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The face of Education in achieving Curriculum Proofing amidst Industrial Revolution

Joshua Vidal[1]

[1]Editor-in-Chief, Electronic Paper for Science and Technology Education, Philippines

*Corresponding author: jvidal.school@gmail.com

Abstract: In the modern industrial revolution, this study looks at how education and curriculum development work together. It does this by looking at the Philippine educational system in particular. The project looks into ways to make curricula more flexible and able to change to changing technology and social and economic needs. The study uses a qualitative research method and involves talking to five teachers from a range of school backgrounds. The interviews aim to explore their experiences and perspectives on curriculum modifications, educational gaps, and the incorporation of technology in teaching. The findings emphasized the need for curricular improvements that integrate technological advancements, promote educational equity, and improve teaching effectiveness. The paper introduces a novel educational framework called "Education 6.0" that seeks to synchronize curricular goals with the ever-changing needs of the global environment. This framework prioritized a transition towards a comprehensive and flexible approach to education, facilitating the acquisition of skills that are applicable to forthcoming societal and economic concerns.

Keywords: Curriculum Proofing, Educational Resilience, Industrial Revolution, Adaptive Curriculum, Technology in Education

INTRODUCTION

Before evaluating and designing the curriculum, we must first define it. Curriculum refers to the subject being taught to students in school. Students gain knowledge in the form of subject matter, skills and strategies, procedures, books and resources, as well as mental habits and dispositions. Education 2000, an initiative of the American Forum for Global Education, has collaborated with local communities in seven different locations since 1987 to develop a unified educational program based on the needs of students in the modern world (Kniep and Martin-Kniep, 1995)

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On the other hand, the formal curriculum and the operational curriculum are frequently confused with one another. When studying different habitats, the formal curriculum does not specify which books students will read or which animals they will investigate. It is essential that the priorities and values of the community are reflected in the operational curriculum. Curriculum outlines the content and resources that students will use to acquire knowledge of a subject. Adoption of standards guarantees that all students possess the same knowledge and skills.

In the latter part of the 20th century, a variety of initiatives and trends emerged with the aim of better aligning traditional education with the realities of contemporary life and the needs of individual students. One initiative resulted from global financial perspectives on the "health" of the planet and its constituent systems (cultural, ecological, economic, political, and technological), and what that means for the future both people and other living things need these components.Therefore, this paper covers a discussion about Curriculum-proofing towards Education Resiliency.

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Chapter II
Analysis and Problem Issue

In the Philippine Education lens

The responsibility of assisting in the accomplishment of the national development objectives outlined in the nation's development plan falls on the education sector, as well as other governmental entities. The national constitution of the Philippines lists the broad purpose and objectives of education. The Constitution's Article XIV, Section 3(2), states:

> *All educational institutions shall inculcate patriotism and nationalism, foster love of humanity, respect for human rights, appreciation of the role of national heroes in the historical development of the country, teach the rights and duties of citizenship, strengthen ethical and spiritual values, develop moral character and personal discipline, encourage critical and creative thinking, broaden scientific and technological knowledge and promote vocational efficiency.*

Educational policies have been developed to achieve these objectives and further developed as the fundamental framework for elementary and secondary education.

According to a conference report ("Globalization and Living Together: The Challenges for Educational Content in Asia; Final Report," n.d.) The elementary school curriculum is developed by the Curriculum Development Divisions of the Central Office Bureau of Elementary and Secondary Education. This bureau is in charge of developing the curriculum structure, establishing national curriculum policies, and determining what students should know in each subject area. Other government agencies and community groups also contribute to these jobs (such as business, socio-civic organizations, institutions for teacher preparation, professional associations, school administrators, parents, and students, among others). They select the available courses, determine how many credit points each course is worth, and determine how much time is allotted to each subject. In the Philippines, there is a national curriculum in place and the curriculum is determined by both what and how it is taught. The Department of Education, Culture, and Sports (DECS) ensures that all grade levels have the necessary knowledge.

The DECS Elementary and Secondary Education division creates, publishes, and disseminates learning competencies. There is a recommended set of competencies that students should have acquired by the time they graduate from primary or secondary school in the majority of fields of study and educational levels. Certain topics combine the two, such as the development of various learning proficiencies across multiple contents and topics. Teachers and students can both interpret and apply the curriculum in their own unique ways. Schools are encouraged to experiment with new methods, add to what they already do, or make adjustments as long as they continue to meet the curriculum requirements. The learning competencies

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outlined in the Philippine Curriculum plan do not include any instructional methods or learning activities. Teachers, then, benefit from autonomy in planning and carrying out learning and teaching activities because it encourages creativity on their part. Teacher's guides also contain higher-level content as well as suggestions for teaching and testing.

