 0.05$).

The mean difference in submissions between the two groups indicates slightly higher activity for the differentiated group, but it should be noted that the standard deviation is quite large in both groups.

5. Discussion

The results clearly show that the accuracy of differentiated students increases statistically significantly, while the accuracy for the group with non-applied suggestion remains on an earlier level. This is understandable due to the fact that differentiated students will receive tasks which are more suitable for their skill levels. Moreover, the data suggests that the number of submissions made by differentiated students increases more, which can be seen as a sign of improved motivation. Getting a sense of success being encouraged is one way of relieving math anxiety (Ashcraft, 2002). The results presented here are promising and indicate that differentiation using digital technology can provide benefits for learning outcomes, a similar finding to that of Haelermans (2013, 2015). The difference with this study in comparison to e.g. Haelermans (2015) is the use of learning analytics instead of tests to automatically identify differentiation needs and make suggestions for teachers.

We propose that further investigation is needed on how learning analytics could provide a steady stream of information to help the teacher better understand how their students are performing, similar to information provided by formative assessment in Tomlinson's (2014) examples of a differentiated classroom, and how this information could be used for more effective differentiation by the teacher. The high standard deviation suggests a lot of variation in both of these groups. On average, differentiation is able to create a more positive learning experience and outcomes but on an individual level one can observe different results.

For future research, it is important to try to identify which students benefit most from differentiation and if there is a way to improve the effectiveness of differentiation for the students who did not seem to benefit from it at the moment. Another interesting aspect is to observe possible differences in effectiveness of differentiation between grade levels. Finally, the third direction for future research would be to find out if providing more challenging tasks to more skilled or faster students would be beneficial to their learning or motivation.

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INTELLIGENT TUTOR USING PERIPHERAL ARTIFICIAL INTELLIGENCE: OPPORTUNITIES AND LIMITS

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Abstract

This article aims to present a model of Intelligent Tutoring System exploiting artificial intelligence to personalize the learning of the learner and to automate certain tasks of the teacher. All the resources consulted and the educational objectives achieved by the learner will be processed using the TinCan API and the limitation of the amount of sensitive data sent to the cloud will be ensured by the use of peripheral artificial intelligence. We start by defining the concepts of artificial intelligence and Intelligent Tutoring System, then we focus on the implementation of machine learning in such a system and the advantages that this technique brings. Finally, we describe the limits of such a technology and the possible solutions to it.

Keywords: *Learning, edge computing, peripheral artificial intelligence, pedagogical resources, semantic technologies.*

1. Introduction

For several years, the increase in the volume of data produced and progress in understanding the human brain have enabled engineers to create machines capable of simulating certain aspects of human intelligence. One of these aspects, the simulation of learning, has allowed the birth of machines capable of perceiving, learning and optimizing: this is machine learning, also called artificial intelligence. This technological evolution is perceived as a disruptive innovation that will upset our society, due to its possibility of interacting and helping humans in high-level tasks. However, the appearance of a powerful tool for processing information does not induce profound changes in learning practices: the practices of teachers and learners must evolve to use technology in an optimal with respect to the targeted objectives (Dai, Chai & Lin, 2020). Loeckx (2016) maintains that artificial intelligence can prove to be an effective tool for learning through its ability to personalize the learner's learning experience but also through the possibilities of automating tasks and summary of the results for the teacher. The increase in resources available online, the democratization of online learning and the development of this technology have allowed the development of tools allowing the construction of personalized learning environments: the Intelligent Tutoring System (ITS). These systems make it possible to personalize the learning on several axes such as the follow-up of the evolution of the learner and the achievement of his objectives, the adaptation of the educational resources proposed according to his style of learning or even the generation of personalized feedback in different formats. Some fear full automation of the teacher's role, but studies tend to say that human intervention cannot be completely replaced. On the other hand, IA and ITS will change the existing pedagogical relationship between knowledge, teacher and learner by adding an aspect of mediation between these entities, leading de facto to profound organizational changes in traditional teaching, both in terms of teaching and student practices: while teachers will see their roles and practices evolve, students will have to learn how to make optimal use of AI to enhance their learning outcomes (Seldon & Abidoye, 2018). However, it will be necessary to ensure that students are educated on the use of such a tool, because even if the mathematical concepts underlying AI begin to be integrated into school curricula, a poor understanding of this technology will inevitably lead to a decline effect on the effectiveness of the tool or even a negative effect on the quality of learning (Ijaz, Bogdanovych & Trescak, 2017). In addition, other problems must also be studied upstream such as learning biases or the management of sensitive data. In summary, this paper will focus on the representation of a field of knowledge and the modeling of a student, on the various opportunities linked to this technology but also on its limits and the means to overcome them.

The research questions we will try to answer are the following:

- What are the interests of artificial intelligence for the personalization of learning?
- How to overcome the intrinsic limits of this type of technology?

2. Methods

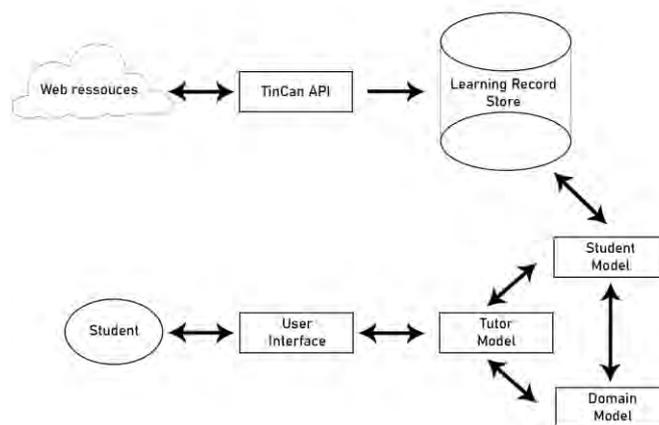
This article is a literature review aimed at analyzing the design and impact of an ITS on the learner and the teacher with a view to creating an intelligent semantic learning support system. Searches on ResearchGate, ScienceDirect, arXiv and Google were made using the keywords “artificial intelligence”, “education” and “intelligent tutoring system”. Other references were obtained by cross-referencing of the various selected articles. These articles include analytical or empirical studies of the topics researched.

3. Discussion

3.1. Architecture of an ITS

Even if ITS have different approach models, they all share a common architecture by having three main types of knowledge: knowledge related to the domain to be studied (stored in the domain model), knowledge about each learner in order to personalize the transmission of knowledge (stored in the student's model) and pedagogical knowledge allowing the tutor to make decisions on the resources to be offered and on the help to be provided to the learner (stored in the tutor's model). Thus, there are two main loops on the system, where one (outer loop) aims to determine the order of future tasks to be given to the learner according to the knowledge acquired and the other (inner loop) aims to follow the learning of the live student to bring him help in case of blockage (Vanlehn, 2006). This help can take different forms, depending on the type of model chosen during the design. This system can be enriched with a Learning Record Store (LRS), which allows the storage and manipulation of data of the learner's learning experiences on different types of web resources (fig.1).

Figure 1. Architecture of an ITS using a Learning Record Store.



3.1.1. Domain model. The knowledge model, also called the expert model or "knowledge expert", contains the concepts, facts and rules of the domain targeted by the learner. Generally produced from the knowledge of experts in the field, it offers the ITS a source of knowledge to present to the learner through different methods. In addition, it also serves as an assessment tool by comparing the learner's responses to their own domain knowledge model. If the answers differ from the model, then the latter must be able to produce multiple solution paths to lead the learner to the expected answer (Gharehchopogh & Khalifelu, 2011). Among the most common design approaches, we can cite the Cognitive Model which is based on the ACT-R theory of cognition and learning or even the Constraint Based Model, where domain knowledge is represented in the form of unbreakable rules (e.g. "If the relevance of the answer is true, then the answer must be correct"). The use of semantic technologies in the design of the knowledge model is important because they offer an ontological language operable by humans and machines by allowing to represent a domain and to symbolize the conceptualization of this domain (Héon, 2016). Composed of a list of Subject-Verb-Predicate statements, they allow the creation of data models representative of a set of concepts in addition to explaining the relationships between these concepts, which allows intelligent processing of these resources in addition to facilitating the inference capability of the system.

3.1.2. Student model. The student model represents their characteristics, knowledge and skills in order to provide the ITS with a source of information about it, allowing it to infer aspects of the learner's behavior. The system will then be able to compare the state of the learner's knowledge with that of the field to identify possible misconceptions and adapt the exercises to work on the weaknesses of student's skills. Two types of information must be processed in order to have a relevant model of the learner: their fixed characteristics (e.g. gender, mother tongue, level of study) and their dynamic characteristics (e.g. knowledge, emotional state, level of attention, problem-solving skills). This information allows the modeling of the learner's knowledge on a domain, which can take different forms (e.g. overlay, disturbance, stereotype, fuzzy modeling) each having their advantages and disadvantages (duChâteau, Mercier-Laurent, Bricault & Boulanger, 2020). The student model can be enriched by using a Learning Record Store (LRS), which makes it possible to precisely follow the progress of learners on various educational media by storing data on the learning experiences emitted by them. This technique makes it possible to capture the informal aspect of the flow of learning and to formalize this data in the form of xApi instructions adopting the form "User + Verb + Object" (e.g. "User read this article", "User played this game", "User participated in such activity"). In addition to allowing the storage of less formal learning data, LRS allow data analysis and exchange with other systems: this is valuable information for ITS because it provides additional data for monitoring student learning (Bealing, 2020).

3.1.3. Tutor model. The tutor model, also called the pedagogical module, is the engine of the system. He acts as a tutor in charge of choosing "what to teach, how and when", evaluating the learner's knowledge and adapting the content offered to his preferences, answering questions or even generating feedback in case of error or misunderstanding (Bourdeau & Grandbastien, 2010). These actions are based on the pedagogical content stored in the domain knowledge model in addition to the characteristics of the learner stored in the learner model, and are intended to encourage the learner to build even knowing her rather than following chain instructions. There are already semantic active learning systems (e.g. SASA) capable of enriching and personalizing the learner's experience, by exploiting a reasoner using the calculation of first-order predicates and ontologies modeling the entities participating in the process. learning (Szilagyí & Roxin (2012). The addition of artificial intelligence in such a semantic system allows the realization of a personal intelligent learning agent, which will aim to optimize the learning of each learner according to the model drawn up of this one and the knowledge to be transmitted through of the various educational resources available. The tutor making the link between the learner and the system, the use of Natural Language Processing (NLP) and various cognitive strategies improve the construction of the learner's knowledge while improving the quality of the student model (Rus, Niraula & al., 2015).

3.2. Opportunities and limitations of AI in an ITS

From a learner's point of view, AI acts as an intelligent tutor in a virtual environment to personalize the educational resources offered according to its learning style (Messika, 2019). All the data transmitted will be stored, analyzed, and processed to improve the representation of the learner's knowledge and skills. This precise representation improves the system's ability to infer the pedagogical content to be favored according to the profile of the learner and allows the personalization of his learning path through the choice of different pedagogical strategies according to each profile. The precise monitoring of the evolution of the learner's knowledge facilitates the production of feedback to be provided to him, through the synthesis of his progress and the achievement of the set educational objectives (Alkhatlan & Kalita, 2019). In addition, the use of artificial intelligence facilitates the processing of information by allowing the highlighting of the different ways in which learners interact with resources and the effect that these have on the quality of learning, data who then assist the teacher in making decisions about the usefulness and impact of the educational objects used. The ability to extract statistical regularity and synthesize the system also allows the teacher to have a summary of the evolution of each learner, both on the achievement of educational objectives and on the evolution of the style of teaching. learning or motivation (Franzoni & al., 2020). This analysis makes it possible to detect the difficulties specific to each learner but can also infer potential dropouts, reducing the digital divide linked to the use of a virtual system (Pitchforth, 2021). Finally, this technology offers the possibility of aggregating educational objects from a domain using semantic technologies and metadata. Properly described pedagogical resources make it possible to drastically increase the amount of relevant pedagogical resources available to the teacher because they are processable and categorizable by machines, which facilitates interoperability between different learning systems (Apoki, 2021). One of the standards that can be used is LOM (Learning Object Metadata), which is a description scheme for digital or non-digital educational resources using several categories (e.g. general, life cycle, rights, relationship, classification) to describe a resource. However, the use of AI in a tutoring system brings several constraints to consider. The first notable problem concerns learning biases during the training phase of the

pedagogical model. This bias, coming from a biased data set, introduces a distortion in the training process which results in a systematic deviation of the model results. This bias can come from a confirmation bias, i.e. from cognitive biases of the designer, but can also be a statistical bias, i.e. from non-representative training data or statistical algorithms used inconsistent with the objective of the system (Mélot, Ris & Briganti, 2021). To limit them, it is necessary to define upstream the precise needs of the users, to control the coherence of the methods used according to the desired results and to surround yourself with experts of the subject to be treated to limit the impact of your own cognitive biases. Another problem is that of poor understanding of the technology, which can occur on the designer and user side. The main problem for the designer is the systemic problem of the black box: we know the input data, we observe an output result but it is complex to explain what is happening between the two. This problem sometimes makes it difficult to explain on what elements the model is based to produce the result, which de facto complicates the explanation of the feedback produced, the debugging of the system in the event of inconsistent output or the trust accorded to a system whose operation escapes human comprehension. There is currently no universal answer to this problem, easily explainable algorithms having lower performance than algorithms using multiple layers of learning (Vilani, 2018). Research continues to improve the transparency of these algorithms, even if this problem of algorithmic decisions may be more about the contestability of the results than the explainability (Abiteboul & Dowek, 2017). On the user side, the poor understanding of technology is rooted in the lack of education on this subject. Currently, at a low level of study, IT is only office automation. It is necessary to demystify this technology by learning the basic algorithms and techniques allowing the operation of artificial intelligence. The population must also be accustomed to using this tool to reduce user bias, better collect data and better understand the limits of this technology (O'Neil, 2016). Moreover, it may be more appropriate to speak of machine learning than artificial intelligence because intelligence is a fairly strong term and ultimately quite incorrect in view of the degree of intelligence that AI really demonstrates. Finally, one of the last important points is that of the processing of sensitive data. The Internet of Things makes it possible to use several different connected objects as learning media, which involves data transfers between devices. In addition, collecting as much information about the learner as possible is necessary in order to design a model of their knowledge and skills, which involves collecting all the data they emit in addition to pre-filled information (e.g. sex, age, level of education). All these data are essential to have an accurate and relevant model of the learner but are extremely sensitive. One of the solutions to avoid having them transit through the cloud is to use peripheral artificial intelligence, a method combining machine learning and cloud computing to process the data as close as possible to the source of transmission to avoid the transmission large amounts of data in clouds. Peripheral computing is a technique aimed at synchronizing on a server only relevant and pre-processed data (Ismael, 2018). This technique applied to artificial intelligence works in two stages: first a local learning where each device adjusts its learning model, followed by a global aggregation where the main server defines the weights of the new model and updates it. on the various connected objects. Data is not transferred between devices, only models are transferred (Li & al., 2019). Thus, time and bandwidth are saved, and the private aspect of the data is protected (Hosseinalipour & al., 2020). This technique also has its limits but remains a feasible and relevant solution for the processing of sensitive data.

4. Conclusion

Given the constant evolution of AI, it is important that students and teachers learn to master the technology to maximize its positive impact. Its possible contributions are not negligible: better personalization of learning, better generation of feedback, powerful tool for statistical inference and aggregation of relevant content. Like any technology, however, AI has limits such as learning biases, usage biases or securing the large amount of sensitive data retrieved. We must continue to work on these risks to avoid falling into a technological dictatorship where the tool becomes a constant monitoring instrument whose operation escapes the understanding of its users. It is certainly a powerful tool, but to be handled with care due to its various ethical and technological implications.

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ARTIFICIAL INTELLIGENCE IN EDUCATION – WHERE ARE WE NOW?

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Abstract

There has been a lot of talk about artificial intelligence (AI) in education recently. However, the utilization of AI in an educational context does not always seem to match with application in a general context. While we are seeing great advances in the development of AI in self-driving cars, facial recognition or computers excelling in chess, the development of intelligent teaching assistants may seem to be lacking. In this article, we take a look at the current state of utilization of AI in an educational context. For this, we reviewed the current literature about artificial intelligence specifically in education. Ten high quality educational journals, with five having special focus on technology, were selected for the review. Based on the review, it seems that artificial intelligence is still mostly covered from a technical point of view, as there were only a handful of articles found in purely educational journals. The main focus seems to be on case studies and in including AI based courses in curriculum, followed by meta studies and critical reviews. Surprisingly, there were only a couple of articles about the ethical concerns of using AI in education, while in general the ethics of AI seems to be quite a popular topic. The total number of articles written about AI in education seems to be nevertheless increasing each year, which seems to be in line with the general interest of AI.

Keywords: *AI, artificial intelligence, meta study, literature review, technology.*

1. Introduction

Artificial intelligence (AI) is a topic that is frequently mentioned in the context of education. Typically the discussion is either about how AI can and will change how we teach and learn (eg Kangasharju, et al. 2022; Gayed, et al. 2022) or how the substance we are teaching should be changed to correspond to the changed needs and requirements for the future workforce (eg. World Economic Forum, 2020). AI is already widely used in numerous applications. For instance, most smartphone users have an AI assistant in their pockets. We are living the fourth wave of AI, where deep learning is the big leap from previous technologies (Jaakkola, et la. 2019). In education there are a lot of promises and expectations. AI has been the hot buzzword in the commercial field for several years and it is often seen as an intrinsic value instead of a tool that it is. There doesn't seem to be many widely spread commercial solutions reclaiming these promises either. However, there are many interesting case studies and pilots that do show promising results but the adaptation of these solutions seem to be far from the promises. (Jaakkola, et al. 2020). There is also a lot of discussion and research around the use of AI in education from the perspective of various stakeholders (e.g. Borenstein & Howard. 2021; Garrett et al. 2020; Holmes et al. 2021; Latham & Goltz. 2019).

In this paper we observe the current state of discussions around AI in the top journals in the field of education and technology according to their H5-index. We aim to find the current trends in AI in education, the tone of voice of researchers towards AI in education and possible solutions that could be adapted by educational institutions.

2. Method

The study was conducted as a meta study. We decided to focus on the following research questions:

1. How is AI in education currently addressed in the top scientific journals of technology and education?
2. Are there differences in attitudes towards AI in education between educational technology journals and education journals?

We narrowed the search down to 5 journals focusing on technology and education and 5 journals focusing on education without a technological view. The decision of journals was made by their H5-index according to Google Scholar (Google 2022). The list of journals is displayed in Table 1.

Table 1. The ten journals selected for the literature review, their types and H5 index at 2020 according to Google Scholar.

Journal	Type	H5-index
Computers & Education	Technology	109
British Journal of Educational Technology	Technology	62
Journal of Educational Technology & Society	Technology	54
Education and Information Technologies	Technology	52
Educational Technology Research and Development	Technology	47
Review of Educational Research	Education	67
Journal of the Learning Sciences	Education	32
Developmental Review	Education	96
Teaching and Teacher Education	Education	83
American Educational Research Journal	Education	51

2.1. Procedure

The articles were searched for with search terms “artificial intelligence” and “AI”. In each case, we used the search provided by the journals’ websites. One exception was “Journal of Educational Technology & Society” where the search returned obviously incomplete results. In that case we manually browsed all articles between selected years.

From all journals, the articles included in the study were chosen according to following criteria:

1. The content of the article should be about artificial intelligence in education.
2. Article should have been published between 2020 and 2022.
3. Article should be peer-reviewed.

Hence, we excluded articles that contained AI (or similar terms such as machine learning or deep learning) in the title, but where the content was obviously about something else. The third criteria meant that we excluded for example editorial comments and forewords as well.

2.2. Analysis

A total of 109 articles were included in the study. The articles were classified according to the following classification:

1. Case studies of adapting AI-based tools in education.
2. Enthusiastic attitudes towards the possibilities of AI in education.
3. Critical reviews of AI in education.
4. The future predictions of what AI may provide in the future for education.
5. Ethical concerns about AI in education.
6. Meta study or literature review.
7. Studies about including or using AI education in curriculum.

The original list of categories was slightly modified after browsing the articles. The original eighth category (Surveys about using AI in education) was combined with category seven.

3. Results

Our initial search yielded 404 results with the search term “artificial intelligence” between the years 2020-2022 in the journals listed. Out of these 404 results, the total number of articles that were found to be about AI was 110. The number of results from journals focusing on technology and education was 107 (97.27%) and the number of results from journals without a technology emphasis was 3 (2.73%). Our results indicate that the largest individual category across all journals was category 1. Case studies of adapting AI-based tools in education with 56 (50.91%) out of 110 results falling in this category. The least common categories were category 2. “Enthusiastic attitudes towards the possibilities of AI in education” and category 5. “Ethical concerns about AI in education”. Complete results are displayed in Table 2.

Table 2. The search results across all selected journals divided into predefined categories.

Journal	Category						
	1	2	3	4	5	6	7
Computers & Education	27	0	4	3	1	8	10
British Journal of Educational Technology	8	0	1	3	1	0	1
Journal of Educational Technology & Society	7	1	1	0	0	2	5
Education and Information Technologies	12	2	4	0	0	3	1
Educational Technology Research and Development	0	0	0	1	1	0	0
Review of Educational Research	0	0	0	0	0	1	0
Journal of the Learning Sciences	1	0	0	0	0	0	0
Developmental Review	0	0	0	0	0	0	0
American Educational Research Journal	0	0	0	0	0	0	0
Teaching and Teacher Education	1	0	0	0	0	0	0
Total in category	56	3	10	7	3	14	17
Percentage of all classified results	50.91%	2.73%	9.09%	6.36%	2.73%	12.73%	15.45%

Table 3 displays the number of articles published per year. A bit under half (n=54, 49,09%) of the 110 articles were published in 2021. The number doubled from the previous year of 2020 (n=26, 23,64%) showing a clear increase. During the first 4 months of 2022 (n=30, 27,27%) the number is already larger than in 2020 and over half of 2021.

Table 3. The number of articles per year.

Year	Number of AI-articles	Percentage of total
2020	26	23.64%
2021	54	49.09%
2022	30*	27.27%

The prevalence of the categories from largest to smallest are listed below:

1. Case studies of adapting AI-based tools in education. (n=56, 50.91%)
 2. Studies about including or using AI education in curriculum. (n=17, 15.45%)
 3. Meta study or literature review. (n=14, 12.73%)
 4. Critical reviews of AI in education. (n=10, 9.09%)
 5. The future predictions of what AI may provide in the future for education. (n=7, 6.36%)
 6. Enthusiastic attitudes towards the possibilities of AI in education. (n=3, 2.73%)
- Ethical concerns about AI in education. (n=3, 2.73%)

The two least prevalent categories are not listed in any particular order with both having 3 articles representing 2.73% of the search results.

4. Discussion

Perhaps unsurprisingly, case studies of adapting AI-based tools was found to be the most prominent category in this meta-study. We believe that we are only starting to scratch the surface of what is possible through the use of AI in education. Perhaps over half of the studies reviewed for this paper dealing with trying to determine the usefulness of AI from various, quite narrow perspectives, through case studies is also indicative of where the current state of the field is.

The second most prevalent category also came as no surprise, since talk about the importance of including AI education in curriculum has been increasing over the past few years. China for example is mandating AI education for their high school curriculum and the United States is also experimenting with different implementations of AI in curriculum (Peterson, et al. 2021). The role of AI will very likely keep increasing in societies around the world as the technology advances and becomes more accessible. Providing the next generation with the means to understand AI and how it affects our lives is something that we look at as a crucial step for all school systems to take in their future curricula.

The lack of articles dealing with ethical concerns about the use of AI in education was surprising, considering this is an area with lots of research and discussion around the ethical considerations of implementing AI in educational contexts from both researchers and the general public (e.g. Holmes, et al. 2021; Latham & Golts, 2019) as well as the need for AI ethics education for present and future developers of these technologies (e.g. Borenstein & Howard, 2021; Garret, et al., 2020). This could be in part due to the nature of research being done around this emerging field. We hypothesize that the researchers dealing with the technical implementations of AI-based technologies often come from a stronger technological background as opposed to a background in educational sciences. Understanding the intricacies of educational sciences could be considered essential to understanding some of the ethical concerns and implications of AI-based systems in the educational context. We hope that the future sees educational scientists working more closely together with those from more technological backgrounds to gain a more holistic understanding of the possibilities and concerns around the ever-increasing prevalence of AI in education.

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CREATIVITY, CULTURE, AND CONSTRUCTION: BRINGING DESIGN THINKING TO INDIGENOUS PRESCHOOLS

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Abstract

This paper presents the process of designing creative workshops that inform the construction of preschools in indigenous communities. The authors aim to answer the following: What is the most effective way to design and execute a workshop that enables community members of other cultures to create a preschool in their local neighborhood? How can this preschool foster and retain creativity among children through its architecture while remaining culturally celebratory and relevant? The authors use the Design Thinking process to develop a workshop for community leaders to conceptualize, ideate, and prototype these buildings. By combining discussion-based research on creativity in early education with the development process of the workshop (and its implementation in the Mayangna community in rural Nicaragua), the authors conclude that, to build a culture- and creativity-promoting workshop model that might be used around in preschool design around the world, the process must be highly adaptive, and indigenous voices must lead the project through longstanding relationships with continued input and redirection.

Keywords: *Preschool education, creativity workshop, culture retention, indigenous community, design thinking.*

1. Introduction

As global modernization rapidly spreads, indigenous peoples face difficulties in fostering and retaining their unique cultures. While each indigenous community is distinct, the issues faced are universal: loss of territory, language, traditions, and educational autonomy. This paper aims to address the last of these: government-monitored education that fails to effectively support indigenous education.

One of the authors has worked with education in Nicaragua for 18 years. Since 2017, he has developed a relationship with the Mayangna people of northern Nicaragua, a group that is facing the loss of culture. Through ongoing conversations, community leaders of the Mayangna village of Sakalwas have identified a need for culture-specific education among the Mayangna. Nicaragua's Ministry of Education (MINED) oversees curriculum, pedagogy, and structures of Mayangna schools, which it monitors for adherence to national standards, leaving little room for traditional Mayangna education.

However, while MINED controls the content and the teachers in the schools, conversations with the Mayangna, MINED, and other education professionals in Nicaragua suggest that there is leeway in the design of the physical space of the buildings. Discussions about education revealed the preschool setting as the ideal place for cultural learning and enhancement, as it is more loosely monitored by MINED. Using Stanford University's design thinking framework, the authors facilitated a workshop that aims to assist the Mayangna people as they fight to retain their culture.

Through this research, the authors aim to answer two questions: What is the most effective way to design and execute a workshop that enables community members of other cultures to create a preschool in their local neighborhood? How might this preschool foster and retain creativity among children through its architecture while remaining culturally celebratory and relevant?

In five stages, the authors created a workshop for the Mayangna. Discussions have been divided into categories of communication, social dynamics, process, participants and materials, and environment. The authors hope that by applying these conclusions to the existing workshop model, others invested in the education of indigenous peoples globally could create a workshop that empowers communities to design education for their culture.

2. Method

Over the course of nine months, ten workshops were developed culminating in the model outlined in the Results section. These workshops were guided by Stanford University's design thinking framework: empathizing with the end user, defining the problem and opportunity, ideating solutions, prototyping solutions, and testing the prototypes (Shanks, n.d.). In the development of the workshop for the Mayangna, the problem was defined before and after each phase of the project, empathy was threaded throughout, and ideating, prototyping, and testing were introduced repeatedly.

In the first phase of the workshop, the authors gathered a group of personal contacts who had expertise in either education, design, or lived experience in the Global South. After a short presentation of a country (Peru, Uganda, and Nicaragua), the groups of four worked to design a preschool built from materials of that country. After three rounds, participants were told to draw, without any limitations, the most creative preschool they could imagine. The second phase began tangible empathizing, bringing an adapted structure to Nicaragua. In two workshops, university students from different indigenous groups and students studying education drew four rounds of creative preschools: one that was open-air, one made of natural materials, one embedded with cultural symbols, and one without any limitations. These workshops, while producing creative drawings, did not yield realistic ideas for a physical structure.

Returning from Nicaragua for the third phase, the authors gathered connections who had experience working in other countries and in education and reevaluated, adding a prototyping stage to the workshop. Students of one of the authors participated in a workshop where they constructed the Nicaraguan students' drawings with craft supplies. In the fourth phase, three additional workshops were conducted that incorporated prototyping. In these, students first briefly researched another culture's symbols and traditions, then they drew and modeled a creative preschool that included those cultural symbols. Craft supplies were labeled with construction materials that might be used in the Global South. For example, foam sheets were labeled as "concrete," straws as "bamboo," pencils as "logs," etc., causing participants to think realistically and creatively work to solve problems together. Once finished, the students provided written feedback to each other on sticky notes.

3. Results

The final two workshops tested the process within the Mayangna communities of Sakalwas and Musawas. These workshops consisted of three steps: drawing cultural symbols, designing a school, and constructing the designs. The Mayangna community members worked in groups of four or five. They first drew and labeled five (or more) symbols that were important to Mayangna culture. Secondly, the groups drew a creative preschool building and were required to include five of their symbols within the structure. Facilitators encouraged participants to avoid ordinary building shapes. Finally, participants modeled their drawings with craft supplies labeled (in Spanish) as construction materials that could be used in their region to build a school. The groups built their models for nearly twenty minutes, and each shared their final product with the group at the conclusion of the workshop.

4. Discussion

In the process of conducting, evaluating, and adjusting the workshops, important themes emerged in five prominent categories: communication, social dynamics, process development, participants and materials, and environment. The subsequent ideas are lessons learned by the authors that proved to facilitate a workshop in another culture that yielded effective, creative results. This discussion aims to use the specific instances of workshops in the Mayangna communities of Sakalwas and Musawas to advise readers on how they might craft a working model that can adapt to other indigenous cultures.

4.1. Communication

One of the biggest challenges of executing an effective workshop is creating a system of communication that allows participants to understand facilitators' expectations without projecting the individual culture and creative ideas of the facilitators onto the participants.

Prioritize culture. Above all, make it abundantly clear the foremost goal of the workshop is to foster and preserve the richness of culture, allowing the participants to be the experts and the initiators. Be only a facilitator. Be engaged, listen, and build relationships. Give undivided attention to creations. If facilitators are not obviously invested and respectful, they cannot expect this of participants either.

Anticipate a language barrier. Workshop facilitators must be prepared to adjust messaging. If working in a second language for either the facilitators or the participants (or both), the timing of the workshop needs to account for either translation, repeated explanation, or any other means of

communicating. The content of the instructions should be simplified. Facilitators should note too that language impacts the comfortability of participants presenting ideas to others. Perhaps more importantly, anticipate that cultural norms and expectations can result in miscommunication or unanticipated hesitancy, hindering creative expression.

State the objective. Share with participants the objective of the workshop and the value of their presence. Skipping this stage, especially in another culture's context, can create confusion and mixed expectations for what is to come from the workshop. (In the authors' first in-culture workshop, participants were asked immediately to begin the symbol activity. Before the next stage, activity paused for ten minutes as participants inquired about the purpose of the activities. In the facilitators' haste to begin and the language barrier, they neglected to share the objective—to have participants think creatively about their community's preschool education. By beginning the second Mayangna workshop with an explanation, participants knew what to expect and could more fully invest themselves in the process.) Share with participants the benefits that will come out of the workshop for them. This gives them stake in the activities and pride in their work, ensuring better results.

