Trends in emergency higher education digital transformation during the COVID-19 pandemic

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Abstract

The article reveals trends in emergency higher education digital transformation during the COVID-19 pandemic. Due to the enormous amount of literature discussing global higher education responses to the Coronavirus, the preference is given to publications with a systematic literature review published in 2021. The period indicates the end of the 2-nd wave of the pandemic and the lessons learnt. However, case studies were also the focus of attention, primarily used for a convincing illustration of the trends in a particular country. Moreover, descriptive survey research allows empirical evidence of 468 students and 179 lecturers from four Ukrainian universities and highlights the theoretical insights. The analysis of cross-cultural investigations, systematic literature reviews, case studies, and empirical data from four Ukrainian HEIs makes it possible to receive experience from 30 countries about their responses to the COVID-19 pandemic in 2020-2021. This massive amount of evidence reveals universal consequences for higher education caused by the COVID-19 pandemic and shapes trends in emergency higher education transition to digital format. The findings show that the emergency higher education transition to digitally-based education during 2020-2021 worldwide is characterised as diverse and unprepared. In the case of Ukraine, the empirical data collected from four national HEIs situated in different regions of the country gives grounds for the following insights: 1) in response to the challenges of the COVID-19 pandemic, the national HEIs show trends similar to global higher education; 2) university teachers have considerable responsibility in transitioning traditional teaching methods into a virtual educational environment and have successfully coped with this challenge; 3) universal trends in higher education are observed on the national level, while there is diversity on the institutional level among national HEIs; 4) there is an opposite attitude of lecturers and generation Z students to the preference for the educational mode in the future.

Practitioner Notes

1. The COVID-19 pandemic impact on higher education worldwide has resulted in universal consequences.
2. The universal consequences caused by the COVID-19 pandemic in higher education worldwide refer to different readiness and preparedness of HEIs for emergency online distance learning; differences in pedagogies, financial and infrastructure support, EdTech implementation, and digital competencies of academic staff; diversities in transition to online distance education; and perception and satisfaction of distance teaching-learning.
3. There are universal trends in the emergency transition of global higher education to digitally-based distance learning.
4. Generation Z students have chosen online distance learning and online exams for education in the future.
5. Having gained an experience in online remote distance teaching, lecturers consider the traditional mode of education in the future.

Keywords

higher education, digital transformation, the COVID-19 pandemic, digitally-based distance learning, educational technology

Introduction

The COVID-19 pandemic brought worldwide lockdowns, distancing, remote learning, and work. It affected higher education systems launching fundamental transformation in teaching approaches and methods, classes and exam formats. The Coronavirus accelerated the higher education transition from traditional with a physical presence in class to online. However, the global higher education systems entered the COVID-19 pandemic in different conditions. The Coronavirus divided the world's higher education map into more prepared and experienced and unprepared and inexperienced educational systems in digitally-based distance learning. On the eve of the COVID-19 pandemic, the World Economic Forum COVID Action Platform (2020) reported high growth and adoption in educational technology (EdTech), with global investments of US$18.66 billion in EdTech in countries with developed economies in 2019. Since then, various digital tools and EdTech – language apps, video conferencing platforms, virtual tutoring or online learning software – have significantly boosted higher education usage. Therefore, the higher education systems in economically developed countries with universities providing distance learning and developed online courses (MOOCs) were undoubtedly more prepared for the transition to digitally-based education and had a particular experience teaching online. For example, in Norway, engagement in learning in MOOCs and the transformative Digital Agency development are discussed in pre-pandemic time (Engeness & Nohr, 2020). In New York, colleges were familiar with providing educational services in crisis (Neuwirth et al., 2021).

On the contrary, countries with developing economies faced significant challenges in transitioning to a new online educational format. The Research Gate has become a supporting platform for exchanging information about experience in virtual classes and online exams, providing researchers and educators from all over the world with an opportunity to find the best solutions and good practices. The researchers and educators from Asia and Africa were deeply involved in discussing questions about problem-solving in online education. It has resulted in numerous studies in the scientific literature related to the impact of the COVID-19 pandemic on third countries' higher education since then.

In the case of Ukraine, the situation was specific due to the national higher education system's continuous modernisation. Since 2005, when Ukraine joined the Bologna Process, national higher education has been transformed according to the Bologna Model, experiencing impacts of globalisation and internationalisation. The new "Law on Higher Education" adopted in 2014 allowed HEIs autonomy and brought the features of marketisation and Europeanisation. However, digitization has not received much attention. Therefore, in pre-pandemic times, national educational services were provided traditionally with a physical presence in classrooms. Blended learning was provided unsystematically primarily for part-time students on LMS Moodle, which is likely to be the only educational technology (EdTech) familiar for a few faculty and students. Therefore, the COVID-19 pandemic caused shock and a flurry of criticism of online learning among national educators. The universities were not ready for that external stimulus facing technical and financial challenges as well (Krylova-Grek & Shyshkina, 2021; Shevchenko et al., 2021).

It is worth mentioning that Ukrainian higher education felt a colossal shock from the COVID-19 pandemic, as it provided educational services primarily in a traditional face-to-face format. Therefore, for the challenging 2020-2021, national higher education has experienced an emergency transition from conventional to remote, hybrid and, finally, online distance learning. This transformation is accompanied by adopting university authorities, academic staff and students to new digital realis and gaining unknown experience (knowledge and skills) in re-organising the educational process online. Consequently, the COVID-19 pandemic has had different impacts on global higher education. Analyzing higher education responses to COVID-19 across 20 countries, Crawford et al. (2020) found that they were diverse to a complex challenge. However, in scientific literature, there are attempts to unify and classify challenges experienced by higher education worldwide in the transition to online distance education (Khan, 2021; Turnbull et al., 2021) and the long-term consequences caused by Coronavirus (Abu Talib et al., 2021). In this regard, the research aims to reveal emergency higher education digital transformation trends during the pandemic.

Methods

A mixture of theoretical and descriptive survey research focuses on revealing trends in emergency higher education digital transformation during the COVID-19 pandemic. The literature review is employed to reveal universal trends in higher education shift to online format worldwide during the pandemic time. Due to the enormous amount of literature discussing global higher education responses to the Coronavirus, the preference is

given to publications with a systematic literature review published in 2021. The period indicates the end of the 2-nd wave of the pandemic and the lessons learnt. However, case studies were also the focus of attention, primarily used for a convincing illustration of the trends in a particular country. As a result, 59 peer-reviewed publications from Web of Science and Google Academy databases have been analysed. Moreover, descriptive survey research allows empirical evidence of lecturers and students from four Ukrainian universities and highlights the theoretical insights. This mixture of methods enables us to trace the trends in the emergency transition of global and national higher education to digital format during the COVID-19 pandemic accounting for external and internal factors and students' and lecturers' experiences.