The Instructional Materials Development Council (IMDC), a government agency in the Philippines, produces and distributes textbooks and other educational resources. Following the passage of the Book Publishing Industry Development Act (RA 8047), private publishers took over the publishing industry. The Instructional Materials Council Secretariat evaluates private educational materials and textbooks. The textbooks that students use are chosen from a list by teachers and administrators. Schools utilize teaching aids, student workbooks, science, technology, and home economics equipment, videos, cassette tapes, educational software, charts, maps, and models. However, before they can be used in classrooms, all of these must first pass an evaluation. On the other hand, students must take the National Educational Testing and Research Centre (NETRC) examinations in order to graduate from the national education system. Students take the national secondary assessment test in fourth grade, and the national elementary achievement test in sixth grade. The exams cover five different subjects taught in elementary and middle school. Students are required to take exams near the end of each academic year. The findings will influence educational policy based on budget, diagnostic and achievement tests. Due to these procedures, entrance exams are not required to enroll in public high schools, making them more accessible to students.

Bella O. Marias and Maria Pelagia Ditapat gave a presentation titled "Curriculum Development" at the conference "Globalization and Living Together: The Challenges for Educational Content in Asia; Final Report." The following are included in the curriculum development process: The design studies linked the Philippines' rapid basic education completion rate to curriculum overcrowding. Seven of the eight classes have nightly homework assignments that must be completed. This is an excessive amount when compared to learning skills at the grade or year level. According to reports, one year is insufficient time to learn science or mathematics. It is detrimental to teaching and learning when a backlog of information and skills from the previous year is carried over to the following year. The scope and order of education from elementary to high school are also concerns. Knowledge and skill gaps exist, as do overlaps and duplicates. Overlapping and duplicating lessons increase the number of work students must do. In contrast, gaps have increased the likelihood that elementary school students will require more time to prepare for middle school.

More so, the curriculum is being implemented on a national scale. With this, administrators and supervisors are now required to complete teacher training and orientation at both the regional and divisional levels, putting a crimp in the national program for trainer training. As a result, school policy was altered, resulting in a scarcity of educational resources. There is a scarcity of science and vocational study facilities, as well as tools and other educational and learning resources. Large class sizes, a teacher shortage, and insufficient classroom supervision all impede curriculum implementation (for the specialized secondary subject areas).

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If you want curriculum reforms to last, you must have regional leadership, a monitoring and evaluation system, and sustainable practices. Local leadership is required for reforms to be successful. The reform will be implemented at the local or field office level, depending on the unique priorities and capabilities of each office. Unfortunately, the improvement of curricula is not always a priority for local school leaders.

As a result of the Program for Decentralized Education (PRODED) and Secondary Education Development Program (SEDP), reform implementers and managers are now held to a higher standard of accountability. Participants include policymakers and program implementers, as well as those who will benefit from reform. Mechanisms and structures must be in place to prevent policies and procedures from being misapplied or misinterpreted. Another task that has not been completed is monitoring and assessing the use of the curriculum. A significant number of elementary schools, for example, were not visited.

In conclusion, the nation needs to urgently make significant progress in taking advantage of upcoming opportunities in the international curriculum. It is very evident that the education sector especially in the Philippines has many things to do and improve to become stable and future-proof, accessible to everyone and can withstand any adversities. Rising temperatures and drought caused crop failure and food shortages. A food shortage is another factor that contributes to increased students skipping class. In addition, children may be taken out of school to work in order to contribute financially to the family (this has been very evident during the covid-19 pandemic, that many students prefer to drop from school and prioritize the family, this is because the country like the Philippines most if not all are family-centered, people usually work and do things for the family). In addition, the occurrence of drought and low rainfall leads to a reduction in the quantity of potable water that is available. As a consequence, climate change significantly impacts the entirety of a student's life, including their security in terms of food, health, and education.

Without addressing climate change, which has a direct impact on the way curriculum is implemented in the classroom for education, these prospects and goals will never be realized no matter how hard individuals try. There is a learning gap between the topics that are covered in the curriculum and missed learning outcomes due to class cancellations because of disasters induced by climate changes. As a result, it is of the highest concern that the educational system be reimagined using the lens of curriculum-proofing using technology towards resilient education.

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Chapter III
Literature Review

Why should we pay attention to the future curriculum?

Technology is becoming more readily available to help improve future curricula. Since new technologies evolve faster than ever, this trend will continue without a doubt. Technology lets students communicate with each other, tutors, and administrators worldwide. The future student and technology must be considered when creating a technology-based curriculum. This concept and argument for the future of education focus on the possibilities and challenges of using technology to improve teaching and learning.

Moreover, futures are unforeseeable. However, if we pay attention to specific global patterns (OECD, 2019), we may learn—and assist our children in learning—how to adapt, thrive, and even impact the future. Students need support developing their abilities, knowledge, attitudes, and values to act ethically and responsibly. They also need creative opportunities to improve society.

