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EMERGENCY HIGHER EDUCATION DIGITAL TRANSFORMATION: UKRAINE'S RESPONSE TO THE COVID-19 PANDEMIC

Abstract. The article explores how higher education in Ukraine has responded to the COVID-19 pandemic, particularly in the case of the Borys Grinchenko Kyiv University's experience. The research provides a comparative analysis of national transformation trends at various levels – HEIs, lecturers and students during two waves of the COVID-19 pandemic in 2020. It covers two timeline periods: March-May 2020 – the 1-st wave (summer semester); October 2020-January 2021 – the 2-nd wave (winter semester). The research reveals the COVID-19 pandemic impact on Ukrainian higher education in 2020. It presents trends in national HEIs transformation, lecturers and students' perception of education and exams online. Based on the literature review and conducting surveys (514 students/97 lecturers), the study makes it possible to reveal universal consequences caused by the COVID-19 pandemic in higher education systems worldwide as well as specific trends in national higher education emergency transition to digitally-based teaching-learning. The research shows that global higher education systems faced the COVID-19 pandemic in different conditions due to various technical facilities, governmental and institutional support, financial investment, digitally competent academic staff, students familiar with educational technology. The "better prepared" higher education systems are likely to cope with the Coronavirus impact easier and transit to digitally-based distance teaching-learning smoothly. Ukrainian higher education met the COVID-19 pandemic unready. Though some national HEIs have managed to re-organise the educational process smoothly and effectively due to the academic staff's enthusiasm and colossal effort. In this regard, positive and negative trends are revealed in the national higher education emergency transition to digitally-based distance learning. The findings contribute to the investigation of higher education transformation in crisis and confirm that the COVID-19 pandemic has accelerated higher education digitalisation worldwide.

Keywords: higher education; digital transformation; the COVID-19 pandemic; digitally-based distance learning; educational technology

1. INTRODUCTION

The COVID-19 pandemic brought lockdowns, distancing, remote learning, and work worldwide. 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 world education systems entered the COVID-19 pandemic in different conditions. The Coronavirus divided the world higher education map into more prepared and experienced and unprepared and inexperienced educational systems in digitally-based distance learning. Before the COVID-19, the World Economic Forum COVID Action Platform noticed "high growth and adoption in education technology, with global EdTech investments reaching US$18.66 billion in 2019" in countries with developed economies. Since then, "language apps, virtual tutoring, video conferencing tools, or online learning software" have had "a significant surge in usage" [1, p.1]. Thus, on the one hand, the EU higher education systems with distance learning universities and developed online courses (MOOCs) were more ready for the transition to digitally-based education. For example, the benefits of MOOCs in enhancing teachers' professional digital competence are explored in Norway on the pandemic eve [2].

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

Statement of the problem. However, there is no data about Ukrainian higher education response to the COVID-19 pandemic. Though there is an attempt to study emergency distance learning [3], its benefits and challenges in students' perception [4]. 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. For the challenging 2020, national higher education has experienced an emergency transition from conventional to remote, hybrid and, finally, 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. The experience of national higher education transformation can contribute to studying university participation in the pandemic era. Based on the above, the research focuses on the COVID-19 pandemic impact on Ukrainian higher education in 2020.

Analysis of recent research and publications. 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 evidence 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. A quick look at the publications shows that world higher education systems faced the Coronavirus with different readiness and preparedness. For instance, 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" [5, p.1]. 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" [6, p.70]. In Hong Kong, "the pedagogical space was moved to virtual classrooms on Zoom," where academics and students conducted their communication [7, p. 114]. However, in Japan emergency, remote teaching was as effective as traditional face-to-face learning [8]. 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 [9, p.1].

Romania has implemented hybrid and online education "with caution". "All these shifts together with the need for fast adaptation determined serious gaps and improvised teaching methods" [10, p.12]. In Turkey, HEIs also "had difficulty in providing sufficient pedagogical and technical guidance to academic staff due to the rapid transition" [11, p.493]. In Slovenia, various digital platforms and examination applications have facilitated the sudden transition from face-to-face to virtual learning [12]. In Italy, lockdown turned distance teaching-learning from "optional for traditional universities to the only means to ensure" educational services [13, p.2]. Italian HEIs managed to re-organise their performance "in only one week" [14, p.86]. In Spain, HEIs also undergo radical transformations to digitise education concisely with academics without technological competence in online teaching [15, p.1]. Though, based on teachers' and students' perceptions of online education, Spain, Italy and Ecuador "identify positive elements in virtuality" [16, p.2]. 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" [17, p.96]. German HEIs, as O. Zawacki-Richter [18, p.1] shows, "have made enormous efforts in a short time to make an online summer term 2020 possible within weeks". They cope with lockdown due to investments made "in a technically stable infrastructure" and lecturers' effort. The COVID-19 pandemic caused an acceleration of the higher education digitalisation in Germany [18, p.1]. Canadian universities moved courses online and suspended in-person operations. The academics felt "unexpectedly wrenching" being unable to use the campus office [19, p.5]. Most HEIs move to remote education in the USA due to the COVID-19 pandemic, which catalysed digital technologies adoption and increased economic pressure on higher education [20]. Finally, international higher education teachers show that transition to emergency remote teaching was challenging, with poor quality of teaching [21]. Lecturers and ICT staff faced a workload increase and decreased students' responsibility to acquire knowledge [22].