The research analyses higher education transformation trends at various levels – higher education institutions (HEIs), lecturers and students during two pandemic waves, 2020-2021. The research covers the timeline after the 2-nd wave of the COVID-19 pandemic – from January-April 2021. Furthermore, the study focuses on three levels of analysis. First, based on the literature review, there is an attempt to shed light on the emergency transformation of world higher education systems during the COVID-19 pandemic. Second, the article makes an effort to make sense of students' experience of participating in remote learning and online exams. Finally, the research aims to reveal lecturers' attitudes toward distance teaching and online exams. It presents evidence of academics and students' perception of online distance education based on collected survey data. The research objective is to reveal universal or specific trends in higher education digital transformation worldwide during the pandemic.

The research objective is identified through the following primary methods. First, a theoretical literature review of the existing materials, particularly current publications on the issue. Second, two quantitative surveys for data collecting were designed and conducted with sampling based on a simple random technique. The surveys were conducted in four national universities located in different regions of Ukraine. Namely, Odesa Polytechnic National University (HEI (O)) is situated in the south-west, Khmelnytsky Humanitarian and Pedagogical Academy (HEI (Kh)) is situated in the west, Ivan Franko National University of Lviv (HEI (L)) is situated in the very west, and Borys Grinchenko Kyiv University (HEI (K)) – the capital university presents the central part of Ukraine. This geographical distribution of national HEIs makes it possible to display the overall state of play and response of higher education in Ukraine to the challenges of the COVID-19 pandemic.

The quantitative surveys for students and lecturers were designed in Google Forms and conducted online in national universities randomly in January-April 2021. The survey participants were lecturers and students doing Bachelor's and Master's programmes in Humanitarian Faculty in HEI (O) and HEI (L), the Teacher Education Department in HEI (Kh), and the Department of English Philology in HEI (K). This survey is based on total responses from 468 students and 179 lecturers. Namely, there are 77 students and 20 lecturers from HEI (O), 85 students and 21 lecturers from HEI (Kh), 96 students and 58 lecturers from HEI (L), and 210 students and 80 lecturers from HEI (K).

The optimal survey analysis was achieved using qualitative and quantitative methods. Descriptive statistics explain the relationship between variables in a sample in the form of measures of central tendency (Loeb et al., 2017). The collected data is presented in comparative tables and figures for better visualisation. In this regard, survey results have statistical significance in indicating trends in the researched issue.

Trends in global higher education digitalisation

Current scientific literature reflects the COVID-19 impact on higher education worldwide. The research coverage varies from developing to developed countries. Numerous qualitative narrative reviews evidenced emergency transition, unexpected change or accelerated shift from traditional (face-to-face) to online distance teaching-learning caused by the COVID-19 pandemic in 2020. However, the transition to online education is characterised by *diversity*. Only developed countries (e.i., Australia, Germany, Italy, Republic of Ireland and the United Kingdom) and some developing countries (e.i., China, Egypt, Hong Kong and Malaysia) reported a move to online teaching. However, in the USA and other countries, not all HEIs launched distance learning (Crawford et al., 2020, p.19).

A quick look at the publications shows that global higher education systems faced the Coronavirus with *different readiness and preparedness*. For instance, based on students' perception of higher education during the COVID-19 pandemic in Australia, Cambodia, China, India, and Malaysia, the comparative research reveals the differences in pedagogies, infrastructure support, EdTech levels, and digital competencies (Eri et al., 2021). Besides, in Malaysia, an emergency transition to remote online learning poses the most significant challenge to higher education, revealing "the existence of a clear digital divide" (Azman et al., 2021, p.70). India was "actually not ready" to "shift the education paradigm from traditional chalk-talk method to online LMS-Blended learning

technique all of a sudden within weeks" (Saha et al., 2021, p.1). In South Africa, academic staff and students experienced challenges from online distance education implementation (Armoed, 2021). In Turkey, HEIs also "had difficulty providing sufficient pedagogical and technical guidance to academic staff due to the rapid transition" (Keskin et al., 2021, p. 493). Due to the sudden transition to remote teaching-learning in Greece, "both academics and students faced a series of unanticipated challenges" (Kefalaki et al., 2021, p.13). HEIs in Romania were not also prepared for online education and experienced its more prominent disadvantages (Coman et al., 2020). Despite the differences mentioned above in responses to the challenges of the COVID-19 pandemic, there are similar trends in global higher education emergency digitalisation. They are listed below.

Accelerated shift to online education

In Italy, lockdown turned distance teaching-learning from "optional for traditional universities to the only means to ensure" educational services. Italian HEIs managed to re-organise their performance "in only one week" (Appolloni et al., 2021, p. 2; Agasisti & Soncin, 2020, p. 86). The Dutch government introduced a week of complete university lockdown that enabled the teaching staff to "prepare themselves for offering online education … and transform all teaching from traditional face-to-face to online teaching" (de Boer, 2021, p. 96). German HEIs, as Zawacki-Richter (2021) shows, "have made enormous efforts in a short time to make an online summer term 2020 possible within weeks" (p.1). Canadian universities moved courses online and suspended in = person operations. The academics felt "unexpectedly wrenching" being unable to use the campus office (Metcalfe, 2021, p. 5).

In Ukraine, the first wave peaked at the end of March 2020, followed by an uneven transition to remote education, with diverse quality and quantity. The pioneers in traditional education transformation have become primarily medical universities as they provide educational services for national and international students and universities located in the capital and big regional cities. In spring 2020, the widely used EdTechs were Moodle and Zoom in medical universities (Mospan & Slipchuk, 2020, p. 8399). The humanitarian universities provided live-video communication with Google Meet, Zoom, and WebEx collaboration platforms (Mospan et al., 2022). Based on the collected data from four universities, the national HEIs met the second wave of the COVID-19 pandemic (autumn 2020) more prepared and experienced in providing online distance education (see Table 1).