In the 2019 Presentation at the Forum on Transforming Education, Global Peace Convention, Seoul, South Korea, Andreas Schleicher, Director of the OECD Directorate for Education and Skills, said, "Education is no longer just about teaching students something. It is more important to teach them to develop a reliable compass and navigation tools to find their way in a world that is becoming more complex, volatile, and uncertain." We will have a better future if we use our creativity, awareness, knowledge, skills, and—most importantly—our shared values, intellectual and moral maturity, and sense of duty.

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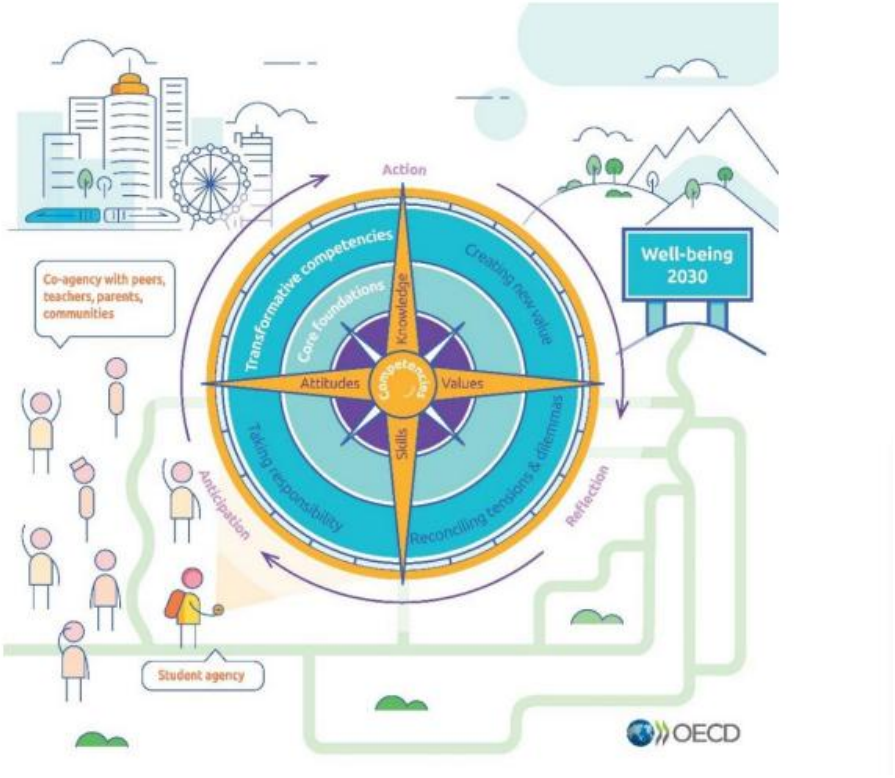
OECD Learning Compass 2030



The OECD Learning Compass 2030 shows students the information, skills, attitudes, and values they need to adapt to environmental and daily changes and help shape the future.

The OECD Learning Compass 2030 says that core foundations are the primary conditions, core skills, knowledge, attitudes, and values that are needed for all curriculum learning. Core foundations help students develop their abilities and skills that can change. Students need this background to grow up to be healthy and responsible members of society. Therefore, to face the problems of the 21st century, students need to feel like they have the power to build a world where they, others, and the earth can be happy and healthy. The OECD Learning Compass 2030 lists three "transformative competencies" that students need to do well in our world and help make a better future: creating new value, solving problems and conflicts, and taking responsibility.

Moreover, student agency means students may set objectives, reflect, and act responsibly to improve themselves and the world. Student autonomy fosters identity. Agency helps students attain well-being through motivation, hope, self-efficacy, and a growth mentality. This motivates individuals to succeed in society. Students develop social agency through co-agency. Students