While some countries measure their new experience in providing distance education, revealing its advantages in pandemic crises, others attempt to predict an all-inclusive resilience model [23] or a model of post-coronial university [24]. In this regard, **the research aims** to reveal Ukrainian higher education response to the COVID-19 pandemic.

2. RESEARCH METHODOLOGY

This descriptive survey research focuses on describing the Ukrainian higher education response to the COVID-19 pandemic, lecturers and students' participation and the changes occurring over two pandemic waves 2020. Besides, this research includes distinct features of longitudinal research conducted over a period of time (in spring and early winter 2020) and trend study using a different sample for "each stage of the data collection, but focusing on the same factors" [25, p.213]. This mixture of methods enables us to trace the emergency transition of national higher education to digital format during the COVID-19 pandemic accounting for external and internal factors, as well as students and lecturers' experience.

The research provides a comparative analysis of higher education transformation trends at various levels – higher education institutions (HEIs), lecturers and students during two pandemic waves 2020. The research covers the following timeline periods: 1) the 1-st wave of the COVID-19 pandemic from March to May 2020 – summer semester; 2) the 2-nd wave of the COVID-19 pandemic from October 2020 to late January 2021 – winter semester. Furthermore, the study focuses on three levels of analysis. First, based on the literature review, there is an attempt to shed light on the current 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 at revealing lecturers' attitude toward distance teaching and conducting online exams. It presents evidence of academics and students' perception of education online based on collected survey data. The research question is how the national higher education system has transformed under the Coronavirus impact?

The research objectives were identified through the following primary methods. First, theoretical literature review of the existing materials, particularly current publications, available on the issue and national – institutional report of Borys Grinchenko Kyiv University [26] as a place for conducting surveys. The university is an employing institution chosen as an example for presenting trends in national higher education transformation. Besides, it has become one of the national HEIs transited to digitally-based learning and teaching during the COVID-19 pandemic. Second, two quantitative surveys for data collecting were designed and conducted with sampling based on a simple random technique.

Implementation and Participants. Although the survey was conducted at the same place, the sample size differed for two stages of the data collection due to some reasons, e.g. a changeable number of students and lecturers every semester, their accessibility and illness during the COVID-19 pandemic. Furthermore, we decided to enlarge the number of lecturers by covering other departments and universities available in the winter semester of 2020. Following the recommendations of Wright [27, p.3], we have enlarged the sample of lecturers to make the data more representative. The sample size has been calculated with Sample Size Calculator (http://www.raosoft.com/samplesize.html). Thus, if the student population at the Department of English Philology was about 560 students in spring and 305 students available in early winter 2020 – the recommended sample size varies from 229 to 304 and from 171 to 210 respectively (where confidence level varies from 95% to 99% and confidence interval – 5%). If there were 28 lecturers at the Department in spring and 78 lecturers available in early winter 2020 – the sample size was 27, and the recommended sample size varies from 65 to 70. The questionnaires were sent randomly to a bit more students and lecturers if someone missed it or refused to respond.

Two quantitative surveys for students and lecturers were designed in Google Forms and conducted online in national universities with an interval of 7 months in 2020-2021. The first 16-question online questionnaire was administered online for the students (randomly) twice – 1) during the 1-st wave of the COVID-19 pandemic (summer semester) in late April – early June 2020; 2) during the 2-nd wave of the COVID-19 pandemic (winter semester) in December 2020 – January 2021. This survey is based on responses from 514 students (304/210) doing bachelor and master programmes in English Philology in Borys Grinchenko Kyiv University in spring-autumn 2020. The second 16-question online questionnaire was administered online for the academic staff (randomly) from three national HEIs twice – 1) during the 1-st wave of the COVID-19 pandemic (summer semester) in late April – early June 2020 and 2) during the 2-nd wave of the COVID-19 pandemic (winter semester) in January 2021. The academic survey is based on 97 (27/70) responses from lecturers from three national HEIs. The majority of respondents are from Borys Grinchenko Kyiv University – 75 (27/48), then 12 lecturers from the National Technical University of Ukraine, "Igor Sikorsky Kyiv Polytechnic Institute," and 10 lecturers from Khmelnytsky Humanitarian and Pedagogical Academy participated in the survey in January 2021. That gives us confidence that the sample size is sufficient for more reliable and precise results.

The optimal survey analysis was achieved using qualitative and quantitative methods. Descriptive statistics is used to describe the relationship between variables in a sample in the form of measures of central tendency and variation [28], [29], [30] calculated through Descriptive Statistics Calculator. 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.