Table 1.
Digitalisation of national higher education in 2020-2021 (M, %)

EdTech	HEI (O)	HEI (Kh)	HEI (L)	HEI (K)	Mean
Virtual learning	70.4	50.6	54.9	71.0	**61.7**
Hybrid learning	44.1	65.1	53.8	49.0	**53.0**
MOOCs	26.3	22.1	41.3	36.9	**32.3**
Google Classroom	93.7	52.8	37.9	40.3	**56.1**
Moodle	22.7	90.3	13.8	95.3	**55.5**
MS Teams	45.9	-	91.9	-	**34.4**
Zoom	59.8	99.4	71.8	95.2	**81.5**
Google Meet	25.5	49.7	33.5	88.8	**49.3**
WebEx	1.5	3.0	49.1	39.1	**23.2**
Skype	3.4	28.7	25.5	9.8	**16.9**
Coursera	72.2	30.0	7.8	89.7	**49.9**

National HEIs experienced various types of online distance learning, e.g., virtual learning (M = 61.7%), hybrid education (M = 53,0%), and MOOCs which were used as alternative resources (M = 32.3%). Among MOOCs –

Coursera was more frequently used (M = 49.9%). In terms of LMS the commonly used were Google Classroom (M = 56.1%). Moodle (M = 55.5%) and MS Teams (M = 34.4%). Virtual classes were conducted primarily on Zoom (M = 81.5%) and Google Meet (M = 49.3%). There were attempts to use WebEx (M = 23.2%). but Skype was less popular (M = 16.9%).

Government and institutional support

The examined studies showed that institutional support was vital to the successful transition to online education (Turnbull et al., 2021). Some universities have provided designated online teaching tools, infrastructure and IT department support for providing teaching in real-time (Abu Talib et al., 2021). Moreover, the HEIs have coped with the lockdown in Germany due to investments made "in a technically stable infrastructure" and lecturers' efforts (Zawacki-Richter, 2021). In the USA, some colleges reactively devised systematic student outreach efforts to alleviate the technology access-related issues and provided them with loaner laptops at no cost during the pandemic (Neuwirth et al., 2021).

In Ukraine, institutional support was more prominent. National HEIs, as autonomous institutions, coped with the pandemic challenges based on their facilities and understanding of the situation. In turn, the COVID-19 pandemic has tested the universities' autonomy to quickly transform education online due to their different technical facilities and financial resources. For example, to provide high-quality distance learning, the HEI (K) developed effective institutional and educational policy and provided teachers with ICT Laboratory support and students with Moodle e-courses available on the pandemic eve (Mospan et al., 2022). However, the successful transition to digitally-based education was made possible largely thanks to university teachers' outstanding efforts and creativity.

Digital shift

Table 2.
Forms of online distance teaching from lecturers' experience (%)

Classes/tests online	HEI (O) (n = 20)	HEI (Kh) (n = 21)	HEI (L) (n = 58)	HEI (K) (n = 80)	Total (n = 179)
Sessions	84.2	81.0	91.2	97.5	**90.5**
Progress achievement test	50.0	95.2	87.7	79.7	**79.8**
Consultations	84.2	90.5	86	70.9	**78.2**
Final achievement test	60.0	71.4	80.7	83.5	**77.6**
Tests on LMS	42.1	61.9	84.4	72.2	**70.9**
Assignments on LMS	36.8	81.0	68.9	70.9	**67.0**
Seminars	63.2	71.4	68.4	48.1	**58.1**
Lectures	78.9	90.5	64.9	40.5	**57.5**
Diagnostic test	40.0	19.0	61.4	39.2	**43.5**
Lectures recording	15.8	33.3	38.6	12.7	**23.4**
Traineeship assistance	36.8	28.6	7.0	24.1	**20.1**

The methodology and pedagogy shift to online format was launched when the teaching-learning method was transformed from face-to-face to virtual mode worldwide. HEIs have coped with lockdowns due to enormous lecturers' efforts, namely in Germany (Zawacki-Richter, 2021). Spanish HEIs reveal a significant increase in the frequency of flipped classroom sessions and a variety of didactic resources with video and audio files during the lockdowns. University instructors consider virtual teaching an opportunity for flipped classrooms and digital skills development that could improve the quality of university methodology (Collado-Valero et al., 2021). In New

York, in virtual synchronous live lectures, faculty were faced with modifying the pedagogy, pacing and presentation of concepts of the course (Neuwirth et al., 2021).

In Ukraine, lecturers evidence that they conducted sessions (90.5%). consultations (78.2%). various tests (M = 66.9%). created test tasks (70.9%) and assignments (67.0%) on LMS, delivered seminars (57,5%) and lectures (57.5%) in online distance teaching during the COVID-19 pandemic. Besides. there were attempts to record lectures (23.4%) and even provide traineeship assistance (20,1%) (see Table 2). The data could fix the transition to methods of e-teaching in online education.

Uneven accommodation to remote virtual classrooms

The experiences of universities in Australia, Malaysia, and Indonesia show that universities were able to accommodate the shift to a remote virtual classroom model quite effectively, although not without hitches, due to a combination of ICT, LMS, blended learning experiences, training, and support (Djajadikerta et al., 2021). On the other hand, in Romania, "fast adaptation determined serious gaps and improvised teaching methods" (Potra et al., 2021, p.12). Moreover, university students in South Africa, Wales, and Hungary evidence significant differences in online education experiences, referring to the differences in countries' economic, digital development, and cultural backgrounds (Cranfield et al., 2021). Investigating the resilience to adapt to the new EdTechs, Olivera et al. (2021) revealed the lack of faculty online technology readiness and the disruption in transitioning online as the main challenges for teaching in virtual environments. Besides, the majority of students in New York elected to continue the synchronous live virtual lectures, and a minority of them had asynchronous recorded lectures on LMS (Neuwirth et al., 2021).

The efficiency of Ukrainian Heis's transition to online education depends on diverse factors, i.e. location (capital or regional), educational field (humanitarian, medical, technical), educational service provision (for national or international students), internal potential (ICT tools, the Internet access, academic and ICT staff), waves of the COVID-19 pandemic and funds. Therefore, the Coronavirus measures taken by universities resulted in the diverse implementation of distance learning types, EdTechs, differences in the ICT tools access or the Internet connection, academic staff preparedness and success of online education. These differences in EdTechs integration and academic staff preparedness are presented in Tables 1 and 6. For example, among LMS – Moodle was frequently used in some universities, (e.i., HEI (Kh) – M = 90.35% and HEI (K) – M = 95.3%) while MS Teams in others – HEI (O) – M = 45.9% and HEI (L) – 91.9%.