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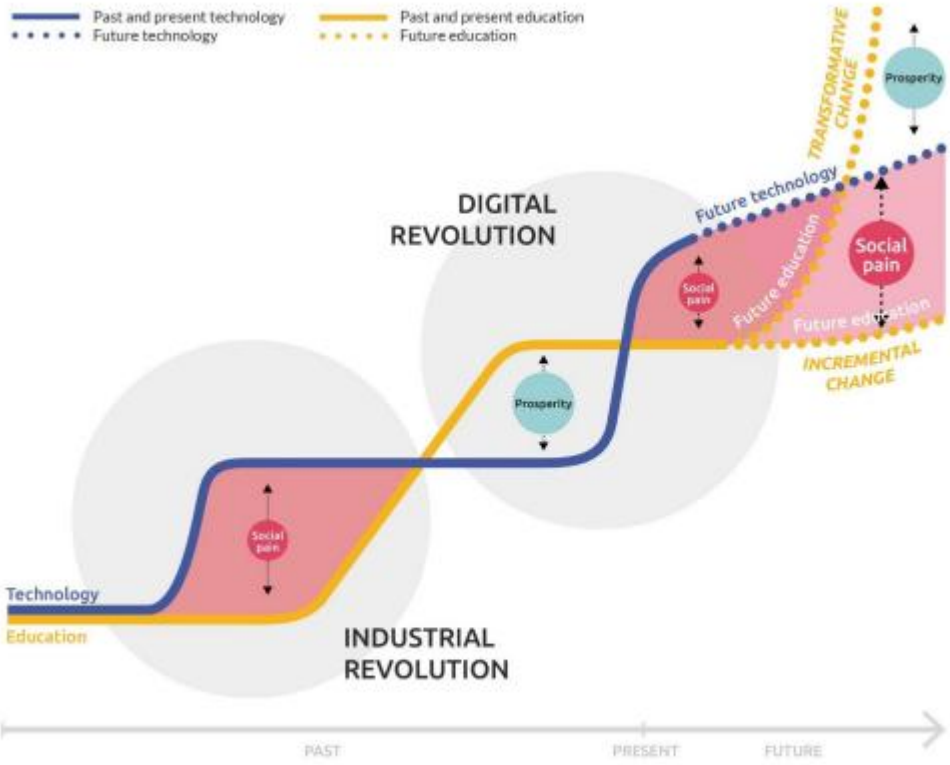
gain co-agency through engaging, mutually supportive, and fulfilling connections with peers, instructors, parents, and communities in an organic learning ecosystem.

Furthermore, the OECD Learning Compass 2030 says that knowledge is made up of theoretical ideas and practical knowledge that comes from doing tasks. The Education and Skills 2030 project considers disciplinary, transdisciplinary, epistemic, and procedural knowledge. As a result, skills allow us to accomplish tasks and use knowledge appropriately. The OECD Learning Compass 2030 divides abilities into cognitive, metacognitive, social and emotional, and practical and physical. Also, attitudes and values affect decisions, judgments, behaviors, and actions toward individual, societal, and environmental well-being. We must create civic principles to build inclusive, fair, and sustainable economies and societies.

Finally, the Anticipation-Action-Reflection (AAR) cycle teaches students ethics. Students anticipate how their activities today may affect their future. Learners will promote well-being in the action phase. Reflection helps students improve their activities for personal, social, and environmental well-being.

The race between technology and education



Source: Inspired by "The race between technology and education", Goldin and Katz (2010[21]).

We must first understand what computers can and cannot do to keep education current with technological and other social and economic changes. Humans are better in abstract, manual, complicated contextual, and ethical jobs than computers, including AI. Autor and Price (2013).

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Moreover, mobile devices, immersive and virtual environments, Web 2.0 technology, and learning analytics are the primary education technology trends (Johnson et al., 2011)

Mobile devices such as iPhones, Androids, and iPads can send and receive the material (such as Apps and e-books). Many people use mobile devices because their batteries last longer, they can connect to the internet better, and they can use the cloud to make their devices lighter and cheaper. Web 2.0 and 3D games offer many ways to learn. With haptic technology, you can simulate real-world procedures, virtual patients, touch, and other senses. Web 2.0 makes it easier to share and download files. Most people use Facebook, YouTube, Blogger, Twitter, and Wikipedia. Mobile devices and technology convergence are rising.

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Chapter IV
Data Collection, Methods and Results

Research Design

As one of the qualitative research methods, a phenomenology model was used in this research. The purpose of phenomenology studies is to reveal personal opinions and experiences related to a phenomenon at a more general level (Creswell, 2013, 2017; Marshall & Rossman, 2014).

Research Participants

Participants of this study were determined through criterion sampling method which is one of the purposeful sampling methods (Creswell, 2013, 2017; Tashakkori & Teddlie, 2010). Study group consists of 5 teachers who work in public and private educational institutions in different cities of the Philippines in the academic year 2021-2022. Information of the participating samples are in table 1 below:

Table 1: Personal Information Regarding the Study Group

Gender	**Number**
Male	3
Female	2
Age	**Number**
0-20	0
21-30	3
31-40	1
41-50	1
Years in service	
0 – 5 years	3
6 – 10 years	2
11 – 15 years	0
16 – 20 years	0

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21 years and over	0
Educational Attainment	
College	3
M.A units	2
Full-pledge MA	0
PhD units	0
PhD full-pledge	0
Type of School	
Public	3
Private	2
With License	4
Without License	1

Data Collection Process

Survey questionnaire was used as the data collection tool in the study. Data collection tool was created as a semi-structured questions form considering the preparedness and resilience of Education in achieving Curriculum Proofing amidst the industrial revolution. Data of the study was collected by using the google form survey questionnaire. Data of the study was collected from 5 teachers of different sectors (private and public) through a survey questionnaire method on a voluntary basis. Additionally, a survey questionnaire of the study was posted in facebook and other social media accounts of the researcher in which everyone to answer as long qualified to the set criteria (by turning the form into Google survey form program) and the qualified answers of respondents were received and evaluated.