3. RESULTS AND DISCUSSION

3.1. Ukrainian HEIs respond to the COVID-19 pandemic

As we mentioned above, the national HEIs provided primarily traditional (face-to-face) educational services on the eve of the pandemic with physical presence at the class. The only standard educational technology (EdTech) – e-learning on Moodle platform was used unsystematically as a supporting tool for part-time students. Therefore, the COVID-19 pandemic caused shock and 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. The COVID-19 pandemic has tested the universities' autonomy to quickly transform education online due to their various technical facilities and financial recourses. The efficiency of national HEIs 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. Thus, 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 (provide educational services for national and international students) and universities located in the capital and big regional cities. In spring 2020, the widely used EdTech appliances were Moodle and Zoom at medical universities [31, p. 8399]. The humanitarian universities provided live-video communication with Google Meet, Zoom, and WebEx collaboration platforms. Based on the collected data (from Borys Grinchenko Kyiv University), the national HEIs met the second wave of the COVID-19 pandemic (autumn 2020) more prepared and experienced for providing digitally-based distance education (see Table 1).

Table 1

EdTech frequency distribution (%)

EdTech		Students' data		Lecturers' data		Central tendency & variation			
		Summer semester	Winter semester	Summer semester	Winter semester	M	Mdn	Mo	SD
Distance learning types	**Moodle**	*94.4*	*98.1*	*100.0*	*92.9*	**96.35**	96.25	ND	≈ 3.27
	E-mailing	*80.5*	*81.0*	*92.3*	*81.4*	**83.8**	81.2	ND	≈ 5.68
	Online exams	*ND*	*86.2*	*ND*	*81.4*	**83.8**	83.8	ND	≈ 3.39
	Virtual learning	*76.2*	*95.7*	*73.1*	*43.7*	**72.18**	74.65	ND	≈ 21.46
	MOOCs	*87.1*	*50.5*	*80.8*	*28.6*	**61.75**	65.65	ND	≈ 27.27
	Hybrid learning	-	*30.5*	-	*67.1*	**48.8**	48.8	ND	≈ 25.88
	Google Classroom	*32.5*	*43.1*	*34.6*	*35.7*	**36.48**	35.15	ND	≈ 4.61
Collaboration platforms	**Google Meet**	*95.3*	*100.0*	*100.0*	*76.7*	**93.0**	97.65	100	≈ 11.09
	Zoom	*76.1*	*96.7*	*69.2*	*95.7*	**84.43**	85.9	ND	≈ 13.89
	WebEx Meetings	*61.8*	*21.9*	*92.3*	*52.9*	**57.23**	57.35	ND	≈ 28.97
	Skype	*25.2*	*3.3*	*11.5*	*18.6*	**14.65**	15.05	ND	≈ 9.41

ND - No data

Table 1 shows the tendency in a gradual transition to digitally-based education. Students show a significant increase in providing virtual learning (from 76.2% to 95.7%), frequent using of digital learning management system – Moodle (from 94.4% to 98.1%), proper shifting to collaboration platforms more appropriate for virtual education – Zoom (from 76.1% to 96.7%). WebEx Meetings lost its position (from 61.8% to 21.9%) due to the high price that the university could not afford. Though since winter 2021, it has frequently been used for live-video communication. The transition to aware distance education has dramatically decreased the need for MOOCs (from 87.1% to 50.5%).

The educational process is provided on the standard schedule with a limited number of classes (lectures, seminars and sessions) – three per day to reduce the time spent on the computer. University governance has transformed to an online format – Council and staff meetings are regularly organised on live-video communication platforms (Google Meet, Zoom or WebEx Meetings). Figure 1 indicates that a gradual EdTech implementation is represented by various types, e.g., asynchronous (Moodle – M = 96.35%, e-mailing – M = 83.8%, MOOCs – M = 61.75%) and synchronous (virtual learning – M = 72.18%). Popular collaboration platforms for live-video communication are Google Meet (M = 93.0%) and Zoom (M = 84.43%). Hybrid learning (M = 48.8%) was introduced only in autumn 2020.