EdTech integration in higher education

EdTech integration is featured by frequently employed video conferencing, E-portals, websites, video recordings, simulations and online quizzes as the primary digital tools for conducting classes and evaluating student performance (Abu Talib et al., 2021). For example, in Slovenia, various digital platforms and examination applications have facilitated the sudden transition from face-to-face to virtual learning (Gradišek & Polak, 2021). The lecturers in the USA, Malaysia, and Taiwan preferred using a wide range of technologies to a HEI-provided LMS (Marek et al., 2021). In Mexico, 60% of teachers showed satisfaction using Microsoft Teams (Zamora-Antuñano et al., 2021). While replicating traditional instruction online, Zoom was a popular platform for conducting synchronous learning, and Moodle was the primary LMS for asynchronous learning activities (Turnbull et al., 2021). Namely, in Hong Kong, the educational space was moved to virtual classrooms on Zoom (Jung et al., 2021), and in Ecuador, Zoom was significantly more attractive than Webex (Parra & Granda, 2021).

Although the data varies from national HEIs, it is obvious that in Ukraine, there was a rapid implementation of various EdTechs. Both students and lecturers evidence that the frequently used online communication platform is Zoom (93.3% & 88.2%), and LMS Moodle (58.3% & 85.4%). In terms of MS Teams, it is used in universities with no Moodle in pre-pandemic times. Google apps are widely used as well, primarily Google Classroom (54.7% & 43.5%) and Google Meet (56.1% & 55.8%). In general, MOOCs on Coursera were used more by lecturers (58.1%) than by students (35.6%) (see Table 3).

Table 3.
EdTech integration in national higher education in 2020-2021 (%)

EdTech	HEI (O) (S-77/L-20)		HEI (Kh) (S-85/L-21)		HEI (L) (S-96/L-58)		HEI (K) (S-210/L-80)		Total (S-468/L-179)	
	S*	L	S	L	S	L	S	L	S	L
Moodle	1.6	43.8	80.7	100	-	27.6	98.1	92.5	**58.3**	**85.4**
Google Classroom	100	87.5	62.7	42.9	55.2	20.7	43.1	37.5	**54.7**	**43.5**
MS Teams	12.9	78.9	-	-	92.7	91.1	-	-	**19.01**	**25.1**
Zoom	82.9	36.8	98.8	100	99.0	44.6	96.7	93.8	**93.3**	**88.2**
Google Meet	30	21.1	23.2	76.2	13.5	53.6	100	77.5	**56.1**	**55.8**
WebEx	2.9	-	1.2	4.8	-	98.2	21.9	56.3	**10.5**	**25.6**
Skype	1.4	5.3	14.6	42.9	18.8	32.1	3.3	16.3	**8.1**	**22.3**
Coursera	82.9	61.5	6.2	53.8	15.6	-	85	94.4	**35.6**	**58.1**

* S – students' data, L – lecturers' data

Distance learning types implementation

HEIs worldwide adopted different approaches to the winter semester of 2020 in response to the COVID-19 pandemic. For example, in the USA, about 45% of HEIs implemented online instruction, 27% provided in = person instruction, and 21% used a hybrid education, e.g., in Indiana University, 85% of classes were offered in person after 2-week-restrictions (Fox et al., 2021). Romania has implemented hybrid and online education "with caution" (Potra et al., 2021, p.12). However, hybrid education provided an intermediate solution, primarily for international students (Yıldırım et al., 2021). In Ukraine, students and lecturers have evidenced that HEIs provided two types of distance learning – virtual learning (82.2% & 37.4%) and hybrid education (39.1% & 65.3%). Using MOOCs was insignificant (36.1% & 24.0) (see Table 4).

Table 4.
Distance learning types in 2020-2021 (%)

Distance learning	HEI (O) (S-77/L-20)		HEI (Kh) (S-85/L-21)		HEI (L) (S-96/L-58)		HEI (K) (S-210/L-80)		Total (S-468/L-179)	
	S*	L	S	L	S	L	S	L	S	L
Virtual learning	82.9	57.9	50.6	50.6	82.3	27.6	95.7	46.3	**82.2**	**37.4**
Hybrid learning	30.3	57.9	65.1	65.1	43.8	63.8	30.5	67.5	**39.1**	**65.3**
MOOCs	31.6	21.1	25.3	19.0	18.8	63.8	50.5	28.7	**36.1**	**24.0**

* S – students' data, L – lecturers' data

Digital literacy needs and EdTech awareness of faculty

During the emergency transition to digital mode, many HEIs were caught off-guard, allowing no time to prepare their academic staff. That has resulted in non = tech savvy academics being under-trained and under-equipped to handle complex computer and internet-related tasks. In addition, the instructors' lack of digital competence and

familiarity with EdTech was an obstacle. Their inability to use ICT tools has negatively affected the success of online distance education (Abu Talib et al., 2021). Namely, in Spain, HEIs faced radical transformations to digitally-based education with academics without technological competence in online teaching (García-Morales et al., 2021). A "deficit in mastering online teaching and learning styles is compounded by a lack of faculty and student proficiency in using online technologies" (Turnbull et al., 2021, p. 6401).

By spring 2021, the majority of Ukrainian lecturers had enough digital competence to provide online distance teaching (65.3%). Although the level of digital literacy varies among the universities, the average amount of digitally competent university teachers was 58.15% per HEIs. However, about 9% of lecturers showed poor digital competence, 16.7% needed training, and 7.8% needed IT staff assistance (see Table 5).

Table 5.
Lecturers' perception of their digital competence for providing online distance teaching (%)

Digital competence level	HEI (O) (n = 20)	HEI (Kh) (n = 21)	HEI (L) (n = 58)	HEI (K) (n = 80)	Total (n = 179)
Enough	40.0	42.9	86.0	63.7	**65.3**
Not enough	15.0	9.5	3.5	11.3	**8.9**
Need training	30.0	23.8	8.8	17.5	**16.7**
Need IT staff assistance	10.0	23.8	1.8	7.5	**7.8**

Quality assurance in online higher education dependency on ICT competence

International higher education teachers show that the transition to emergency remote teaching was challenging, with poor quality of teaching (Weidlich & Kalz, 2021). In addition, lecturers and ICT staff faced a workload increase and decreased students' responsibility to acquire knowledge (Vinichenko et al., 2021). The lecturers' inability to use ICT tools has negatively affected the success of online distance education in many cases (Abu Talib et al., 2021). For example, in Romanian HEIs, students experienced technical issues and "teachers' lack of technical skills and their teaching style improperly adapted to the online environment"(Coman et al., 2020). In Turkey, all HEIs were not fully prepared to have their courses online. As a result, inexperienced instructors and students in distance education have emerged issues (Şenel & Şenel, 2021) which could affect student performance. In Spain, higher education instructors, mostly unprepared, had to make the necessary changes to their teaching methods (Iglesias-Pradas et al., 2021). In turn, although the traditional educational environment was changed to virtual mode, many teachers and students were not prepared to continue their education online due to poor Internet connection and lack of computers (Parra & Granda, 2021). It is worth mentioning that in the spring of 2021, online distance learning was still a new experience for the majority of Ukrainian lecturers (53.07%) and students (68.3%) (see Table 6).