Demonstrate expectations. In instructions, give examples of expectations. Emphasize creativity. Reinforce with phrases like "big, crazy ideas" and "non-traditional structures." The authors found that by bringing examples of pre-drawn ideas from their own culture, they could enable understanding and prevent copycat ideas. Live demonstrations through humorous skits were effective too.

Encourage labeling. Ask participants to consistently label drawings. This fosters further explanation and cultural sharing. Facilitators can learn from the labels later.

4.2. Social dynamics

Facilitators should plan for the nuances of social dynamics. Whether the workshops be taking place within their own culture or in another, interpersonal components of the workshop can affect the outcome greatly.

Understand power distance and dominance. Recognition of the hierarchical and familiarity structures in the room is key to creating a dynamic that maximizes creativity. What are the relationships at play? Who is the audience? Consider the dynamics between students and professors, men and women, parents and community leaders, young and old, etc. In the first day of Mayangna workshops, the authors found that in groups with both men and women, the men dominated conversations and design, while the women sat quietly, drawing and constructing as directed by the men. Separating the men and women for the second workshop allowed the women freedom to initiate and create a highly detailed, feasible, and creative structure.

Recognize the association to the project. Participants will have different levels of investment. Knowing how much group members care about results informs facilitators' behavior and communication. Students who are participating as a class exercise will behave differently than school parents who see direct value in the project.

Understand relationships. Participants' level of comfort with and respect for facilitators can affect results of the workshop greatly. Students who are accustomed to the authors' style knew what to expect; Mayangna people were more hesitant. Thus, the authors used humor and initiated individual conversations with community members before and during the workshops. Participant-to-participant relations affect results too—are there strong relationships? How confident are they interjecting or presenting? Are there power structures at play in gender, community role, or class? Facilitators might consider separating the dominant from the nondominant to maximize comfort and creativity. Additionally, facilitators must work together as a cohesive unit. They should have spent sufficient time preparing. Familiarity with each other's strengths and weaknesses allows facilitators to fill in communication gaps during the workshop. If possible, someone should be designated to translate into the necessary language. In the Mayangna workshops, the authors shared responsibility of the instructional portions and interjected when the other missed something. A third facilitator, a native Spanish speaker, could reiterate the instructions in more detail. A fourth facilitator, a Mayangna community member, served as a translator to Mayangna for further clarification.

Receive an invitation. Foremost, the question must be asked: *does the community want the facilitators to be there?* If the answer is *No*, the facilitators need to seriously reevaluate the purpose of the project. The Mayangna communities both had leaders who eagerly met with and shared more about their culture with the facilitators before and after the workshops. This led to personal relationship development that opened doors for future collaboration. The community hosts should be engaged throughout the workshop. If these leaders stay motivated and excited, they set an excellent example for the participants who might be feeling overwhelmed and confused.

4.3. Process development

Design thinking serves as an effective model for developing the practical aspects of the workshop, as it provides a flexible structure for adaptations. Specifically, it is imperative to thread empathy throughout the process. The facilitators' decisions about the activities and communications must be made with the participants' experience, personhood, culture, and empowerment at the forefront. Empathy informs many important adaptations to the process. Testing, too, is vital. The authors found it useful to conduct the workshops in settings within their own culture with familiar students at the university to hone the process.

Set an agenda. Facilitators should know their plan and decide whether to explicitly share the plan with participants. In the case of the Mayangna, the authors did not state all the steps before the workshop in order to save time. Timing proved to be a difficult but important piece of the puzzle. There must be ample time for creative thinking with room for misunderstandings and reexplanation. However, as ideas catch hold, it is important to keep the workshop moving even if groups have not finished (ie. set time limits on each step to motivate groups and make time for the later steps). At some point along the way, groups should be encouraged to present their work to the group. It is not efficient to do this after every step, but it allows participants to take ownership and share their culture while providing some closure to the activities.

Adjust constantly. Flexibility is imperative in workshop design. The process will continue to change, and the people benefiting from the workshop should remain the central catalyst of this change. The problem will continue to be defined along the way. Sometimes, elements must change during the workshop itself. If participants copy facilitators' examples instead of drawing from their own culture, or if they misunderstand, it may be best to take materials away, reexplain, and try again. This proved successful with the Mayangna. The authors also found that integrating participant feedback into the workshop did not translate well into the Mayangna culture. Participants were unfamiliar with sticky notes and unused to providing constructive criticism to their peers. Instead, most of them simply labeled elements of other groups' designs. The authors have not yet figured out a way to communicate this process successfully.

4.4. Materials and participants

Know the people. Workshop results are impacted heavily by the group of participants. Twenty-five to thirty participants are ideal for a manageable group that can be divided into smaller groups of four or five. Passing around a sign-up sheet that asks for name, relation to the school, number of schoolchildren in the family, and the community in which they reside all help when evaluating data. The stronger the connection to the schools, the more relevant the results. Nametags would be a useful addition. Participants can and should vary in age, income, gender, and community role to provide a comprehensive communal perspective. It is possible that this is the participants' first exposure to collective drawing and prototyping, which can pose both opportunities and challenges in the results. There will likely be participants who express a keen interest and understanding in the process, and this will be evident in their work and attitude. Facilitators should follow up with these standouts and exchange contact information for future engagement and perspective.

Bring supplies. For the purposes of this workshop, the following materials were found to be useful: large sheets of paper for drawing (approximately 2ft. x 3ft. [0.7m x 0.91m]); dark, thick markers of many colors; craft supplies that represent realistic construction materials of the host culture as denoted in the method, labels in a host language for the materials, and refreshments to allow for a brief break and an expression of gratitude. Participants' levels of familiarity with the craft supplies may affect timing of the workshop as well as results.

4.5. Environment

The Mayangna workshops were conducted within the existing schools. The authors found this practical, and it provided better context for the project. A school building allows for maximum comfort of participants. Small group activities are most effective when moveable chairs and tables are available. If these are unattainable, any method that groups can be arranged to draw collaboratively is preferable (compared to sitting in fixed rows). Community members might bring children of all ages to the workshop, as childcare may not be an option. Facilitators can anticipate many distractions, side conversations, and curious onlookers. It is imperative that workshop developers not only receive an invitation in the community but that they spend time learning about the host culture to maximize respect for community members, cultural learning, and value of time.

5. Conclusions and applications

After conducting the discussed workshops within indigenous communities, themselves, the authors have concluded that, for the project to be successful in empowering culture-specific education, it must be highly adaptive. Adaptations occur through macro reiterations of the design thinking steps in the process development and in micro adjustments during the workshops themselves. More importantly, culture must drive design. The voices of indigenous community members are the most valuable for an effective design that empowers lasting, culturally empowering improvements in education. Expert opinions are needed too—for maximum efficacy, creative initiatives must be met expertise in all connected fields.

The project discussed in this paper is ongoing. Moving forward, the authors will assemble a panel of experts (from varying cultural backgrounds) in the fields of design, education, architecture, and engineering. With focus groups and regular written communication, these experts will be reached for input, ensuring that each step of the following process is well-informed. Most crucially, community contacts in Mayangna villages will lead the design process through their input and communication after each stage of ideation of the product.

In the workshop development, the authors aimed to create a model that can be used, with minor adjustments, to empower any indigenous community to reclaim a culture-retaining education for its preschool children. Research was limited by language barriers and cultural understanding. Facilitators, as visitors from outside cultures, ultimately risk miscommunication, and a project such as this one must coincide with a willingness to build long-term relationships with the community. However, this research proposes a process—rather than a product—which other researchers might use to assist other indigenous communities facing culture loss in the revaluation of their education system. The authors invite further contact from anyone with expertise in the above fields or with close connections to indigenous communities around the world.

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YOUNG CHILDREN AND SCREEN-TIME: SPANISH RESEARCH GAP AND FUTURE INVESTIGATIONS PROPOSALS

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Abstract

Nowadays, technology and digital screens have become an essential part of our routine. At the same time, young children are being exposed to these screens at an earlier age. Literature suggests that there is a digital gap between those children who have been trained to use technology critically and effectively and those who have not. Considering the relevance of the topic in developed societies, we will analyze the current national (Spain) and international literature on the issue. The objective of the study is to recognize the needs and weaknesses of Spanish research with the aim to offer an effective data collection tool for future research. The literature review reveals that as a result of COVID-19 pandemic, several new articles have been produced with the aim of analyzing the situation, anticipating possible consequences and providing action strategies and healthy routines for families and schools. On the international scene, during the last 10 years the number of studies about experts' recommendations, health concerns and the benefits of educational Apps has increased consistently. Focusing on national research, most Spanish studies exclude young children (0-6 years) and those who include them, focus on a specific field or analyze a small sample. To cover the research gap from 0-6 years old, we have designed two surveys, one for caregivers and one for preschool teachers. Some semi-structured interviews are also being considered to complement the quantitative data with qualitative information related to the perceptions, experiences, beliefs and practices of parents and teachers. The sample is divided into the main caregivers of young children and early education tutors of preschools in the Metropolitan Area of Barcelona. To include different socioeconomic status (SES), should be conducted in at least 30 preschool education centers distributed as follows: 10 schools located in low-income neighborhoods, 10 schools located in middle-income neighborhoods and 10 schools located in high-income neighborhoods.

Keywords: *Young children, preschool, screen-time exposure, caregivers' perceptions.*

1. Introduction

Today children are often used to using digital devices (smartphones, game consoles, televisions, tablets, etc.) in everyday activities. For example, many children play with their tablets while eating dinner or watch videos while traveling on public transport. Despite the fact that young children were born into a digitized world, there is a gap between those who have been trained to use technology critically and effectively and those who have not (Granado Palma, 2019). That situation highlights the need to create some strategies in order to supervise and support children's media use (Montoya et al., 2018). Parents, caregivers and educators are the key axis to support young children's interactions in a healthy, constructive and safe way.

According to Jiménez-Morales et al. (2020) the socioeconomic situation of parents influences their digital mediations. In particular, the research establishes a relation between low-income environments and excessive use of digital devices by children. Moreover, educators are another important influence on children's digital behaviors. Digitized classrooms could become interactive learning environments where students are at the center of the teaching and learning process (Latorre-Coscolluela, 2018). However, according to García Aretio (2019), the simple fact of equipping the classroom with digital devices is not enough to promote a useful use of the digital media. To achieve this purpose, it's necessary to support the use of digital devices with actions focused on scaffolding children's learning process and digital literacy.

According to the Instituto Nacional de Estadística (2019) 91'4% of Spanish families have access to the internet. Also, Spanish households are equipped with, at least, one of the following devices: 99'1% of households have a television, 98'5% have a mobile phone, 80'9% have a computer, 56'8% have a tablet and 25% have an e-book reader. These data reflect the high percentage of digitalization in Spain and the importance of further research on screen time.

2. Method

For the present study we will analyze, by a literature review, the current literature on the issue from two different fields of study: health sciences and social sciences. We are comparing the differences between international literature -mostly written in English- and national literature. For the literature review we used the database Scopus with the keywords "preschool" OR "young children" and "screens" for the English search and "educación infantil" (preschool education) OR "niños" (children) and "TIC" (Information and Communication Technology) OR "pantalla" (screen) for the Spanish search. These words have been chosen as a result of a previous analysis of the most commonly used terms in each language. Furthermore, we selected those documents that included these words in the title or in the keywords.

Based on the literature review, we will design a qualitative and quantitative data collection instrument that may be used in future research. The questions in these surveys are based on the reference literature such as Zabatiero et al. (2018), American Academy of Pediatrics (2019).

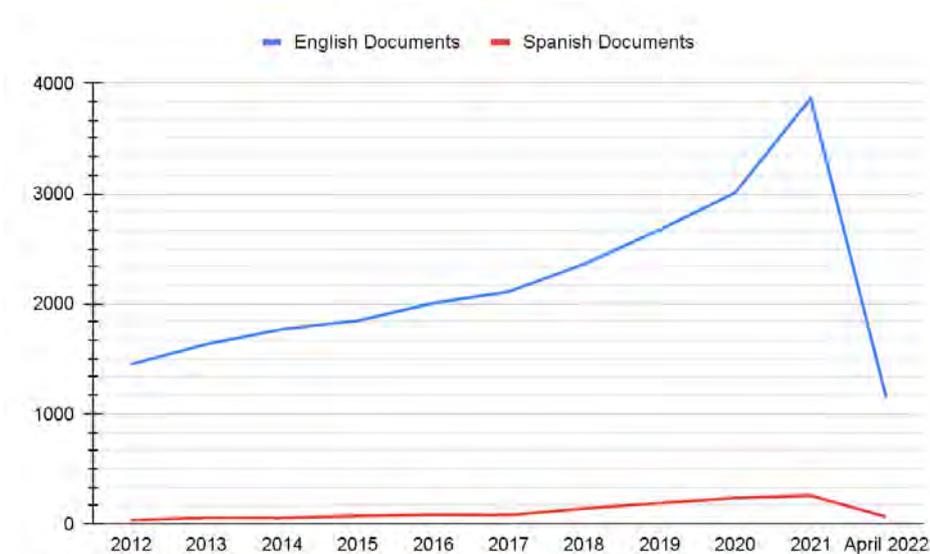
The two main objectives of the literature review are:

- 1- To identify the current state of the art.
 - 1.1-To establish the main differences between national and international literature on the issue.
 - 1.2-To detect those ambits that require further research in Spain.
2. Create a data collection instrument based on the detected research requirements.

3. Results

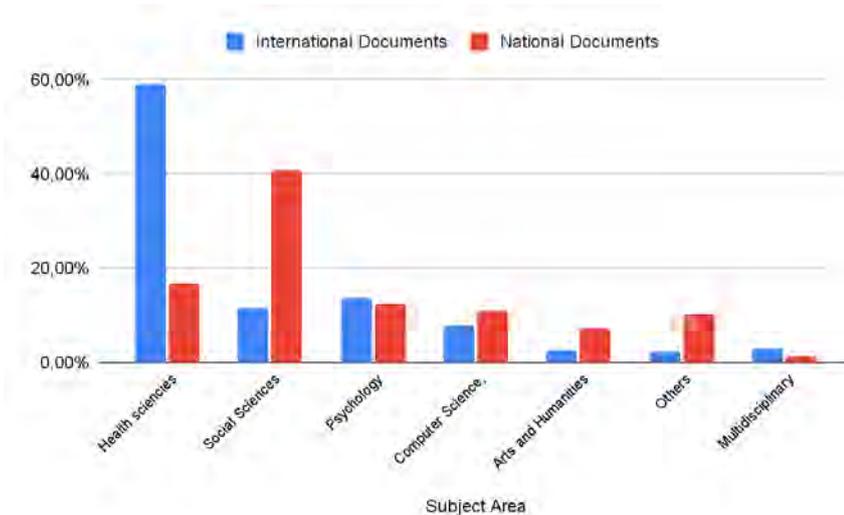
The keyword search shows that the volume of documents has been rising quite consistently. However, in recent years, literature on these issues has experienced a faster growth after 2020, especially in the international context (see Figure 1).

Figure 1. Document volume evolution.



Regarding the distribution by field of study, there is a great difference between the most common fields in the national and international literature. On the one hand, in Spain, research from the social sciences and humanities prevails. On the other hand, internationally, the research studies from the health sciences prevail. However, in both cases, the multidisciplinary approach is in the minor (see Figure 2).

Figure 2. Distribution of National and International articles by field of study.



Two surveys have been designed to understand in more detail the perceptions, experiences, beliefs and practices of parents and teachers. One questionnaire is addressed to main caregivers of children (0-6) (see Table 1) and a second questionnaire is addressed to early childhood education tutors (see Table 2). These instruments include two types of questions: On the one hand, quantitative questions that attempt to obtain objective data, for example, what type of digital devices children have in their bedrooms. On the other hand, qualitative questions that attempt to obtain subjective details, for example, the general opinion of teachers on the use of screens in early childhood education.

Table 1. Household survey.

	Theoretical background	Items
Background		SES (socioeconomic status)
		Age
Hours of digital devices	American Academy of Pediatrics (2019), Canadian Paediatric Society (2017)	Hours of use of digital devices on weekdays
		Hours of use of digital devices during weekends
Hours of physical activity	Ministerio de Sanidad, Servicios Sociales e Igualdad (2015), World Health Organization. (2019)	Weekday physical activity (non-school hours)
		Physical activity on weekends
Home use of digital devices	American Academy of Pediatrics (2019) Canadian Paediatric Society (2017)	Devices on or off when not in use
		Devices located in the infant's bedroom
		Types of content consumed
		Moments of devices' use
		Use of devices to calm the child
Digital parenting	Australasian Journal of Early Childhood (Zabatiero et al., 2018), American Academy of Pediatrics (2019), Canadian Paediatric Society (2017) Radesky, J. & Rosenblum, K. (2019)	Shared or individual use of devices
		Going to orientation sessions on digital parenting
		Searching for information about digital parenting
		Guidelines for device use
		Supervising the use of technology
		Need for early introduction of technology
		Age-appropriateness of device use
Use of devices by adults		

Table 2. School survey.

Main topics	Theoretical background	Items
Background		SES (socioeconomic status) Grade
Hours of digital devices	American Academy of Pediatrics (2019), Canadian Paediatric Society (2017)	Hours of educational use of devices
Hours of physical activity	Ministerio de Sanidad, Servicios Sociales e Igualdad (2015), World Health Organization. (2019)	Physical activity during school hours
School use of digital devices	American Academy of Pediatrics (2019), Canadian Paediatric Society (2017)	Individual or collective use of devices Types of content consumed Situations in which devices are used
Perceptions about digital devices and education	Australasian Journal of Early Childhood (Zabatiero et al., 2018), American Academy of Pediatrics (2019), Canadian Paediatric Society (2017)	The need to introduce technology at an early age Training offered by the school Opinion on the use of technology with children Suitability of device use for their age Feeling prepared to use technology with infants

4. Discussion and conclusion

The results show a significant progressive increase in the number of documents discussing the issue of screens and preschoolers in both the national and international literature. In the last two years, the impact of the pandemic has also resulted in an explosion of current research exploring the role of Information and Communication Technology (ICT) in education. This exceptional situation has highlighted the weaknesses of educational environments and the need for further research to maximize the benefits and minimize the risks.

The main difference between the international and national literature lies in the distribution by field of study. International literature tends to approach the issue from a medical perspective, this type of research tends to be highly rigorous but not always consider social realities. This makes it difficult to obtain flexible solutions that can be adapted to the needs of families and schools. However, Spanish literature tends to approach the problem from a social and educational perspective. For this reason, it is considered necessary to develop future research using a methodology that combines health and social science approaches. This will provide qualitative and quantitative data that will allow us to offer realistic recommendations adapted to the current issue.

As mentioned above, it is relevant to obtain a holistic point of view regarding the use of technology by young children (0-6). For this purpose, the designed instrument allows us to collect data related to different experiences and perceptions of families and educators. Also, question the reasons behind the use of technology they express (lack of time; the belief that children have to start using technology gadgets at an early age; lack of digital literacy, or skills by parents or teachers).

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RESEARCH ON ONLINE PROGRAMMING EDUCATIONAL TOOL: CASE STUDY ON A THREE-IN-ONE ENVIRONMENT

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Abstract

In the field of information education, the introductory course of programming is a threshold. It is often the first course faced by students with no or little background knowledge. For learning unfamiliar and difficult things, students will inevitably be vulnerable and give up their learning. Hence, it is necessary to help students correctly cultivate the concept of computational thinking to assist them in their learning process to reduce learning difficulties as well as enhance interest. Our research team designed an online programming educational tool that is based on Python, Scratch, and activity diagrams. The purpose is to help students learn the basic concepts in the introductory programming courses. Users can just connect to the website to learn and many convenient functions are added to record the learning process. The Python part is provided for non-primary school students to learn and the Scratch part is for primary school students to learn logical concepts. Also, there is an activity diagram to increase students' interest in learning and reduce learning difficulties. The questionnaire data were collected at the beginning and end of the course and the results were finally analyzed. By analyzing the questionnaires collected and analyzing the data content, we can see that the results of this experiment have improved the students' learning process. However, the operation of the tool has also received feedback from students. Our designed features need to be closer to the user, and it is expected to assist more learning content, not only at the beginning of programming but also in the future to assist in more advanced programming learning. Compared with traditional teaching, this research uses tools to assist learning so that students can better understand the working principle of coding.

Keywords: Digital learning, information education, programming language, Python, Scratch.

1. Introduction

Computational thinking ability was proposed and advocated by Professor Jeannette M. Wing (Wing 2006) of Carnegie Mellon University in the United States to define the concepts needed to solve problems effectively in different situations. This concept is not necessarily an ability necessary for daily life the same, but it can effectively understand and convey the concept of the computer, and it is very important to the process of programming, which is the basic concept of all educational courses in the field of information. Cultivating students' computational thinking ability in education can also train students' ability to identify and solve problems, which can not only be used in the field of information education.

Some studies have found that interactive learning materials are more useful than the use of programming textbooks. Students will have insufficient learning motivation due to difficulties in learning (Tan et al., 2009). Lack of a sufficient learning environment will lead to increased difficulties for students to learn programming. Therefore, it is necessary to create a learning environment for students to improve their learning motivation (Hwang et al., 2012).

We have developed a systematic tool to assist beginner programming learners so that they will not be discouraged by difficulties or difficulties when entering the programming field. We know from the literature that visual tools are useful for learning and help students better understand the programs they execute, so we add visual functions to the system to help students understand difficult programming languages and train students. Understand operational thinking concepts.

This research is to put the developed tools into the physical courses, conduct experiments, observe and analyze the collected data, and understand whether the tools achieve their goals.

2. Methods

We have developed an auxiliary tool for assisting programming learning. It consists of three functions: Python, Scratch, and activity diagram. The purpose is to use it in basic programming courses to help students learn basic programming functions and concepts. Just connect to the website. Learning can be carried out easily, and many convenient functions are added to record the learning process. This system quickly calculates and displays the results through the real-time calculation function.

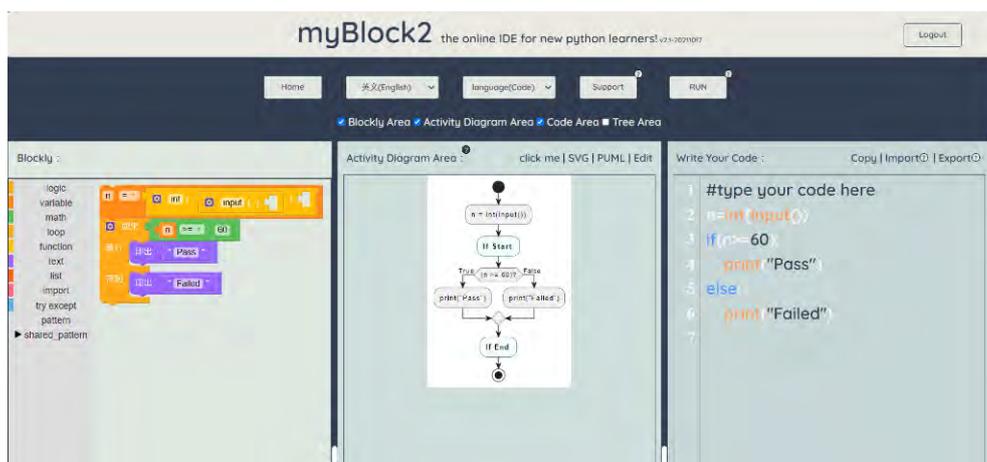
The tools developed in this study were put into the basic course of programming, integrated into the practical content of the course, observed the learning progress of students, collected and analyzed the questionnaire results, and observed whether the system tools were helpful to students' learning, and also Tools for review and improvement.

2.1. Tools

The teaching tool of this study is a platform built on a web page, which can be provided to users and write python language on the platform or write programs in a visual way such as scratch, and one of the two is converted through the system when writing. Another language is also presented on the page visually as an activity diagram so that students can understand the grammatical structure.

For non-undergraduate students, learning programming is mainly to cultivate the concept of computational thinking, often using visual programming language to combine methods in a building block-like way, which is easier to learn than directly typing code; in addition to basic computational thinking, undergraduate students also need to cultivate professional skills. learning programming languages is even more important. The tools are designed with two blocks, namely the block for writing Python, the Blockly area, and the Scratch-based block code area, and there are two other blocks, the activity diagram area, which renders the program as an activity diagram.

Figure 1. Assisted Program Learning System.



2.1.1. Blockly Area. The Scratch language developed by MIT converts grammar into visual building blocks and develops by stacking building blocks, making the programming language more intuitive, reducing the difficulty of memory, and making it easier to debug. We use this method to make a building block language and operate according to the rules of Python syntax.

2.1.2. Code Area. An area is written in the Python language, you can choose to execute it after completion, and the result will be displayed in the Console. It has basic compiler functions and can import and export the completed program for simple debugging.

2.1.3. Activity Diagram Area and Tree Area. The two areas can convert the written language into Activity Diagram and Syntax Tree in time. Users can observe the grammar structure filled in by themselves while writing, and strengthen the concept of grammar and logic.

2.2. Course

We put the tool into the programming basic courses of two different schools. There were 13 and 22 students participating in the research, including 20 freshmen, 10 sophomores, 2 juniors, and 4 seniors. Except for one double-major student, the others are major students, and most of them are freshmen. They do not have perfect operational thinking and logical concepts in the field of information, and they are the auxiliary objects of the tools developed.

We teach students to use tools at the beginning of the course and practice with practical content in the course. In order to analyze whether the tool is beneficial to learning and its operability of the tool for novices, a pre-test questionnaire is conducted before the course starts to use the tool. After using the tool and filling out a questionnaire before the end of the course, we use the google form to fill in online, which reduces the trouble of paper collection and facilitates the centralized processing of data.

2.3. Questionnaire

According to the literature, H. Rex Hartson's Affordance classification on human-computer interaction, we designed three types of questions in the questionnaire, including Cognitive Affordance, Sensory Affordance, and Functional Affordance, in addition to verifying whether the tool will have a positive impact on the user, also needs to analyze the operability of the tool through data, as a reference for the subsequent development of the tool (Hartson, 2003).

The questionnaire contains 15 Cognitive Affordance items, which are about whether the user can understand the meaning of the object and the purpose of each function. The Sensory Affordance item is about the user's perception. Through the perception of the tool to understand his Affordance, there are a total of 10 items, and there are 2 Functional Affordance items. Whether the entity operation of the tool makes the user feel the corresponding functionality, we design the options of each item according to the Likert scale of 11 points (Lewis et al., 2017).

2.4. Data analyzing

In order to understand whether the tool has an effective impact on the user, we divide the questionnaire into pre-test and post-test. Students take a pre-test before using it, and then take a post-test after using and using it for learning. First, use the SPSS analysis tool to analyze the scale. The validity and reliability were analyzed using Pearson product-moment correlation to test the validity of each item for its corresponding construct. The reliability of these items was analyzed using Cronbach's alpha coefficient.

3. Discussion

According to the analysis of SPSS, bivariate correlate the data and obtain the correlation between each item, as well as the two-tailed significant p-value. Based on the obtained p-value, $p < 0.05$ for all items can be observed, and the quantitative scale can be concluded. The item is valid data; since the number of people in the data, the survey is 35, when $N=35$, the 5% value of the search significance on the r table product moment is 0.334. When the correlation coefficient is greater than 0.334, the item is valid. The values of the Correlations coefficient and the correlation coefficient of the total score of each item are all greater than 0.334, which shows that these items are effective.

After the data is tested for reliability, we obtain Cronbach's alpha coefficient. When $\alpha \geq 0.7$, the data is reliable. When analyzing the data, the coefficient of each item is listed (Cronbach's Alpha if item deleted). Information is reliable.

Table 1. Validity and reliability tests for each item.

Construct	Item Number	Validity Test (Correlations)	Reliability Test (Cronbach's Alpha if Item Deleted)
Cognitive Affordances	1	0.865**	0.989
	2	0.889**	0.989
	3	0.837**	0.989
	4	0.901**	0.989
	5	0.929**	0.989
	6	0.896**	0.989
	7	0.918**	0.989
	8	0.877**	0.989
	9	0.922**	0.989

	10	0.918**	0.989
	11	0.924**	0.989
	12	0.895**	0.989
	13	0.939**	0.989
	14	0.908**	0.989
	15	0.821**	0.990
Sensory Affordances	16	0.843**	0.989
	17	0.764**	0.990
	18	0.828**	0.989
	19	0.919**	0.989
	20	0.874**	0.989
	21	0.906**	0.989
	22	0.844**	0.989
	23	0.742**	0.990
	24	0.857**	0.989
Functional Affordances	25	0.935**	0.989
	26	0.899**	0.989
	27	0.921**	0.989

$p > 0.05$, $p \leq 0.05$, $p \leq 0.01$, and $p \leq 0.001$ indicate no significance and significance at the levels of 0.05(*), 0.01(**), and 0.001(***), respectively.

4. Discuss

After analyzing the data, we observed the reliability and validity of the data. We observed the data of the pre-test and post-test, as well as the feedback from the students in the classroom, and we can understand that the tools are helpful to the students.

However, this study only conducted one course and conducted operations in two different teaching environments. It is impossible to judge whether the tool has a more positive effect on students' learning through the students' performance.

5. Conclusions

With the rapid development of information technology, the social environment, and information technology have become inseparable, so school education must keep up with it and teach students the concept and thinking of information. However, the traditional education system cannot be changed overnight. Both students and teachers need to make efforts. The tool system we developed is to assist students in learning in basic programming courses, arouse their interest in learning, and enable students to better understand the concept of computational thinking through visual images.

Through the analysis of research data, it can be seen that for students, this tool has achieved its goal, which is to assist program learning, reduce the difficulty of learning, and make it easier to cultivate computational thinking and program logic.

There are still some limitations in this research. The research data is collected for beginners in programming, but they are all undergraduates. It should be possible to choose younger students such as high school students or even middle school students. In addition, our tools can be more interactive. With a visual interface, it will be easier to operate for younger users.

Acknowledgments

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INVESTIGATING SELF-DETERMINATION ASPECTS IN STUDENTS WITH VISION DISABILITY THROUGH DRAMATIC PLAY

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Abstract

Self-determination is a very crucial and sensitive developmental domain for students with vision disability. This study investigates the role of dramatic play workshops on self-determination of eight students with vision disability, aged 8-12, from their parents' perspective. Quantitative data revealed that dramatic play intervention had a small positive effect on students' self-determination level, whereas qualitative data showed that parents observed significant positive changes on their children self-determination skills expression.