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Results

Answers of teachers are given in Table 2 as themes/categories.

Table 2. Training on Curriculum Planning

Interview Question (IQ)	Category	Theme	Frequency
Is the school providing adequate training and workshops on curriculum planning?	YES	*Most Essential Learning Competencies *Transfer of goals *Coping Mechanisms *Fundamentals of Google Meet and The role of ICT in the context of Covid 19	100% (5)
	NO		0

Five teachers agree that schools give adequate training and workshops on curriculum planning. It also shown on the table that teachers had a training focus on curriculum most essential learning competencies (melcs), transfer of goals during pandemic, coping mechanisms both students and teachers during pandemic, and the use of online learning platform like google meet, along with the role of technology amidst the Covid-19 pandemic.

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Table 2. Lessons Preparation

Interview Question (IQ)	Theme	Frequency
When classes are canceled, what do you do as a teacher with your lesson planning? Why?	*Revise/Modify lessons *Rescheduling	100% (5)

Survey revealed that all respondents were unprepared caused by any lessons interruptions most especially calamities. One of the teachers stated " I need to be productive even though I have no class, so I planned again, I change my whole lesson plan, I watched youtube, I read books that connected to my subject, I listened to music while thinking, and I always seek for the interesting motivation which is very hard for me." (R1). This finding demonstrates that the education curriculum needs to be changed. Another respondent stated why they need to modify the lessons is to "make some adjustments to secure the alignment of the lesson." (R2). This means that the curriculum maps are basically not stable enough that needs to be realigned from time to time without scientific basis for changes and modifications to do.

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Table 3. Alternative Mode of Learning

Interview Question (IQ)	Category	Theme	Frequency
Do you include alternative modes of learning when classes are suspended? Why	YES	Modules including the activity sheets	100% (5)
	NO		

All of the respondents use modules or self-paced materials as an alternative mode of learning when classes are canceled. This is very true especially during pandemic, the Department of Education used modules to deliver lessons to students.

On the other hand, there is one respondent that used both online and offline mode of learning—google classroom for online and activity sheets for offline.

However, teachers also allow intervention for students who were not able to get passing scores. One of the teachers shares the mode of delivering the intervention to students. “I used the blended learning as an alternative move by using offline format to send some activities or the modules itself.” (R2). (R4) added “Yes, I give intervention to bridge the learning gaps”.

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Table 4. Curriculum Adjustments

Interview Question (IQ)	Category	Theme	Frequency
Is there any change in your school's curriculum since the return of face-to-face classes? Why?	YES	Changes interms of: *Modality *Use of Technology	100% (5)
	NO		

` The respondents revealed that there was a sudden change from online learning to full-blown face to face in the post pandemic. " From blended modality we change it to full blast face to face since we no longer use the modules or LAS we do explicit teaching." (R2). Majority of the respondents transitioned into face to face mode of learning but only one respondent emphasized the use of technology during the transition from online to onsite mode of learning " practicing the teaching-learning process using technology and accompanied by the books." (R5).

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Table 5. Teachers Perceptions towards Educational Gaps

Interview Question (IQ)	Category	Theme	Frequency
Do you believe there is a significant learning gap in education prior to, during, and after the pandemic? If so, how did you respond to them, and if not, why not?	YES	*Learning gap/loss *Lack of learning interaction	100% (5)
	NO		

Respondent one (R1) gave emphasis on the learning gap and lack of interaction during the pandemic by stating " during the pandemic all of the classes are in online mode and as a teacher we just feed them different activities without knowing how each of them learn better in different modes of learning." (R2) added " there is a learning gap and learning loss based on the incurred scores of the learners based on the quizzes and exams. Also, I do explicit teaching to give emphasis on the learning competencies that the learners don't master."

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Table 6. Teachers Idea on incorporating 4Cs

Interview Question (IQ)	Theme	Frequency
In this educational era, how will you incorporate the 4 Cs (Critical Thinking, Collaboration, Communication, and Creativity) into curriculum, instruction, and assessment(s)?	Appropriate and alignment of teaching strategies and approaches	4
	Re-assessment of spiral curriculum with the involvement of different experts of the subject matter	1

When applying 4Cs (Critical Thinking, Collaboration, Communication, and Creativity) into curriculum, instruction, and assessment(s) in this education era, teachers stated that there must be a re-alignment to the teaching strategies and approaches (f=4) (Table 6). Another respondent added that re-assessment of the existing spiral curriculum of the Department of Education must be done through different experts of the concerned subject area (f=1) (Table 6).