Table 6.
Lecturers' and students' experience of distance learning (%)

Online format	HEI (O)	HEI (Kh)	HEI (L)	HEI (K)	Total
Lecturers' data	*L (n = 20)*	*L (n = 21)*	*L (n = 58)*	*L (n = 80)*	*L (n = 179)*
New	73.7	71.4	57.9	41.3	**53.07**
Familiar	26.3	28.6	42.1	58.8	**45.8**
Students' data	*S (n = 77)*	*S (n = 85)*	*S (n = 96)*	*S (n = 210)*	*S (n = 468)*
New	63.2	85.4	76.8	61.7	**68.3**

| Familiar | 36.8 | 14.6 | 23.2 | 38.3 | **30.3** |

Distance teaching/learning satisfaction and effectiveness

Participants of online education in Spain, Italy and Ecuador "identify positive elements in virtuality" (Tejedor et al., 2021, p.2). In Japan, emergency, remote teaching was as effective as traditional face-to-face learning (Kawasaki et al., 2021). Similarly, in Egypt, "the sudden shift from face-to-face to online distance learning" in higher education caused by the COVID-19 lockdown has not crucially affected students' outcomes (El Said, 2021, p.1). Teachers and students in KSA and India show satisfaction with e-learning in the COVID-19 pandemic due to its usefulness and ease of use (Dash & Chakraborty, 2021). Online distance education was perceived by teachers as satisfactory or beneficial, adequate and effective (Abu Talib et al., 2021). In addition, lecturers perceived distance education as a successful mode giving wide opportunities for teaching online in the future (Meishar-Tal & Levenberg, 2021). Regarding students, the majority (62%) of the health sciences students in Saudi HEIs expressed satisfaction with online learning (Ansari et al., 2021). Universities in Malaysia, Turkey and Costa Rica show high satisfaction with emergency remote delivery and preference for hybrid education in the future (Benito et al., 2021).

In Ukrainian HEIs, 2,721 students of technical and 9,000 students of humanitarian programmes showed high satisfaction with distance learning (Melnychenko & Zheliaskova, 2021). Based on the collected data, both lecturers and students perceived online distance learning as a beneficial format. The majority of students and lecturers found online education interesting (53.4%/52.5%), supporting (42.3%/48.6%), and effective (34.1%/37.4%). In turn, the majority of students and lecturers felt tired (40.3%/39.1%), while for the minority of them, online education was ineffective (24.3%/7.8%) (see Table 7).

Table 7.
Lecturers' and students' attitude to online distance education (%)

	HEI (O) (S-77/L-20)		HEI (Kh) (S-85/L-21)		HEI (L) (S-96/L-58)		HEI (K) (S-210/L-80)		Total (S-468/L-179)	
	S*	L	S	L	S	L	S	L	S	L
Interesting	43.4	42.1	59.0	33.3	47.9	62.5	58.1	55.0	**53.4**	**52.5**
Supporting	39.5	63.2	41.0	57.1	49.0	51.8	41.4	42.5	**42.3**	**48.6**
Effective	31.6	26.3	19.3	52.4	38.5	19.6	39.5	50.0	**34.1**	**37.4**
Tiring	19.7	42.1	34.9	42.9	36.5	33.9	52.4	42.5	**40.3**	**39.1**
Ineffective	30.3	10.5	31.3	-	28.1	12.5	18.1	6.3	**24.3**	**7.8**

* S – students' data, L – lecturers' data

Internet accessibility and EdTech inequity

In online education, lecturers and students worldwide experienced poor internet reception or Wi-Fi, connection stability, glitches and other technical failures (Abu Talib et al., 2021). One of the most fundamental obstacles to online education transition was good internet connectivity, which was particularly prevalent in remote areas of Middle East countries (Turnbull et al., 2021). Although university students in Indonesia have positive (due to its flexibility) and negative perceptions of online learning, the majority of students (91%) prefer face-to-face to online learning due to unstable connection and the high cost of the Internet (Laili & Nashir, 2021). Moreover, Ireland reveals disparities in Internet access, where one-in = six students come from areas with poor broadband coverage. These students are more likely to be socioeconomically disadvantaged (Cullinan et al., 2021). In Romanian and Turkish HEIs, students experienced technical issues and a lack of digital tools available (Coman et al., 2020; Şenel & Şenel, 2021). Online education causes unequal access to online platforms for university students in underdeveloped countries (Yıldırım et al., 2021). In Nepal, universities' shift to online education has reinforced social inequalities in EdTech access among students from rural areas with low socio-economic backgrounds and

poor technological skills (Devkota, 2021). The problems with ICT tools and Internet accessibility were also in the USA. Namely, in New York, many students had only cellular phones and unstable access to the Internet without sufficient bandwidth to accommodate multiple users since, in most cases, several family members worked remotely (Neuwirth et al., 2021). In Ukraine, there were problems with Internet accessibility as well – only 41.2% of students and 40.2% of lecturers had no problems. The typical technical problem was poor Internet connection for 47.4% of students and 58.1% of lecturers. However, there is evidence that fewer students and lecturers lack access to the Internet (19.01%/17.3%) and to the computer (10.2%/8.9%) (see Table 8).