Keywords: *Self-Determination, vision disability, dramatic play, AIR self-determination scale, intervention.*

1. Introduction

Vision Disability (VD) is defined as “*decrease in vision that, even when corrected, adversely affects a child’s educational performance*” (Individuals with Disabilities Education Act of 2004, sec. 300.8.). The notion of Self-Determination (S-D) is defined as “*a combination of skills, knowledge, and beliefs that enable a person to engage in goal-directed, self-regulated, autonomous behavior*” (Field, Martin, Miller, Ward, & Wehmeyer, 1998, p. 10). In addition, S-D is considered as one of the nine areas of the Expanded Core Curriculum for students with vision disability (SwVD) (Hatlen, 2003). One of the most effective means to develop S-D, is the dramatic play. This is a type of play which is used very often in education and through these type children act out various roles challenging their imagination and creativity. Usually, dramatic play consists of four steps which incorporate a sequence of tasks and activities as well as instructional methods relevant to theatrical techniques in order achieve specific educational goals (Beauchamp, 1985; Koyretzis, 1991; Mellou, 1994).

In addition, SwVD usually face difficulties in making choices which can affect positively the level of their S-D. Simultaneously, SwVD are “*at risk of remaining dependent on others for life*”, if their S-D is underdeveloped (Wolffe & Rosenblum, 2014, p. 472). Furthermore, although S-D seems to be a crucial predictor of future employment (McDonnall, 2011) and quality of life (Chao, 2018) of SwVD, there are only few studies which investigate effective S-D practices (Cmar, 2019; Cmar & Markoski, 2019). All the above converge on the need to study more systematically the effect that dramatic play can have on S-D. The present study aims to fill in this gap by investigating the impact of dramatic play on students’ S-D who have vision disability.

2. Methodology

2.1. Sample

The sample of the present study consisted of parents of SwVD. The obtained data referred to their children S-D level, when the latter were involved in dramatic play workshops. Eight SwVD, aged 8-12, were involved in this study. SwVD attended a special education school of a large Greek city (above 1.000.000 residents). Three of them were totally blind and five had low vision. In terms of their gender, four were boys and four were girls.

2.2. Instruments

The AIR Self-Determination Scale (Wolman, Campeau, Dubois, Mithaug, & Stolarski, 1994), was used to measure the S-D level of the SwVD through their parents’ opinions. The Scale in question contains two (2) subscales: a. capacity for S-D behavior (what the child does) with six 5-point Likert question and b. opportunities for S-D behaviors which consists of two parts: a. opportunities for S-D behaviors at home with six 5-point Likert questions and b. opportunities for S-D behaviors at school with

six 5-point Likert questions. As a whole, the AIR S-D Scale for parents included 18 questions and the score could vary from 0 up to 90 and the overall score could be converted in percentages.

In addition, when the participating parents filled in the AIR S-D Scale, the researchers asked their opinion about the impact of dramatic play on their children’s S-D level. The questions were the following:

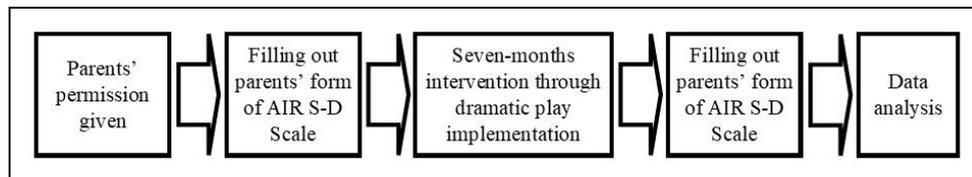
1. Do you believe that the dramatic play, in which your child participated in, empowered his/her level of S-D? If that was the case, could you kindly tell us how did you realize it?
2. What was the feedback that your child gave you regarding S-D and dramatic play?

The purpose of the last two questions was to obtain also qualitative data; for this reason, parental permission was granted in order to record the interviewing process.

2.3. Research procedures

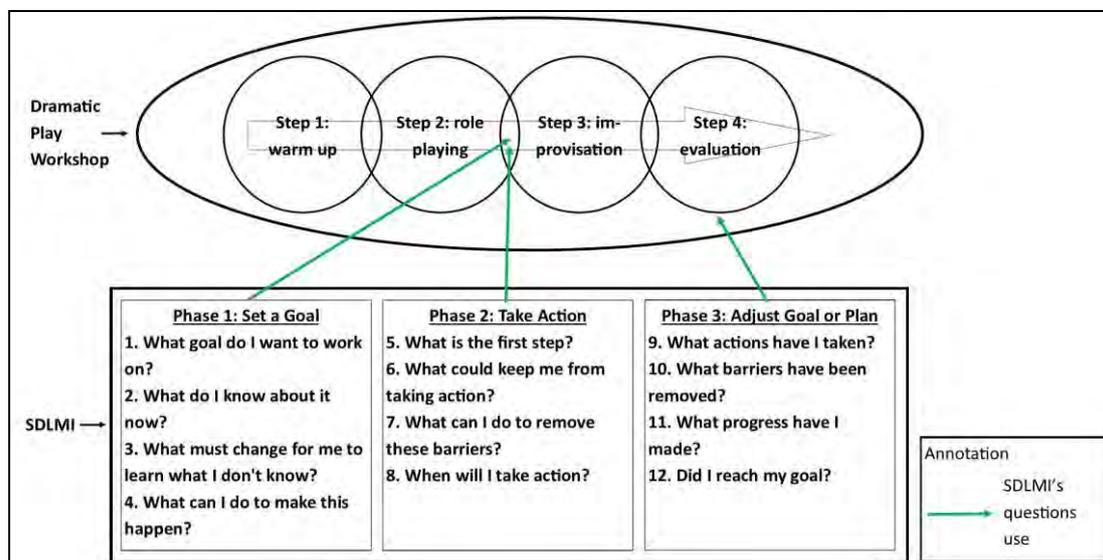
The present paper is considered as a quasi-experimental study which incorporates pre-test and post-test pre-experimental designs without control groups (Cohen, Manion, & Morrison, 2018). A seven-month intervention programme through dramatic play was implemented and its’ purpose was the acquisition and development of S-D skills of eight SwVD. As mentioned above, the parents’ form of the AIR S-D Scale (Wolman et al., 1994) was used to measure the S-D level of their children before and after the intervention (i. e. the involvement in dramatic play, see Figure 1). The intervention took place in a Greek special education school for seven consecutive months. After that data analysis followed in conjunction with the interpretation of the results.

Figure 1. Research Design.



The intervention process consisted of 19 dramatic play workshops. Each workshop lasted for 45 minutes and took place once per week. The structure of the dramatic plays followed the Self-Determined Learning Model of Instruction (SDLMI) and each dramatic play consisted of four steps (i. e. warm-up, role-playing, improvisation, and evaluation) which was enriched with theatrical techniques aiming at an educational goal (Beauchamp, 1985; Koyretzis, 1991). SDLMI is a 12- question model, grouped in three successive phases (four core questions per phase): a. phase 1 – set a goal, b. phase 2 – take action, c. phase 3 – adjust goal or plan. All three phases of SDLMI aim to a. acquire and develop S-D skills, b. set goals and attainments, c. achieve positive (post-) school outcomes, and d. become more self-determined person (Shogren, Raley, Burke, & Wehmeyer, 2019). The phases of the SDLMI were present in all nineteen dramatic play workshops and took place mainly in the last three steps (see Figure 2).

Figure 2. The structure of dramatic play workshop.



2.4. Data Analysis

The method which framed the present study may be characterized as a mixed method because both quantitative and qualitative data were used. The quantitative data were analyzed through IBM SPSS Statistics 24 (descriptive and inferential statistical analysis) and qualitative data analysis was based on general inductive methodological frameworks (Miles, Huberman, & Saldana, 2014). In addition, the qualitative analysis, was conducted through Atlas.ti 8 for Windows. The two researchers followed a coding system by distinguishing groups of data and tracing thematic patterns from the participants' responses.

3. Results

3.1. Statistical results

Based on parents' responses to the AIR Self-Determination Scale, it was found that the children increased their S-D level after their involvement in the dramatic play workshops. The overall increase was 4.6%, the increase regarding the "capacity subscale" was 14.33%, whereas there was no change regarding the "opportunities subscale" (see Table 1).

Table 1. Descriptive statistical results of parents' form of AIR S-D Scale.

Subscales		Mean	Std. deviation	Min	Max
Capacity Subscale	Before	17.7 / 30	6.2	7	25
	After	22.0 / 30	3.5	18	27
Opportunities subscale	At home – before	24.5 / 30	3.6	21	29
	At home – after	23.8 / 30	4.0	18	29
	At school – before	21.8 / 30	3.8	17	28
	At school – after	22.3 / 30	4.8	16	28
	Opportunities Overall – before	46.3 / 60	5.7	39	54
	Opportunities Overall – after	46.2 / 60	6.9	38	55
Scale Overall	S-D level – before	64.0 / 90 (71.1%)	7.0	54	75
	S-D level – after	68.2 / 90 (75.7%)	8.9	56	81

In addition, inferential statistical analysis (see Table 2) was conducted through Wilcoxon Signed Rank Test (Morgan, 2017) and it was found that no significant statistical changes took place ($p = .168 > .005$) regarding the students' overall S-D level before and after the intervention (i.e. their involvement in the dramatic play workshops). Finally, internal consistency was ensured since the value of Cronbach's α (Fan & Randall, 2018) was sufficient (before the intervention was .717 and after .881).

Table 2. Descriptive statistical results of parents' form of AIR S-D Scale.

Subscales & Parts	Means		Wilcoxon Signed Rank Test	
	Before	After	Statistic	p
Capacity	17.7	22.0	1.782	0.075
Opportunities at School	21.8	22.3	0.272	0.785
Opportunities at Home	24.5	23.8	0.687	0.492
Opportunities Overall	46.3	46.2	0.211	0.833
Overall S-D level	64.0	68.2	1.378	0.168

3.2. Qualitative results

Qualitative data analysis revealed six categories which were related to specific S-D skills. Very often the parents' reports referred to more than one S-D skills. All parents observed that their children's S-D skills had been improved during the dramatic play workshops.

1. *Self-Knowledge and Self-Awareness*: All parents discussed about their children's *self-knowledge and self-awareness* enhancement in terms of their characteristics and personality traits such as vision disability awareness and the pace of schoolwork completion. One mother stated that her child said "I feel that I can manage better in class when I work at my own pace ...", and similarly another mother reported that:

“I think that dramatic play helped my child’s self-knowledge more than the sessions with a psychologist, because during dramatic play, children expressed their feelings in an easy-going way”

2. *Self-Advocacy and Assertiveness*: All parents highlighted the fact that when their children started to reflect on themselves, then they started to develop *self-advocacy and assertiveness* skills. Parents underlined that their children expressed their needs directly and in a more appropriate and refined way. They asked for help when they needed without having second thoughts because of their vision disability. According to a mother, her child said: *“I can’t do this because I am blind, could you please explain it to me...”*. Also, parents held the view that all SwVD who were involved in the dramatic play workshops, started to take more initiatives in their daily life, such as dressing, food, type of leisure, etc.

3. *Goal Setting and Attainment*: Five parents mentioned that their children started to set their own goals regarding their daily life. For example, *“study faster to save time to play more with my toys”*, *“learn to play many songs on bouzouki (Greek music instrument)”*. The same parents also observed that their children worked in more persistent way to attain their goals, something that was not happening before the dramatic play workshops.

4. *Planning*: Four parents said that their children seemed to have a better understanding regarding the steps needed to achieve a goal. For example: *“I must learn to play on bouzouki that part of this song, until the next lesson, ... mum please record my play to hear it”*. Another mother mentioned for her child: *“I think that her thoughts are more structured now in order to achieve her goals and wants”*.

5. *Self-Evaluation and Self-Monitoring*: Three parents reported that their children had developed *self-evaluation and self-monitoring* skills in every day activities. Their children started to inform them about their progress and evaluate their performances at school or outdoor activities.

6. *Problem Solving*: Two parents realized that their children’s *problem solving* skills have been improved. According to their report, their children started to discuss about potential solutions to problems that they were facing during that time.

4. Discussion

The analysis of the data revealed that the use of dramatic play through workshops may be considered as a range of good practices in order to empower the level of S-D of SwVD. There is only another one similar study which measured the influence of an intervention on S-D level of SwVD via AIR S-D Scale (Levin & Rotheram-Fuller, 2011) and the results were comparable. Because of the small sample, the results cannot be generalized, but the qualitative data showed that the development of S-D skills in SwVD can help them to succeed in school and in daily life challenges enhancing their psychological empowerment as well as their pathways thinking mainly in problem solving and goal attainment (Shogren et al., 2015). It can also be argued that S-D skills in blind students’ lives constitute the critical mass of goal-directed and autonomous behavior (Shogren et al., 2015). Finally, it is suggested that the aforementioned issues, should be an integral part of a systematic educational policy for the provision of educational opportunities in terms of equality and inclusion for all children including children with vision disability.

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OPINIONS OF FUTURE TEACHERS ON COMPETENCIES FOR WORKING WITH STUDENTS WITH DEVELOPMENTAL DISABILITIES

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Abstract

A significant number of children in relation to educational institutions in the European Union, subjected to inappropriate and discriminatory position, represent the basis of the document *Union of Equality: Strategy for the Rights of Persons with Disabilities 2021-2030* (COM, 2021). At the same time, the social model of inclusion in education (Slee et al., 2019; Sunko, 2021) and articles 2 and 23 of the Convention on the Rights of the Child (1989) advocating equal rights of all children to education, indicate the dichotomy of desired and achieved.

Each individual, whether he/she has certain difficulties or not, differs in his/her abilities, and each of them has their “personal needs”. It is important to note that students with special educational needs are students with disabilities and gifted students. Meeting the diverse needs of students through inclusive practices is often difficult or even impossible for those teachers who have not acquired the necessary skills and knowledge, so it is imperative to empower and support teachers primarily through formal education so that teachers learn to use effective inclusive teaching methods at all levels (Loveys, 2022).

The aim of this research was to determine whether personal experience and student’s attended academic year of the teacher study (N = 304, all academic years) from three Teachers’ Faculties in the Republic of Croatia, correlate with their sense of personal competence, motivation for further professional development, or the need to change the study program.

The results of this research show that students’ personal experiences with children with developmental disabilities (DD) affect the sense of their personal competence for working with children with DD, and that students of all attended academic years are equally motivated to teach children with DD. They also point out the need for additional training, and 84.64% of them emphasize the importance of practice in learning that deals with teaching children with DD. Data suggest that the same percentage of students feel the need to change/adapt the content of the study program accordingly. The main feature and implication of this research is the insight into the development of future teachers’ needs for further higher education for teaching children with DD.

Keywords: *Children’s rights, professional development, school education, teacher skills, values.*

1. Introduction

The right to inclusive education is enshrined in Article 24 of the 2006 UN Convention on the Rights of Persons with Disabilities, guarantees the right to education without discrimination and presupposes that all persons with disabilities can access inclusive, quality and free early, primary and secondary education in their own community. States must also provide reasonable accommodation and individualised support to maximize the academic and social development of persons with disabilities. The *Strategy for the Rights of Persons with Disabilities 2021-2030* (COM, 2021) highlights “non-discrimination and equal opportunities”, with the aim of protecting people with disabilities from any form of discrimination and violence, thus ensuring equal opportunities and access to education and subsequent employment. In 2015, 193 countries around the world committed themselves through the 2030 Agenda to ensure inclusive and equitable quality education by 2030, as stated in the 4th Sustainable Development Goal (UN, 2015). This connected all positive and sustainable key reasons for inclusion as the best social investment in people and humanity.

Certainly, public education policies have influenced the shifts in the education of teachers for inclusion. However, a number of key issues remain that require the knowledge, competencies, and cooperation and solutions of all stakeholders responsible for the success of the inclusive process. The implemented activities would result in a better initial teacher education, more competent to meet the

different needs of students in inclusive educational environments (Global Education Monitoring Report, 2020). Florian and Camadea (2019) emphasize the importance of the Teacher Education 4 Inclusion project (2009-2012) which, although it identified the required skills, knowledge, understanding, attitudes and value system of future teachers, did not produce response models for developing different teacher training programs to work with students in an inclusive classroom. This research is therefore focused on the opinions and attitudes of students of three Teachers' Faculties in the Republic of Croatia on self-perception of their competencies and motivation to work with children/students with developmental disabilities (hereinafter DD) and what future teachers think about how adequate their study programs are in acquiring competencies to work with children with DD.

2. Objectives and hypothesis

The aim of this research was to determine whether teacher education students consider themselves competent to teach students with DD (considering the individual needs of students, level and amount of support, teaching strategies), whether personal experience with children with DD affects the sense of their competences, whether they are generally motivated to work with children with DD, and whether they need to gain additional competencies to work with children with DD. The need to acquire additional competencies would suggest the need to change the content of the study program at the Teachers' Faculties in Rijeka, Split and Zagreb.

The problems of this research dealt with: the relationship between personal experience and assessed personal competence to work with student with DD; the difference in the assessment of competencies between students who had personal experience with children with DD and those students who had no personal experience; the connection of the attended academic year with the motivation for teaching students with DD and the need to acquire additional competencies; the connection of the attended academic year (organisation of teacher faculties in Croatia, in sample) with the opinion on the need to change the content of the study program in order to acquire more competencies for working with students with DD.

From the goals and problems, hypotheses emerged which claimed that - There is a statistically significant high and positive correlation:

H1 – with personal experience of students with children with DD and assessments of personal competence for teaching students with DD, where students with personal experience are assessed as more competent than students without personal experience.

H2 – of the academic year with motivation to teach students with DD and to acquire additional competencies, while students of higher years of study are more motivated to teach students with DD and to acquire additional competencies than students of lower years of teacher training.

H3 - of the academic year with the opinion / attitude of students, on the need to change the content of the study program, where students of higher years of study believe that a greater change of program is needed to work with students with DD, than students of lower academic years.

3. Methodology

The survey was conducted using an online questionnaire completed from 28 October 2020 to 24 December 2020. All participants were guaranteed anonymity and confidentiality of data, and participated in the survey voluntarily.

3.1. Sample

An appropriate sample of groups of students from teacher education participated in the research. A total of 351 students participated, but the final sample consisted of 304 students with coherent answers. In order to achieve heterogeneity and sample size, we focused on all academic years of the Teachers' Faculties in Rijeka, Split and Zagreb. Teachers' faculties in the Republic of Croatia always last 5 years. Representation of individual years of study is shown in Table 1.

Table 1. Representation of each academic year in the sample of teachers from Rijeka, Split and Zagreb.

Academic year	<i>f</i>	%
1st	64	21,1
2nd	40	13,2
3rd	82	27,0
4th	46	15,1
5th	67	22,0
Together	299	98,4
Missing values	5	1,6
TOTAL	304	100,0

3.2. Instrument

The first part of the questionnaire contained questions related to general students' data such as gender, place of study, academic year of study, and whether they had any experience with a child with DD. The second part of the questionnaire referred specifically to the basic students' competencies for teaching students with DD and consisted of 31 items. The task was to assess which number on the Likert-type scale of 5 degrees, best describes how much each statement applies to them. The Likert-type scale of 5 degrees included (1 - *does not apply to me at all*, 2 - *mostly does not apply to me*, 3 - *neither applies to me, nor does not apply to me*, 4 - *mainly applies to me*, 5 - *completely applies to me*). The items referred to the experience of personal competence of students, motivation to teach children with DD, and the position on the need to change / adjust study programs at all three Faculties, in favour of developing competencies for teaching children with DD. In order to verify the constructive validity of the questionnaire on our sample, a series of exploratory factor analyses were performed. Factorisation matrix suitability index Kaiser-Meyer-Olkin was 0.88, and Bartlettov test sphericity proved significant ($p < 0.01$). According to the obtained values, it can be concluded that the sample used in this research is adequate. An exploratory factor analysis was performed, using the principal components method (PC), with orthogonal (Varimax) rotation. Nunnally and Bernstein (1967) suggest that correlations between factors after Oblimin (oblique) rotation be taken into account when deciding which rotation to use. Orthogonal rotations are used when correlations between factors are low. Correlations between the three factors after Oblimin rotation were -0.07 (1st and 2nd factor; *Motivation for teaching* and *The need to change the content of the study program*), -0.40 (2nd and 3rd factor; *The need to change the content of the study program* and *Assessment of personal competence*) and 0.21 (1st and 3rd factor; *Motivation for teaching* and *Assessment of personal competence*), and are not statistically significant. The extraction method was fixed on 3 factors, which explain 47,53 % variance.

4. Results and discussion

After the data collection was completed, they were processed in the Statistical Package for Social Sciences (SPSS), version 20. The results of Pearson's r (, 246) show that there is a statistically significant, positive, but low correlation between the personal experience of students with children with DD and the assessment of personal competence for teaching students with DD (Table 2).

Table 2. The connection between the personal experience of students with children with DD and the sense of personal competence for teaching students with DD.

		A sense of personal competence
Personal experience with children with DD	Pearson's r	-,246**
**. The correlation is significant at the level $p < 0.01$		

To examine the differences in the *Assessment of personal competence* between students who had personal experience with children with DD and those without personal experience, a t-test was calculated for independent samples and a statistically significant difference was obtained ($t = 4.17, p < 0.01$). Students with personal experience were (self)assessed as more competent to work with children with DD ($M = 35.95, SD = 5.44$) than students without personal experience ($M = 31.19, SD = 6.33$). Various researches (Kunz, Luder & Kassis, 2021) support a positive correlation between additional training of students (future teachers) for working with children with DD and assessment of personal competencies, but experience from the personal environment of future teachers brings a lasting impact on the formation of positive values towards children with DD, and consequently greater motivation to acquire better competencies for their teaching. (Frolin, Cedillo, Romero-Contreras, Fletcher & Rodriguez Hernandez, 2010).

From the results of Spearman's rho coefficient (,224) the relationship between the academic year of study and the motivation to teach students with DD, and the acquisition of additional competencies is visible in Table 3.

Table 3. Relation between the academic year of study and the motivation to teach students with DD and the acquisition of additional competencies.

		Motivation
Academic year	Correlation coefficient (Spearman's rho)	,224**
**. The correlation is significant at the level $p < 0.01$		

The same can be related to the research from Vannini (2011) whose results show that a clear desire and motivation for the teaching profession of students is defined between 15 and 19 years of age, and the acquisition of additional competencies in addition to personal experience is greatly influenced by contextual aspects such as GDP, institutional culture, sense of belonging (community, profession, etc.) and relationships with colleagues and teachers (Panadero, Fraile, Pinedo, Rodríguez-Hernández, Balerdi, & Díez, 2022). One-way analysis of variance (ANOVA) was used to examine the differences between students (future teachers) in the motivation to teach students with DD and to acquire additional competencies with regard to the academic year of study. The results of the analysis of variance indicate a statistically significant, but small difference in the motivation to teach students with DD and the acquisition of additional competencies between students, given the year of study ($F = 2.95$, $p < 0.05$), and an insight into the reliability intervals, *arithmetic means* and *post-hoc tests*, no significant difference was noticed between the students of each academic year of study. These results show that Croatia, with its three largest teacher training universities, ranks among the countries to which pre-service and in-service teachers have reported a need for more meaningful and high-quality professional development higher than average, in teaching students with special needs. (OECD, 2019b according to UNESCO, 2020).

From the results of Spearman's rho coefficient (-0.083 , $p = 0.175$) in relation to the academic year of study and the opinion of students on the need to change the study program in favour of acquiring additional competencies for teaching students with DD, no statistically significant correlation was observed. The results thus indicate the need for students of all faculties to change the study program regardless of the length of study. Namely, emphasizing the need of students to acquire additional competencies for work in an inclusive environment indicates a form of personal professional guidance and motivation to indirectly influence the evaluation, modification or adaptation of existing study programs according to their own needs. This indicates a newer paradigm in the education of teachers who, in addition to formal initial education, acquisition of knowledge and skills and professional development as part of an ongoing process, consider it important to include intrinsic motivation to (self) manage their personal professional development (OECD, 2021).

5. Conclusions

The first confirm hypothesis show that students who have personal experience with children with DD (self) assess themselves more competent to work with children with DD than those without personal experience. The second hypothesis was partially confirmed, and although it shows a positive correlation between variables, academic year of study with motivation to teach students with DD and acquisition of additional competencies, no difference in motivation was found with respect to academic year of study. This result raises new research questions about the quantity and quality of competencies acquired during teacher education for the implementation of inclusive education, as well as about areas of competencies that future teachers consider insufficient. The third hypothesis has not been confirmed. Students of higher academic years of study do not indicate a greater need to change the content of the program with regard to working with children with DD than students of lower years of teacher training. Such an opinion can be clearly linked to the new paradigm of teachers in education, and the need for future teachers to regardless of acquired knowledge and competencies to strive to manage personal requirements within professional development and point to the need to change the study program to work in an inclusive environment. Taking into account the results of this research, especially the confirmation of the first hypothesis, the way in which education contributes to the development of inclusive culture and the increasing inclusiveness of education praxis, there is a need to reorganise future higher education curricula to enable all students to acquire additional competencies and practical experience for working with students with DD. This research has clearly shown that future teachers of these Universities have the need and motivation to demand a more coherent approach to their own education, and also to understand the importance and opportunity of initial higher education to acquire additional knowledge and skills to achieve inclusive goals. The adoption of the UN Convention on the Rights of Persons with Disabilities in 2006 and the 4th Sustainable Development Goal 2015 has created a framework that needs to be practically implemented and continuously adapted. The inclusion of children with development disabilities and special needs, is a social process (Sunko, 2021), and teachers' opinions and attitudes are an important part of the educational process and the quality of inclusive practice. It is an imperative to hear them.

6. Implications and Limitations

The advantages and implications of the research conducted in this paper represent an appropriate insight into the always current opinions of future teachers as bearers of inclusive pedagogical practice.

Science directs towards the development of inter-institutional cooperation that includes a *bottom-up* perspective of students as future teachers in an inclusive environment and educational policy makers (Skedsmo & Huber, 2019). The original idea of this paper was to gather a heterogeneous sample of students from all faculties at these three Universities, with a sufficient amount of data for processing. However, due to the insufficient number of responding participants from the two Universities, the analyses could not be carried out adequately, which we consider to be a lack and at the same time a limitation of this research. Statistical analyses were mostly focused on correlation, so the cause-and-effect relationships between variables were not investigated in this paper. It remains within the scope of the proposal for some future research.

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**+YOU: ASK YOURSELF, ACT AND MAKE IT POSSIBLE!
 PHERECLOS PROJECT: A LOCAL EDUCATION CLUSTER AT PORTO,
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Abstract

U.Porto plays a major role in the Northern region of Portugal and intends to continue to play a major role in the development of the region's future, especially establishing connections with schools and its community, municipalities, companies, and others. establishing a Local Education Cluster (LEC). Based on the experience of the University of Porto (U.Porto) regarding young public engagement through many different succeeded initiatives, like Junior University and U.Porto's Fair, the University aims to promote a closer relationship with schools and many stakeholders and not just opening its doors to the school public. These activities are well succeeded stories that illustrate the strong impact of such activities in the development of the region, together with their mobilizing effect on key stakeholders. In H2020 Partnerships for Pathways to Higher Education and Science Engagement in Regional Clusters of Open Schooling Project (PHERECLOS) U.Porto developed several entrepreneurship workshops based on an inquiry approach highlighting the importance and role of student's questions. The U.Porto intervention in this H2020 project also engaged the participation of families and CEOs from companies with some storytelling activities. This activity was an inspirational factor to develop students' involvement, strengthening the connections with the school project and also acted as a motivational factor. Other educational activities aimed to help students with innovative ideas and entrepreneurial challenges to follow in future careers, by highlighting STEAM competences that they can use in the future. All activities are done through collaborative work allowing students to learn with others and gather ideas, ambitions and interests in different careers. This group sharing initiative promotes and stimulate rethink in new approaches for a future job by the engaged students that voluntarily participated. With success in its initiatives for School Opening to society, PHERECLOS project developed diverse Local Education Cluster in the different partners' countries that will ensure the continuation of the PHERECLOS aims in future activities even after the end of the project. In this presentation, we aim to introduce LEC developed by the UPorto University and explain how family members were invited to engage with the school community. In this moment our LEC involved almost reached 100 students and more workshops are schedule to be developed with students from two public schools. The results show an increase of students' interest in entrepreneurship and a higher motivation in their academic future and employment.

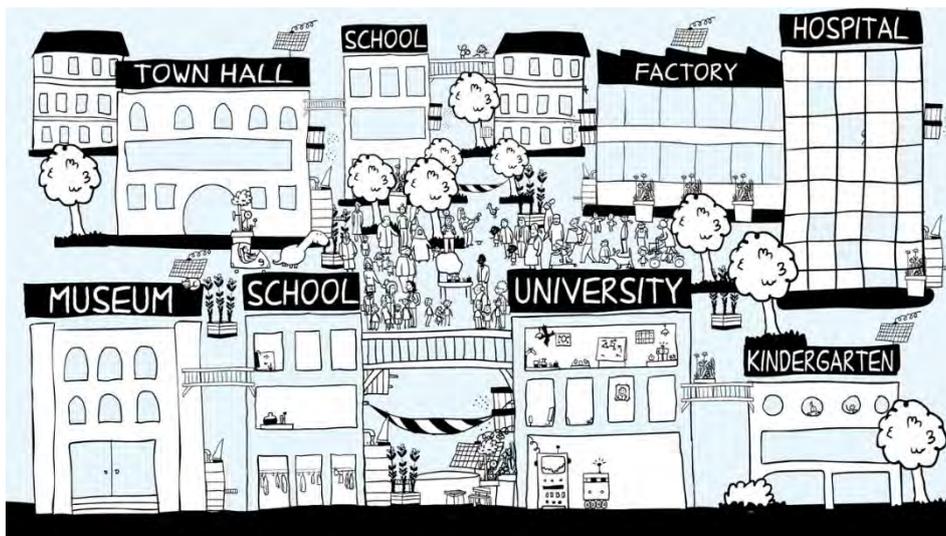
Keywords: *Education, entrepreneurship, stakeholders, public engagement, schools.*

1. The PHERECLOS project

The PHERECLOS project (Partnerships for pathways to **H**igher **E**ducation and **S**cience **E**ngagement in **R**Egional **C**lusters of **O**pen **S**choolin) builds upon the theory of science capital and on the experience accumulated over several years at Children's Universities, an important component in the Third Mission of Universities.

The PHERECLOS project (H2020 Project; Grant Agreement: 824630) aims to establish a total of six "Local Education Clusters" (LECs), which bring together schools and other relevant actors, such as business, universities, civic society organizations and educational providers, in the educational environment, supported by a mentoring program between pairs. The LECs will be local education facilitation groups that will enable dialogue between partners and help to establish joint activities in education (formal and non-formal activities) that help to develop learning environments (Figure 1).

Figure 1. The evolution of a Local Education Cluster.



(Source: <https://www.phereclos.eu/media-centre/>)

At the same time, LECs aim to impact the quality of opportunities for scientific engagement in a variety of areas. This ecosystem will witness the development of individual capacities through formal and/or non-formal STEM educational means. The operation and regional impact of similar initiatives to similar studies by know-how to implementation, are intended to cause deviations and consequences and good practices for the future.