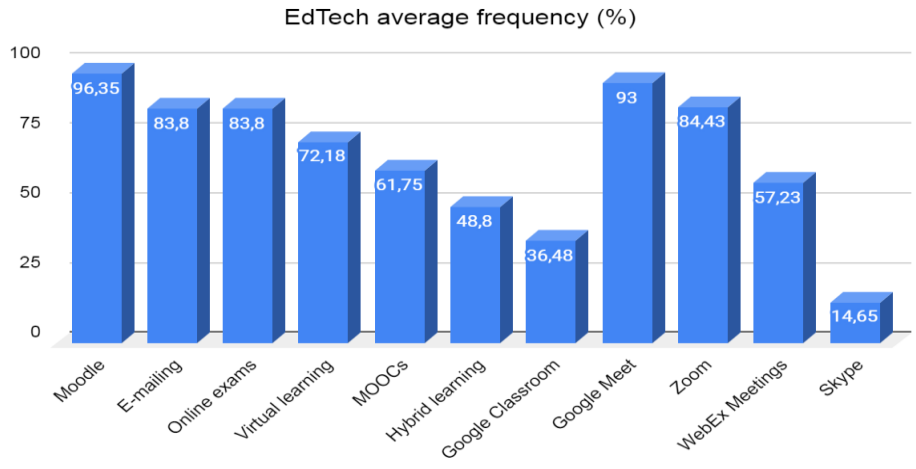

Figure 1. EdTech implementation during the COVID-19 pandemic, 2020

For providing high-quality distance learning, the university has issued internal "Standards and guidelines for university Moodle e-courses" and developed Digital Campus. As a result, the number of e-courses has doubled, and the number of e-registers has significantly increased (from 642 to 1412) since March 2020. That enabled 90% of e-courses on Moodle, virtual assessment, and exams conducted online [26, p. 77]. Thus, Borys Grinchenko Kyiv University has transformed smoothly to digitally-based education in particular. It became possible due to effective institutional, educational policy, ICT Laboratory support and developed e-courses on Moodle platform available on the pandemic eve.

3.2. Lecturers' perception of online education during the COVID-19 pandemic

The first week of the lockdown in March 2020, the majority of educators at universities felt shocked by a challenge – remote learning. It was a new experience for 65,4% of respondents. They were unprepared for teaching online for numerous reasons, i.e. poor digital literacy skills,

unawareness of EdTech, adherence to traditional education, ageing, psychological barriers, and others. At the university, the academic staff encouragement in providing online education had three stages – testing, promotion and training. At the first stage, teachers-enthusiasts test new EdTech under ICT professionals' supervision, gain new knowledge and adapt it to their course needs. The minority of lecturers (10% from the department) participated at the first stage for a month. At the second stage, the teachers-enthusiasts share gained experience with their colleagues. That stage includes supervision of online classes, academics' collaboration, teamwork, problem-solving, recommendations, and a new educational strategy. The second stage finished in May 2020 there 50-60% of academic staff supported digitally-based education. The third stage started in late August 2020 and engaged the majority of academic staff (500 teachers and researchers) in training to improve digital literacy skills. The university provides workshops, online consultations, video instructions on developing e-courses on Moodle, and technical support in lecture recording. These measures have facilitated the number of lecturers decline (from 65.4% in summer to 41.4% in the winter semester) who evidenced new online education experience. As a result, the academic staff has gained sufficient knowledge and skills in operating EdTech. The 2020/2021 academic year was launched prepared to provide digitally-based distance learning. The collected data by Borys Grinchenko Kyiv University in December 2020 shows that the academics have improved their digital competence significantly (61%), slightly (29%) and poor (4%) during distance education [26, p. 77]. Besides that, in line with the survey conducted for the research in March 2021, the majority of academics (64.4%) have enough digital competence, while others – poor (11.4%), need extra learning (17.1%) or need ICT professional assistance (7.1%).

It is worth mentioning that despite the first shock and criticism of remote teaching, the lecturers perceived distance education as positive after adaptation (M = 43.25% in summer and M = 41.75% in the winter semester) (see Figure 2). A slight decrease is likely due to increased workload in re-organising the educational process online. From 1300 academics at Borys Grinchenko Kyiv University surveyed in December 2020, the majority of respondents (81%) evidence time increasing for online classes preparation (59% – significantly, 22% – slightly) vs 8% with opposite opinion [26, p. 77].