Table 8.
ICT tools and Internet accessibility (%)

	HEI (O) (S-77/L-20)		HEI (Kh) (S-85/L-21)		HEI (L) (S-96/L-58)		HEI (K) (S-210/L-80)		Total (S-468/L-179)	
	S*	L	S	L	S	L	S	L	S	L
No access to computer	20.3	5.0	7.3	19.0	12.6	14.3	8.1	3.8	**10.2**	**8.9**
No access to Internet	17.6	25.0	26.8	14.3	28.4	32.1	12.9	6.3	**19.01**	**17.3**
Poor Internet connection	20.3	60.0	36.6	71.4	42.1	82.1	65.6	38.8	**47.4**	**58.1**
No problems	59.5	40.0	43.9	19.0	43.2	17.9	34.4	62.5	**41.2**	**40.2**

* S – students' data, L – lecturers' data

Psychological restructuring and workload increase

The majority of university teachers in the USA, Malaysia, and Taiwan experienced much higher workloads and stress in distance learning during the COVID-19 pandemic than in face-to-face classes (Marek et al., 2021). Many students experienced lockdown = related fears about financial stability and socializing, which indirectly affected their academic performance. Academic staff had to face an increased or even doubled workload (Abu Talib et al., 2021). Besides, "emergency remote education overwhelmed students and teachers with a sudden workload driven by unplanned learning activities, unstructured evaluation methods and lack of monitoring procedures and digital skills" (Olivera et al., 2021, p. 1357). Cranfield et al. (2021) report that disrupting the typical student learning experience was inevitable, primarily for those attending traditional universities. In Ukraine, the majority of lecturers (81.0%) also evidenced workload increases during the emergency transition to online education in 2020 (Mospan et al., 2022, p. 101). Moreover, the new virtual environment affected time management significantly – only 37.4% of lecturers and 45.2% of students were able to manage time for work/learning and rest (see Table 14).

Shift to online assessment

The online assessment methods in higher education include online quizzes, multiple-choice questions, continuous feedback, and automated assessment for essays. The formative assessment includes online feedback, a self-test quiz and discussion forums. The online examination is conducted via freely available software and video conferencing tools (Tuah & Naing, 2020). Şenel & Şenel (2021) emphasize the importance of formative remote assessment and feedback as students are more satisfied with the quality of the assessment practices, e.g. interaction with instructors and online tests. However, the need to redesign evaluations in a way that fairly and reliably captured student performance was particularly challenging in practical courses (Abu Talib et al., 2021).

In Ukrainian HEIs, a rapid transition to online assessment is also observed. Lecturers were forced to create various tests and conduct them online, e.g., progress (79.8%) and final (77.6%) achievement tests. By spring 2021, 70.9% of university teachers have gained experience in conducting online exams (see Table 9). Filling e-registers on Moodle tends to become a common practice as well.

Table 9.
Lecturers' experience of testing and assessing students' participation (%)

Online testing and assessing	HEI (O) (n = 20)	HEI (Kh) (n = 21)	HEI (L) (n = 58)	HEI (K) (n = 80)	Total (n = 179)
Progress achievement test	50.0	95.2	87.7	79.7	**79.8**
Final achievement test	60.0	71.4	80.7	83.5	**77.6**
Diagnostic test	40.0	19.0	61.4	39.2	**43.5**
Online exams	85.0	85.7	47.4	82.3	**70.9**

It is worth mentioning that due to a new online format of exams, university teachers experimented with various approaches, searching for good practice. It resulted in top-3 approaches effective for assessing students' output at exams online – conducting a test on LMS and direct answers in virtual communication with examiners (55.8%), tests on LMS (41.3%) or only direct answers in virtual communication with examiners (32.9%) (see Table 10).

Table 10.
Ranking of lecturers' perception of online-exam approaches for university students (%)

Online-exam approaches	HEI (O) (n = 20)	HEI (Kh) (n = 21)	HEI (L) (n = 58)	HEI (K) (n = 80)	Total (n = 179)
Test+direct answers	65.0	52.4	54.4	56.3	**55.8**
Tests on Moodle	20.0	28.6	52.6	42.5	**41.3**
Direct answers	30.0	28.6	40.4	30.0	**32.9**
Test+project work+direct answer	25.0	23.8	40.4	28.7	**31.2**
Project work+direct answer	5.0	14.4	36.8	18.8	**22.3**
Project work	5.0	14.3	35.3	15.0	**20.1**
Term paper	0	38.1	24.6	13.8	**18.4**

E-communication emergence and digital writing intensification

Online education facilitates an electronic mode of communication and educational discussion. Namely, during virtual lectures, students can benefit from e-discussions by listening or by engaging through chat. It is an effective means of communication, encouraging further discussion as participants do not meet in person or face the discomfort of speaking in front of a live audience (Abu Talib et al., 2021). Following this insight, the article highlights the tendency of e-communication emergence and digital writing intensification in online distance learning during the COVID-19 pandemic. Both students and lecturers have shown that they have learnt to communicate online in a virtual educational environment. Namely, there are significant indicators of student-teacher online communication (M = 72.1%) and online communication between group mates and colleagues (M = 65.47%). In addition, digital written communication was intensive as well, primarily through e-mailing (M = 63.05%) (see Table 11).

Table 11.

E-communication emergence & digital writing intensification (%)

Communication online	HEI (O) (S-77/L-20)		HEI (Kh) (S-85/L-21)		HEI (L) (S-96/L-58)		HEI (K) (S-210/L-80)		Total (S-468/L-179)	
	S*	L	S	L	S	L	S	L	S	L
Students/teachers	51.3	75.0	67.5	90.5	66.7	80.7	82.9	63.7	**71.1**	**73.1**
Groupmates/colleagues	39.5	70.0	48.2	90.5	43.8	80.7	80.5	60.0	**60.04**	**70.9**
Emailing	44.7	36.8	48.2	90.5	58.3	73.7	81.0	54.5	**64.1**	**62.01**

* S – students' data, L – lecturers' data

Furthermore, students showed significant indicators of texting (64.1%) via Telegram (70.2%) and Viber (67.3%) messengers widely used in Ukraine (see Table 12).

Table 12.

Students' evidence of texting via popular messenger apps (%)

	HEI (O) (n = 77)	HEI (Kh) (n = 85)	HEI (L) (n = 96)	HEI (K) (n = 210)	Total (n = 468)
Telegram	53.9	50.0	78.9	87.1	**70.2**
Viber	96.1	98.8	72.2	47.5	**67.3**
Texting	44.7	48.2	58.3	81.0	**64.1**

Bridging and widening the generation gap

EdTech integration in higher education introduces students to modern and relevant technologies. This helps both students and educators bridge the technological literacy gap, fostering expertise in online and digital media and preparing students for the job market in digitization and automation (Abu Talib et al., 2021). According to the collected data in Ukraine, there is a contradictory trend referring to the generation gap. On the one hand, the emergency transition to online distance education fosters bridging the generation gap between lecturers and students. Both of them faced challenges in the new educational environment and a lack of awareness of EdTech's potential. Therefore, both participants have gained new educational experiences, e.g. 89.1% of students and 95.5% of lecturers (see Table 13).