Moreover, it is important that in every Diversity, Volatility, Uncertainty, Complexity, Ambiguity, Disruption (D-VUCAD) world the leader must always show excellence, compassion and firmness to face these challenges (brought by the D-VUCA-D). Therefore, the respondents were asked a question:

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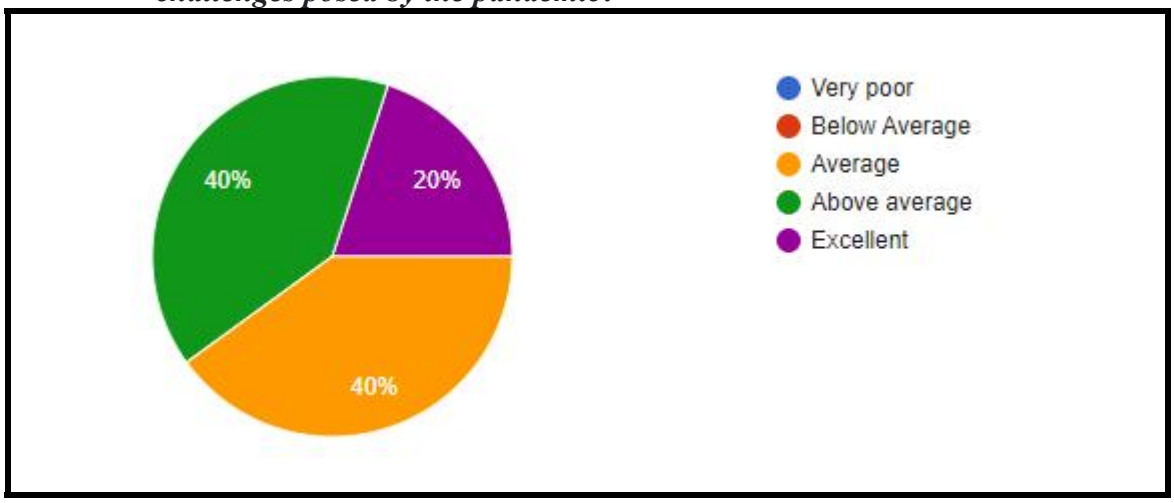
In terms of leadership, how well does your school leader respond to the challenges posed by the pandemic?



Graph 1. Educational Leadership in the D-VUCA-D world

The survey revealed that not all leaders during the pandemic were excellent in handling the D-VUCA-D world. This survey revealed that there is a need for our school leaders to learn and master educational management 80% more.

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V
Conclusion, Solutions

According to the findings of this research, educators working in public as well as private schools are willing to adjust their practices in response to new developments when the team's leaders are skilled and qualified enough to do so. In addition to the appropriate training that is provided to teachers by the institution, there must be a significant and real willingness on the part of a leader to make a difference and confront issues. It should be a leader's top concern to train teachers and analyze curricula for alignments in both the horizontal and the vertical directions. Excellent use of approaches drawn from both inter and transdisciplinarity.

Solution

According to Cooper (2006), assessment has also started to shift its focus from outcome measures to an understanding of the learning process, with formative assessment for learning being used to guide approaches for both teaching and learning. I agree with this claim, and it is essential to note that this shift has occurred. The findings of the survey that was administered to the teachers made it apparent that the misaligned competencies are causing the teachers to need help with delivering the content of the lessons they are teaching. It was also mentioned that providing intervention is quite challenging in terms of delivering and trusting it. The significant curricular shifts implemented during the pandemic made it impossible to maintain academic integrity. As a result, a new curriculum must cover learning modalities.

Moreover, this paper presents an educational theory to understand the shifts and basis for reconstructing the educational curriculum.

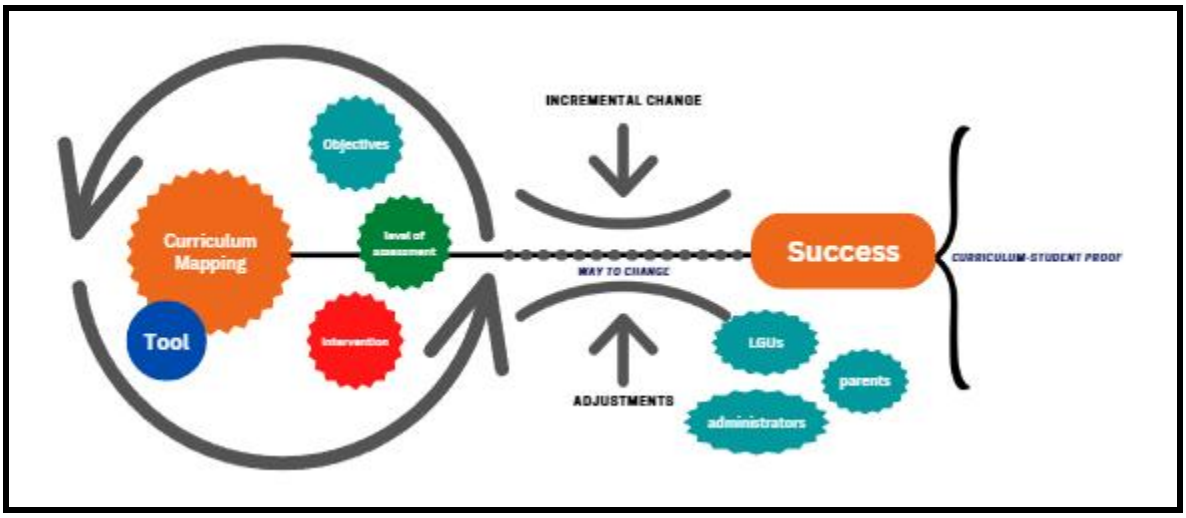

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Figure 1. New propose theory towards Education 6.0 in the PH