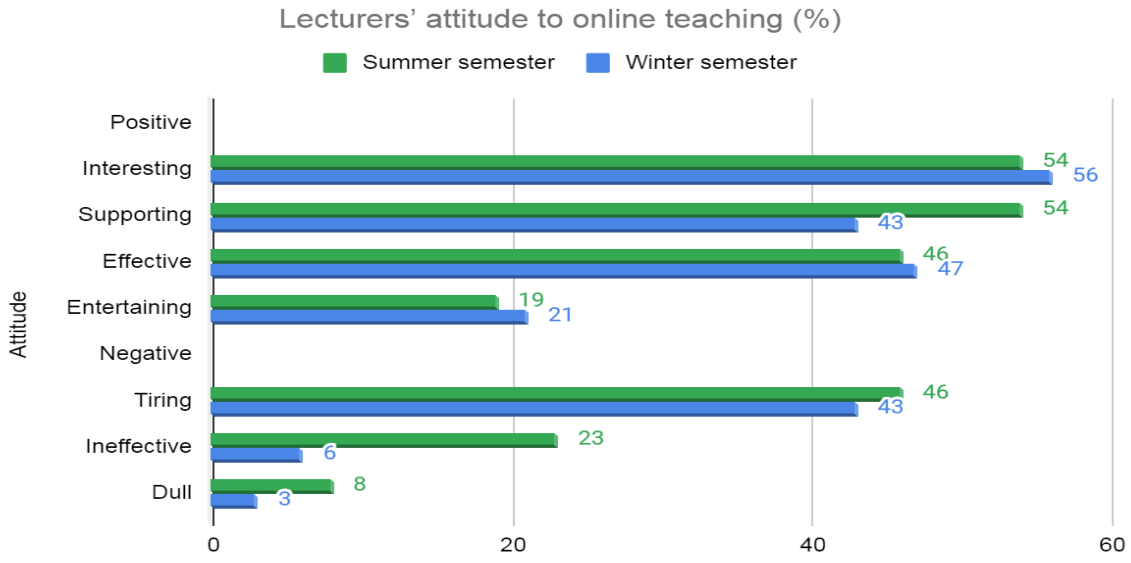

Figure 2. Lecturers' attitude to distance teaching during the COVID-19 pandemic, 2020

All academic respondents (100%) evidence that they have gained new professional experience at distance teaching during the COVID-19 pandemic. They have developed professional and digital literacy skills. The lecturers have learnt to conduct online exams (M = 74.7%), provide classes online (M = 73.8%), communicate online with students (M = 73.0%), work with digital platforms (M = 73.0%). These skills development was the most intensive during the 1-st wave of the COVID-19 pandemic (summer semester 2020). Though, there is a significant increase in converting teaching material (educational handouts) in digital format (from 65.4% to 75.7%) and using online educational resources (from 57.5% to 60.0%) during the 2-nd wave of the COVID-19 pandemic (winter semester 2020). The only indicator – work with digital platforms – remains almost unchanged (from 73.1% to 72.9%) (see Table 3). The data show gradual lecturers' acquiring of EdTech and its implementation in the educational process.

Table 3

Lecturers' skills gained at teaching online during the COVID-19 pandemic

Professional & digital literacy skills	Summer semester (%)	Winter semester (%)	Mean
Conduct exams online	80.8	68.6	**74.7**
Provide classes online	84.6	62.9	**73.8**
Communicate online with students	84.6	61.4	**73.0**
Work with digital platforms	73.1	72.9	**73.0**
Convert teaching material in digital format	65.4	75.7	**70.6**
Communicate online with colleagues	76.9	58.6	**67.8**
Use online educational resources	57.5	60.0	**58.8**
Manage time for teaching and rest	46.2	40.0	**43.1**

The central pressure in the online educational process was on lecturers and teachers. The collected data show a significant increase in EdTech use for online teaching and testing. In particular, since the COVID-19 pandemic start there have been revealed the trends in transiting to providing classes (from 84.6% to 97.1%), seminars (from 42.3% to 49.3%) and lectures (from 34.6% to 39.1%) online (see Table 4).

Table 4

Online teaching and testing forms during the COVID-19 pandemic

Forms of online teaching/testing	Summer semester (%)	Winter semester (%)	Mean
Online-classes	84.6	97.1	**90.9**
Final Achievement Test	92.3	84.1	**88.2**
Online-consultations	96.2	73.9	**85.1**
Assignments at Moodle	92.3	71.0	**81.7**
Tests at Moodle	88.5	69.6	**79.1**
Progress Achievement Test	76.9	79.7	**78.3**
E-mailing	80.8	56.5	**68.7**
Online-seminars	42.3	49.3	**45.8**
Online-lectures	34.6	39.1	**36.9**
Diagnostic test	34.6	39.1	**36.9**
Online-traineeship assistance	26.9	24.6	**25.8**

Another challenge for lecturers was the online examination caused by the first wave of the COVID-19 pandemic in May 2020. The examiners were engaged in designing appropriate distance exam forms, exam materials and choosing a collaboration platform. WebEx Meetings and Zoom platforms were considered more reliable for live-video communication at exams due to their technical support of audio and video material, image demonstration, annotating, waiting at lobby, recording etc. The exam cards created in PowerPoint presentations enabled examinees to read, listen and write (annotate). By 2020 84.1% of teachers have gained experience in conducting online exams. According to the survey the best is a combined format – test on Moodle and direct answers during virtual communication with the examiner among various approaches implemented in online exams to assess linguistic and teacher competencies (see Table 5).

Table 5

Lecturers' experience of conducting exams online during the COVID-19 pandemic

Frequency of approaches to online exams	Summer semester (%)	Winter semester (%)	Mean
Test + direct answer virtually	64	61	**63**
Tests on Moodle	68	57	**63**
Direct answers virtually	36	49	**43**
Project work	24	29	**27**
Test + project work + direct answer virtually	12	26	**19**
Term paper	12	23	**18**
Project work + direct answer virtually	12	16	**14**
Effective approaches to online exams	**Summer semester (%)**	**Winter semester (%)**	**Mean**
Test + direct answer virtually	60	56	**58**
Project work	32	16	**48**
Tests on Moodle	48	43	**46**
Direct answers virtually	40	31	**36**
Test + project work + direct answer virtually	32	31	**32**
Project work + direct answer virtually	12	19	**16**
Term paper	12	16	**14**

During the COVID-19 pandemic in 2020, the minority of respondents (53.8% in summer and 62.9% in winter semester) among the academics had no problems with ICT tools at remote and distance learning. Though the others evidence the following issues: poor Internet connection (46.2% in spring and 38.6% in autumn), have no access to a computer (7.7% in spring and 4.3% in autumn), have no Internet access at home (0% in spring and 7.1% in autumn).