Moreover, students and lecturers have gained new knowledge and developed new skills in online education. Namely, lecturers have learnt to create teaching materials online (71.5%), provide classes online (69.2%), work with digital platforms (67.5%), and conduct exams online (60,3%). As for students, they have gained awareness of collaboration in online classes (74.3%), assignment creation in digital format (59.8%), alternative online educational resources use (54.05%), and others (see Table 14).

Table 13.
New experience gained by students and lecturers in online education (%)

	HEI (O) (S-77/L-20)		HEI (Kh) (S-85/L-21)		HEI (L) (S-96/L-58)		HEI (K) (S-210/L-80)		Total (S-468/L-179)	
	S*	L	S	L	S	L	S	L	S	L
Yes	85.5	80	93.9	95.2	89.5	98.2	90.9	100	**89.1**	**95.5**
No	14.5	20	6.1	4.8	10.5	1.8	9.1	-	**9.6**	**3.3**

* S – students' data, L – lecturers' data

On the other hand, online distance learning is likely to cause widening the generation gap. This insight is confirmed by lecturers' and students' perceptions of the future format of higher education and exams. It is worth mentioning that the education participants, as representatives of different generations, show an opposite preference for future educational services. Thus, despite a positive attitude to online distance learning, lecturers remain conservative in their preference for future higher education and exam formats. The majority of lecturers choose traditional higher education (72.06%) and exams (82.1%). However, there are few supporters of distance learning (43.5%) and online exams (34.6%). On the contrary, the majority of students vote for distance learning (55.5%) and online exams (55.3%). Although the traditional educational format is still popular among generation Z students (50.4%), traditional exams have support from their minority (25.6%). In addition, MOOCs are not considered an effective format for further formal education by both lecturers (13.4%) and students (19.8%) (see Table 15).

Table 14.
Students' and lecturers skills and knowledge gained in remote online education (%)

Responses	HEI (O)	HEI (Kh)	HEI (L)	HEI (K)	Total
Lecturers' data	*L (n = 20)*	*L (n = 21)*	*L (n = 58)*	*L (n = 80)*	*L (n = 179)*
Create e-teaching material	60.0	61.9	73.7	76.3	**71.5**
Provide classes online	65.0	81.0	70.2	67.5	**69.2**
Work with digital platforms	45.0	66.7	70.2	72.5	**67.5**
Conduct exams online	60.0	81.0	43.9	67.5	**60.3**
Use online educational resources	35.0	47.6	68.4	58.8	**57.5**
Manage time for work and rest	25.0	42.9	36.8	40.0	**37.4**
Student's data	*S (n = 77)*	*S (n = 85)*	*S (n = 96)*	*S (n = 210)*	*S (n = 468)*
Collaborate at online classes	72.4	80.7	74	73.8	**74.3**
Create assignments in digital format	50.0	63.9	52.1	66.2	**59.8**
Use alternative online educational resources	42.1	49.4	62.5	57.1	**54.05**
Manage time for learning and rest	42.3	54.2	44.8	43.8	**45.2**

Table 15.
Lecturers and students' preference of the higher education and exam format in the future (%)

Responses	HEI (O)	HEI (Kh)	HEI (L)	HEI (K)	Total
Lecturers' data	*L (n = 20)*	*L (n = 21)*	*L (n = 58)*	*L (n = 80)*	*L (n = 179)*
Traditional education	85.0	76.2	94.7	52.5	**72.06**
Distance learning	40.0	23.8	31.6	58.8	**43.5**
MOOCs	10.0	14.3	15.8	12.5	**13.4**
Traditional exams	100.0	90.5	94.7	67.5	**82.1**
Online exams	25.0	19.0	24.6	48.8	**34.6**
Student's data	*S (n = 77)*	*S (n = 85)*	*S (n = 96)*	*S (n = 210)*	*S (n = 468)*
Traditional education	48.7	46.3	56.8	51.4	**50.4**
Distance learning	56.6	59.8	49.5	58.2	**55.5**
MOOCs	11.8	13.4	26.3	23.1	**19.8**
Traditional exams	34.2	41.5	23.2	18.2	**25.6**
Online exams	51.3	36.6	62.1	62.7	**55.3**

International student population redirection and the consequent reduction in the teaching surplus may lead to a re-focusing on local, regional and national problems in university curricula (Márquez-Ramos, 2021). The COVID-19 pandemic has significantly decreased international student mobility and shifted the mobility flow. For example, the majority (84%) of students in Mainland China and Hong Kong showed no interest in studying abroad after the pandemic. Moreover, Asian countries, e.i. Hong Kong, Japan and Taiwan are listed in the top five for studying abroad, apart from the US and the UK (Mok et al., 2021). On the contrary, higher education in Ukraine experienced an influx of international students, primarily to medical universities, in 2020-2021 (Mospan & Slipchuk, 2020).

Higher education management model change. Due to intensive digital higher education transformation, HEIs are transmitting to new forms of management and employment, affecting the traditional employment relationship, collaboration, competition and control over workers. However, new approaches to HEI organisation and management may either help HEIs to deal more effectively with digital transformation or lead to de-skilling the workforce. Ultimately, "a radical transformation towards a customer-driven strategic business model might be adopted by university managers, which would result in cross-cutting organisational change" (Márquez-Ramos, 2021, p. 630).

Based on the personal experience of teaching in HEI (K), national universities have also changed their management model, transitioning to an e-management model. For example, in HEI (K) in 2020, education was provided on the standard schedule with a restricted number of classes (3 per day) to reduce stress and tiredness. In addition, University governance was transformed into an online format – Council and staff meetings were regularly provided on live-video communication platforms (Google Meet, Zoom or WebEx) (Mospan et al., 2022, p. 95). Moreover, all documentation was converted to digital format, and e-registers were introduced in practice. Consequently, texting and emailing have become common ways of written communication between administrators, academic staff and students.