2. The University of Porto “Junior University”

2.1. The Portuguese context

At the end of the 20th century occurred a massive expansion of the Higher Education (HE) in Portugal. Over the 1975-2001 period the average annual growth of enrolment in the tertiary education exceeded 5% (almost an exception amongst the OECD countries). Nevertheless, and despite the very high enrolment growth rate, the level of HE attainment in Portugal was still low. Moreover, during the first five years of the 21st century the Portuguese students' dropout rate, among the basic and secondary schools, was around 38.5% (46.2% for males and 30.25% for females) [Pordata - <https://www.pordata.pt/>].

It was expected by the Ministry of Education that the basic school learning reach 12 years, which happened five years later, in 2009. Government has dwelled with the problem in two main ways: on one hand, by diversifying the offer of basic and secondary level courses, notably by a wide variety of “training” and “professional” courses directed to students which don't want to follow the “regular” school curricula, but also to school dropouts, and to adults already part of the workforce who wish to improve their qualifications; on the other hand, and subject to much criticism, it has developed procedures of “recognition and validation of competences” that have spectacularly risen the number of graduates from each of the educational cycles.

Many initiatives (e.g. Junior University) begun to grow in order to attract the primary and secondary education students to HE and motivate them to pursue knowledge in many different subjects. As referred by some authors the individual in question (their motivation) and the immediate circle both actively participate in the formation of the conscious job choice (Balakhonov et al, 2021).

2.2. The junior university

The Junior University (Universidade Júnior - U.Jr) is a very large educational program conducted during the summer months by the University of Porto. The U.Jr. is directed mainly at the 10-18 age group. Junior University is a summer program that has a purpose of dissemination of different areas of knowledge, offering summer courses designed by university professors, for the youngsters. U.Jr. is a ground-breaking and very successful summer school from U.Porto that began in 2005 with the main purpose of promotion of knowledge in science, technology, and mathematics, art, humanities, and sports, with the goal of enticing newcomers to Porto University (Marques et al, 2012).

The program offers non-formal activities that cover a wide range of areas, from basic sciences to technologies, from humanities to arts and sports, that allow students to acquire knowledge, that can help

them in formal education contexts and everyday life activities. It also has the purpose to provide support in the process of vocational choice and return to society a part of the investment that was made and contribute to mitigate the low HE rates of the country, one of the aspects that throughout history has been one of the main reasons for the country's underdevelopment.

The Junior University has as main goal the promotion of knowledge – in the fields of science, technology, arts, humanities and sports – among basic and secondary level pupils. To this end, several learning programs and small research projects are annually designed by university lecturers and executed mostly by undergraduate and graduate students, under supervision, and in some cases junior researchers. Usually at each edition counts with more than 150 different activities covering many different areas of knowledge.

The University of Porto has been identifying and establishing many partnerships that are growing since the beginning of the Junior University, especially in what concerns the development of educational activities and relation with the youngsters. For instance, the House of Music, the Serralves Foundation, the Gaia Biological Park and the Ciência Viva Agency and many others jointed more recently such as Arouca Geopark, Museum FC Porto, CICCOPN, Transport and Communication Museum, Portuguese League Against Cancer, etc.

Figure 2. Junior University final meeting at the House of Music.



An important component of the U.Jr. is the promotion of pupils from underprivileged socioeconomic groups through a wide partnership with several Portuguese municipalities, associations and enterprises. Junior University has been establishing across the country many agreements with almost 50 municipalities, associations and enterprises. These strong connections have a major importance for the project because they grant the social inclusion of pupils from underrepresented groups in the summer courses.

The U.Jr. has been addressing multiple issues: vocational orientation, introduction to specific scientific areas or topics, the promotion of higher education and knowledge-based careers, and provides a glimpse into everyday life at the 14 schools that integrate the University.

During July and September, it's interesting to see the University campus full of young students and watch all the interactions that they establish each other. Every years (since 2005) almost seven thousand students enrolled in our activities. They come from all over the country and from other countries as well.

These connections and networks between the pupils continue beyond the participation in the summer courses. The pupils often contact the University of Porto, sometimes within the framework of some work they are doing with their teachers at school other times to exchange some points of view or to ask some details about a possible choice for the future at the university.

We are aware that very diverse factors shape student choice of the university, but we are sure that about the promotion of knowledge among young people, indirectly translated in HE student recruitment.

3. The University of Porto local education cluster

The Porto LEC integrates institutions ready to develop new collaborative open schools to society ecosystems, providing teachers with valuable skills and promoting connections between schools and their communities. It is based on the knowledge, expertise, and good practices of LEC's partners.

In Portugal, non-formal education has a special favorable context in primary schools, not being really formally developed in higher levels of education. Due to national exams, students from the secondary level are not really motivated to be involve in non-formal activities – they prefer to focus their time to study the conceptual knowledge to have higher grades to apply for a faculty student position. To younger students, non-formal teaching and learning activities typically include visits to museums, to biological parks, to biodiversity galleries or botanic gardens, to scientific centers or even geoparks. Some teachers also develop visits to enterprises and research centers as part of the schools' vocational orientation program.

Some Junior Universities, all over the country, open their activities in the end of the school year to develop students' interest for many different areas of knowledge. The attendance to Junior Universities' activities is high and raises every year, not only for the motivational process promoted but also as a quality leisure time.

Porto LEC involved several schools and new partnerships to welcome innovative teaching projects in open schools to society in a close relation. These non-formal education exchanges will gather the experience of professors, professionals, teachers, families, and students.

STEAM4E "E" of Entrepreneurship was the project's motto. Porto LEC aims to foster creativity and entrepreneurship ideas among young people. The students' outputs, learning outcomes, and ideas will be vital to reach LEC goals. Students who engage in STEM contests (such as robotics, engineering, and scientific fairs) and afterschool STEM-related programs are more likely to express interest in a STEM-related field of work than those who do not participate (Miller et al, 2018; Maiorca et al, 2021).

Some of the actions developed were based on connections between the schools and the University, and also some inspirational talks and conferences were organized with the aim of covering some topics related with STEAM (Science, Engineering, Arts and Mathematics). One of the actions was related to a truss structure project after an approach of several concepts related with physics and forces (application, direction, direction and intensity), causing acceleration of materials particles. These forces are the cause of the cohesion or breakdown of matter, traction or compression, among many other phenomena.

Students were able to understand how the trusses work, relating with many buildings or bridges structures. This was followed by a project where students built bridge models using ice cream wood sticks (Figure 3). These students were organized into teams and all the models produced were submitted to the application of a load, in order to measure the maximum load supported.

Figure 3. Example of a structure built by students.



At the same time, some workshops on youth entrepreneurship were developed, exploring also this component. Whenever possible, it was integrated the third generation (grandparents) in the professional development of the students, through the promotion of storytelling between students, the third generation and market players. The entrepreneurs, with their own expertise, contributed for new knowledge development with short lectures during visits to the enterprises.

The starting point for the entrepreneurship approach was a process of inquiry among the students (basic and secondary) about their future interests and expectations related with the project, then a program about entrepreneurship for the secondary students, was developed by Porto Business School of the University of Porto - 12 hours' workshops were an overview of innovation entrepreneurship journey; a hands-on dive into relevant tools and methods for entrepreneurship and a way to learn, co-create and meet like-minded people. Concepts related to business plan, marketing strategies, startups, innovation, design thinking were addressed. Building a startup is often very motivating, inspiring and usually rewarding with full of new learnings, experiences, unexpected opportunities and challenges, that's why startups are called ventures or journey, and also referred as a rollercoaster ride. In startups students will learn more about world, people, business etc. more than they can imagine.

While ultimately the path to success requires entrepreneurial mindset, hard work and commitment - deciding to start that path is easy and best way is to "just do it" - take the first step. What is needed is a curious mind and motivation to build something new and meaningful together with others.

In the entrepreneurship workshops students discussed relevant concepts from the innovation entrepreneurship lexicon, learned about the startup journey and critical aspects of each phases understanding the startup development phases (problem, vision, product, business model and market fit).

4. Final thoughts

To develop some activities students were gather in groups and in every cohort was clearly perceptible a change in mindset. In the beginning of the workshops, students would verbalize their lack of entrepreneurial and creative skills, but every time it ended up with them being proud of the work they developed, the problems they explored and the prototypes they built.

These are the critical competences that students should embrace and take to their personal and professional lives - analytical and creative thinking, empathy, bias towards action, and an investigator mindset.

They learned that building businesses and coming up with innovative concepts is about constantly validating hypothesis - truly as a scientist - that starts with a blank page, a neutral conception regarding a given topic or problem, and goes exploring a new phenomenon or, as in Porto's LEC, an opportunity.

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A PEDAGOGICAL APPROACH FOR SOCIO-CULTURAL INCLUSION: A STUDY ON IMMIGRANT ENTREPRENEURS IN FINLAND

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Abstract

According to the United Nations in 2019, the number of migrants worldwide reached 272 million and the wave of migration is expected to increase after the pandemic. As the number of immigrants increases, a strategy for their socio-cultural inclusion becomes essential. Finland is a Nordic country with a limited population that considered culturally, ethnically, and linguistically homogeneous, however, it is gradually changing as the number of immigrants increases. Promoting the integration of migrants and increasing their access to public services, labor market, private sector and opportunities in the host country is included in the strategies of the European Commission. Regarding the importance of entrepreneurship in the cultural inclusion of immigrants, this case study was conducted with an emphasis on the role of information technology in facilitating entrepreneurship for immigrants in Finland. Accordingly, a group interview was conducted to understand the challenges that migrants encounter in obtaining the information that they need. The results showed that immigrant entrepreneurs with different fields and backgrounds had difficulties finding some required information on Finnish websites. Some information or sources of information are known to locals while unknown or inaccessible to immigrants. In addition, participant of the study expected more variety and interaction in content on Finnish websites. This study proposes technological pedagogical content design (TPCD) as a systematic approach to design websites with more attention to multicultural users. TPCD assumes immigrants as learners who need to learn the new knowledge and skills in the host country. It utilizes pedagogical principles to define the needs of immigrants to clarify goals, create and organize content, and design web pages.

Keywords: *Socio-cultural inclusion, immigrant entrepreneur, TPCD, user-centered design.*

1. Introduction

Based on a United Nations (2020) report in 2019, the number of migrants worldwide reached 272 million. According to Eurostat (2022), 23 million non-EU citizens lived in the EU in 2020 which represented 5.1 % of the EU population and 13.5 million with citizenship of another EU country. Immigrants in any country need to be adjusted, integrated, and cohesive in the host country. In a general sense, inclusion refers to “the process of increasing the degree of participation of all citizens in social life” (Chernukha et al., 2021, p.213). The Council of Europe has defined social cohesion as “the ability of a society to ensure the welfare of all its members, minimizing disparities and avoiding polarization” and promoting immigrant inclusion and social cohesion is at the core of the work of the International Organization for Migration in Europe (IOM, 2022). Increasing immigrants' access to public services, the labor market, the private sector, and opportunities in the host country are key strategies for their cultural inclusion. In this regard, this study investigates some of the challenges of the socio-cultural inclusion of immigrants, to find information for entrepreneurship in Finland.

2. Cultural inclusion of immigrants in Finland

Finland is a small country with a limited population that is still considered culturally, ethnically, and linguistically homogeneous. With the growth of the European Union, which facilitates greater labor mobility, Finland is gradually changing. According to Finnish statistics, the immigrant population was about 444,000 out of 5533793 at the end of 2020. (Statistics Finland, 2020). The Finnish Institute for Health and Welfare defines inclusion as the meaning that “everyone’s right to health, education, work, income, housing, and social relationships. Everyone should have the possibility to participate and exert influence in matters that concern themselves and the development of society” (FIHW, 2022). However, there is still no clear definition of the social cohesion of migrants, according to FRANET, the Agency's

multidisciplinary research network of contractors in each EU country. Only some aims have been identified in the government integration program for 2012-2015. One of the aims outlined in the programme is “to bring the level of immigrants’ living conditions closer to the general population in the areas of housing, income, employment, education, and participation. The measure proposed to achieve this is monitoring of living conditions of immigrants and considering positive measures as a result of monitoring” (Sams & Anttila, 2015, p. 7).

3. Employment and cultural inclusion

The concept of cultural inclusion is linked to the employment rate of immigrants in the labor market (Sotomayor-Morales et al., 2017). Unemployment is an obstacle to the socio-cultural inclusion of immigrants by keeping immigrants in their cultural repression as a disconnect from society. Studies have acknowledged a bilateral relation between cultural compatibility and business success in the host country (Jun, Gentry & Hyun, 2001; Tretyak, Weck & Ivanova, 2013). Martínez and Prior (2011) believe that the social integration of immigrants is closely related to their presence in the labor market and the development of sustainable employment paths. Employment as a major source of income and position of individuals is essential for the integration of economic migrants into host societies. In fact, the employment of immigrants is important both in socio-cultural and economic terms.

As the number of immigrants in Finland increases, a strategy for their inclusion becomes essential. According to the UTH survey (2014), people with a foreign background accounted for about six percent (144,000) of all employed people aged 15 to 64 in 2014. The survey found that Finnish origin people have an employment rate of 10 percent higher than those with a foreign background and that the unemployment rate is even higher among educated immigrant women: 62 percent for foreigners, compared with 83 percent for highly educated Finns. Despite of efforts and strategies to enhance the cultural inclusion of immigrants in Finland, still, the unemployment rate of immigrants living permanently in Finland was higher than the total unemployment rate (27.5% vs 0.7%) in 2021 (Yle, 2021). Heikkilä, research director of Migration Institute of Finland believes: “Immigrants are sometimes ready to take a job not corresponding to their education just to get on the first step of the labor market and through this integrate into society”. He believes some factors may be responsible for this discrimination, such as language barriers or foreign certificates that are not valued in Finland (Heikkilä, 2021). The unemployment of immigrants has negative effects on the economy and culture of the society. Finland, therefore, seeks to increase labor migration and international students for the future (Valtion Koulutuspoliittinen Selonteko, 2021). While there is a negative significant relationship between the regional employment rate and immigrant self-employment rate (Fornaro, 2018), facilitating immigrants’ entrepreneurship seems important. Given the importance of information technology, this study focuses on the role of information in facilitating immigrant entrepreneurship and their inclusion in Finnish society.

4. Immigrant entrepreneurship in Finland

According to Merriam-Webster, an entrepreneur is “one who organizes, manages, and assumes the risks of a business or enterprise”. In this sense, entrepreneurship is the process of starting this business. Entrepreneurship is defined as a fundamental strategy for economic growth. Based on the OCE report “The self-employment rate in Finland was below the European Union average in 2016 (12.4% for Finland vs. 14.0% for the EU)”. The Finnish environment for entrepreneurship appears to be strong, with the aim of achieving a national employment rate of 78% (OECD, 2017), however, the current rate of immigrant entrepreneurs in Finland is not significant. According to a UTH (2014) survey, full-time and part-time employment for salaried employees with foreign experience in the age group (26 to 64) was relatively similar to the Finnish age group (14 to 25) in 2014. Immigrant employees and entrepreneurs also differed slightly in terms of working hours, shifts, and field of entrepreneurship. The data of the nationality of immigrant entrepreneurs in Finland shows that at the lowest level are immigrants from sub-Saharan Africa (including Somalia, one of the largest immigrant communities in Finland) with an entrepreneurship rate of 4%. At the other end of the spectrum is the highest self-employment rate for immigrants from Turkey, at around 40%. The industry with the largest share of immigrant entrepreneurs in the restaurant business. Other industries in which immigrants work most are personal services such as hairdressers, beauty salons, etc. (Fornaro, 2018).

5. Methodology

The purpose of this study is to understand how foreign entrepreneurs in Finland find the information they need. Accordingly, a group interview was conducted to understand the challenges that

migrants face in accessing the information they need. In coordination with Suomen Yrittäjät in Finland, six immigrant entrepreneurs of different nationalities were participated in an unstructured interview. The Suomen Yrittäjät is the largest and most influential business federation in Finland. The company consists of more than 115,000 businesses of different sizes from all over the country. The group interview was conducted online with unstructured questions. It helps the participants share their unexpected experiences. Interviews were recorded and transcribed, and the results were obtained through thematic analysis.

6. Results

The results of the study demonstrated that entrepreneurs have encountered some difficulties to access the information they needed to start and continue their business in Finland.

6.1. Lack of content

There is some information who immigrants need to know but they are not available online while it is obvious for the local people. Entrepreneur A. believed “there is a huge gap in information about running a business, especially for someone from a different [country and] background running a business in Finland”. Entrepreneur C. stated, “there is a lot of information that people (immigrants) even do not look for them and do not know it exist”.

6.2. Finding content

In addition to the lack of content, finding and accessing some available information seems to be a serious challenge for entrepreneurs. *“They [immigrants] may not have the same organization as Suomen Yrittäjät that they seek [in their own countries],”* Entrepreneur D. said. The other entrepreneur believed that for some businesses, such as opening a restaurant, the rules may be well known and similar, but for a particular industry, they have to know many specific rules that they cannot find. He needed to know what the law is and what the restrictions are on sales, etc., and he has not yet found a source to learn them. *“There are a lot of [forbidden] rules in sales marketing that took me 5 to 6 years to realize,”* he said.

6.3. Diverse and interactive content

The participants believed that there is a need for practical information and presenting information in different formats. One of the participants suggested including podcasts and videos. Another stated *“You can see many organizations (websites’ organization) have many materials that you get bored, and you become lost in those materials. Nowadays there is a need for audio and video materials when you are not required to read”*. Entrepreneur F. expected websites to be more interactive: *“information of the different industries be available [on the personal profile in the site] like a calendar year so that an entrepreneur receives the alarm that what, when and which action should be done [in its exact time].”*

7. Discussion

Immigrants are a potential human resource in a host country, especially for the aged countries. Analysis of the age structure of the population in Finland shows that the average age of foreign nationals is lower than that of Finnish nationals; an average of 45 vs 36 years (Eurostat 2022). Immigrants, especially the educated, consider their cultural integration and inclusion to be more related to employment in a decent place in the market, rather than having Finnish friends or attending Finnish events to feel part of Finnish society (Hosseini et al., 2020). Although Finland has made great efforts and investments to integrate culture and include immigrants, the unemployment rate in Finland is still higher than that of locals, and migrants’ wages, working hours, and shifts vary from locals, the UTH report said. In addition, people with foreign backgrounds were less likely to be employed in specialized occupations than people with Finnish backgrounds, and compared to people with Finnish backgrounds, people with foreign backgrounds were somewhat more involved in service and sales, as well as in other labor occupations (UTH Survey, 2014).

Familiarity with the rules is an important key to success in entrepreneurship and business. The available data show that foreign residents, originally from Western and Southern Europe, have a slightly higher entrepreneurship rate (12%) than the self-employment rate of the entire immigrant group (Fornaro, 2018). The probable reason is that they may be more familiar with commercial law in Europe. Websites are one of the most important ways of distributing information (Hosseini et al, 2022_a). However, some deficiencies in the content of the website have been reported due to lack of expected content (Bernstein, et al., 2021) or difficulties in finding and reading content despite the ability to access and pay too much attention to the aesthetic features of the web pages instead of appropriate content (Shao et al., 2020).

As the results of this study show, Finnish entrepreneurs as locals may be familiar with many regulations, which an immigrant entrepreneur with different needs and backgrounds may not be aware of. It reduces the usefulness of content on websites for immigrants in Finland. While the culture of silence and privacy, communication seems a challenge for foreigners in Finland (Hosseini & Sirkku, 2021; Hosseini, 2022), some Finnish websites (such as the university website) have also shown that they do not meet the needs of foreigners (Hosseini et al., 2020). All these together further hinder the cultural inclusion of foreigners. This may be due to Finland's homogeneous population, which has left locals familiar with the information and how to access it, while foreigners are confused about finding information from the right people, resources, or on websites. With the rapid growth of immigrants in Europe, especially Finland, websites need to be multiculturally designed. Since immigrants are adult who needs to transform their knowledge, we suggest using pedagogical theories principles specifically for designing websites.

Surprisingly, none of the entrepreneurs interviewed complained about the language barrier to receiving information through the website. Maybe because some of them were familiar with the Finnish language or more probably, if the information they need is available, findable, and accessible on the Finnish sites, they could use the software to translate and understand it if the information is readable or transferable formats by software. However, a fact is that many important applications, documents, and forms on non-translatable Finnish language formats, which makes the language barrier more prominent for non-Finnish speaking users. Regarding the growth of immigrants in Europe, especially Finland, an integrative pedagogical model has been proposed for the design of a multicultural website.

8. Conclusion

This study focuses on the relationship between employment and socio-cultural inclusion and the role of access to information in employment and entrepreneurship, especially among immigrants. Despite the high rate of immigrants' unemployment in Finland, immigrants are encouraged to be an entrepreneur. Since the immigrants are new in each society, they need to learn new knowledge, skills, and attitude as adult learners and websites are the potential sources to answer their need. However, finding unbiased, accurate, and up-to-date information from websites in the host country seems to be a challenge for them. With a pedagogical viewpoint, this study introduces Technological Pedagogical Content Design (TPCD) to prepare and present the required information for immigrants (Hosseini et al., 2021). This is a model for integrating pedagogy into technology (Hosseini & Kinnunen, 2021) and designing a user-centered website (Hosseini et al., 2022_{a, b}). TPCD is a systematic approach based on Technological Pedagogical Content Knowledge (TPACK) framework that utilizes information technology strategies as well as pedagogical theories and methods such as user experience (UX), human-computer interaction (HCI), web-based learning, and user-centered design. TPCD focuses on the needs, expectations of immigrants as adult learners learning new knowledge and skills in the host country and utilizes pedagogical theories and principles for each stage of information transfer (Hosseini et al., 2022_d).

Pedagogical integration in designing a website has more focus on human learning functions in technology design. Pedagogical findings provide knowledge about how the immigrants receive, communicate, and understand new concepts through the website. Further, it helps designers to systematically define the immigrants' needs, expectations, experiences, abilities, culture, learning styles, etc., as well as which materials are right for them. Due to the variety and background of immigrants, it is recommended to provide alternative content for different immigrants with different backgrounds. By considering the results of learning theories, designers find a clear picture of the human mind in the face of different information and data formats. This can help designers organize content across pages so that immigrants can find it easier, faster, and more efficiently (Hosseini et al., 2021). Pedagogical knowledge can help web designers in every stage of creating a website. For example, Gestalt design principles are examples to guide web designers to use graphic techniques based on mind processing (Hosseini et al., 2022_d). Overall, the integration of pedagogical theories and principles assists the designer in collecting data, formatting, organizing, and presenting the content based on multicultural users (immigrants and locals) which facilitate socio-cultural inclusion and integration of immigrants.

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HOW MEANINGFUL WORK AND SOURCES OF MEANING CHANGED DURING THE PANDEMIC: AN EXPLORATORY STUDY

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Abstract

The COVID-19 pandemic has affected many aspects of our life leading to a completely new world, increasingly complex and uncertain. This is also evident in the workplace, especially on how employees experience and perceive their work. Indeed, it is not surprising that current critical reflections in the study of work and organizations give attention on the challenges on individuals' wish for meaningful experiences at work. The current debate focuses on how employees can get lost in terms of their sense of work in the face of job demands, responsibilities and working hours. From here, it is central that in the face of new working methods and conditions, organizations behave to guarantee the quality of work and the degree to which work can be a source of meaning. This study has exploratory purposes and intends to investigate the relationship between the dimensions of quality of work and the dimension of meaningful work in the context of the post-pandemic. The data were obtained with a pre-test–post-test design, i.e., before and after restrictions due to the pandemic, through a survey administered online to about 145 workers. We investigated (a) the level of quality at work considering the dimensions of training, safety and communication at work, and (b) the Meaning in Work construct and the related sources of coherence, significance, purpose and belonging. We analysed data via the Structural Equation Modelling to explore the predictive role of job quality for meaning in work dimensions. The results indicate that the latent variable of job quality, described by the observed dimensions of organizational safety and training resources, at time 1 affect meaning in work dimensions respectively at time 1 and time 2. The results of the present study are relevant both for directing further studies on the topic of meaningful work and for organisations wishing to foster meaningful work and link sources. In the context of top-down work redesign process, our results offer initial implications about the role of job quality for sustaining employees' wish for meaning in their work. The present study represents one of the limited studies on the sources of meaningful work and posit initial insights on how to foster meaningful work. Moreover, this happens in the context of the post-pandemic, supporting initial comprehension about whether organizations can support individuals' quest for meaning in this uncertain time.

Keywords: *Meaningful work, Source of meaning in work, COVID-19.*

1. Introduction

Growing interest on meaningful work is due to associated positive implications for employees and organizations, e.g., individual wellbeing. Meaningful work represents a positive phenomenon at work which can ensure personal growth and guarantees a sense of usefulness in society, thus a greater commitment to one's work. For instance, regarding mental health, people perceiving their work as meaningful and satisfying report less anxiety and stress (Allan et al., 2016). However, despite the amount of literature on definitions and conceptualizations of meaningful work, in which scholars examined how individual, job, organizational, and social factors are contributing to meaningful work, there is still no cohesive comprehension of how these factors interrelate (Tommasi et al., 2020).

Furthermore, there is a lack of research concerning how and to what extent sources of meaning in work and meaningful work itself can be leveraged by pandemic, i.e., job quality post-pandemic. Due to the public health emergency status declared internationally for the COVID-19 pandemic since March 2020, a number of protection measures were adopted to maintain people safe. In most of the countries this has resulted in reducing mobility and activity to essential tasks and services. For sure, global pandemic has significant economic, social, and public health consequences: halt of production and significant loss of jobs, increased poverty, reduction on the population's mobility, acquisition of new hygiene habits,

development of psychological distress often turning into illness, overcoming of hospital resources (Gómez-Salgado et al., 2020). In this critical situation, also work and the way people handle work changes.

Considering this, the study aims to analyse how the quality of work is perceived by employees in pandemic times, e.g., if there is a perceived worsening quality of work as a result of the implementation of anti-covid rules, if there is a proper level of health protection at work, if employees develop higher or lower sense of work changing their way of perceive it with regard to the type of contribution it can make or its usefulness. It is also interesting to look at whether the dimensions that are considered to be sources of meaning for workers (coherence, significance, purpose and belonging) also change at organizational level (Schnell & Hoffmann, 2020; Tommasi et al., 2021).

The present study aims to explore the relationship between the dimensions of job quality and the dimension of meaning in work in the post-pandemic context. The COVID-19 pandemic has affected many aspects of our lives, and it is to be expected that among these changes there may also be a change in the meaning of work. In particular, it would be interesting to understand how employees perceive their job quality in terms of safety, compliance with new covid standards, and new ways of working. In the present study, we sought to understand how the so-called sources of meaning at work could be influenced by the perceived level of work quality.

2. Method

The on-going pandemic has affected many aspects of our lives (Correia & Almeida, 2020). This is having also a notably impact on work life, and particularly on how employees perceive the meaning of their work. Due to work pressure, increased job demands, responsibilities, introduction of smart-working and social distancing rules at work, employees may be *lost* in terms of their work's real meaning (Laaleh & Umair, 2020). Indeed, employees are facing many challenges in terms of gaining the sense of belonging, coherence significance and purpose of their work, in other words: in meaningful work (Baum & Goh, 2021). Since employees perceiving work to be meaningful has many promising outcomes (Ahmed et al., 2019; Bailey et al., 2019), the authors view it as an urgent issue requiring empirical attention to facilitate organizations with objective information to address this issue (Laaleh & Umair, 2020).

Meaning in work and associated facets may be impacted by the quality of work, especially with reference to the context post-pandemic working conditions. The covid-19 pandemic has led, among various organizational changes, to an increase in smart-working, forcing many workers to use online platforms to communicate (Cellini et al., 2021; Barbieri et al., 2021). This change may have led to problems regarding job quality. For example, smart working may have decreased its frequency and effectiveness of the communication between employees (Bolisani et al., 2021), also impacting on training hours efficacy provided by the organizations. Moreover, the rules of social distancing, the obligation to use a mask and to measure body temperature, etc., if not been followed regularly within the organizations, may have compromise the safety level perceived by employees. In this sense, we assume that variations within job quality indicators (i.e., communication, safety and training) may have compromised the meaning that employers and employees perceive of their work. Given the above, there are reasons to explore the relationship between the dimensions of job quality and meaning in work.

2.1. Participants and procedure

To explore such associations, we used a quantitative explorative approach following the overall aim to found how meaning in work and associated facets changed as a consequence of the pandemic. Data were obtained through a longitudinal survey administered online to workers of 6 organizations belonging the Veneto region in two different temporal sessions, one month apart. They investigated (a) the level of quality at work considering the dimensions of training, safety and communication at work, and (b) the construct Meaningful Work and related dimensions for the modules (1) facets of meaning in work (i.e., coherence, significance, purpose and belonging; (2) Meaning and crisis of meaning at work; (d) Work as a Source of Meaning (Schnell & Hoffmann, 2020; Tommasi et al., 2021). Participants initially recruited were 145, but 17 of them did not complete the questionnaire; then, because of several missing data in the returned questionnaires, 128 participants (56,3 % females, $n = 72$, average age $\mu = 37$ years, $\sigma = 12,3$) constitute the final sample of this study. Each participant gave consent to participate to the study after being informed about the aim of the study and instructed about the study procedure.

3. Results

3.1. Descriptive statistics

Participants were firstly asked to report their demographical data. In this section, they answered to closed questions about age, gender, education (1 = secondary school license, 2 = high school diploma, 3 = bachelor's degree, 4 = master's degree, 5 = post-graduate studies (e.g., second level master) 6 = PhD, 7 = other), contract (1 = fixed-term part-time, 2 = fixed-term full-time, 3 = permanent part-time, 4 = permanent full-time, 5 = temporary worker, 6 = other). About education, 3,9% of the sample completed secondary school, 50% have a high school diploma, 14,8% have a bachelor's degree, 22,7% have a master's degree, 3,1% completed post-graduate studies, 3,1% have a PhD, and 2,3% of participants reported "other" for their education status.