The curriculum needs to be reviewed based on its objectives, evaluation levels, and intervention strategies. These factors need to ensure that technological tools are used in conjunction with it in order to make it more exciting and current. Remember that technology is the future and is used to teach. In addition, students are granted access to course handouts and more advanced multimedia presentations through learning management systems (LMS). On the other hand, the emerging trends mentioned above could replace current technologies and offer exciting new ways to improve teaching and learning. As shown in the diagram above, the curriculum map, along with the tools, objectives, level of assessment, and intervention, must be contained in a single circle and subject to adaptation and change.

Finally, achieving success is always complex. Because of this, I mentioned earlier that a good leader needs to be excellent, compassionate, and genuine to lead effectively. This is because the path to success requires going through incremental changes, such as implementing new curricula. Adjustments must be made to achieve educational success in schools' curriculum, and support from local governments, students, parents, and educators must be obtained.

Bridging Technology and Education as Emerging forces

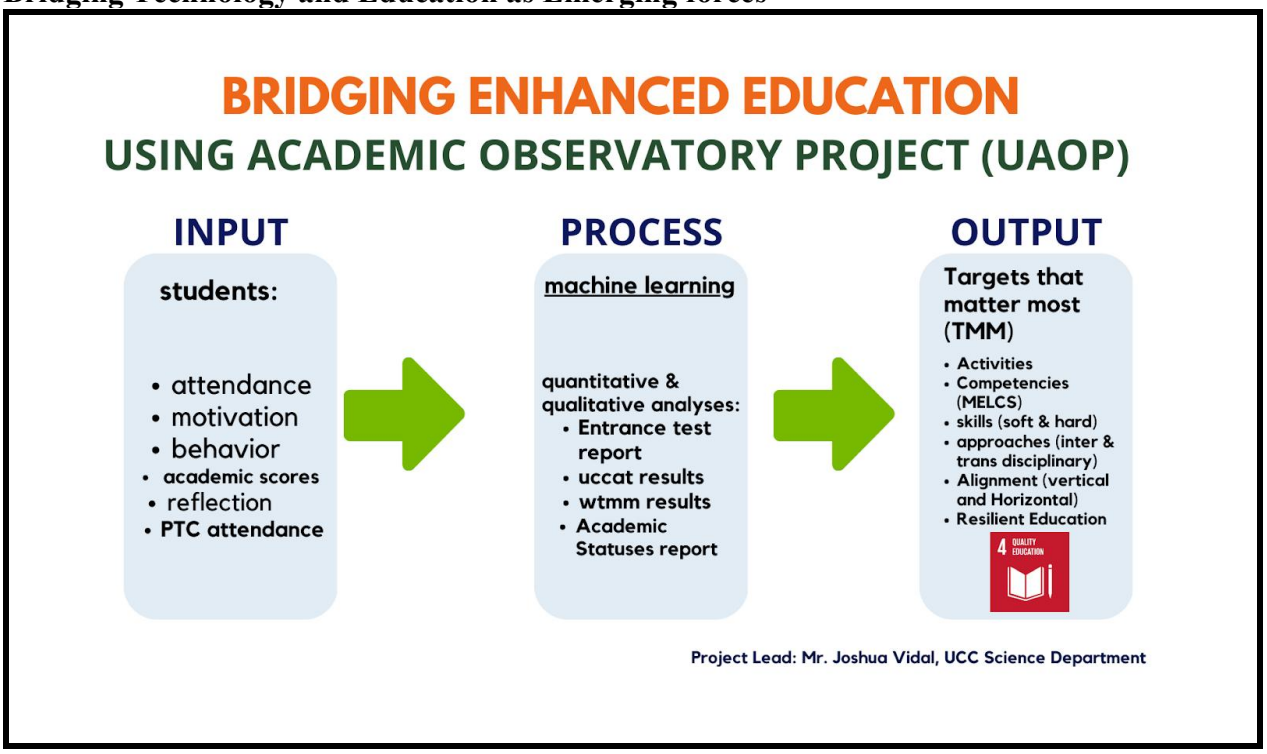

Figure 2. Academic Observatory Project (UAOP) framework

Through the Academic Observatory Project (UAOP) framework, education can trace, evaluate, observe trends and current issues both to students and teachers. The data generated from this model will be the empirical basis of the administrators. This would be an answer to the finding by Vidal (2022) that *Teaching* is a job that is mainly disconnected to technological