Despite the positive perception of remote teaching and gaining new professional experience, the academic perspective for future education became more conservative in spring 2020. The significant majority of respondents (84.6%) choose traditional education with physical presence at classes, while 50% prefer digitally-based distance education and the minority (38.5%) vote for online courses. However, in March 2021, their opinions have dramatically changed – the majority (58.6%) of respondents see their future with digitally-based distance education vs 50% of supporters of face-to-face instruction and online courses (14.3%). On the contrary, in terms of exams, the majority of respondents (67.1%) consider the traditional format more reliable than online exams (48.6%) in March 2021.

3.3. Students' perception of online learning during the COVID-19 pandemic

Based on the collected data, we believe that students met online education during the COVID-19 pandemic with more enthusiasm than their teachers found it interesting (56% in spring and 58% in autumn) but tiring (51% in spring and 52% in autumn). Since spring 2020, the students' positive attitude to online education has increased significantly (from M = 38% to 43%), while their negative perception has slightly decreased (from M = 29% to 28%) (Figure 3). However, for the majority of respondents, remote and distance learning was a new experience – 79.2% in spring and 61.7% in autumn 2020. That indicates a gradual increase in students' awareness of EdTech.

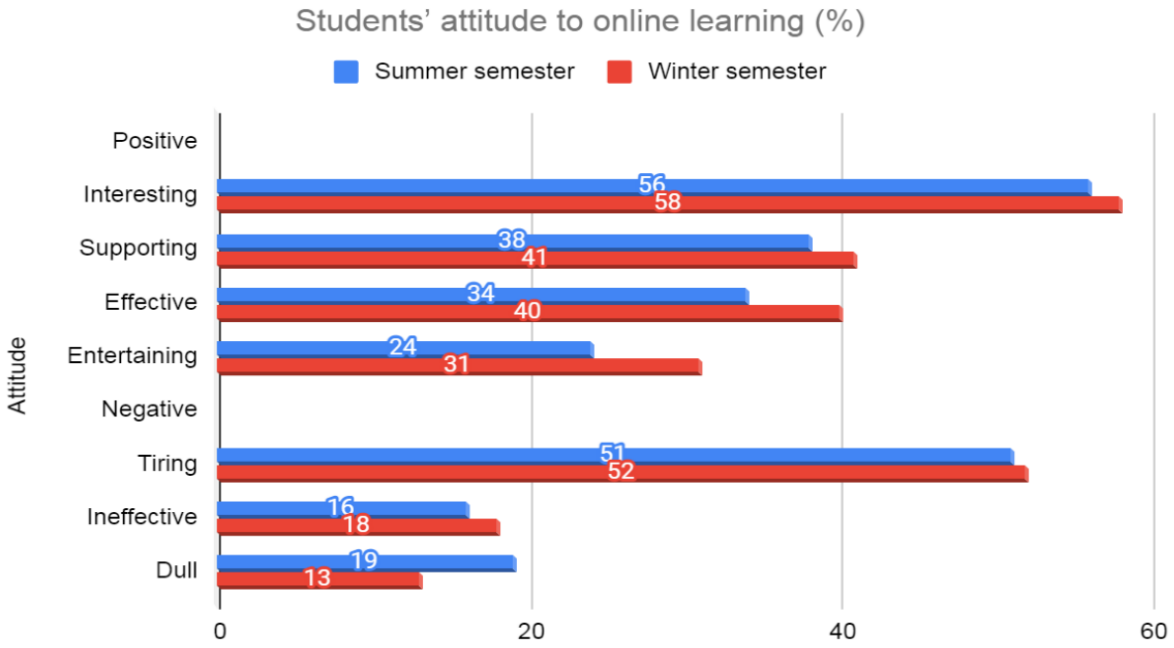

Figure 3. Students' attitude to online learning during the COVID-19 pandemic

During the COVID-19 pandemic in 2020, the minority of respondents (34.0% in spring and 34.4% in autumn) among the students had no problems with ICT tools at remote and distance learning. Though the others evidence the following issues: poor Internet connection (66.7% in spring and 65.6% in autumn), have no access to a computer (10.2% in spring and 8.1% in autumn), have no Internet access at home (9.2% in spring and 12.9% in autumn). The lack of access to a computer is likely to happen due to purchasing a new ICT tool as a necessary gadget for obtaining education in the digital environment. On the other hand, the increase in lack of Internet access at home may occur due to various reasons, i.e., regional (student location – city, town, village) or family (family budget cuts due to economic crises). This question needs significant study.