Table 1. Correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Job quality																
2 Coherence	.471**															
3 Significance	.227*	.553**														
4 Purpose	-.368**	.425**	.537**													
5 Belonging	.312**	.434**	.289**	.570**												
6 Meaningful work	.474**	.603**	.573**	.547**	.494**											
7 Meaningless work	-.289**	-.106	-.085	-.126	-.216*	-.267**										
8 Work as a source of meaning	.443**	.608**	.567**	.603**	.415**	.783**	-.250**									
9 Job quality (1)	.443**	.289**	.098	.321**	.184	.206*	-.152	.319**								
10 Coherence (1)	.376**	.565**	.421**	.343**	.345**	.384**	-.206*	.474**	.309**							
11 Significance (1)	.276**	.385**	.660**	.434**	.419**	.456**	-.224*	.468**	.132	.461**						
12 Purpose (1)	.415**	.446**	.273**	.520**	.423**	.460**	-.158	.490**	.393**	.397**	.419**					
13 Belonging (1)	.415**	.478**	.297**	.339**	.470**	.519**	-.333**	.469**	.414**	.312**	.386**	.688**				
14 Meaningful work (1)	.365**	.419**	.435**	.464**	.414**	.468**	-.254*	.432**	.524**	.440**	.464**	.455**	.460**			
15 Meaningless work (1)	-.319**	-.312**	-.184	-.278**	-.423**	-.547**	.647**	-.437**	-.137	-.184	-.312**	-.337**	-.486**	-.285**		
16 Work as a source of meaning (1)	.474**	.480**	.412**	.510**	.396**	.495**	-.284**	.573**	.555**	.550**	.430**	.553**	.490**	.834**	-.273**	

Note. *p < .05; **p < .01; ***p < .001

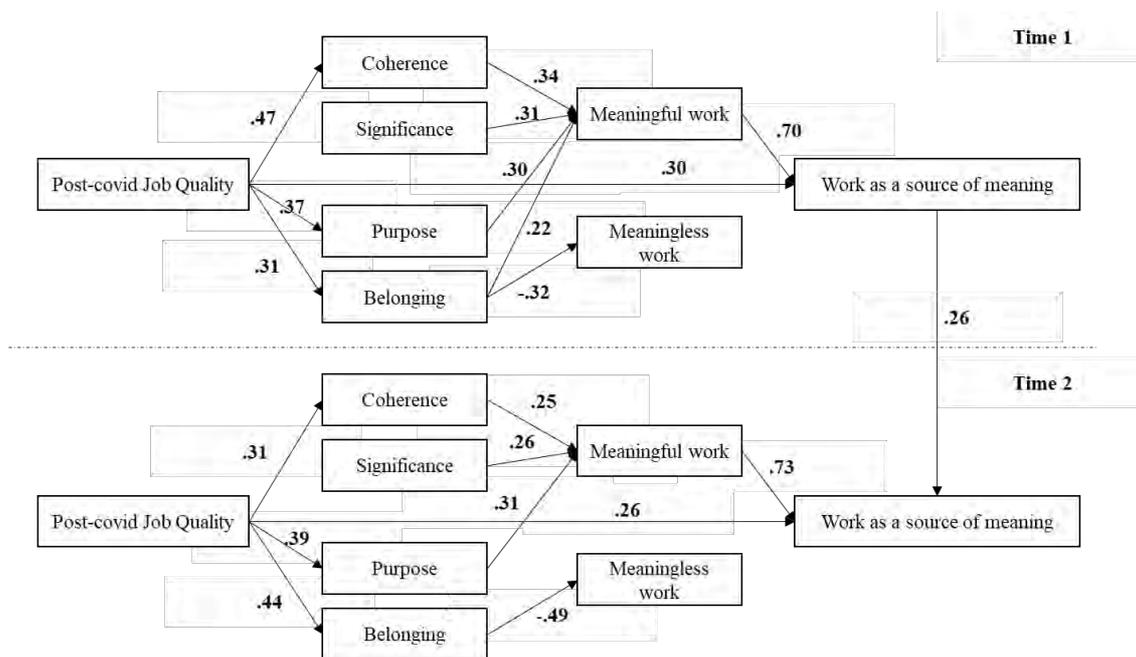
3.2. Associations among the variables

To test the hypothesis, we ran a correlation analysis (Table 1). We discovered that our findings are consistent with what research is investigating. More specifically, we found that job quality is significantly related to meaningful work, in terms of coherence ($r = .471$, $p < .01$), significance ($r = .227$, $p < .01$), purpose ($r = .368$, $p < .01$) and belonging ($r = .312$, $p < .01$), and lower reported levels of meaningless work ($r = -.289$, $p < .01$). This is true both in time 1 and in time 2 of measuring, even if a few points are different for first and second measurements. Moreover, we found that job quality is significantly related with work as a source of meaning ($r = .433$, $p < .01$). Therefore, from the correlation analyses we can conclude that the hypothesis we wanted to test was largely confirmed by obtained data: post-covid job quality affects the level of meaning at work, and the second measurement confirms the results of the first one.

3.3. Model testing

Given the correlations reported above, we verified the two mediation models reported in Figure 1 using SEM. Therefore, the observed variables comprised four latent variables, namely, Post-covid Job Quality, Meaningful work, Meaningless work and Work as a source of meaning. Before verifying the hypotheses of the mediation role of Meaningful and Meaningless work in Time 1 and 2, hypotheses of the association between Post-covid Job Quality and Work as a source of meaning were tested, in both Time 1 and 2. Post-covid Job Quality positively predicted the level of Work as a source of meaning ($X^2(100) = 573.852$, $p < .001$; CFI=0.87; TLI=0.955; RMSEA=0.043; SRMR=0.019) with a standardized coefficient effect equal to $\beta = .30$ in Time 1, and $\beta = .26$ in Time 2. Given this verification, we verified the mediation role of Meaning and Meaningless work. We analyzed the mediation role of Meaningful and Meaningless work within the association between Post-covid Job Quality facets (i.e., Coherence, Significance, Purpose and Belonging) and Work as a source of meaning. Meaningful work positively predicted Work as a source of meaning in both Time 1 ($\beta = .70$) and Time 2 ($\beta = .73$). Thus, the hypothesis of the mediating role of Meaningful work on the association between Post-covid Job Quality and Work a source of meaning, was confirmed. No significant changes within Time 1 and 2 were found.

Figure 1.



4. Discussion

It is therefore no coincidence that the current critical reflections focus on questions concerning the challenges for the meaning of work following the health and economic crises of recent months. In particular, the debate focuses on how in face of the demands of work, responsibilities and working hours, employees can lose themselves in terms of meaning at work. Hence, it is central how, in face of new working arrangements and conditions, organizations act to guarantee and protect work from the point of view of the quality of work and the degree to which work can be a source of meaning. This study attempts to show how changes in terms of work arrangements and perceptions of job security can influence perceptions of meaning at work. It reveals how the quality of work as measured by organizational safety and training resources affects the level of meaning at work. Given the challenge that organizations are called to face due to the changes caused by the covid-19 pandemic, in this contribution we tested differences in employees' job quality perceptions (in terms of training, safety and communication) and meaningful work (in terms of purpose, sense of belonging, sense of coherence, and significance). This effort was necessary to provide organizations some insight that serve as basis on which conducting new training interventions. Such interventions can be capable to ensure job quality and meaningful work in the new (post-pandemic) organizational contexts.

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A NARRATIVE INQUIRY INTO THE SOLIDARITY EXPERIENCED BY MYANMAR STUDENTS IN KOREA

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Abstract

The purpose of this study is to explore Myanmar students' experience of solidarity in Korean civil society and figure out the meaning of their experience. This study adopted Narrative inquiry among various qualitative methods, and in-depth interview is used for data collection. It seeks to discover the meaning of solidarity using the narratives lived and told by two research participants studying in Korea. As a result, three specific meanings embedded in the participants' narratives were founded. First, recognize the need for solidarity due to the military dictatorship. Second, experience solidarity that transcended boundaries. Third, have will for another solidarity toward others. This study expects to reaffirm the importance of solidarity in the international community for Myanmar people and suggests a desirable direction for sustainable solidarity.

Keywords: *Solidarity, Myanmar students, Korea, narrative inquiry.*

1. Introduction

In addition to being Asian countries, Myanmar and Korea have something in common that they have experienced military dictatorship. As Korean people see Myanmar people brutally suppressed by the Military, most of them think of May 18 uprising in 1980 (Um, 2021). If there is a difference between the two countries, the military dictatorship in Korea is over, but it is still going on in Myanmar. Korean civil society has long been in solidarity with Myanmar's democracy with special affection since the 1988 uprising. It has also shown solid solidarity in the current political situation compared to other countries, regardless of conservative and progressive backgrounds (Na, 2021).

According to Korean immigration, 26,096 Myanmar people reside in Korea as of December 2021. Among them, 790 are students, and they are primarily twenties. Some of them came to Korea before the military coup in 2021, and some came to Korea after the coup. Whether they came earlier or later, they have strongly resisted the military dictatorship and demanded solidarity from the international community for Myanmar's democracy and peace. A new aspect of the 21st-century civic movement is found in the democratic civic movements in Hong Kong in 2019, Thailand in 2020, and Myanmar in 2021. First, the so-called Generation Z leads the civic movements. Second, civic movements are being activated through the Internet or social networks. Third, international solidarity has been formed through real-time information sharing (Chung, 2021). In this respect, Myanmar students in Korea can be referred to as the new generation that will lead Myanmar's democracy in the future.

The pandemic reminded us that individuals cannot exist alone and how important solidarity is in overcoming the crisis. Solidarity has become a keyword in the era of Covid-19, and the global crisis has provoked the need for international solidarity (Libal & Kashwan, 2020). Even individualistic people have learned that they cannot live without solidarity with others. Although solidarity seems a very familiar concept, it is not easy to understand the concept of solidarity. Despite its frequent use, it has not been established as a scholarly concept due to its multiplicity and ambiguity (Seo, 2013). Social scientists have tried to categorize the concept of solidarity. As a representative scholar, Kurt Bayertz divided the concept of solidarity into four types: First, universal solidarity in a broad sense for the whole of humankind, Second, solidarity within a specific community. Third, solidarity which used in the context of social movements. Fourth, Welfare solidarity, as a fundamental concept of the state (Bayertz, 1999).

French sociologist Emile Durkheim discussed mechanical solidarity and organic solidarity. There is a vast difference in that mechanical solidarity is related to community members, whereas organic solidarity is related to others outside the community (Zoll, 2000). Durkheim emphasized the importance of justice, which is the basis of morality in organic solidarity, and insisted on a shift from charity, the basis of morality in mechanical solidarity, to justice (Eugen & Stjepan, 1989). The universal solidarity described by Bayertz and Durkheim's organic solidarity based on justice has similarities, for they refer to

solidarity with others that goes beyond the boundaries of one's community. What is needed today is solidarity that transcends all kinds of limits and boundaries and solidarity that embraces others (Zoll, 2000).

Since the military coup occurred, Myanmar people have consistently appealed for universal and organic solidarity from the international community despite its disappointing response. The tragedy continues in Myanmar, and Myanmar students in Korea earnestly long for peace in their home country. Therefore, this study aims to explore the solidarity experience of Myanmar students in Korea and figure out the meaning of their experience.

2. Method

Human beings naturally live storied lives and tell stories of those lives, and narrative researchers describe such lives. They collect and tell stories of research participants and write narratives of experience (Connelly & Clandinin, 1990). To explore the solidarity experience of Myanmar students in Korea, the solidarity experience that transcends boundaries and embraces others, this study was conducted by Narrative inquiry. Narrative inquirers relate the meaning of individual stories to theoretically important areas of the broader social sciences (William & Maureen, 2000). It expected to understand the power of solidarity and how it works for people who are harshly threatened and frustrated due to the political situation by collecting and telling their individual stories.

2.1. Participants

Narrative inquiry is a relational inquiry and is a research method suitable for revealing human experience as it is (Kim et al., 2018). In other words, narrative inquiry emphasizes the relationship between the researchers and the research participants, and it considers the participants as collaborators, not objects of the research. The researchers live their lives alongside the participants during the research process (Yeom, 2009). Thus, it is vital to invite participants who could actively and voluntarily participate in the research, understanding the research purpose plenary.

The participants of this research are two Myanmar students currently staying in Korea. Both are from Myanmar, but their ethnicities are different. The purposive sampling was used to recruit the participants with two organizations' help¹ and they consented to participate in the research voluntarily. The characteristics of the participants are listed in Table 1.

Table 1. Participant characteristics.

Participant Code	Age	Gender	Ethnicity	Major	Course
A	Early 20s	Female	Burma	International Logistics & Trade	Bachelor
B	Late 20s	Male	Chin	Political Science	Master

2.2. Data collection and Analysis

The in-depth interview was conducted as a semi-structured interview, twice for each research participant, from 1 hour 30 minutes to 2 hours. The first interview was face-to-face, where the research participants' solidarity experiences were taking place, and the second interview was conducted via ZOOM. Artifacts such as a reflective journal written by a participant after the interview, a radio interview, newspaper articles, and a master's thesis were collected as additional data.

Clandinin & Connelly (2000) suggested the three-dimensional narrative inquiry space for narrative inquirers. First, temporality, second, sociality, and third, place. Based on temporality, data was analyzed before the solidarity experience, experiencing solidarity, and after the solidarity experience. It was analyzed to see through what social relationship they experienced solidarity and the change of places of their solidarity experience.

3. Narrative of the solidarity experience

3.1. Participant A

A is a Burmese born in 1999, and her family live in Yangon. Immediately after the military coup, she joined protesting and one day knelt in front of the Korean embassy in Yangon to plead for solidarity, screaming, "Please, help our country." The video describing that day appealed to and touched

¹The May 18 memorial foundation and Korea democracy foundation.

Korean people. At last, she was invited to Korea with a university scholarship. She participated in this research because she thought it could be an opportunity to leave a record about Myanmar's situation.

3.1.1. Before the solidarity experience. A majored in political science in Yangon. She loved Korean dramas and music, which made her learn Korean earnestly, and she finally spoke Korean fluently. A said her dream was relatively simple; she wanted to work at a Korean company and take good care of her parents. As university classes stopped due to the outbreak of Corona, A volunteered to teach the Korean language to her community's youth, including elementary students at a local temple. However, while she was waiting for a job interview result with a Korean company in Myanmar, the military coup broke out.

“I asked them who studied Korean whether they were afraid of the coup, and they replied to me why they had to be. I was surprised by the courage of the youth, but I wondered what the future would be for them if the coup continued.” (1st interview, 17 Jan 2022)

As soon as she heard that a coup had taken place, she determined to join demonstrations for democracy. Of course, her father, who had witnessed people's death in the past military coup, stopped her by saying, “We tried to resist, but nothing was changed.” However, she left home with the resolution that “If we do nothing, then it will be just accepting the military.” She began to stay at her friend's house away from her home and continuously protested.

A learned about May 18 uprising through a Korean drama and a movie and thought Korea had a similar history with Myanmar. After all, she is now studying in a city where the May 18 uprising occurred.

3.1.2. Experiencing solidarity. Before coming to Korea, A has already experienced solidarity. The protests after the coup were not led by well-arranged organizations. People who came out on the street to resist the military became ‘We’ as one group. A went to the Korean embassy, for she speaks Korean well. At first, she never planned to shout with a loudspeaker in front of people nor kneel on her knees. However, she knelt on her knees with a desperate heart, and the video of that day became well known in Korea. The president of a broadcasting company in G city saw the video and the person talked to the president of a university in the same city. In the end, she was invited to Korea with warm hospitality.

“It seemed like no one was going to save us. I thought if no one saved us, we would have no choice but to die, and our democracy would die, too. It helped me a lot when the governments of Korea and other countries announced that they were not working with the Myanmar military. I thought we should continue the protests because many countries were on our side.” (1st interview, 17 Jan 2022)

She had two interviews with a Korean radio program before and after coming to Korea. She was asked if she was okay with being in danger due to the interviews, but A did not hesitate because she believed it was something she had to do and could do. We accompanied A on her second radio interview after she came to Korea. A's recorded voice, “Please save our country.” resounded in the radio booth for a while. Transcending time and place, the scene of that day was vividly revived.

A thought that she had done her job after seeing that many Koreans left comments saying they became supported Myanmar in her interview video on YouTube. She often gets moved by Korean people who ask about her parents and the situation in Myanmar.

3.1.3. After the solidarity experience. A willingly accepted our suggestion to write a reflective journal about her interview. A wrote while talking about the past in the interview she felt many emotions such as sadness, regret, guilt, and burden. In particular, she mentioned responsibility several times. A said that she has a great responsibility not to forget the people who died in the protest and work hard to achieve democratization. Also, she feels much obligation to repay the Korean people for supporting Myanmar a lot and wants to be a person who connects Korea and Myanmar.

“I think I will only dream related to democracy from now on. I feel much burden. I am usually lazy, but I want to change myself and live my life hard.” (2nd interview, 9 Feb 2022)

A had no extraordinary dreams other than to serve her parent, has a remarkable dream after experiencing the power of solidarity. Now, she strongly wants to become a person who can tell the next generation what happened to Myanmar and how the people worked for democracy. A said she would change her lazy habit, hoping the next generation would not have the same tragedy as her.

3.2. Participant B

B was born in 1991 and is from a minority ethnic group. He has a sturdy desire for a world where people live like human beings than anyone else. For him, politics is crucial to changing the world. B was a master's student who majored in political science when the data collection was started. However, he has recently graduated with a thesis titled 'Myanmar peace process and nation-building.' He is currently a consultant of NUG² Representative to the Republic of Korea and looking for a doctoral program in Korea.

3.2.1. Before the solidarity experience. B majored in industrial chemistry at the second largest university in Myanmar. He wanted to study politics but could not because there was no political science major in Myanmar. His interest in politics was formed from a relatively early age. As he experienced much discrimination as an ethnic minority, B thought he had to save his people through politics.

“Because there is only one way. If we do not fight and do not know politics, we are bound to die. I want to make the Myanmar constitution a human right based and make our people and country where we can live like human beings.” (1st interview, 20 Jan 2022)

His youngest sister, a medical student, is helping the wounded who are resisting the military. Despite his father's advice not to join civil disobedience movement (CDM) because of enormous danger, his sister believes that it would be an honor if she died for the country. B is heartbroken for the sisters, but he supports them and says, “freedom is not free.” His hometown is one of the poorest regions in Myanmar and does not have natural resources like other regions. B had heard many stories from the political leaders of his ethnic group that “We can also be developed like Korea” and came to Korea to discover how Korea achieved democracy and rapid economic growth.

3.2.2. Experiencing solidarity. NUG, the provisional government of Myanmar, currently has representative offices in seven key countries, including Korea. B thinks it gives him a great strength to open the NUG representative offices abroad, for it shows many countries support Myanmar's democracy globally. B met many civic groups and politicians in Korea through NUG activities and gained courage when people he met said to him, “Do not give up. Let us do it together.” NUG is cooperating with the Korean Ministry of Foreign Affairs to help Myanmar people who have difficulty extending their visas due to the unstable political situation. According to B, solidarity with civic groups is being actively formed, and there are about 300 organizations in Korea cooperating with NUG. When he went to the city where the May 18 uprising occurred, he was amazed at how Koreans supported Myanmar. Through all these experiences, B came to define solidarity as working together.

“Korean civil society is helping Myanmar the most in the world. Koreans say that Myanmar's problems are ours, Myanmar's peace is Asia's peace, and Asian peace is the world's peace. Having that perspective, I can already see it as one purpose.” (2nd interview, 17 Feb 2022)

B believes that the experiences of the Korean people who fought the military dictatorship and achieved democratization led them to show much solidarity with the Myanmar people. He also thinks that Korean people understand the NUG because they have experience setting up a provisional government. In other words, experiencing similar histories made solidarity solid.

However, it does not mean he has only experienced suitable types of solidarity. In his sight, some Korean politicians pretended to help the Myanmar people and took their political interests. Furthermore, B expressed strong dissatisfaction with the Korean government for not sanctioning Korean companies collaborating with the Myanmar military.

3.2.3. After the solidarity experience. Before the coup, he had dreamed of running for a parliamentary election in about 2030. He wrote a book on democracy and articles for magazines to prepare his dream step by step. However, the coup changed everything.

“When I heard the news of the coup, I was outraged. I expected Myanmar could become a federal democratic country in about 40 years, but it failed.” (2nd interview, 17 Feb 2022)

²National Unity Government of the Republic of the Union of Myanmar.

The day the second interview was conducted was B's graduation ceremony day. He prefers to stay in Korea more than go back to Myanmar and hopes to apply for a doctoral program in Korea to study political science further. He thinks it is better to fundraise in Korea and support Myanmar than a return. The current situation in Myanmar is complicated, but he believes that because of the solidarity given to the Myanmar people, Myanmar's revolution will be fulfilled one day.

From the people who stood with Myanmar, B learned the power of solidarity and eventually came to think of solidarity with other countries' people experiencing difficulties.

4. Conclusion

This study explored the narratives on the solidarity experience and analyzed data based on the three-dimensional narrative inquiry space suggested by Clandinin & Connelly (2000). The two participants are different in many ways. However, both are dedicated to building democracy for Myanmar and desperate for solidarity from outside their groups. We figured out three specific meanings embedded in the participants' narratives.

First, recognize the need for solidarity due to the military dictatorship. The participants had the will to resist the military before as well as after the coup. Both understood the democratization process of Korea, and after the coup, they felt the need for solidarity from Korean civil society. Second, experience solidarity that transcended boundaries. They experienced solidarity transcending boundaries such as nationality, race, age. On the other hand, they also experienced incomplete solidarity that did not rise above one's interests. Nevertheless, many joined together in unconditional solidarity, and the participants had a sense of gratitude and much responsibility. Third, have will for another solidarity toward others. The experience of solidarity made them commit to another solidarity for others. It suggests how solidarity with others can be extended to another stage of solidarity.

This study is meaningful, for it shows the possibility that one solidarity can extend to another dimension of solidarity. The era of neoliberalism led humans to infinite competition; however, there is still a need for solidarity, even today.

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A STUDY ON DEVELOPMENT OF KOREAN NATIONAL POLICIES FOCUSED ON MULTICULTURAL YOUTH'S MENTAL HEALTH

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Abstract

South-Korea has been demographically transformed into a multicultural society for recent decades. Accordingly, Korean government has prepared the societal transformation through law and policy making. However, these laws and policies need to be reviewed in terms of multicultural counseling, which was recognized as one of the most necessary policies by immigrants. In this sense, this research intends to focus on multicultural youth's mental health while tracking and comparing the change of main multicultural policies like Multicultural Family Policy, Multicultural Education Policy, and Youth Policy. Therefore, this research can help expand the depth and width of discussion for the next 5-years policy plan (2023-2028) by measuring the past and current Korean policies in terms of youth's mental health.

Keywords: *Multicultural family policy, multicultural education policy, youth policy, multicultural youth, mental health.*

1. Introduction

Korean government's preparation for transformation as a multicultural country has been done within recently two decades. The first multicultural education policy began in 2006, and then the first foreigner policy and the first multicultural family policy followed up in 2008 and 2010 respectively. The demographical rate of foreigners who resided in Korea against total population in 2021 was almost 5%. And the rate of students with migration backgrounds in public schools reached to 3% in 2021. However, this statistical data does not certainly present the quality of Korean society's mature degree to accept foreigners as a full member of society or to seriously discuss their quality of life in Korea. Korea society have just now been experiencing the transition from the first generation of multicultural family to the second generation. In this sense, every sphere of life and every stage of life about so-called multicultural members in Korea is necessary to be seriously paid attention and discussed in academic and governmental circle. This study's research focus is on health area, specifically mental health of multicultural youths in Korea. This is because migration and its entire process can be a critical point for an immigrant's life and health (Lee & Oh, 2018). Especially, mental health which treats emotional area is also an essential factor of health of every human being including immigrants and residents. Recently, many academic papers and governmental documents have recognized more comprehensive approach as a full human beyond the previous interest in adaptation dimension of immigrants. Therefore, this study's research interest in mental health of multicultural youths is meaningful. This study's research questions are as follows: How have Korean national policies developed in terms of multicultural youth's mental health? And therefore what is the direction of next 5-years policy plan to promote multicultural youth's mental health?

2. Research methods

This study adopted literature research method. Thus, this study attempted to explore all of official documents from national policies on multicultural youths in Korea. Therefore, this study collected 23 national policy documents and extracted mentions about mental health issues from those document. Finally, this study attempt to show policy development on mental health in chronological order and in comparison with three policies. This research method is accepted, as it is appropriate to present a series of policy trend in terms of a specific theme like mental health.

3. Development of Korean national policies on youth mental health

Main national policies on youths with migration backgrounds are Youth policy, Multicultural Family Policy, and Multicultural Education Policy. As this study's focus is on multicultural youth's mental

health, this study recognizes policies related to the focus from three national policies' yearly or regularly plans. And this study also recognizes the importance of mental health in overall development of three policies as follows.

3.1. Youth policy and its interests in youth mental health

Youth Policy Plan (YPP, 청소년정책 기본계획) has been developed by several governmental ministries such as the Ministry of Education, Ministry of Culture, Sports and Tourism, Government Youth Commission, Ministry of Health and Welfare, and Ministry of Gender Equality and Family since 1983. This policy has covered overall policies on youth, including youth with migration backgrounds and North Korean defection. This policy has been announced every 5 years, consisting of the current status of family with immigrant backgrounds, policy direction, goals, and main tasks. However, the discussion on youths with multicultural backgrounds have begun from the 4th Youth Policy Plan since 2008. This policy's focus on youth's mental health support has been developed as following Table 1:

Table 1. Youth Policy Development focused on Youth's Mental Health.

Period	4th YPP (2008-2012)	5th YPP (2013-2017)	6th YPP (2018-2022)
Status	- Appearance of multicultural youth (including North Korean defector youths) in crisis - Necessity of customized service	Accelerating multicultural socialization in Korea and marginalization of multicultural youth	Diversification of family structure and forms, including multicultural family
Main Policy Tasks	Reinforcement of support for self-reliance of youth in multicultural families - Emotional support by visiting instructors - Development of career exploration programs	Reinforcement of social adaptation through customized support for youths from migration backgrounds - Professional counseling service support - Development of specialized counseling programs and training of counselors - Community Integration Support System (CYS-NET) - Barracks environment for youths	Youth participation in society and rights promotion - Career education support - Identity recovery, career guidance, social development, and self-reinforcement

As the above Table 1 is seen, Youth Policy Plan (YPP) has focused on youth's mental health, according to three 5-year plans since 2008. First, the 4th Youth Policy Plan (2008-2012) was the starting point of discussion on multicultural youths. This phenomenon was consistent with the appearance of serious discussion on multiculturalism in Korea. The 4th YPP first recognized a necessity of customized support. Specifically, this plan considered emotional support by dispatching visiting instructors to children of multicultural families and development of career exploration programs through Ministry of Gender Equality and Family.

Second, the 5th Youth Policy Plan (2013-2017) paid more attention to professional and specialized counseling for marginalized youths from multicultural families. For this purpose, this plan considered reinforcement of professional counseling service support for multicultural children and adolescents through the Ministry of Gender Equality and Family, development of specialized counseling programs for those youths and training of counselors, improvement of access to counseling services through the Community Integration Support System (CYS-NET), and creation of a barracks environment for those youths reaching the enlistment age through Ministry of National Defense.

Third, the 6th Youth Policy Plan (2018-2022) has been interested in participation and human right of multicultural youths as members of society. In this sense, this policy has considered reinforcement of career education support system, and provision customized programs for multicultural youth for identity recovery, career guidance, social development, and self-reinforcement through the Ministry of Gender Equality and Family.

3.2. Multicultural family policy and its interests in youth mental health

Multicultural Family Policy Plan (MFPP, 다문화가족정책 기본계획) has been developed by the Ministry of Gender Equality and Family. The first MFPP has begun in 2010, reflecting demographical transformation to multicultural society in Korea. This MFPP has mainly covered immigrant married women and their children. This policy has been announced every 5 years, consisting of the current status of family with immigrant backgrounds, policy direction, goals, and main tasks. This policy's focus on youth's mental health support has been developed as following Table 2:

Table 2. Multicultural Family Policy Development focused on Youth's Mental Health.

	1st MFPP (2010-2012)	2nd MFPP (2013-2017)	3rd MFPP (2018-2022)
Status	Rapid increase of children from multicultural families	Necessity to form a family relationship and provide academic support for immigrant youths	Change from a policy centered on early adaptation to a policy for long-term settlement
Policy direction & goals	Environment for healthy growth of children from multicultural families - Expansion of infrastructure to support maladjusted children in school	Supporting the growth and development of children of multicultural families - Universal services - Support for improvement of Korean language skills, provision of school information, and adaptation	Supporting the stable growth and strengthening capabilities - Career preparation and social advancement support - Customized support for immigrant youths
Main Policy Tasks	Regional base center to support multicultural children for their settlement in the local community and school - Comprehensive support through youth counseling, mentoring for learning, counseling hotline, identity program, and customized case management	- Support for early adaptation to school life - Reconstruction of the CYS-Net	Reinforcement of counseling support for adolescent children and parents - Professional counselors training - Utilization of the CYS-Net - Expansion of Rainbow School

As the above Table 2 is seen, Multicultural Family Policy Plan (MFPP) has focused on youth's mental health, according to three 5-year plans since 2010. First, the 1st MFPP (2010-2012) had begun in creating environment and infrastructure to support maladjusted children in school. Specifically, this policy considered expanding the regional base center to support multicultural children settling down in the local community and school life. And it also considered responsibility for comprehensive support for multicultural youth such as youth counseling, mentoring for learning support, counseling hotline, home country identity program, and customized case management.

Second, the 2nd MFPP (2013-2017) paid more attention to immigrant youths, who was not born in Korea and have entered from abroad in their adolescence. Therefore, the policy considered supporting the growth and development of those youths through universal services rather than special services, Korean language education and school information for school adaptation. The policy also considered supporting for early adaptation to school life, and restructuring of the CYS-Net, a social safety net for youth in the local community, to include counseling and welfare for youth with migration backgrounds.

Third, the 3rd MFPP (2018-2022) has focused on multicultural youth's stable growth and capability strengthening, according to those youth's long-term settlement in Korea. In this sense, the policy have prepared career exploration and social advancement support. Specifically, the policy considered training for professional school-counselors with knowledge of the characteristics of multicultural students, utilizing the CYS-Net to provide customized service for multicultural youths in crisis, and expanding Rainbow School to help early adaptation of immigrant youths.

3.3. Multicultural Education Policy and its Interests in Mental Health Support

Multicultural Education Support Plan (MESP, 다문화교육 지원계획) has been developed by the Ministry of Education since 2006. This policy has covered public education for the 12-grade students from elementary school to secondary school. As yearly plan, this policy has been announced every year, consisting of the current status of students with immigrant backgrounds and policy direction, vision and main tasks, and detailed plans. This policy's focus on youth's mental health support has been developed as following Table 3:

Table 3. Multicultural Education Policy's Development focused on Youth's Mental Health.

Period	1st 6-Years (2006-2012)	2nd 5-Years (2013-2017)	3rd 5-Years (2018-2022)
Yearly Policy Tasks	2006 MESP: Concerns about maladjusted students	2013 MESP: Separation of emotional status by types of multicultural students	2018 MESP: customized support by developmental stages from infancy to childhood and adolescence - Pilot project - Utilization of official manual - Multicultural education best practice contest

	2008 MESP: Customized educational support for positive identity formation through international college student mentoring	2014 MESP: No comments	2019 MESP: No comments
	2009 MEP: Training for professional counselors and interpreters	2015 MESP: No comments	2020 MESP: Strengthening the emotional support system - multilingual emotion test - School and community connection - Prevention of school violence
	2010 MESP: Training for professionals through WEE center, Support through mentoring and vacation camp	2016 MESP: No comments	2021 MESP: Same as 2020 MEP
	2011 MESP: After-school program.	2017 MESP: First appearance of emotional counseling support as main policy tasks - Designation and operation of WEE center as multicultural counseling base. - Empowerment of counseling support personnel - Collaboration with local multicultural institutions	2022 MESP: Same as 2020 MEP

As the above Table 3 is seen, Multicultural Education Policy can be divided with three periods, as the above two policies like Youth Policy and Multicultural Family Policy are divided with three 5-year plans since 2008. First, the 1st 6-Years policy plans (2006-2012) has begun with little and partial recognition of multicultural youth’s mental health. The first 2006 MESP recognized emotional difficulty of maladjusted students with migration backgrounds like North Korean defector students, but there was not systemic support. This tendency of partial recognition of multicultural youth’s mental health without support system had continued until 2016.