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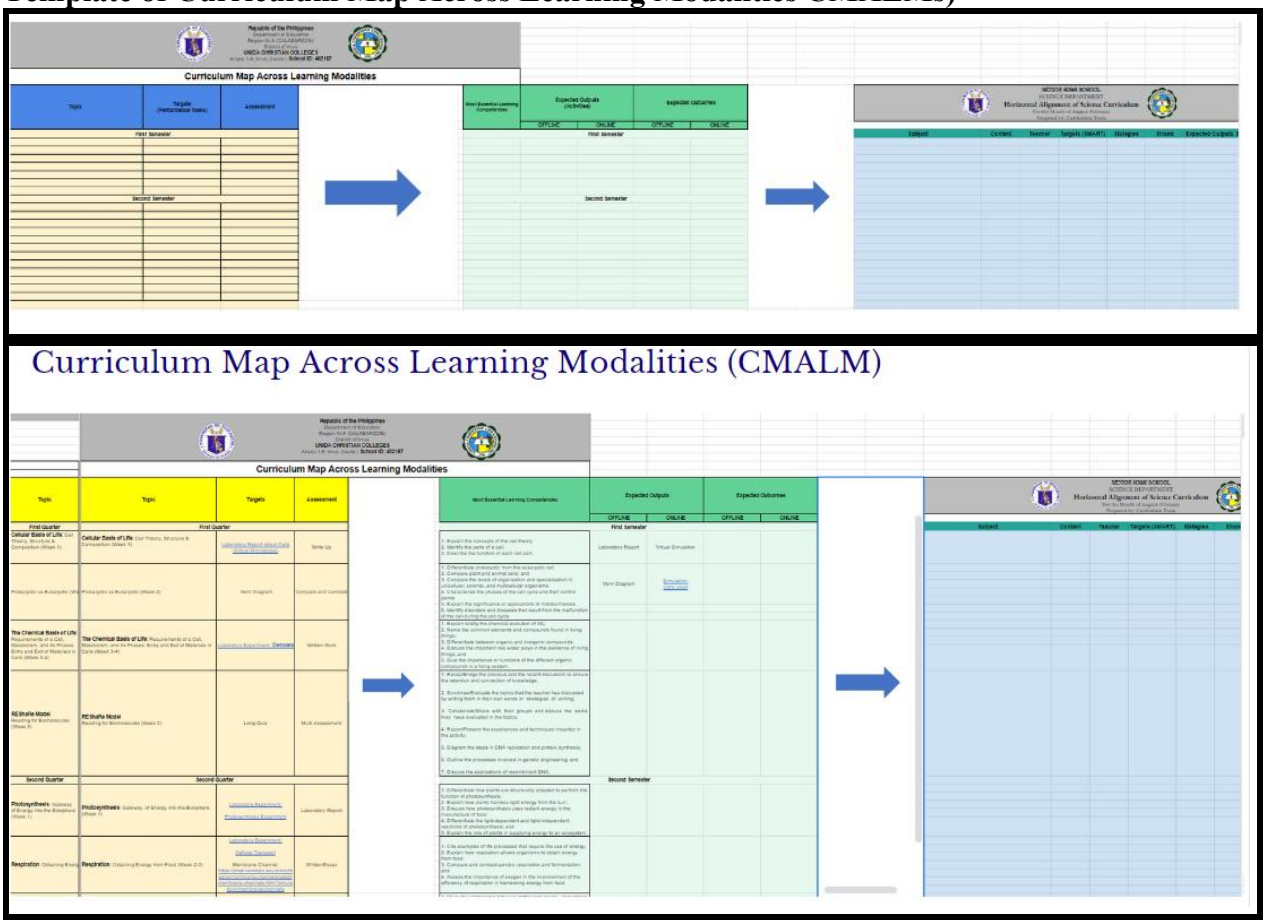
progress, so, when a pandemic hits the world, Philippine Education is one of the sectors that is caught off-guard when it comes to Blended Learning. Worse, teachers are being given a lot of new things to do, which has led to criticism and talk about the educational aptitude of students in terms of their skills. With this, the UAOP framework will support and aid the call of Vidal & Radulla (2022) emphasizing that it is about time that people learned from what happened during the COVID-19 pandemic, and we shall implement a flexible or future-proof curriculum that should be tied to and used in the education system. All of these shall start with the curriculum planning as what Vidal (2022) reiterated in his paper titled Proposed Curriculum Planning and Management Model towards Education 6.0 in the Philippines that alignments and collaboration.

Curriculum Preparation

Template of Curriculum Map Across Learning Modalities CMALMs)



This Curriculum preparation will become the projectile fired from a gun to achieve improved educational resilience in the Philippines (refer to figure 1).

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