Another example of students' positive attitude to distance education is the evidence of the majority of the respondents (71.8% in spring and 90.9% in autumn) that they have gained new learning experience at remote and distance learning during the COVID-19 pandemic in 2020. Besides that, students have developed communicative and digital skills in particular. We should emphasise that these indicators have increased significantly since spring 2020. Simultaneously, there is a progressive decline in time management skills that are likely to happen due to increased time spent at the computer. Moreover, students evidence the significant improvement in online

communication with teachers (from 75.0% to 82.9%) and groupmates (from 58.6% to 80.5%), collaboration at online classes (from 61.8% to 73.8%). Students' data show that there is a tendency to accelerate transition to digitally-based distance learning (see Table 6).

Table 6

Students' skills gained at online learning during the COVID-19 pandemic, 2020

Skills		Summer semester (%)	Winter semester (%)	Mean
Digital literacy skills	**Communicate online with teachers**	75.0	82.9	**79.0**
	Communicate online with groupmates	58.6	80.5	**69.6**
	Collaborate at online classes	61.8	73.8	**67.8**
	Organise homework in digital format	53.6	66.2	**59.9**
	Use alternative online educational resources	47.0	57.1	**52.1**
	Search for educational information	43.1	58.6	**50.9**
	Manage time for learning and rest	51.3	43.8	**47.6**
	Share educational resources with groupmates	35.2	49.5	**42.4**
General skills	**Communicative skills**	53.6	72.9	**63.3**
	Linguistic skills	48.7	61.4	**55.1**
	ICT skills	35.5	43.3	**39.4**
	Professional skills	26.0	31.4	**28.7**
Soft skills	**Networking**	58.1	66.2	**62.2**
	Time management	62.0	51.0	**56.5**
	Teamwork	36.3	59.5	**47.9**
	Creative thinking	37.3	51.0	**44.2**
	Conflict resolution	20.5	27.6	**24.1**

The tendency to support the transition to digitally-based distance learning is observed in students' perspectives in the education formats in the future. The number of respondents choosing distance learning increases (from 38.9% in spring to 58.2% in autumn). On the contrary, the number of supporters of the traditional (face-to-face) education format is gradually descended (from 69.5% in spring to 51.4% in autumn). The same trend exists with online courses (from 24.5% in spring to 23.1% in autumn).

The following valuable research issue regarding students' perspectives of a future education format is their attitude to online exams. The first wave of the COVID-19 pandemic caused online exams in May 2020. According to the survey, the majority of respondents (72.4%) found the online exams quite comfortable. In comparison, their small amount did not care about the format (16.7%), and for the significant minority (9.0%), the online exams were uncomfortable, the others (8.6%) did not have experience. In perspective, the majority of respondents (62.7%) choose online exams, the minority (18.2%) prefer traditional format while the rest do not matter (26.3%). Thus, surveyed students have confirmed their readiness for transition to digitally-based learning as a future format of education.

3.4. Discussion

Theoretical literature review makes it possible to analyse global the COVID-19 pandemic impact on higher education systems, revealing universal consequences caused by the Coronavirus and variable conditions on the eve of pandemic.

This paper's main contribution is to reveal trends in higher education emergency transformation in Ukraine from different perspectives (HEIs, lecturers and students' perception), with a primary focus on comparing higher education shift to online format during the 1-st and the 2-nd waves of the COVID-19 pandemic in 2020. The research shows that the national HEIs has made a considerable effort to meet the 2-nd wave (winter semester 2020) more prepared and experienced for providing digitally-based education. Despite the slight difference in data academics and students evidence increase in EdTech use, i.e. asynchronous (Moodle – M = 96.35%, e-mailing – M = 83.8%, MOOCs – M = 61.75%) and synchronous (virtual learning – M = 72.18%), where Google Meet (M = 93.0%) and Zoom (M = 84.43%) are popular collaboration platforms for live-video communication. Compared to the1-st wave (summer semester 2020), the educational process in autumn 2020 was smoothly transmitted to distance format with virtual classes restriction (3 per day), staff meetings online, e-registers and e-documentation. Being unfamiliar with EdTech on the pandemic eve, the lecturers have gained new professional experience at emergency distance teaching during the COVID-19 pandemic, i.e., conducting online exams (M = 74.7%), providing classes online (M = 73.8%), communicating online with students (M = 73.0%), and working with digital platforms (M = 73.0%). In line with academics' experience (M = 58.0%), the best approach for assessing linguistic competencies is a combined online exam (test + direct answer virtually). Their majority (81.0%) evidence workload increase which confirms the scientific literature trends [18], [22]. In the winter semester, the majority of respondents (64.4%) have gained enough digital competence for providing distance teaching. Moreover, there is a trend in increasing student awareness in EdTech – the number of students evidenced that distance learning was a new experience has decreased (from 79.2% to 61.7%) in the winter semester. They found it interesting (M = 57%) but tiring (M = 52%).