Second, the 2nd 5-Years policy plans (2013-2017) finally highlighted the issue of multicultural youth’s mental health as main policy tasks in 2017. However, although the policy seriously elaborated emotional status by types of multicultural students in 2013, no mention on mental health had unfortunately existed for three years from 2014 to 2016. In this sense, the 2017 year was the turning point in Multicultural Education Policy in terms of youth’s mental health.

Third, the 3rd 5-Years policy plans (2018-2022) have tried deepening mental health support for multicultural youths. The 2018 MESP customized support by developmental stages from infancy to childhood and adolescence through pilot project and official manual (A study on the status of professional counseling for multicultural students and case analysis), and multicultural education best practice contest. And the 2020, 2021, 2022 MESP have tried to strengthen the emotional support system through multi-lingual emotion test with 10 languages version, school and community connection, and school violence prevention.

4. Conclusion

This study can summarize national policy development in terms of multicultural youth’s mental health as follows: First, national policies have chronologically developed from the perspective of maladjusted youths in crisis to the perspective of youths as human resource. Korean policies have overall reflected assimilative perspective in which immigrants have to adapted Korean culture alone without reflecting their own cultural heritage. However, Korean policies gradually seem to reflect integrative perspective in which immigrants can adapt Korean culture alone with their own cultural heritage.

Second, national policies reflect each policy’s perspective of youth. Youth policy reflects an ideology to present multicultural youth with human rights and participation as a member of society. Multicultural family policy considers multicultural youth as a long-term settler and with capabilities. And Multicultural education policy considers multicultural youth as a human with emotion who cannot be approached with education alone, but can be effectively helped by emotional support like counseling. However, three policies take note of individualization and customization for several types of multicultural youths, and systemic infrastructure with local community’s counseling resource beyond school.

In the light of this national policy development, future policy needs to consider the situation after second generation. Current multicultural youth will settle down and pass on from generation to generation

in Korea. Their own health including mental health cannot be promoted without being guaranteed at the same level as residents. Moreover, academic research needs to be conducted in a wide range of theory and practice.

This study tried to analyze and spotlight contents from national policy documents, focusing on a specific theme like mental health, although those documents were not totally psychological reports. Those documents' original intent may not be captured by this study's researcher with different intent. Nonetheless, this study is meaningful in providing a serious attempt to promote national policy development and psychological research direction about multicultural youth's mental health.

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PROFESSIONAL PRACTICES OF SCHOOL SOCIAL WORKERS IN PROMOTING EQUITY IN TIMES OF COVID 19 PANDEMIC

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Abstract

Children and young people from different social and cultural backgrounds, nationalities, ethnicities access school, but they have not had the same opportunities for school success and to see their right to education and other human rights guaranteed. Intervening with this diversity in a positive way means making difference, not synonymous with stigmatization and school and social exclusion, but rather with school and social inclusion, through the promotion of equity and social justice. The covid 19 pandemic, by electing distance learning, expanded and intensified the risks of dropout and failure of students with a more fragile relationship with the school, accentuating social inequalities and other inequalities and not allowing the multiplicity of their needs to be satisfied, in the sense of its integral development. The increased risk of school dropout and failure is more accentuated in some segments of the population, namely, those with greater social vulnerabilities. The government wanted to respond to the problems of absenteeism and school dropout, child poverty, intra-family violence and mental illness, which were aggravated by the covid-19 pandemic, giving guidance to managers, teachers and technicians to reinvent the role of the school in times of physical distance, quarantine and isolation. In this reinvention, the intervention strategies of the multidisciplinary teams of the schools were highlighted in the identification, signaling and monitoring of risk/danger situations for children and young people and in the articulation with the competent authorities and the community institutions, in promoting the right to education and social protection of children and young people. In these teams, social workers, with a diversified and multi-referenced academic scientific and technical background, have the necessary conditions to intervene in the realization of the right to education because they are able to bring together and promote the collaboration and communication that is essential between knowledge and educational actors for the elaboration of a diagnosis and respective intervention plan, which should focus on the three main domains of the ecological model of assessment in risk/danger situations: the child's developmental needs, the parental skills of the families and the family and ecological factors.

Focusing on a qualitative approach, through interviews with social workers who are part of multidisciplinary teams in school clusters, we sought to know how these professionals, in times of pandemic, perceive their functions and tasks, their professional practices and its potential in making the right to education effective and in combating school and social inequalities.

Keywords: *Professional practices, school social workers, covid 19 pandemic, social inequalities, equity.*

1. Introduction

Ensuring access to inclusive, quality and equitable education and promoting lifelong learning opportunities for all is an objective outlined by the UN for the sustainable development agenda 2016-2030 and which has been committed to the emergence and expansion of the pandemic. de covid 19. To mitigate the negative effects of the pandemic on the realization of the right to education, educational policy measures were implemented that have required educational systems to pay special attention to the increase in social inequalities resulting from different learning conditions in the various social categories of students. Such teaching-learning conditions accentuated the differences in student performance resulting from factors related to social, economic and cultural contexts. In this pandemic period, the risk of school dropout and failure to which certain categories of students are subject is associated with their low family capital for learning, which leads these students to situations of greater school and social exclusion. Socio-economic, cultural and personal conditions cannot prevent access to education and qualifications. Guaranteeing all children and young people the right to a quality education that fights social inequalities, that promotes inclusion and social justice, is the challenge of the educational system, namely to consolidate the school as a place that provides for all, without exception, opportunities to learn, full integration into the school environment and the creation of conditions for personal fulfillment. Such educational measures sought to make the school promote the process of equity and school and social inclusion. Social justice as a guarantee

that personal and social circumstances, such as socio-economic status and ethnic origin, are not an obstacle to the development of educational and social inclusion potential as a guarantee of achieving a minimum level of skills for all, sufficient to the continuation of training in the sense of a satisfactory integration into society and the labor market, were seriously compromised in times of the covid19 pandemic. All the more so since equity in education is a fundamental instrument of social equity and inequality in school results has social and economic costs: school failure and dropout increase the risks of unemployment, juvenile delinquency and criminality. Equity is a central issue of education policies and is considered as the condition through which individuals can take advantage of education and training, in terms of opportunities, access, attendance and results. An education and training system is equitable when “its results are independent of socio-economic background and other factors leading to educational disadvantages” and when “attendance takes into account specific individual learning needs” (Valter Lemos, 2013: 3). International studies that measure equity in education systems and that allow the collection of relevant information on student performance and on teaching and learning contexts have concluded that, despite a significant improvement in education indicators, social inequalities persisted. and, in the period of pandemic crisis, they increased. Pre-pandemic data showed some positive indicators regarding the mitigation of inequalities in access to education, expressed, for example, in the reduction of the percentage of students who leave education and training early and in the reduction of school retention rates. However, the 2020 Goals, regarding the increase in the percentage of students with minimum skills in Reading, Mathematics and Science, were not achieved, which also made visible the influence that the socioeconomic resources of families had in explaining school results, which compromises the social justice indicator. (CNE; 2021: 139) There is still no accurate and comprehensive assessment of the effects of the COVID-19 pandemic on education. But, as the report on the state of education (CNE, 2020) advances, there is already a consensus, worldwide, that social inequalities have worsened, that the learning done by students was harmed and that there was an increase in dropout and failure. schoolchildren. The closure of schools led to an unequal situation of access to technological equipment, the Internet network and digital training that allowed students from socially disadvantaged groups, even at a distance, to continue learning and maintain contact with their teachers and with the your pairs. No less important is the reference to the low level of schooling achieved by their families, who did not have the knowledge or skills that would allow them to monitor their children's schooling, as well as the non-existence of conditions for access to food and other essential goods, namely health. Confined in often overcrowded housing, without living conditions and without a quiet space to study, children and young people had a significant increase in levels of anxiety and mood swings, as well as a greater number of conflicts and disagreements at home, signs of depression and irritability and feelings of loneliness. These factors had a major impact on the worsening of learning inequalities. Thus, in the pandemic period, it is necessary to pay special attention to factors related to different learning contexts: in particular the family context and resources for families' learning (family capital for learning) and the social composition of schools (Diogo, 2010). The family capital for learning indicator brings together a set of variables related to the cultural (in particular academic), social and economic resources of families, which can have an impact on school performance and on the integral development of children and young people, namely the level of education and professional qualifications of guardians/parents and other family members, as well as existing resources at home: the number of books, in particular children's books, having access to the internet, having a room to study, etc. In the CNE study (2021), “about half of the teachers and directors, surveyed at the end of the first confinement, considered that the closure of schools increased the risk of dropping out of school. The severity attributed to the risk of dropping out is more evident in schools with more vulnerable populations. For example, in schools located in Educational Territories of Priority Intervention, with higher rates of poverty and social exclusion, the risk of dropping out of school was considered serious or very serious by the principals. In these schools, among students, 50% or more have School Social Action, more than 10% have Portuguese Non-Mother Language, more than 10% have Specific Needs and more than 2% did not participate in school activities during the first closing period of schools (CNE, 2021: 23) The well-being of children and families has become increasingly urgent, given the public health crisis and the resulting greater social inequalities that significantly affect vulnerable groups of the population in terms of access to education and social protection.

2. Research methodology: Objectives, design, methods

The research work developed aimed to know the representations of social workers working in a school context about their professional practices and the reinvention of intervention in the context of a pandemic crisis. It fits into the qualitative research strategy, having given special focus to the words and speeches of social workers, in order to capture the subjective reality of social actors. The study had an exploratory character, constituting the first stage of a more comprehensive, methodological and territorial research, which is in progress. For data collection, a semi-structured interview was used using a script composed of 6 main themes (academic path; professional path; work developed as a social worker at school;

social work and school mediation; intervention in a school context during the Covid Pandemic 19; role of the Social Worker in Schools: representations and perceptions). Given the impossibility of conducting the interviews in person due to the pandemic situation, and taking into account the availability of the interviewees, it was decided to send the interview guide by email. The interviews were conducted during the 2020/21 school year. Ten social workers who are part of multidisciplinary teams in School Groups in the Porto Metropolitan Area participated in the research. The sample was non-probabilistic, built intentionally and for convenience. To read the interviews, thematic content analysis was used. In order to contextualize the work of social workers, a content analysis of legal documents was also carried out, which enunciated emergency measures in the context of education and the action of these specialized technicians in the school context.

3. Discussion: The professional practices of social workers and the Covid 19

As previously mentioned, 10 social workers participated in the research who have professional experience as social workers, mostly for more than 10 years. However, as professionals integrated into the school context performing functions in the area of Social Work, experience of less than 10 years predominated. With the exception of two interviewees, the others joined the school through public measures to promote educational success: the Educational Territories of Priority Intervention (TEIP), the Integrated and Innovative Plan to Combat School Failure (PICIE) and the National Program for Promoting School Success (PNPSE). In addition to their basic training in Social Work, most of the interviewees had specific training, either at post-graduate or Master's level, in the area of childhood (e.g. Sociology of Childhood), intervention with children and young people (e.g. Social Intervention in Children and Youth at Risk of Exclusion) or mediation (e.g. Family Mediation). From the analysis of the interviews, for this article, we highlight the theme of professional practices and the reinvention of intervention in the context of pandemic crisis. In this line, it was important to know not only what challenges the interviewees faced in the performance of their professional activity, but also what strategies they developed to overcome them. First of all, their confinement forced them to use technology to carry out the follow-ups, i.e. the intervention started to be done at a distance through digital platforms and telephone contact. Nevertheless, in situations of greater social risk, all maintained the field work with students and families through, mostly, home visits. But the most substantive change was related, above all, to a reorientation of action: the closure of schools has forced a greater focus on situations of risk of absenteeism and school dropout. The school as a first-line entity plays an important role in preventive and protective intervention in situations of risk and danger. Of the 41337 dangerous situations reported in 2020 to CPCJ, 6232 are related to the non-fulfillment of the right to education: the highest values relate to reports of school absenteeism, with 60% of the situations reported, followed by school dropout (30%). According to the national commission, the growth trend in this category continues in the age brackets from 11 to 14 years and 15 to 17 years, always higher among males. (CNPDPCCJ, 2021) The intervention to combat absenteeism and school dropout was carried out by social workers in order to support children in need and without resources to keep up with distance learning, and also to support situations of deprivation and poverty through some work to meet basic needs, particularly at the food level. Thus, in a context of crisis intervention, the efforts made by schools to ensure the continuity of learning and minimize the effects of social inequalities were perceptible. The reinforcement of intervention by social service technicians and other specialized technicians allowed, in addition to social monitoring of children and young people and their families, the reception of children and young people at school, the provision of meals, the availability of resources to support distance learning methodologies, the dissemination of diversified support documents and alternative and more personalized forms of articulation between school and family. In addition to the realization of the right to education, the pandemic has made it clear that the school is an important space for the promotion of the personal, social and emotional well-being of children and young people, and that special attention must be paid to the most vulnerable students, in order to provide everyone with the necessary conditions for their safety, training, education, well-being and full development. The pandemic brought a worsening of social inequalities that, in turn, became more visible and affected more students and families. The most vulnerable were the most affected, becoming even more vulnerable, and this implied the implementation of monitoring and evaluation responses in an educational ecosystem that involved the various actors, and among them the specialized technicians of the multidisciplinary teams, so that inclusion and social justice could continue to be developed and guaranteed. It was also very clear that the effectiveness of educational measures implies intervention in other social, economic and cultural areas, with the purpose of promoting skills and qualifications and improving the living conditions of children and young people and their families. This orientation for intervention stems from the ecological approach, used by social workers in making the diagnostic assessment and defining and implementing social intervention plans, which always considers the child and young person and their families in transformation, in relation to their changing context, in which all influence each other reciprocally. We must analyze and reflect on the various phases of the

intervention process in the context of social accompaniment, as mentioned by the interviewees. In practice these phases are confused and often appear simultaneously, although here they are presented sequentially:

- The request, as most of the referrals are made by teachers, especially by class principals and head teachers, management bodies, local partners, the team of specialized technicians, educational assistants, families, peers, students themselves and the Social Worker herself who ends up identifying situations through informal contacts established with students in various activities at school. Thus, the implementation of activities in which he has direct contact with students can make him a signaling agent;

- After the request, the social worker in conjunction with other technicians and teachers diagnoses the situation, identifying the full development needs of children and young people, the problems and their causalities, but also the potentialities to be developed in the social intervention plan;

- The diagnosis is the basis for defining an intervention plan, appropriate to the problems and needs identified and the existing resources, which should be built together with students and families who should commit to the actions to be developed, making a commitment to change;

- Following the principles of the helping relationship, the social worker does the monitoring, that is, the follow-up in order to support the student and the family in the actions and checking if what has been defined is effectively being carried out. Such monitoring should involve several players in the educational community who should be attentive and available to collaborate. Based on the diagnosis, the process of social intervention presupposes a negotiation where the social worker assumes the role of mediator between the various social factors that influence the process and an intervention in the school system and with the students and their families, developing a close monitoring through regular contact with the students and strategies to approach the families, calling them for appointments, making phone calls and home visits;

- The evaluation of the intervention process should be systematic and continuous, in order to review, whenever necessary, the diagnoses and expected results in the implementation of the action plan. This allows not only to know the results and effects of the intervention, but also to correct trajectories if they are undesirable;

- To end the process, the ideal will be a closure because the child, youth and family have reached the established goals and have become autonomous. However, it can occur on the initiative of the targets themselves, by referral to another body or for various causes.

It was possible to understand that the risk or danger to which children and young people were subjected, results from the interaction that occurs between the different elements that make up the different systems and the accumulation of factors such as lack of parental support, lack of social support, low educational level and unemployment of parents, lack or insufficient participation and involvement of parents in the personal and school development of their children, schools in poor neighborhoods, etc. These factors are directly related to the family context and in particular the socio-economic and cultural status of families that exerts its action on the child's well-being and school achievement. The Covid 19 pandemic caused increased exposure to certain conditions or risk factors in the family microsystem that increased the likelihood of the child or youth experiencing social, emotional, or physical problems.

However, the interviewees did not forget that the risk factors for school failure are also in the school context. Regarding school, it should be noted the experiences lived by children and young people in the interaction with the different elements that make up this school context, namely teachers and peers, the relationship, support and expectations of teachers and the relationship/support of peers, their level of motivation towards learning and the type of recreational/pedagogical activities developed, etc. In addition to knowledge of the school and family contexts, social workers identify other factors that play a decisive role in school success and in the comprehensive development of a child/youth: the influence of the local community in which the family is inserted and broader aspects of the socio-economic and political environment, without losing sight of the temporal and historical changes of each of these contexts. It also emerged from the speeches of the 10 interviewees that they work with children and youth at risk/in danger, providing psychosocial support in the host schools in close coordination with institutions in the area of promoting the rights and protection of children/youth at risk (Commission for the Protection of Children and Young People and Multidisciplinary Teams to Support Courts, in particular) and social support (municipalities, Social Security Institute and Private Social Solidarity Institutions). The articulation of the family with the school and the school with the entities of the promotion and protection system for children at risk/anger, such as the CPCJ, is essential in the individualized response to be built for each case of risk/anger. Mobilizing the data from the National Commission for Protection and Promotion, there has been less visibility and increasing complexity in the access to children, youth and their families in the community since the beginning of the pandemic. In the National Commission's report for 2020 data, of the total 188 CPCJ respondents in a survey, half (50%) report that the greatest difficulties were experienced at the assessment stage for making a diagnosis of the referenced danger situation during the period of the state of emergency. This trend maintained a significantly high value (44.9%) in the defined post-state of emergency period (from May 3 to August 31, 2020). Examples of difficulties experienced are: "the decrease in field

work, fewer looks at children and youth." (34 CPCJ); "the difficulty in talking to children and young people." (90 CPCJ); "the greatest difficulty was felt in conducting home visits" (165 CPCJ); "maintaining face-to-face meetings at this stage, in view of the temporary barring/closure of care services in the building where the CPCJ is located (City Hall)." (171 CPCJ. (CNPDPJC, 2021). In several cases, the action of the schools' multidisciplinary teams is highlighted in the support and social monitoring of children and youth at risk/in danger, which allowed the local CPCJ to overcome any difficulties. When CPCJ did not even make home visits, the schools' social workers made home visits that served to understand what was going on, why they were not attending classes 'online', why parents did not answer the phones or did not respond to emails sent.

4. Conclusions

Improving relationships and communication between the various actors on the educational scene, implementing the role of mediator, is possible because the social worker in school context is specialized in making social diagnosis and intervention plans focused on the child / young person who is the student. At the methodological level, it is the social diagnosis that will underpin the entire intervention plan at the level of psychosocial support focused on the child/youth who is the student, the group, the family, the local community and the school. It is the professional with the knowledge and skills to understand and work with what is in the school organization and "on the other side of the school", not only with regard to the personal and social skills of children and young people, parenting skills (basic care; safety; affection; stimulation; setting rules and limits; stability) and other family and ecological factors: family history and functioning; extended family; housing conditions; and employment status of household members and their impact on the child and the parents' relationship with him/her. It is the child and the young person who are at the center of their intervention, understood in their uniqueness, getting to know them at school and also what is on the other side of the school. The social worker has the knowledge and skills to understand the social reality, identifying the needs and problems that affect children and young people, as well as their causalities, in order to define pertinent paths of intervention. With an integral look, the social worker perceives the multiplicity of development needs of the child/youth in terms of education, but also in terms of health; behavioral and emotional development; identity; family and social relationships; social presentation, and empowerment for autonomy. The social worker is a professional who allows the school to understand the environment where each student is inserted, share it with other specialized technicians and with teachers. To this end, it is crucial to carry out a social diagnosis capable of grasping the complexity and multidimensionality of the problems affecting children and young people, their families, and local communities, highlighting the diversity of factors that lie at their genesis. Furthermore, the social worker knows and is able to mobilize the local community's endogenous resources to better respond to the multiple needs of children/youth, families, territories and the school organization and, because she/he uses the potential of networking, she/he designs and implements intervention projects in partnership with various entities of the municipal social network and the local social action commissions of the parishes. The local development projects in which they operate, the articulation with different services in the fields of promotion and protection of minors, social action, employment and health and the participation in working groups are just examples of the various responsibilities assumed by social workers in their daily professional life in a work of opening the school to families and the local community.

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THE IMPACT OF THE PANDEMIC ON SOCIAL-EMOTIONAL LIFE OF YOUNG ADULTS: AN EXPLORATORY STUDY

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Abstract

The SARS-Cov-2 coronavirus and COVID-19 pandemic has disordered peoples' everyday life due to the extended measures of transmission restriction. For "young adults", that is for people in the age range between 19-24, the impact of pandemic may be of greater importance, given that this early years of adulthood is a critical stepstone for their further social and emotional development. Thus, it is interesting to focus on them during those hard times. The aim of the study was to investigate the views of young adults, firstly, on their social life and its disruption due to the coronavirus and, secondly, on their emotional life. In this context, a quantitative research has been conducted based on a questionnaire, that has been designed by the research team. The questionnaire included 37 questions (likert, open ended, and multiple choice). The study was conducted via internet and in total 285 young individuals have participated. Regarding the main results of our study, it was found that watching movies seem to have a positive effect in help passing time and coping with boredom. Regarding the impact of pandemic on participants' emotional life, it was found that during lockdown, fear -specifically fear for the future and fear for their beloved ones- was the feeling mainly experienced by the young adults. It is notable that after the lockdown the fear of the future and the fear for the beloved ones is still a dominant feeling. Moreover, it was found that social and emotional impact go hand by hand. Specifically, it was also found that, controlling for age effect, participants' after lockdown feelings such as stress, sorrow and fear for their beloved were associated to whether entered University before or during pandemic. A holistic view of social and emotional impact of pandemic, challenges emerged for young adults who faced extended restrictions and implications of our results will be discussed.

Keywords: *COVID-19, young adults, social-emotional life.*

1. Introduction

People's everyday life has changed due to the SARS-Cov-2 coronavirus and COVID-19 disease that caused the extended measures of transmission restriction (Alzueta et al., 2021). Humanity all over the world had to face the rapid changes along with the personal challenges, that seem to be of great difficulty, both psychologically and physically (Violant-Holz et al., 2020). One of the most important protection measures towards COVID-19 globally, is physical distancing (Aminnejad & Alikhani, 2020). Governments restricted any public or private activity that would cause crowds and thus, possible high levels of transmission, in order to achieve this (BBC News, 2020).

Many recent researches focus on the emotional effects that COVID-19 and lockdown had caused to people in different countries around the world (Gismero-González et al., 2020; Gittings et al., 2021; Shukla et al., 2021). Thus, an increased interest is noticed around the social and emotional consequences of COVID-19 and the quarantine periods in young adults (Green et al., 2021; Shanahan et al., 2020). In addition, many researches focus on specific groups of young people that appear to be more vulnerable, as they are considered to face more challenges in their everyday life than others (Jones, 2020). Some health domains that are associated with vulnerability are disability, chronic illness, chronic medical conditions, etc. (The American Journal of Managed Care, 2006).

As young people seem to be able to bring social change (UNICEF, 2000), it is interesting to focus on them during those hard times. Individuals in the age range between 18-24 belong to the phase of late adolescence and are characterized as "young adults" (University of Minnesota, 2022). At this age, humans experience changes and develop important traits, such as the ability to make independent decisions about their beliefs and values, and, in relation with other people, the interest they show in others (Arnett, 1994).

Young adulthood seems to be a complex period of time, due to the fact that young adults may face challenges that are connected to the start of the university life, such as a variety of different emotions (Christie, et al., 2008) and the possibility of homesickness, especially in younger ages (Thurber & Walton, 2012). Moreover, researchers have focused on correlations between the social and emotional changes of this time, along with problems that may arise during the early years of adulthood, such as substance use in daily life (Papp & Kouros, 2021), or the negative effects of social media use (Ngien & Jiang 2021). However, young adults appear to use social media in their everyday life for socialization purposes (Niland, et al., 2015).

In parallel, during COVID-19 time the entertainment field has received important limitations and adaptations (Moon, 2020). Home entertainment activities seem to offer a safe alternative, as people could avoid physical contact with others and stay in their homes. In order to entertain themselves during the lockdown periods, people can choose among surfing online, watching movies or TV, and many other choices (Kim et al., 2021). Furthermore, researches show that lockdowns are connected to negative emotions and young people tend to use media as a try to cope with these negative emotions (Cauberghe, et al., 2021).

2. Aim of the study – Research questions

The aim of the study was to research the views of young adults, firstly, on their social life and its disruption due to the coronavirus and, secondly, on their emotional life. Specifically, to achieve this purpose, the following research questions were formulated:

- a) Was there a difference on the emotions young adults have felt during and after lockdown?
- b) Has “watching movies” as a leisure activity helped young adults to deal with negative emotions?
- c) Have students entered university during pandemic felt more negative emotions compared to students entered university before pandemic?

3. Methodology

The present study employs quantitative research methodology which is widely used to provide information for a large number of people, as a representative of a population. It is appropriate to investigate social phenomena by processing numerical data through statistical analysis in an objective way (Watson, 2015). Through quantitative analyses and statistical techniques, conclusions are drawn with the ultimate goal of interpreting the perceptions and expectations of the respondents.

3.1. Participants

The sample has been collected randomly via online questionnaire that has been distributed through the administration of the Universities. A total of 285 people participated, aged 19 to 23. Two hundred and fifty people identified as women (87.7%), 34 as men (11.9%), and one as “other” (0.4%). Moreover, 215 of them seem to depend financially on their parents (75%), while 49 (17.2%) accept parental support and work at the same time. Two broad groups were identified according to the year enter the University. Specifically, we identified a group of 153 young adults (54,1%) first entered University before 2020, that is before pandemic named "before pandemic students, (BPS)", and a group of 130 young adults (45,9%) entered University during pandemic named "first year students in pandemic (FYSP)".

3.2. Procedure – Data analysis -ethics

The study was conducted during the pandemic via internet only, to ensure the safety of the participants. A google form questionnaire was created and the link was posted online. The collected data were encoded and analysed through the statistical package of SPSS 22.0, frequencies and percentages were calculated for the questionnaire items and analysis of variance and t-tests were computed to check the differences between the SLC and NSLC groups. The research was approved by the Committee for Research Ethics of the University of Macedonia.

3.3. Instrumentation

A tailor-made questionnaire with 37 items, including Likert-scale, open ended and multiple choice questions, was specially designed by the research team. All of the above types of questions appear in numerous surveys and social research studies (i.e., De Vaus & De Vaus, 2013). The questionnaire consists of 3 parts: Part A (6 questions) focuses on demographics of the participants. In Part B, participants are asked to answer questions about changes in their daily life due to the pandemic (17 items) and in part C (14 items) on issues related to accessibility issues brought about by the pandemic restrictive

measures. The present paper focuses on the questions related to the emotions of the participants and the leisure activity “watching movies” and its effect on dealing negative emotions during lockdown. The online questionnaire has been chosen due to the limitations of the pandemic.

3.4. Reliability

The reliability of the scales measured with Cronbach’s Alpha are for the

- Emotions during quarantine, $\alpha=.833$
- Watching movies, $\alpha=.873$ and
- Emotions about the Covid-SARS-19, $\alpha=.800$

4. Results

This exploratory study aims to highlight the social-emotional life of young adults. More specifically, this paper focuses on the results related to the emotions of young adults during and after lockdown as well as their habits. Concerning the emotions young adults felt during and after lockdown it was found that one of the most important emotions the participants felt during lockdown, according to their answers, is fear for the future ($M: 3,88$, $SD: 1,14$) and fear for their beloved ones ($M: 4,02$, $SD: 1,13$). After the lockdown the fear of the future and the fear for the beloved ones seem to stay in the same levels ($M: 3,95$, $SD:1,16$ and $M:4,08$, $SD: 1,17$ accordingly) (see Table 1). To see whether emotions felt by young adults during and after lockdown were significantly different, paired sample T-Test was performed. The results revealed that only two emotions were significantly different during and after lockdown. Boredom was found significantly higher during than after lockdown ($t(284)= 2,664$, $p= 0,008$) while anger was significantly lower during than after lockdown ($t(284)= -4,283$, $p< 0,001$). Concerning the rest of the researched emotions, differences that traced were not statistically significant. As regards the second research question, i.e., whether “watching movies” as a leisure activity helped young adults to deal with negative emotions, it was found that during the restriction measures, watching movies seems to have a positive effect mainly on helping passing time ($M:3,79$, $SD:1,19$) and boredom ($M:3,63$, $SD:1,18$). The aggregated mean concerning “watching movies” as of a coping activity revealed that for the total of our sample “watching movies” has helped participants dealing with negative emotion moderately ($M: 2,92$, $SD: 0,92$).

Table 1. Emotions during and after lockdown.

	During lockdown Mean	During lockdown Std. Deviation	After lockdown Mean	After lockdown Std. Deviation
Stress	3,54	1,30	3,59	1,23
Loneliness	3,10	1,40	3,10	1,43
Boredom	3,72	1,28	3,51	1,34
Anger	3,05	1,43	3,35	1,44
Sorrow	3,77	1,10	3,85	1,14

The third aim of this study was to research whether entering university during pandemic has any significant relationship with negative emotions felt by participants. To this end a partial correlation analysis has been performed between bad feelings felt by students a) during and b) after lockdown with the year participants entered university. Participants’ age set as control variable. It was found that bad emotions felt during lockdown, were uncorrelated to the year participants enter university. However, participants’ bad feelings after lockdown found to have a low, positive and statistically significant relationship with the year participants entered university ($r(280)=0,129$, $p= 0,030$).

Table 2. Analysis of variance (BPS and FYSP).

Variable	Before pandemic students, (BPS) (n=153)		First year students in pandemic (FYSP) (n=130)		$F(1,282)$	p
	M	SD	M	SD		
Total of bad feelings today	3,48	0,88	3,81	0,90	9,845	0,002
Stress	3,37	1,23	3,85	1,18	10,786	0,001
Sorrow	3,63	1,15	4,10	1,08	12,548	<0,001
Fear beloved	3,94	1,22	4,24	1,12	4,521	0,034

In simple words, those participants entered university more recently, that is, closer or during pandemic felt significantly stronger negative emotions, compared to participants enter university formerly, and that the observed difference was not due to their different age. To have a clearer picture of this an analysis of variance was performed with dependent variable the negative emotions felt after pandemic and year of entering university as the independent factor. It was found that after pandemic BPS as a group felt significantly higher stress, sorrow and fear of beloved compared to participants belonging into FYSP group (see Table 2).

5. Discussion

The current study underlines the effects of Covid-19 lockdown and restrictions on young adults in social-emotional area. The results of the present research are being discussed based on the research questions. Considering the first research question, boredom seems to be the highest rated emotion during lockdown, while a decrease after the lockdown is noted. More particular, restriction measures and limitations appear to cause negative emotions, including boredom (Brooks et al., 2020). Furthermore, emotion of anger increased during after the lockdown period, comparing to the lockdown time. While anger truly appears as one of the negative emotions caused by pandemic restriction measures (Brooks et al., 2020), young adults note a decrease in anger during the post lockdown period, comparing to older adults who note an increase (Maggi et al. 2021). In this particular topic, factors as finances and gender appear to affect these results (Brooks et al., 2020).