Increased or decreased economic pressure on higher education. Most HEIs moved to remote education in the USA due to the COVID-19 pandemic, which catalysed digital technologies adoption and increased economic pressure on higher education (Watkinson, 2021). In the case of Ethiopia, the pandemic has severely impacted the academic

and commercial activities of private HEIs, reducing their sources of income, lowering the productivity of their staff, and limiting institutional capacity to cover basic costs such as salaries and rent (Tamrat, 2020). Moreover, the decrease in the international student population caused significant financial reductions. However, Márquez-Ramos (2021) believes that HEIs may benefit from cost reductions, e.g. in the amount of office space needed, increased adaptability and flexibility of educational services online. On the other hand, it may result in more significant work-related fatigue, worsening work-life balance.

Regarding this trend, higher education in Ukraine might have benefited more than lost. First, faculty and students were teaching and learning from home during the lockdowns, using personal computers and ICT tools. Accordingly, they paid for Internet access and increased electricity consumption. Furthermore, although universities kept providing computer labs for teaching, lecturers could not use them due to lockdowns and strict restrictions. As a result, HEIs saved money on digital equipment and utility bills. However, although the financial burden fell on university teachers, they received no compensation, and many were forced to spend personal savings on computers that skyrocketed in price. Second, the increase in the international student population in medical universities in 2020-2021 could beneficially influence the educational service for medical students.

Academic research transformation. The COVID-19 pandemic has impacted academic activities that have traditionally been performed in in-person environments. It has transformed networking and publishing into an online format, reducing publication costs and availability. Moreover, lockdowns had a significant financial impact on research due to the decline in international students. However, the long-term consequences for research funding vary by country (Márquez-Ramos, 2021). Due to providing traditional educational services and conducting research in person, Ukraine has decided to suspend public dissertation introduction procedures during lockdowns. Accordingly, on the one hand, this may have affected the research duration and, on the other hand, aroused interest in the impact of the COVID-19 pandemic on national higher education.

Discussion and Conclusion

The analysis of cross-cultural investigations, systematic literature reviews, case studies, and empirical data from four Ukrainian HEIs makes it possible to receive experience from 30 countries about their responses to the COVID-19 pandemic in 2020-2021. In turn, this massive amount of evidence reveals universal consequences for higher education caused by the COVID-19 pandemic and shapes trends in emergency higher education transition to digital format.

There are the following universal consequences for higher education worldwide. First, different readiness and preparedness of HEIs for emergency online distance learning. Thus, universities in Malaysia, India, South Africa, Turkey, Greece, Romania and Ukraine were not ready for the digital transition, and their academic staff and students experienced challenges from EdTech integration. Second, differences in pedagogies, infrastructure support, EdTech awareness levels, and digital competencies of academic staff are revealed in Australia, Cambodia, China, India, Malaysia, and Ukraine. Third, diversities in transition to different types of distance learning. Thus, hybrid and online education were implemented in Romania and Ukraine, online education in Spain, Denmark, Germany, and Canada, distance teaching-learning in Italy, virtual learning in Hong Kong and Slovenia, and remote education in the USA. Finally, the emergency higher education transition to distance teaching-learning worldwide indicates its opposite perception and satisfaction. Thus, international university teachers perceived the transition to emergency remote education as challenging and of poor quality. However, teachers and students in Spain, Italy, Ecuador, Japan, Egypt, and Ukraine accepted remote virtual teaching-learning as a supporting and effective format. Ultimately, the emergency higher education transition to digitally-based education during 2020-2021 worldwide is characterised as diverse and unprepared. In addition, the research findings prove that countries and university teachers were not homogeneous in their readiness to teach and learn online (Scherer et al., 2021).

On the other hand, universal trends are observed in global higher education transformation to digital format. The following trends universal for the mentioned countries (e.i., Australia, Germany, Italy, the USA, China, Egypt, Hong Kong, Malaysia, Cambodia, India, South Africa, Turkey, Romania, Denmark, Canada, Indonesia, Wales, Hungary, Slovenia, Taiwan, Mexico, Ecuador, Spain, Japan, KSA, Nepal, Greece, and Ukraine) are revealed: accelerated shift to online education, government and institutional support, methodology and pedagogy shift to online format, uneven accommodation to remote virtual classrooms, vast EdTech integration in higher education, distance learning types implementation, digital literacy needs and EdTech awareness of faculty, quality assurance in online higher education dependency on ICT competence, distance teaching/learning satisfaction and effectiveness, the Internet accessibility and EdTech inequity, psychological restructuring and workload increase, shift to online assessment, e-communication emergence and digital writing intensification, bridging or widening

the generation gap, international student population redirection, higher education management model change, diversity in economic pressure on higher education and academic research transformation. However, observing the two last trends in some countries is likely to make them specific for certain higher education systems.

In the case of Ukraine, the empirical data collected from four national HEIs situated in different regions of the country gives grounds for the following insights. First, in response to the challenges of the COVID-19 pandemic, the national HEIs show trends similar to global higher education. However, the unpreparedness of national higher education for the digital transition may be explained more by the lack of need for online education than by technical weakness in the pre-pandemic time. Second, the findings show that university teachers have considerable responsibility in transitioning traditional teaching methods into a virtual educational environment and have successfully coped with this challenge. Thanks to their efforts and creativity, students evaluate online learning positively and choose it as an effective format for their education in the future. Third, despite universal trends in higher education observed on the national level, there is diversity on the institutional level among national HEIs. This diversity refers to different readiness and preparedness of HEIs for emergency online distance learning; differences in pedagogies, financial and infrastructure support, EdTech implementation, and digital competencies of academic staff; diversities in transition to online distance education; and perception and satisfaction of distance teaching-learning. Finally, students and lecturers showed relatively homogeneous evidence of their experience in remote online education. That allows looking at the digital transformation in national higher education from the perspectives of both participants. However, there is an opposite attitude to the preference for the educational mode in the future. Generation Z students have chosen online distance education, thereby challenging the traditional model of education.

Regarding this, the article assumes that trends in the emergency higher education transition to digitally-based education during 2020-2021 worldwide are universal at the global or national level but can be diverse at the institutional level. In the bottom line, the experience of national higher education transformation can contribute to studying university participation in the pandemic era.

Conflict of interest

The authors report no perceived or actual conflict of interest.

Data availability statement

The data supporting the findings of this study are available within the Google Disk. Teachers' surveys in 2021 https://docs.google.com/document/d/1-KXXvS2qtyZtcgjXN286eDhQcAoAf6C2-nkip6J2J1o/edit?usp=sharing

Students' surveys in 2021 https://docs.google.com/document/d/1pbpRA8qC86JrFb5OTpOsropmwSM1DI-aqr2R2AoliGQ/edit?usp=sharing

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