It is worth mentioning that both lecturers and students have gained new teaching-learning experiences at emergency distance education during the COVID-19 pandemic. They have developed communicative and digital literacy skills primarily. However, time management is weak for academics (M = 43.1%) and students (M = 47.6%). It remains a significant challenge for the participants of the educational process. We assume that the COVID-19 pandemic has ruined life's habitual pace, unbalancing time for working, learning and rest. Despite the emergency transition to distance teaching-learning, the majority of academics (58.6%) and students (58.2%) see their future with digitally-based distance education. In perspective, the majority of students (62.7%) choose online exams confirming the research of the student perceptions of the online exams [12]. However, the majority of lecturers (67.1%) consider the traditional format more reliable.

In bottom line, the research findings prove the insights that countries and teachers at universities were not homogeneous in their readiness to teach and learn online [32] and that the "organizational factors may contribute to the successful implementation of emergency remote teaching" [33. p.1] and learning.

4. CONCLUSIONS

The research makes it possible to reveal universal consequences caused by the COVID-19 pandemic in higher education systems worldwide. They are emergency transition to distance education; lack of academic staff readiness and digital literacy skills; the colossal effort of academics to re-organise educational process online; their workload increase; students' positive perception of distance learning; the effective influence of distance learning on students' outcomes. Moreover, this research showed that international higher education systems faced the COVID-19

pandemic in different conditions, i.e., technical facilities, governmental and institutional support, financial investment, digitally competent academic staff, students familiar with EdTech. These higher education systems are likely to cope with the Coronavirus impact easier and transit to digitally-based distance teaching-learning smoothly. Ukrainian higher education met the COVID-19 pandemic unready. Though some national HEIs have managed to re-organise the educational process smoothly and effectively due to the lecturers' enthusiasm and colossal effort. In this regard, positive and negative trends are revealed in the emergency transition of national higher education to digitally-based distance learning. Positive trends are the rapid development of digital literacy skills and awareness in EdTech. Negative trends are tiredness, academic's workload increase, a challenge in managing time for teaching-learning and rest. The findings contribute to the investigation of higher education transformation in crisis and confirm that the COVID-19 pandemic has accelerated higher education digitalisation worldwide. The prospects for further research are to trace the trends in national higher education digital transformation accelerated by the COVID-19 pandemic.

Data availability statement. The authors confirm that the data supporting the findings of this study are available within the supplementary materials.

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НАДЗВИЧАЙНА ЦИФРОВА ТРАНСФОРМАЦІЯ ВИЩОЇ ОСВІТИ: ВІДПОВІДЬ УКРАЇНИ НА ПАНДЕМІЮ COVID-19

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Анотація. У статті досліджується, як вища освіта в Україні відреагувала на пандемію COVID-19, зокрема на прикладі досвіду Київського університету імені Бориса Грінченка. Наведено порівняльний аналіз національних тенденцій трансформації на різних рівнях ЗВО, викладачів та студентів протягом двох хвиль пандемії COVID-19 у 2020 році. Дослідження охоплює дві хронологічні межі: березень-травень 2020 року – 1-а хвиля (літній семестр); жовтень 2020 – січень 2021 – 2 хвиля (зимовий семестр). Розкрито вплив пандемії COVID-19 на вищу освіту України у 2020 році. Визначені тенденції трансформації національних ЗВО, а також сприйняття викладачами та студентами навчання та викладання онлайн. На основі огляду літератури та проведення опитувань (514 студентів/97 викладачів) дослідження дає змогу виявити універсальні наслідки пандемії COVID-19 у міжнародних системах вищої освіти, а також спеціальні тенденції надзвичайного переходу національної вищої освіти до цифрового викладання та навчання. Показано, що глобальні системи вищої освіти зустріли пандемією COVID-19 у нерівних умовах, зокрема щодо використання ІКТ, державної та інституційної підтримки, фінансових інвестицій, цифрової компетентності науково-педагогічних працівників, обізнаності студентів в освітніх технологіях. «Краще підготовлені» системи вищої освіти, швидше за все, легше впораються з впливом коронавірусу та плавно перейдуть до цифрового навчання онлайн. Зауважено, що українська вища освіта зустріла пандемію COVID-19 неготовою. Хоча деяким національним ЗВО вдалося плавно та ефективно реорганізувати навчальний процес завдяки ентузіазму та колосальним зусиллям науково-педагогічних працівників. З огляду на це спостерігаються позитивні та негативні тенденції в надзвичайному переході національної вищої освіти до цифрового навчання онлайн. Отримані результати сприяють дослідженню трансформації вищої освіти в умовах кризи та підтверджують думку, що пандемія COVID-19 прискорила глобальну цифровізацію вищої освіти.

Ключові слова: вища освіта; цифрова трансформація; пандемія COVID-19; дистанційне навчання на основі цифрових технологій; освітні технології.