About the second research question, watching movies as a leisure activity seemed to have helped young adults to deal with negative emotions and in particular with boredom, which was the most highly rated negative emotion among the participants. According to researches, the above result is confirmed as media were widely used during quarantine in order to help people cope with negative feelings (Cauberghe et al., 2021) and specifically isolation (Taylor et al., 2020). The third research question examines the relationship between the year of enrolment in university and negative emotions. Young adults who entered university during pandemic felt more negative emotions compared to students who have entered university before pandemic. Adjustment to university seems to be a challenging process for first year students (Bland et al., 2012). In combination with the increase of negative emotions in young adults due to covid-19, it seems that FYSP have to deal with more difficulties than other students.

It is crucial to understand that the society is reflected on the educational system and vice versa. As young adults enroll university, it is significant to take their social-emotional needs into consideration and to provide them with the necessary support. In Greece, universities provide psychological support to the students who need it, through Student Consulting Centers. Furthermore, during the Covid-19 period, the Greek government had launched a psychological support hotline and support centers into hospital facilities (<https://www.moh.gov.gr/>). Nevertheless, future policies and practices need to focus on raising awareness and providing to young adults entering the university help seeking behaviors and skills.

In conclusion, further investigation is recommended including a follow up research using mixed methods in order to gain real insight into the social-emotional impact of Covid-19 to young adults.

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RECONFIGURING & RESHAPING WORK INTEGRATED LEARNING (WIL) FOR EMPLOYABILITY BEYOND COVID

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Abstract

Higher education institutions have become increasingly focused on the quality of teaching and learning, and the provision of high-quality educational experiences for students in various learning contexts. Well-designed and structured work-integrated learning is beneficial to the student, the academic institution, the employer and the community. Graduate employability is a complex concept, one which has expanded in recent years to encapsulate a diverse range of skills, attributes, and other measures including active citizenship. Continued improvement of methodologies in teaching and learning is key to the development of any society. It is therefore essential to governments for devising strategies to compete with the rising global competition in times of economic uncertainty. But progress cannot be created in a vacuum. It requires connected efforts, cross-border discussions and vigorous assessments. Thus it is important to highlight forward thinking and future-driven strategies for smooth transitioning from education to the labour market and identify factors impeding skills performance.

WIL is significant in exposing undergraduates to the required employability skills to function effectively in their chosen profession. This poses a challenge to higher education to design and deliver curriculums that meet these expectations. This paper discusses key points that include creating a culture that fosters partnerships between higher education and industry, designing curriculum which is responsive to the needs of both community and industry, as well as reviewing key graduate and labour market data to inform long term employability strategies. Covid-19 has impacted WIL, remote WIL experiences and the contribution that has been made to enhance employability outcomes for graduates now and post Covid.

Keywords: *Curriculum design, employability, skills development, partnership, work integrated learning.*

1. Context: The Impact of COVID-19 and its Challenges

Our world of work is going through a rapid transformation. Globalization, demographic shifts and technological changes brought about the Fourth Industrial Revolution (4IR) are having profound effects on the global labour market. Work-integrated learning (WIL) is considered a key strategy for promoting graduate employability. Graduate employability is a complex concept, one which has broadened in recent years to encapsulate a diverse range of skills, attributes, and other measures such as networks, professional-identity and active citizenship. One impact of the global pandemic of 2020 was a rapid shift in the delivery of work-integrated learning (WIL) to remote activity. Along with professional practice research in higher degrees, WIL practice, including placements and non-placements, responded actively and sometimes reactively to the challenges of sudden transition to online environments.

In the post-secondary education setting, work-integrated learning (WIL) is used to describe all kinds of practice-based learning integrated into the curriculum. Work-based learning (WBL) in a narrow sense, is used to refer to learning that takes place in the professional setting. It can refer to a broad range of learning experiences including; clinical placements, internships, work experience and is integral part of many practice-based degrees such as Engineering, Health, Education. The impact of the pandemic restricted the access to professional environments so students had less to no opportunities to experience work placements and at the same time lower university incomes and budgets meant restrictions in support which had further implications on equity and accessibility within these programs. The WBL types mostly affected by the pandemic were compulsory placements where students are fully immersed in a workplace setting (Zegwaard et al., 2020).

As society entered 2020 the changing trends of work was also a discussion that was being had on the periphery of much practice. Viloni et al (2020) reported that while ideas such as increases to remote working or greater reliance on digital communication had been spoken about, the impact of the COVID-19 pandemic saw these trends accelerate at a pace never before seen. Recent interventions in

response to the COVID-19 emergency has seen an acceleration of the evolution of work with large segments of the workforce, previously not impacted by emergent and gradual change, being suddenly forced into new ways of working at a distance to colleagues and the workplace. Volini et al., argue that it has not been the inadequacy of technology that has previously prevented the long-awaited transformation of work, but the challenge of building models that integrate humans with technology. The COVID-19 crisis highlighted the importance of human connection, belonging, and creativity in the modern workplace. Drivers of innovation and creativity in how work is undertaken and structured, and how organizations remained connected, despite government enforced lock-downs, has revealed a raft of new ways of connecting and working. Technology is also changing the skills requirements of occupations, affecting both new entrants to the labour market and older workers. Unfortunately, current education systems are not adequately preparing the workforce for these changes, tending to fail both young and old. There is a disconnect both in terms of curriculums and requisite skills in occupations and between education outcomes and employers' needs.

Globally, many youths are unemployed or disengaged from the labour market. According to the International Labour Organization (ILO), 64 million youth are unemployed worldwide (ILO, 2019). More strikingly, 20 percent of young people are not in education, training or employment—they are disengaged. At the same time, millions of jobs remain unfilled. In part, this is brought about by youth not possessing relevant work experience, having underdeveloped or inadequate skills, and lacking career guidance. This paradox—high youth unemployment alongside widespread vacancies—requires rethinking the role that education systems, and specifically Technical and Vocational Education and Training (TVET) and other types of work-based learning, can play in bridging this divide.

Sadly, there is a residual view in most countries is that an academic track is the only pathway to a good career, while TVET—in both traditional occupations (i.e., construction and manufacturing) and emerging occupations (i.e., Information technology, hospitality, and management) remains stigmatized as inferior. Yet TVET graduates with the requisite knowledge and skills can command high salaries, particularly in advanced economies, a fact that is given insufficient emphasis when advising young people about their career possibilities (OECD, 2018a). One solution would be to create mechanisms and systems whereby highly skilled employees can contribute to the learning process, benefitting not only TVET institutions but also creating opportunities for TVET innovations. Such partnerships could represent two-way flows—from workplaces into educational settings and through joint working for knowledge and skills to flow back into workplaces. Such a two-way street could both help raise the standing of TVET systems and the quality of work-based learning. Given this confluence of challenges, the higher education sector could have an important role in examining pathways to employment and the role that TVET can play both for those entering workforce and older workers that need to reskill. TVET systems must increase their partnership with employers to ensure appropriate forms of learning and access to world-class skills to promote new and continuing employment suitable for a high-skill economy and newly emerging forms of employment.

2. Methodology

The desktop research took place under exceptional circumstances, where face-to-face interviews were not possible but where websites could be used to gather information and data for debate and discussion. The study adjusted to these new circumstances innovative investigating of various articles, institutional practices and responses to the pandemic. In doing so the was able to extract information on individual experiences.

On the Universities South Africa (USAF) website a document called *Guidelines for Universities to Follow Regarding Work Integrated Learning in the Context of the Covid-19 Pandemic* – is worth reading. A scan was done of the WIL environment at the 26 public universities in South Africa to determine the impact on students and universities involved with WIL. Responses were received from several universities of which 13 contained sufficient data to be used for analysis. This showed that just over 70 000 students were in programmes with a WIL component.

3. Theory

3.1 Kolbs – tenets of experiential learning theory

Experiential learning opportunities should be grounded in a theoretical framework to ensure that each opportunity is educational. Kolb's (1984) experiential learning theory was chosen as the framework for this guide. As identified by Thornton Moore (2010), most approaches to learning through experience share theoretical underpinnings drawn from early experiential learning philosophies. Kolb and Kolb

(2005) identify six core tenets upon which the experiential learning theory is founded [Adapted from Kolb (1984); Stirling (2013)].

- I. **Learning is a process.** • Promoting student acknowledgement of previous informal and formal learning.
- II. **Learning is grounded in experience.**
- III. **Learning involves mastery of all four learning modes.**
Introducing student learning experiences at an appropriate pace and progression;
Challenging students' preconceptions in light of new experience, theory and reflection and providing students with opportunities to experience, reflect, theorize and apply
- IV. **Learning is a holistic process of adaptation.**
Addressing students' feelings, perceptions, thoughts and actual behaviours throughout the WIL experience
- V. **Learning occurs when an individual interacts with his or her environment.**
Providing students with experience in the wider real-world environment (e.g., workplace context)
- VI. **Knowledge is created through learning.**
Learning should be individualized to each student and assigning students responsibility over their own learning.

According to Kolb (1984), experiential learning is often accompanied by personal development. From this perspective, the connection between learning and development occurs when an individual's personal qualities interact with the external environment and provide an opportunity for personal knowledge to collaborate with the cultural or social knowledge of this environment (Kolb, 1984). In the context of experiential learning theory, personal development relies on the degree of complexity an individual reaches within each learning mode, as well as an individual's abilities to integrate and effectively express all four learning modes (Kolb, 1984). As individuals develop through the learning process, they progress through the developmental phases of acquisition, specialization and integration.

4. Conceptions of employability - literature review

The term employability is often used interchangeably with the notion of work-readiness. Yorke (2010) contends that work-readiness is a set of conditions sufficient for gaining initial employment, while employability is a set of skills which are necessary but not sufficient for gaining employment. Whatever term is used, it is better to holistically consider that a graduate needs to be both employable and work-ready to increase their chances of employment (Sachs, Rowe, & Wilson, 2017). Conceptions of employability have broadened in recent years, from a focus on mostly technical skills and attributes thought to be required by graduates in order for them to be considered work-ready, to a wider notion encompassing non-technical areas such as networking (Bridgestock, 2017) and professional identity (Zegwaard, Campbell, & Pretti, 2017). Both these conceptualizations focus on an individual's 'potential' to acquire desired employment (through the development of appropriate human capital), which differs from 'realized employability' - the actual acquisition of desired employment (Wilton, 2014, p. 246).

Recent calls for more critical approaches to understanding employability (e.g., Burke et al., 2016), including broader conceptions of the term (e.g., Clarke, 2017), have led to views moving beyond the skills based approach to a wider conceptualization that better captures "the complexity of graduate work-readiness" (Jackson, 2015, p. 925). Some have advocated that the term 'profession-ready' may better capture the recent wider conceptualization and shift the discussion from 'work' to the 'profession' instead (Zegwaard et al., 2017). Advocates of the wider conceptualization approach argue that "employer-driven lists...do not address the full picture of what is required by the graduate facing the prospect of the labour market" (Bridgestock, 2009, p. 34). Namely, the shift from predictable, linear, and vertical progression pathways to horizontal organizational structures, global mobility, and rapidly changing work environments (McMahon, Patton, & Tatham, 2003), means that graduates need to be flexible and adaptive to manage uncertainty, ambiguity, and unpredictability, rather than acquiring a fixed set of skills (e.g., Barnett, 2012; Helyer & Lee, 2014). Emerging perspectives of employability reflect this change and are inclusive of a diverse range of areas including career self-management, professional identity, transfer of capabilities across contexts, students perceived employability (and their ability to articulate it), networking, global citizenship, and scholarship among other notions (e.g., Bridgestock, 2009; Jackson 2015; Mason, Williams, & Cranmer, 2009; Wilton, 2014).

The impact of WIL on employability capability development emerges as a dominant theme within the literature, supporting recent developments in the evaluation of WIL initiatives and programmes. The experience of WIL alone, however, does not guarantee employability outcomes for

students and graduates. In order to be truly effective, such experiences should be embedded in curriculum and supported by pedagogical strategies throughout a program to maximize learning opportunities (Bates & Hayes, 2017). Finally, the quality of student learning, including development of employability capabilities, needs to be assessed. However, assessment of employability skills development is a complex endeavour requiring assessments to be framed carefully around notions of proximity and authenticity (Kaider, Hains-Wesson, & Young, 2017), and one which has resourcing implications for higher education institutions.

5. Promoting employability through curriculum design

Despite the growing body of evidence supporting WIL as a useful strategy for promoting employability, the WIL experience alone is not a guarantee of success. As Clarke (2017) and others have noted if it is to be effective then WIL activities must be meaningful, relevant, and intentionally integrated and aligned with university curriculum (Johnston, 2011; Patrick et al., 2008; Sachs et al., 2017). Indeed, recent scholarship suggests the relationship between WIL and improved employability may be less direct than once thought. Oliver (2015, p. 63), for example, conceptualizes WIL as a “means to an end (employability) rather than an end in itself.” Clarke (2017) similarly contends that employability promotes a higher level of self exploration, guidance seeking and other associated proactive career behaviours which in turn may improve employability, rather than impacting directly on employability per se (e.g., guaranteeing career success). Okay-Somerville and Scholarios (2017) found that the process of engaging in career self-management developed employability through the promotion of self-exploration, guidance seeking, and other associated proactive career behaviours. Another consideration is the role of WIL stakeholders in improving employability – much existing scholarship emphasizes the role and responsibility of HEIs, but there are other stakeholders such as industry, community partners, government, and employers, whose input into curriculum is vital to ensure it remains relevant to the needs of employment markets (Tran, 2015).

Employability capabilities can to some extent be fostered through “add-on” activities that sit outside of formal academic programs (e.g., co-curricular WIL), or more effectively using holistic approaches which embed employability within academic curriculum. There has been a move towards favouring the latter recent years (Blackmore, Bulaitis, Jackman, & Tan, 2016; Helyer & Lee, 2014). For example, Billett’s work (2015) established that effective pedagogical interventions before, during, and after a WIL activity (including reflective practice, debriefing, and assessment) are key to maximizing students’ learning from the experience. Further, including WIL early on in a student’s program of study and sequencing experiences throughout their study is thought to be particularly beneficial for assisting students to determine what study specialization they prefer and/or are best suited to (Billett, 2015). Despite such developments, Speight, Lackovic, and Cooker (2013) observe that “tensions over the relationship of employability to the academic curriculum” (p. 123) remain, and “employability as bolt-on serves those who need it least.

Employability as ‘hidden’ within the curriculum serves no one as it cannot be articulated” (p. 124). There clearly is no one size fits all approach, and not surprisingly various models of developing employability are proposed in the literature. As Knight and Yorke (2004, p. 2) note, “the complexity of employability and the variety that exists in curricula...mean that no single, ideal, prescription for the embedding of employability can be provided.” Reconceptualizing employability as capability, that is, “the combination of skills, knowledge, and personal qualities that engender flexibility and adaptability” (Speight et al., 2013, p. 123) may offer a middle ground. In light of what has just been said one can make a case study for how employability can be embedded throughout a university degree program, drawing attention to the importance of scaffolding employability before, during, and after a student’s time at university in order to build their awareness of career options from an early stage.

6. Conclusion

Although employability seems to receive considerable attention and scholarly debate in the literature, there are still notable gaps around evidence that links successful attainment of work-ready skills to the impact graduate employability and employment, including the long- term career implications. There are few available longitudinal studies exploring employability. Furthermore, there is a need to consider curriculum redesign with employability foundational to the curriculum, where students can identify and explicitly link to their learning activity to a desirable graduate competency. Advancing the education provided to post-secondary students is integral to effectively preparing them for a life-long career in their chosen field. Therefore, it is likely that employability, despite the considerable discussion already in the literature, will remain a key research direction and focus of scholarly debate for some time yet.

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SCHOOL LEADERSHIP DURING COVID-19: EMOTIONALLY INTELLIGENT CRISIS MANAGEMENT

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Abstract

The COVID-19 pandemic presented rapid, unpredictable shifts in education, which had rippling effects on school leaders' responsibilities. In the early stages of the pandemic, school leaders throughout the United States, and the rest of the world made the strategic decision to transition to remote learning in adherence to CDC guidelines. This decision presented critical and immediate challenges for school leaders to manage their institutions. Emotional intelligence (EI) is well documented in the literature as a contributor to leadership effectiveness. We considered the novelty of the pandemic and the myriad of changes that accompanied it. To this end, we conducted a qualitative study to learn how emotionally intelligent school administrators leveraged EI in their daily leadership during the Covid-19 pandemic. A sample of eight emotionally intelligent K-12 principals from a larger study on school leadership across North Carolina was selected for analysis. We utilized Goleman's emotional intelligence model to frame our analysis of principals' emotionally intelligent leadership. Four coders analyzed semi-structured interviews through a series of open coding followed by axial coding techniques. The findings revealed that emotionally intelligent school principals across North Carolina generally displayed key emotional competencies that supported self-awareness, self-management, social awareness, and relationship management. In their crisis leadership during the pandemic, the principals attended most to relationship management. Given that EI is known to positively impact school leadership, these findings can help us understand how it works in practice to lead schools during difficult times. This work adds a US perspective to current education conversations that aim to unpack the COVID-19 experience, by providing practical knowledge from principals rated high in EI. Our work has implications for professional development and principal preparation programs as they forge forward to prepare principals for these unpredictable experiences.

Keywords: *Emotional intelligence, crisis management, Covid-19, school leadership, pandemic.*

1. Introduction

The COVID-19 pandemic presented rapid, unpredictable shifts in education, which had rippling effects on school leaders' responsibilities. In the early stages of the pandemic, school leaders throughout the United States, and the rest of the world made the strategic decision to transition to remote learning in adherence to World Health Organization (WHO) and Center for Disease Control (CDC) guidelines. This decision presented significant challenges for school leaders to manage the procedural, operational, physical, and socio-emotional structures of their institutions. The decision required major, spontaneous transformations in instruction and learning which have been demanding on all stakeholders of the learning community (Lavonen & Salmela-Aro, 2022; Robinson et al., 2021).

One of the core influencing factors in principals' leadership during the pandemic was the mandates prescribed by state and district-level administration. Although principals in the state of North Carolina are typically tasked with school-related decisions such as staffing, scheduling, budgeting, instruction, and events, the pandemic impacted their autonomy in some areas, especially in the domain of school operations. Decisions such as school closures, rules and regulations, among others were hinged on determinations made at a higher level (Reich et al., 2020). Principals and school leaders essentially became the conduit between state and district-level management and school-level operations and they had to be creative, strategic, and empathic in their leadership.

Emotional intelligence (EI) is well documented in the literature as a contributor to leadership effectiveness. In fact, research indicates that it is a critical component of school leadership success, showing significant effects on school turnaround, school climate, student achievement, teacher commitment, and change management, among other variables (Rivers et al., 2012; Saleem et al., 2017; Qijie, 2011). We considered the novelty of the pandemic and the myriad of changes that accompanied it. To this end, we conducted a qualitative study to explore how emotionally intelligent K-12 school administrators leveraged EI in their daily leadership during the Covid-19 pandemic. In particular, we examined how these principals managed their own experiences and supported their students, teachers, and the wider school community during this critical period in history.

2. Literature review

Research in educational leadership has been shifting its focus on the influence of school leaders on those under their charge (Tai & Kareem, 2019). School leaders influence students' academic performance indirectly since their leadership affects teacher morale, job satisfaction, and commitment, which consequently has a direct influence on student success (Zins et al., 2007; Moore, 2009). Similarly, school leaders can impact student performance indirectly through their influence on school climate (Rivers et al., 2012). Principals' leadership styles also have a positive impact on teachers. Decades ago, we learned that collaborative leadership and school climate have increased teacher commitment in urban schools and have positively impacted teachers' feelings of efficacy and job satisfaction (Kushman, 1992).

As a longstanding research topic, leadership styles in school leaders have been extensively studied. More recently, however, EI is being studied alongside leadership styles to better understand how the construct (EI) impacts the way school administrators lead. EI has been found to be impactful in instructional leadership preferences (Chen & Guo, 2020; Goldring et al., 2015) as well as task-oriented leadership and relationship-oriented leadership preferences (Wirawan et al., 2018). Chen and Guo (2020) investigated the effect of EI on instructional leadership in principals of 54 schools in China and found that appraisal, use, and regulation of emotions were all predictive supports to instructional leadership. A validity study on a leadership measure and an EI measure indicated convergent validity between instructional leadership and EI, suggesting that EI may be linked to effective school leaders.

A noteworthy finding in the literature is that EI has been linked to change management. Positive relationships were found between EI and the way principals managed change in their schools (Grobler et al., 2017). Another key finding is that principals' EI has been found to be positively associated with teachers' attitudes toward change (Kin & Kareem, 2020; Tai & Kareem, 2019). These findings are useful to the current study because the pandemic presented a series of uncertainties that introduced themes of spontaneity and change within the educational setting. EI can therefore be a critical attribute and skill to support principals and their stakeholders through crisis situations, such as the pandemic

2.1. Theoretical framework

Goleman's Emotional Intelligence Model was utilized to frame principals' statements about how they define and apply emotional intelligence to their work. The model focuses on EI from a performance perspective. This makes it a good fit for the current study because it supports our inquiry into how principals think about their roles and specifically, how they *perform* in it. Goleman (2001) describes how leaders' potential for demonstrating emotionally intelligent management behaviors are rooted in the domains of *self-awareness*, *self-management*, *social awareness*, and *relationship management*. Each domain has several emotional competencies, which are observable skills. Within the domain of self-awareness, there are emotional competencies of emotional self-awareness, accurate self-assessment, and self-confidence. Within the domain of self-management, there are emotional competencies of self-control, trustworthiness, conscientiousness, adaptability, achievement drive, and initiative. In the domain of social awareness, there are emotional competencies of empathy, service orientation, and organizational awareness. Finally, there are competencies in developing others, influence, communication, conflict management, leadership, change catalyst, building bonds, teamwork, and collaboration within the domain of relationship management.

3. Method

The current study used an exploratory qualitative design (Maxwell, 2005) to examine the crisis leadership practices of emotionally intelligent K-12 school administrators during the Covid-19 pandemic. Given the exploratory nature of this study, a qualitative research design was best suited to answer our research question — How do emotionally intelligent school administrators describe their use of emotional intelligence in their leadership during a crisis? Moreover, Bryman (2004) portrays the benefits of

qualitative research in leadership studies as “giving the reader a profound sense of the realities of leadership” (p. 763). To this end, this design allowed us to explore how principals’ emotional intelligence influenced their leadership practices during the pandemic.

3.1. Participants

A purposive sample of eight K-12 principals across North Carolina was selected from a pool of 49 principals who participated in a larger mixed-methods study on emotional intelligence in school leadership. The present sample represented the principals with the highest scores on the Genos Emotional Intelligence Inventory administered in the mixed-methods study. The Inventory is a behavior-based EI measure specifically designed for use in the workplace. Pseudonyms were used to maintain the anonymity of the participants and their demographic information can be seen in Table 2.

This study relied on semi-structured interview data. The interviews were audio-recorded and transcribed verbatim. The interviews were analyzed by four coders through a series of coding steps. First, the coders used open coding to identify relevant text within the transcripts, and memo emergent ideas. Simultaneously, *in vivo* coding was used to assign meaning to pieces of text (Creswell & Poth, 2016). The second round of coding included a continuous and iterative process of axial coding to identify relationships among the codes and to work towards agreement across coders. Next, using the theoretical framework as a guide, we used selective coding to identify codes that relate to existing concepts in the literature. Codes that did not directly answer the research questions, or provide additional understanding to the overall study were not used in the results.

4. Findings

The findings revealed that during the pandemic, emotionally intelligent school principals across North Carolina generally displayed key emotional competencies that supported self-awareness, self-management, social awareness, and relationship management. Their responses are organized thematically within those domains.

Self-awareness. This theme includes principals’ ability to notice and clarify their emotions, being mindful of the impact they can have on their staff and students. The principals in this study showed emotional self-awareness and accurate self-assessment. For example, Shania recognized the impact that the stress of the pandemic had on her engagement with her staff and she became intentional about addressing it in order to effectively show up in her role as a school leader. She revealed,

It was a stressful two weeks for me because we're reopening. And so I allowed what was happening around me to affect me and I had a bad attitude. And so I was ...disappointed in myself as a leader because I should be supportive and not allow that to affect me because then it affects everything in my building. I had reached my peak. So what I did was take a mental health morning, Monday morning and spend a lot of time in meditation, reflection, energy clearing...and it's been a much better week so far.

Emotional self-management. This theme represents principals’ ability to manage emotionally arousing states such as anxiety and anger in order to control emotionally impulsive responses. The pandemic presented so many uncertainties that emotional impacts were expected throughout the world. Principals in this study mostly demonstrated emotional self-control, trustworthiness, and adaptability when leading a school through the present turbulent times. Ken described his process as “staying grounded in the truth, even when chaos is happening around him”. Ann spoke about how she manages her staff in the midst of her own struggles,

I'm very consistent with them, I treat them the same every time, whether I'm feeling good on the inside, or not. If I'm in a staff meeting with 22 of my staff, and I'm dealing with something internally, there's only one person in the room who knows about it. And that's me. And I do that on purpose because they don't need my stuff, you know because they're working with kids.

Social awareness. The theme, social awareness, refers to principals’ effectiveness in interpreting emotions in others, reading social cues, being aware of others’ needs, and responding appropriately to them. Principals shared evidence of empathy, service orientation, and organizational awareness. Empathy was useful to understand the experiences of others. Principals discussed situations where this was helpful.

I'm able to have empathy and compassion and see the perspective. So we've had some upset parents, we've had, again, difficult conversations, but frequently, I'm able to calm the rest of the staff down, whoever's in there, trying to deal with these parents, and remind them that these are their babies. This is always important to them. They're just trying to deal with what's going on. (Macy)

To ensure that teachers felt supported, some principals disrupted lines of power. Being present in teachers' experiences was important to Brad. He voiced,

And I think they would say that I tried to lead by example. You know, I don't have teachers, anybody do stuff that I'm not willing to do. So that means I may have to drive a van, I may have to mop something up in the hallway, I may have to cover a class, I may have to help a kid with their computer, all those things.

Relationship management. This theme includes principals' effectiveness in being attuned to their own emotions, the emotions of their staff, students, and other stakeholders, and forging productive and progressive relationships based on this awareness. This domain of EI was most represented in the principals' leadership during the pandemic. Their interviews suggested that they emphasized practice in the emotional competence areas of visionary leadership, collaboration and teamwork, communication, and influence in order to ensure that their schools function optimally under uncertain circumstances. Decisions regarding mode of instruction were one challenge that required principals to exhibit skills in relationship management. Ken spoke about his experiences convincing fearful parents about the decision to serve students in person during the pandemic. He shared,

So, when we began the second semester, where we're going face to face, we had to make some decisions about some students who weren't doing well, virtually...and we had to painstakingly look at each individual student to ensure that we were making the right decision for them. And we had to convince their parents one way or the other...that this is a safe environment for your kid....

Principals also prioritized their teachers and students in their decision-making. Given that many decisions were tied to requests at a higher level, the principals in this study protected their relationships at school. In making big decisions, Macy explained that she would go to her team and say "Here's the problem, and then get their feedback after they ask clarifying questions..." Ken shared that he tries not to rush into decisions but involves all decision-makers in the building. Further, one principal, Leah, discussed how she included students in her decision-making. She revealed,

I give a lot of student voice here. My students have a say in just about every aspect of the school, and I value that they're the customer, they're the people I'm serving. So it behooves me to know what they prefer, what they like. And so when I'm interviewing for a candidate for an English position, I have a student panel, just like I would have a staff or my adult panel and in the case of recently, when I had to hire during this season of COVID, my students sat on a panel with the adults because I didn't want to do two different sessions. And they asked their questions, they got their input, they voted and told me who they prefer, just like the staff did...

5. Conclusions

This exploratory qualitative study examined the perspectives and leadership decisions of eight emotionally intelligent K-12 school principals across North Carolina during the Covid-19 pandemic. The findings revealed that principals demonstrated key emotional competencies in self-awareness, self-management, social awareness, and relationship management with greatest emphasis on relationship management during the pandemic. Given that EI is known to positively impact school leadership, these findings can help us understand how it works in practice to lead schools during difficult times. This work adds a US perspective to current education conversations that aim to unpack the COVID-19 experience, by providing practical knowledge from principals rated high in EI. Our work has implications for professional development and principal preparation programs as they forge forward to prepare principals for these unpredictable experiences.

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DIGITAL TRANSFORMATION OF UNIVERSIDADE DE SÃO PAULO: FROM FACE-TO-FACE TO VIRTUAL LESSON

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Abstract

Online learning has been around for a while, but it's never been more important than it was in 2020 and 2021. While many students have been able to complete their degree requirements, the pandemic has presented new challenges for educators, students, and administrators alike. E-Aulas (Virtual Lesson in Portuguese) is a platform that helps teachers, students, and colleges adapt to the new challenges presented by COVID-19. The platform helped the management of the Universidade de São Paulo (USP) undergo a process of digital transformation to offer online classes for students. USP has served students since 1934 and is a leading educational institution in Brazil.

The platform, which enabled professors to upload, with automatic metadata generation, registration, storing, and streaming video lessons, was implemented in 2012 with the aim of serving professors and students at USP. This platform, developed by a research group at the USP Polytechnic School, is currently managed by the pro-rectory of undergraduate studies. It can be used to support new teaching methodologies such as Flipped Classroom or Blended Learning, or for students to review face-to-face recorded lessons or as supplemental material for teacher' classes. Before the pandemic, there were several e-Aulas users who used the platform on a regular basis. However, during the pandemic, this number increased dramatically.

During the period 2020-2021, there were an average of 1.030 videos published per month, and 91.660 new users. There were as well 95 million hits during this same period, that is an average of 7 million accesses per month. E-Aulas has helped USP to make the transition to remote learning much easier. Therefore, it's clear that E-Aulas has been an invaluable resource for teachers who had to adapt their lessons to accommodate remote learning during the pandemic. In this case study we'll look at how E-Aulas helped USP navigate COVID-19 and still modernize the teacher methodology, enabling the use of learning active methodologies, by providing a safe way for educators to teach classes online while still maintaining high quality standards and student engagement levels.

Keywords: *E-Aulas, video platform, digital transformation, teaching-learning modernization, remote learning.*

1. Introduction

Two decades ago transmitting videos over the Internet was a big challenge. Until the emergence of streaming video distribution services like Youtube and Vimeo, platforms that use a specific network architecture called Content Distribution Networks, or CDNs (Pathan, Buyya, and Vakali, 2010).

More recently, platforms specific for teaching purposes have emerged in which it is possible to publish video lessons of complete courses, such as MOOC (Massive Open Online Course) (Zhang, 2013), EdX (Chen, 2016), and Coursera (Knox et al., 2012), bringing great benefit to people who wish to qualify, and for whatever reason, had no access to face-to-face teaching. These platforms have brought thousands of people together, democratizing access to information.

In 2012, inspired by these two movements, a platform was developed by a research group at the Polytechnic School of University of São Paulo (USP), Brazil, to store and distribute the video classes produced at the USP. This platform, which received the name e-Aulas, made it possible to create a repository of videos, and also making these video lessons available to students of the university, and also people outside it. e-Aulas architecture is based on CDN, which promotes a better video stream distribution over the Internet, guaranteeing the content delivery to those who are accessing it remotely. The platform did not have the same purpose as a MOOC, since it does not offer certification services, but

it serves mainly to preserve the educational assets, which is the academic production of the institution's professors while making it accessible.

During these last two years, we could see that this platform was very helpful for faculty to be able to maintain their classes, even with the restrictions imposed by the pandemic. And that it can still play a fundamental role in the continuity of teaching activities, allowing even the modernization of the teaching-learning process at USP.

To show this, this article will bring in section 2 details about the platform, section 3 will show the use observed during the pandemic, section 4 teaching models that can continue to benefit from the platform and the content already produced, and finally in section 5 we show our final considerations.

2. e-Aulas Platform

The e-Aulas platform was implemented in the technological development project context, funded by RNP (National Education and Research Network), with the goal of creating a national academic CDN for Brazilian public Universities (Cunha et al., 2015). Thus, in addition to the national teaching network version, called Eduplay (Sant'ana, 2021), which is currently used by all federal public universities, a smaller version was adapted and installed for the University of Sao Paulo.

In this way, e-Aulas could be adapted to USP's needs, being integrated to the administrative systems and to the central library system so that it could automatically register the videos recorded as academic production of the lecturers. From 2015 to 2021 the platform was managed by the pro-rectory of undergraduate studies.

2.1. e-Aulas Functionalities

When uploading and registering their video lesson, the faculties must provide information for the creation of metadata, such as title, abstract, key words, course, subject, version, guest teacher. In addition, the teacher will be able to define the license to use the content produced by him/her and define if that catalog record should be included in his/her list of academic productions.

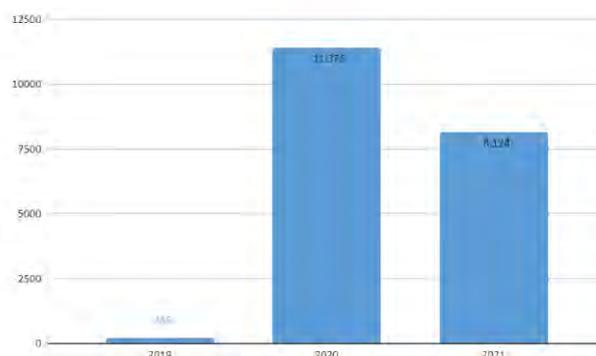
Besides allowing faculty to register and publish their video lessons, e-Aulas has other features such as account configuration, my lesson, playlist management, favorites management, video notes management, and mailing.

In the administration area, there are functionalities like user account configuration with publisher permission, servers configuration, statistics, portal pages configuration, mailing list, reporting, among others. In addition, there are some features for interacting with the published videos, such as creating a favorites list and playlist, liking, sharing, embedding, annotating, recommending, bug reporting, and denouncing.

2.2. Pre-pandemic use of e-Aulas platform

Although e-Aulas has been up and running since 2012, its use was still very limited to a few teachers who offered videos as additional content to students. However, some faculties used e-Aulas to offer their students videos with:

Figure 1. Videos published in 2019, 2020 and 2021.



- Recordings of the lectures already taught: allowing the student to review lectures already taught or watch the missed lecture.
- Records of practical demonstrations made in laboratories: allowing students to have the perception of a practical activity without going to the laboratory.
- Record made by the teacher of contents not yet taught: allowing students to watch the content before going to the classroom.

The small volume of videos published in 2019, in comparison of 2020 and 2021, can be seen in the graph of figure 1. From 2012 to 2019, only 4,300 videos were published. Nevertheless, we could observe that a large number of external users, that means, people outside of the university, from different states of Brazil, making video access was surprising. This means that people are searching for high quality content, and USP is a Brazilian reference. This is a stimulating fact considering USP's leadership role and the possibility of contributing to the democratization of information, knowledge and education.

3. Remote class at isolation period

COVID-19 presented to us new challenges. With the pandemic outbreak, the courses started to operate in remote mode, which required a great effort of adaptation from all the educators in order to achieve an adequate level of teaching.

Initially, insecurity was the feeling of part of the faculty, because they did not feel able to do teaching-learning activities in the remote mode. Others quickly adapted to the new model. This is a reflection of a university that has 5,800 faculties.

Therefore, the Pro-rectory of Undergraduate Studies immediately started a process of faculties support by offering:

- a website with videos with recommendations on how to conduct classes, use teaching tools, and create digital didactical materials,
- online workshops, using Google Meet, for hundreds of faculties.

The classes started to be held by videoconference using Google Meet or Zoom tools, with which it is possible to have visual contact between the faculty and the students. However, due to the adverse conditions imposed by the pandemic, it was defined by the USP rectory that all classes should be recorded, so that students who could not watch the class in synchronous mode, could watch it at another time (in asynchronous mode). This has benefited students with lack of internet connection or with health problems. Associated to online classes, other tools were also used to assist the learning process, such as the e-Disciplina system, an LMS (Learning Management System) based on Moodle and customized for USP, that offers files repository, chat, forum, etc.

Thus, a large volume of video records were generated, with the faculty's lectures. And some of them were published on e-Aulas, so that students could watch them. The big boom in video lesson publications can be seen in the graph shown in figure 2, which also shows the seasonality of academic production, according to the academic period in our country. The volume of new videos registered on the platform went from a few hundred in 2019 to a little over eleven thousand in 2020, and eight thousand in 2021. In terms of video production, that volume may not be much if you consider the number of faculty at the institution.

However, we observed that the number of new registered users, and the number of video accesses increased abruptly, which allows us to infer that there was an intense consumption of the videos published and an accentuated search for content that would add to the professional and intellectual formation of the users.

Therefore, we can observe the significant role of the platform during this period by comparing the number of new users registered and the video number accessed in 2019, 2020 and 2021, as shown in figure 3 and 4. As we can see in fig. 3, about 130,000 new users were registered in the system, and in terms of video access, shown by fig.4, we had in 2020 more than 6 million accesses per month, on average about 211,000 accesses per day.

4. Digital transformation of the teaching-learning process

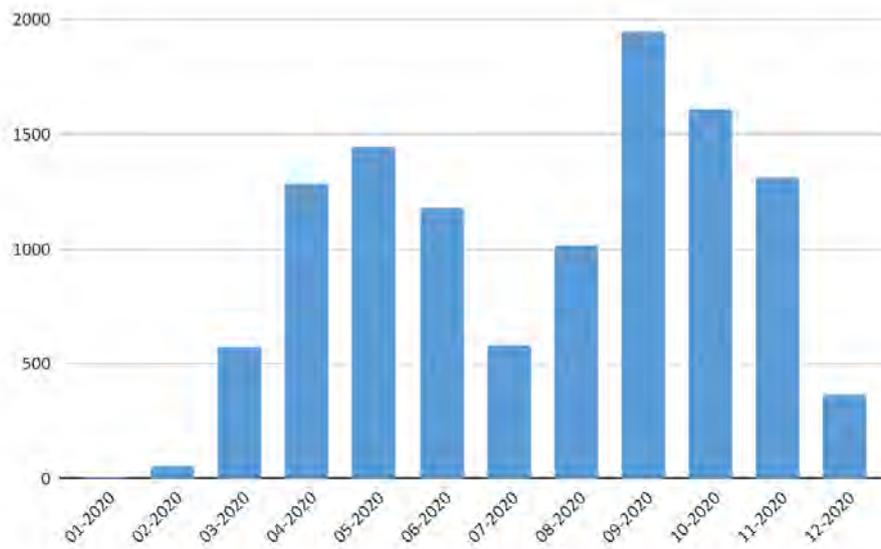
The concept of digital transformation (Lanzolla, Anderson, 2008) is understood as a process of improving an activity through the use of technological tools. It is a structural change in organizations, which no longer see technology as a one-time resource, but as part of their daily routine.

The uptake of digital technologies in schools and universities is changing the ways in which people interact and students consume content. The increasing number of available tools to produce digital content means that the academic community will have more opportunities to create and consume them, when and how they want.

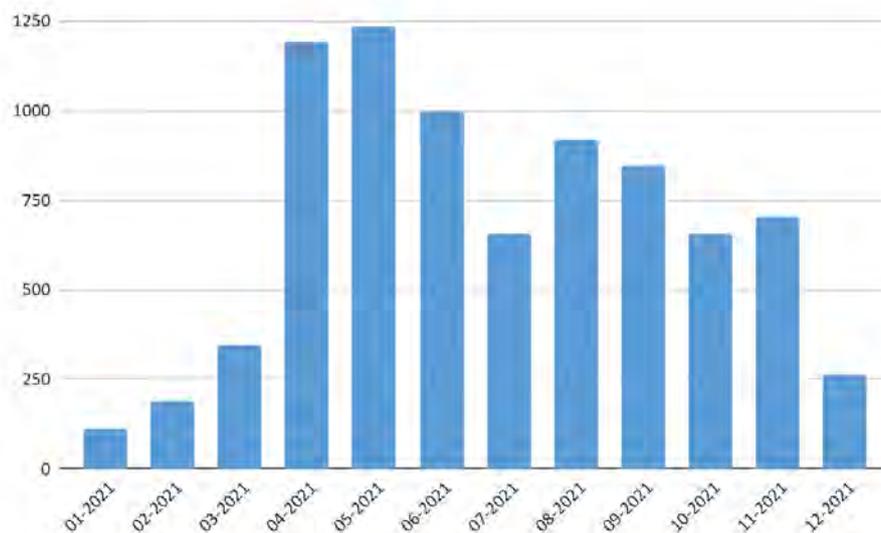
We observed that the period of social distance served as a springboard for the faculties to acquire new skills, discovering many new possibilities for producing their own content.

Overmore, some teachers, who had produced video lessons in 2020, started using this material differently in 2021, implementing other pedagogical methods and adapting them to the social distance scenario. This was the case of teachers who started using a modified form of the flipped classroom. But at this moment being used in remote classes, that is, “flipped virtual classrooms”.

Figure 2. Video lessons published month by month in 2020 (a) and 2021 (b).



(a)



(b)

These observations made it clear that e-Aulas can leverage the University of São Paulo's digital didactic transformation, supporting new teaching methodologies such as Flipped Classroom (Akçayır, Akçayır, 2018) or Blended Learning (Sharma, 2010), besides their use for students to review face-to-face recorded lessons or as supplemental material for teacher' classes.

5. Final considerations

With digital transformation, preserving an institution's intellectual assets becomes very important. The modernization of teaching is key to the continuity of a mature and efficient teaching-learning process. For this reason, digital transformation also applies to universities.

The use of pedagogical methodologies that are aligned with this transformation will be very enriching for students and faculties, who will reap the rewards of a more intense and engaged interaction with the didactic content, and between themselves, in the modern world. For this reason we are confident that the use of methodologies such as flipped classroom, and blended classroom, that integrate the use of videos to explain, demonstrate or exercise concepts, will be beneficial to USP. Each video produced by faculties, in their didactic activities, becomes an asset to be stored and distributed with copyright and patrimonial rights guarantees. In this way, e-Aulas plays an important role in this process, and also contributes to the democratization of information, since 50% of the video lessons are openly available.

Figure 3. New Users in 2019, 2020 and 2021.

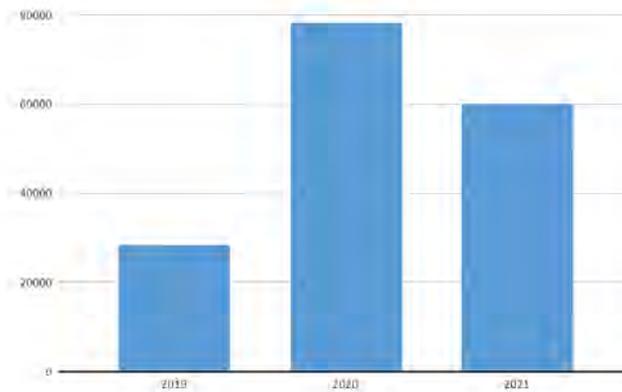
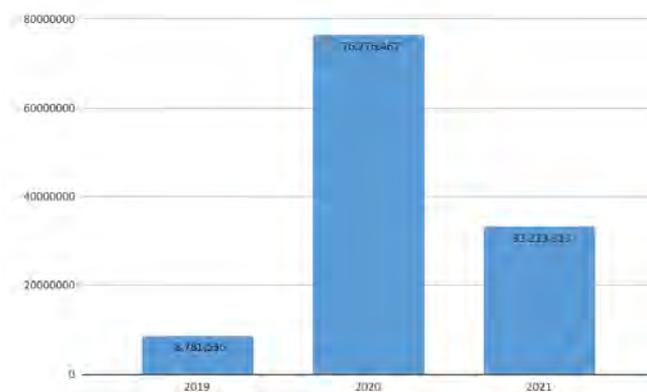


Figure 4. Number of videos accessed in 2019, 2020 and 2021.



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INTENTIONAL SCHOOL LEADERSHIP IN UNCERTAIN TIMES

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Abstract

In this study of elementary and secondary school administrators, interviews were conducted to determine effective strategies before, during, and after online learning during the pandemic. California public schools began whole school online learning during March 2020 and most schools returned to in person learning one year later in 2021. Challenges during online learning included providing sufficient technology to all students, the online learning platform, and academic rigor. When students returned to school one year later many students suffered academically and socially. School leaders were required to refocus and plan accordingly. Administrators shared their strategies and philosophy for success in times of continued uncertainty.

Keywords: *Administrators, pandemic, California, online learning, strategies.*

1. Introduction

During the 2021-2022 school year and in the past two previous school years, education has changed drastically. The COVID-19 pandemic caused elementary and secondary school closures and online learning became the norm. Schools were forced pivot and provide virtual education for all students without warning or preparation. The daily operation of the schools experienced a paradigm shift. Students, parents, teachers, and administrators were forced to learn and operate in a different world. Schools and districts attempted to provide students with computer devices, internet connections, online lessons, and parental support.

The surge of the COVID-19 pandemic caused students to have high levels of attendance issues, discipline problems, technology needs and loss of learning. Educational administrators around the globe agree that kindness, honesty, positivity, and relationships are key to overcoming the challenges of the worldwide pandemic (Woo, 2021). California educational leaders also stressed the importance of community partnerships, diversity, equity, inclusion, and the agency of human decency. During remote learning, many students reported stress-related health issues that included loneliness, lack of technology, and other problems (Torres, 2021). Thus, a shift to an urgency of becoming more intentional on building human connections became necessary.

COVID-19 has caused more trauma to inner-city school students. Elementary and secondary school students are more likely to experience adverse childhood experiences (ACE's) or trauma as a result COVID-19 (Washington-Brown, McKinney, Fair, White, & Washington, 2021). Examples of trauma may include abuse, neglect, violence, mental health issues or death of family members. The pandemic challenges included family illness, death, lack of finances and other family stressors that affected school children. Additionally, it is crucial that administrators create safe and stable environments to help all children succeed (Washington-Brown et al., 2021).

Educational administrators must become leaders who lead with intention. Because the environment is constantly changing, school administrators must learn to control their behavior and actions without allowing the environment to take control. Leaders who lead with intention connect people and concepts, help others find direction and achieve goals (Sanfelippo, 2022).

Levenson (2022) identifies three shifts to assist students who are of the COVID generation. He suggests utilizing best practices to support students, social-emotional learning (SEL), and intension in staff hiring. Best practices include scaffolding and interventions for all students. SEL includes empathy, compassion, and self-awareness. Several California districts have shifted their hiring practices to include the goal of hiring teachers who have a diversity, inclusion, and equity mindset.

2. Design

The design of this qualitative study was to collect the leadership strategies of school leaders before, during and after online learning in the elementary and secondary school levels in urban California school districts. The research questions were:

1. How was being a school administrator different **before** the school closures in the spring of 2020?
2. How did the job of a school administrator change **during** the total online learning phase after schools were shut down during spring 2020?
3. How has school administration evolved **now** that the students have been back on most campuses in person for one school year (2021-2022)?

An online survey and follow up phone interviews/questions were used to collect the data. The researcher had experience as a school principal and administrative coach to elementary and secondary administrators. This experience assisted her in the collection of the data.

3. Objectives

This qualitative study objectives were to survey school administrators who served in schools before, during, and after school closures due to the pandemic. The findings of this study were to provide school administrators with strategies and practices to assist other administrators during a time of crisis and beyond.

4. Methods

The researcher emailed eight different southern California urban school districts with a request for interested and willing administrators to respond to the research questions. Ten administrators from four different districts responded. The researcher utilized districts that included administrators that were familiar with the work of the researcher through educational administration programs. The data was collected and coded to deductively determine themes with supportive evidence (Creswell, 2014).

5. Data collection and discussion

Before school closures, elementary and secondary school administrators mentioned that interpersonal interactions were natural and that emotional and social cues were present. Collaborative projects including project-based learning was also possible. Schools worked as a family and teacher morale was positive. Parents were actively involved in the schools. Site principals were able to spend more time observing classrooms and teacher effectiveness.

After the schools closed for in-person learning and learning became totally on-line, according to the respondents, the roles of the administrators and/or principals changed drastically. Principals were no longer able to observe teachers in their classrooms. Several teachers lacked the skills to teach remotely. The principal spent endless hours making parent phone calls, texting, and emailing parents to monitor student attendance and their use of virtual learning. Home visits were made to encourage students to join the online learning platform. Many students were just not online at all. When there were teacher substitutes, many had problems with the online learning platforms and procedures. Principals spent hours supporting substitute teachers and regular teachers with technology needs and computer training. The job of the administrator became less personal. The role of principals became that of essential workers as they distributed electronic devices, and Wi-Fi hotspots.

When schools returned to in-person learning, administrators noted that the fragility of the students was obvious. The lack of social skills and social cues was evident. Some students were more self-conscious and were missing the necessary soft skills that include organizational skills and work habits. Administrators spent more time on student discipline and working with teachers to support social emotional learning. Attendance challenges continued when students returned due to many parents not feeling comfortable in the beginning when students returned. As the pandemic continued, on some days at least half of the faculty were out sick due to COVID-19 exposures or illness. This led to a shortage of substitute teachers. Administrators were responsible for COVID-19 protocols including cleaning, sanitizing, testing, and contact tracing. The role of the principal became more of a health practitioner. Educational leadership was not a priority. Administrators spent their entire day monitoring the positive cases, contact tracing, communicating with parents regarding outbreaks, and handling student issues related to discipline that may have been related to the lack of socialization over the past 13 months.

Students were also mandated to remain home for 10 days or more if they were symptomatic or exposed to positive cases. Parents, staff, and teachers avoided interactions due to the health protocols and distancing restrictions. Building staff capacity became a focus for principals as teachers were reluctant to participate in extracurricular activities. Leading with empathy become extremely important.

K-12 administrators offered similar supports to assist students who had suffered from learning loss due to the pandemic. Afterschool and Saturday intervention classes were made available for students on most campuses. Intervention counselors, tutoring, and wellness centers were created at several high schools. These centers were staffed by mental health counselors and support staff. Additional nurses were hired to help with COVID testing and assessment. Student Success Meetings which include parents, students, administrators, and teachers were developed and held to help individual students with academic and discipline problems. Attendance incentives were provided to students with weekly and/or monthly awards at all school grade levels. Increased parent and family engagement was stressed to support families in the reopening of the schools. Informational meetings were held at various times of the day to accommodate the parent schedules. Social Emotional Learning (SEL) lessons became part of the curriculum and was integrated in other core academic disciplines. School Administrators became managers of the added personnel and programs to support learning.

Principals reported that culturally relevant pedagogy has also become a focus to help students relate to their own cultures and the cultures of others. This shift in instruction helps all students feel valued and included. District and school administrators are focusing on hiring teachers who value diversity, inclusion, and equity. In addition, several California school districts require administrators to conduct equity audits and to evaluate teacher lessons through the lens of diversity and equity. Equity audits provide a measurement of inequities in the school's physical integration, SEL engagement, opportunity to learn, instruction and student empowerment (Fisher & Frey, 2022).

Administrators of all school levels mentioned that due to the learning losses, schools have made changes in the instructional schedule. Schools are now focusing on longer instructional minutes for the core subject areas of mathematics and language arts. In the elementary grades, mathematics and English Language Arts time blocks have increased. There are extra teachers and college tutors to support learning. Blended learning is used to help teachers differentiate learning based on individual needs. Secondary administrators are working with peer tutors, college tutors and intervention teachers on special assignments to increase student achievement based on grades and other assessment data. Additionally, at the middle school, 60-minute class periods have been increased to 90-minute blocks with four periods per day.

6. Conclusions

After the interviews and surveys from school administrators were collected, four themes emerged from the data. Several administrators mentioned the challenges with attendance, the need for social emotional learning (SEL), parent and community engagement, and a commitment to diversity, inclusion, and equity.

6.1. Attendance

Attendance at all schools suffered during and after online learning. Elementary and secondary school leaders emphasized the importance of students being present for academic success. In the Los Angeles Unified School district, the second largest district in the country, the chronic absentee rate was 19%. When students returned to school fully in person the percentage increased to 46%. Chronic absenteeism is defined as missing at least 9% of the school year (Esquivel, 2022). The chronic absence rate for Black students is about 57%, Latinos 49% and homeless students 68%. School leaders must find solutions to encourage students to attend school regularly.

6.2. Social emotional learning

Districts have required instruction in SEL for all students. Administrators observe and assess the teaching of SEL activities in the classroom. SEL activities are designed to help reduce the effects of trauma and promote positive relationships. The goal of SEL is to improve decision making, self-awareness and self-management (Jones & Jones, 2021).

6.3. Family and Community Engagement

Family and community engagement helps students succeed. Administrators supervise and work with community partners that include college tutors, nurses and mental health professionals that have joined the school staff to support students and parents during the pandemic era. Parent collaboration

maximize student outcomes (McLaren, 2022). Communicating with parents must be ongoing, differentiated, and deliberate. There is not a “one size fits all” when it comes to serving the parents of diverse student populations.

6.4. Diversity, equity and inclusion

District and site administrators are focused on hiring teachers and staff members that celebrate differences, support inclusion, and have high expectations for all students. School leadership must be intentional during a pandemic and beyond. Safir (2017) denotes that listening is a tool to build capacity and that school transformation requires moving schools to promote equity for all students. Leaders who utilize a listening approach understand emotional intelligence which includes empathy and relationship building.

7. Summary

During these uncertain times with continued waves of communicable viruses, hospitalizations, high mortality rates and a changing learning environment, it is imperative that school leaders shift their leadership style and become centered on the importance of human needs, mental health, and equity. Families need administrators who are visible, available, and willing to help with their children’s individual needs. Maslow’s theory of hierarchical motivation applies to the worldwide pandemic (Shoib et al., 2022). Educational leaders must be intentional in supporting the physiological needs, safety needs, and esteem needs of all stakeholders during any global, environmental change, or circumstances that are faced by our students.

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An illustration featuring several graduates in black gowns and yellow stoles, wearing white face masks. They are shown in various celebratory poses, some holding their black mortarboard caps high. The graduates are positioned as if they are emerging from or standing on large, light-blue rectangular frames that are scattered across a light blue, cloud-like background. The word "WORKSHOPS" is written in a bold, black, sans-serif font, centered horizontally and partially overlapping the graduates and frames.

WORKSHOPS

CAPOEIRA'S CONTRIBUTION TO ETHNIC, CULTURAL AND EDUCATIONAL ISSUES

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Abstract

In Brazil, Capoeira is present in the country's history, culture, education and in the schooling process. Today, it is part of the national heritage, integrates the formal Physical Education curriculum of the public network of the State of São Paulo (CEF-SP), of private schools, is an extracurricular activity in several schools and is present at the university as a content of Physical Education courses. School Physical Education was conceived in the treatment of culture related to bodily aspects that manifest themselves in different ways: games and games, gymnastics, dances, sports and fights. In this way, Capoeira was listed as the content of Physical Education classes, acquiring new pedagogical contours and methodological treatments. Thus, this proposal aims to work strategies for dealing with different contents that make up the universe of Capoeira as a content of school Physical Education. In the didactic part, strategies, methods and styles of teaching, playful characteristics, as well as the posture in the teaching process will be addressed. In this sense, we had as a starting point the understanding of Capoeira based on commonly discussed topics, which allowed us to establish the following axes of work: Historicity, Specific Movement, Musicality, Play, Body Language. Once the axes of work were determined, we experienced the organization and systematization of these contents, based on activities and teaching dynamics. Thus, it is expected to promote strategies that make possible the treatment of Capoeira as a content of school Physical Education in the international scenario, thus configuring a rich pedagogical process, based on a plural and liberating education.

Keywords: *Capoeira, scholar physical education, teaching practice, educational issues.*

1. Introduction

Currently, Capoeira is part of the universe of Brazilian schools, either as an extracurricular activity, as a curricular component in basic education (more common in early childhood education) or as content in Physical Education classes (ALVES; BARRETO, 2007).

Understood as a cultural element, Capoeira allows students to express themselves and understand different realities, which pass through different areas of knowledge, such as History, Geography, Politics, Religion, Culture, among others.

Capoeira is associated with important facts and historical episodes of Brazilian society, in its development process, adding historical, socio-economic and cultural interrelational aspects. This dynamics of Capoeira is what allows it to renew itself, to adapt to historical moments, conflicts and the environments that are imposed on it. It was precisely this polysemic, multifaceted character that enabled Capoeira to be legitimized in educational circles (LIMA; MULLER, 2013).

In this sense, Capoeira presents great cultural diversity and learning possibilities. Among them, its multiple approaches stand out, such as fight, dance, sport, game, as well as the preservation of the cultural heritage and the symbology of the black slaves who built a series of corporal tricks aimed at their defense and liberation. In this sphere, Capoeira offers multiple possibilities of intervention, such as competitive forms of spectacle, learning and cultural appreciation (SILVA, 2011).

It is in this scenario that Capoeira has become a reality in the daily life of Brazilian schools, driven mainly by the recognition of its cultural value. This reality has as a backdrop the approval of the Law Project nº 17/2014 (LSP) which recognizes the educational and formative character of Capoeira in Brazilian Basic Education.

As it is a corporal practice, Capoeira, in the school environment, has been worked in parallel with the discipline of Physical Education, provoking questions about the practice of teaching this content, since it is framed in the perspective of the “body culture of movement”, involving fighting, dancing and other content.

School Physical Education was conceived in the treatment of culture related to bodily aspects that manifest themselves in different ways: games and games, gymnastics, dances, sports and fights. In this way, Capoeira was listed as the content of Physical Education classes, acquiring new pedagogical contours and methodological treatments. However, the term body culture is understood as the forms, or practices by which man represents the world around him, through body expression, externalized by games, dances, fights, gymnastic exercises, sport, games, jokes between others, which for Collective of Athors "can be identified as forms of symbolic representation of realities experienced by man, historically created and culturally developed." (COLLECTIVE of AUTHORS, 1992, p.38)

It is the role of the Physical Education discipline to problematize and highlight the multiplicity of senses and meanings that social groups give to the different manifestations of the body culture of movement, and not just limit themselves to reproducing them. Thus, new positions in relation to the contents of Physical Education emerge. This means a new look at its object of study, that is, the body, is now understood as a cultural construction, therefore, symbolic. It is at this moment that “the expressions, body culture, movement culture and movement body culture are coined to express the object/content of teaching Physical Education” (BRACHT, 2010 p.2).

From this scenario, we highlight Ehrenberg and Fernandes (2012), where they point out that for Capoeira to be effectively inserted in the educational scope, the teacher must seek, beyond the experience, the contextualization and the theoretical - critical foundation, so that their students reflect, identifying political, economic and social aspects of the surrounding context. Thus, this experience presents the following study problem:

How to propose some pedagogical principles for the teaching of Capoeira as a content of school Physical Education, enabling the treatment of this content for teachers, without falling into the trap of crystallizing the teaching capacity with ready-made recipes for classes?

Our attempt will be to present principles that minimally systematize Capoeira, as an object of understanding and performance of the school Physical Education teacher, in order to think about the important senses and meanings of Capoeira, suggesting to the teacher, transform them into bodily practices, that is, into a bodily know-how.

2. Objectives

In recent years, new possibilities have emerged that expand the pedagogical treatment in relation to Capoeira as a content in the school environment. Such growth made its social and pedagogical relevance also challenged, raising new questions and corroborating the development of proposals for the systematization of teaching, as well as the scientific production on this theme (FALCÃO, 2004). Observing the advent of this scenario, this study aims to analyze Capoeira as a content of school Physical Education, pointing to possible advances and challenges in dealing with this theme.

From the problem presented, the objective is to work strategies for dealing with different contents that make up the universe of Capoeira. Among these we can highlight, ways of acting, teaching strategies, organization of contents, contextualization, among other aspects, all being worked in a very particular and specific way to this universe.

3. Methods

There are vast proposals on how to work with capoeira as part of school Physical Education, from its historical disposition and influence on our current culture to its bodily, social and affective development (SILVA, 2011). The strategies to be worked on revolve around the realization, games and re-signified games, experiences of gestures and musicality, related to Capoeira, where the ludic emerges as an important aspect to be worked on.

In this sense, the theoretical basis developed by Muska Mosston, more specifically, the spectrum of teaching styles is shown to be a significant instrument for the elaboration and diversification of teaching strategies used by Capoeira professionals (HEINE; CARBINATTO; NUNOMURA, 2009).

Presenting another perspective on teaching methods, Brandl Neto and Brandl (2009) highlight the directive, semi-directive, non-directive and relational forms, in which they can also be applied to the teaching of Capoeira. The transposition of the work methodology with games, analytical-synthetic, global-functional and mixed presented by Grecco (1998), has also given important contributions to dealing with the content of capoeira in the school environment.

Thus, working on the teaching practice of Capoeira associating traditional theoretical content has been essential for the development of this modality within formal education institutions, which every day open their doors and offer opportunities for Capoeira to demonstrate its pedagogical and educational.

4. Development

This proposal is applied in private schools in the city of São Paulo, with the main focus being to contribute to the organization of Capoeira, since there is no uniformity in concepts, contents and activities, in view of the elaboration of propositions that seek to legitimize it. as a school component.

In this sense, we had as a starting point the understanding of Capoeira based on commonly discussed topics, which allowed us to establish the following axes of work: Historicity (history), Specific Movement (movements), Musicality (music), Game (roda) , Body Language (body expression). Once the work axes were determined, the next step was the delimitation of what each axis deals with as well as its content in each specific series. From this scenario, we experience as a starting point the organization and systematization of the specific contents of Capoeira, from activities and dynamics to deal with these axes.

5. Expected results

Thus, it is expected to promote strategies that make possible the treatment of Capoeira as a content of school Physical Education in the international scenario, thus configuring a rich pedagogical process, based on a plural and liberating education. In this context, the theme of Capoeira emerges as a possibility of bringing formal education closer to cultural and ethnic manifestations, contributing to the construction of educational spaces and becoming important elements of discussions that not only increase the cultural background of students, but make them more critical and able to exercise their roles as citizens.

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