Digital and Technological Support of Distance Learning at Universities under COVID-19 (Case of Ukraine)

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Abstract: The crisis of COVID-19 and the lockdowns announced in all countries of the world in early 2020 affected all people and areas of the economy, including education. In this regard, universities around the world were quickly forced to transform the educational process into a distance format. Thus, the article analyses the advantages and disadvantages of distance learning and teaching for students, as well as the peculiarities of the response of universities to actual challenge. The article presents the results of scientific-theoretical and applied research on the problem of providing distance learning at a high-quality level. The authors used the case of Taras Shevchenko National University of Kyiv, which was one of the first in Ukraine in 2020 to introduce a powerful distance educational platform “KNU Online”. The scientific novelty of the study is that the authors analysed the current state of higher education in a pandemic and made a forecast of possible changes in the market of educational services using ICT. In addition, in the period of turbulence, the processes are analysed, when free economic zones are actively inclined to find innovative ways to increase their own level of competition and provide educational services on quality and continuous basis. It is proposed to use the case “KNU Online” as a good practice to obtain all the necessary range of educational services in the most accessible and convenient way.

Keywords: *Distance Learning; Higher Education Sector; Digital Tools; COVID-19.*

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1. Introduction

The unexpected pandemic in the face of coronavirus disease 2019 (COVID-19) has affected all people around the world, causing a crisis of the global economy and spreading shockwaves across all countries. From the OECD economic outlook report, there is an expectation that the global economy is going to fall around 6% in 2020 (OECD, 2020b). According to statistical data from UNESCO, the highest point of public education institutions closures was recorded at the beginning of April 2020, when around 1.6 billion learners were affected across 194 countries, accounting for more than 90% of total enrolled learners (UNESCO, 2020). Now the situation is better, but still in a dramatic position. At the beginning of September 2020, hundreds of millions of students, who correspond to about 48% of total enrolled learners, are affected by the pandemic (UNESCO, 2020).

Undoubtedly, at the time of the pandemic, public spending are more concentrated on both the health sector and economy rather than on the education sector because of the short-term challenges. These short-term issues include the closure of borders, a limited global flow of goods, a decline of the governments' tax revenues and a need to fund overcrowded hospitals. It is vital to mention that government funding is the main source of funding for higher education institutions (HEIs) (OECD, 2013; OECD, 2020c). According to the OECD's report about the education sector, under the influence of external factors (crises, political destabilisations, diseases), public funding on education often gives a sign of volatility and fluctuation because of the shifting of priorities (Schleicher, 2020). The example of such public spending rebalance is the consequences of the financial crisis in 2008. It is notable that just after the crisis there was no decrease in public spending on education, however, first indications of a decline in public spending on education showed up in 2010 in almost 30% of OECD countries (OECD, 2020b). Nevertheless, there is an opinion that the novel pandemic may more quickly have a considerable impact on the education sector due to significant current changes to the governments' policies (IIEP-UNESCO, 2020). For instance, the Ukrainian government cut the education budget for US\$217 million (4%) in 2020 to transfer these financial sources to deal with COVID-19's consequences (Al-Samarrai et al., 2020). All these create a challenging environment for universities to sustain their economic and social functions and support the quality of the learning process.

After the spread of the virus, many governments closed education institutions and all actors who are related to the education sector (politicians,

academics, and students) had to find an alternative way to maintain the learning process without physical appearance. Many authorities have introduced distance learning using digital tools as one of the solutions to current realities (OECD, 2020d). However, heterogeneity among universities all around the world exists regarding their responses to an unexpected challenge. On the one hand, some universities did the minimum to respond to the pandemic. On the other hand, some universities closed their buildings and moved the education process to online settings (Crawford et al., 2020). In today's situation, two crucial questions should be answered: whether higher education systems are prepared to the adoption of distance learning on an extraordinary speed level and whether they are ready to the upcoming digitalisation of the learning process?

Some academics argue that universities all around the world were not ready for such a radical transition in the mode of learning delivery (Hammond et al., 2020; Platje et al., 2020). Many concerns arise, including the accessibility of distance learning, the quality of changed learning process, and the lack of needed skills among teachers and students (OECD, 2020a). According to (Majowicz, 2020), the pandemic has a wide range of macrolevel factors with the potential effects on academia activities. For instance, the inequality issues in the face of changing the delivery mode of education to online settings. Many students do not have the ability to access the internet because of the price of the connection. It may create a social disadvantage for them under the current circumstances. The other examples are workforce availability and the ability of academics to teach using digital tools. It means that a huge percentage of teachers might be unable to work because of the health problems and the proportion of those academics, who eventually might be able to teach, might have a lack of needed professional skills. Besides, the issue with the cost efficiency of introducing a distance learning environment gives concerns (Majowicz, 2020). Interestingly, the interest of both society and politicians on distance learning may lead to reconsideration on how universities should operate in the post-pandemic period. Therefore, such extreme change of the learning process is an exam for HEIs of their organisational capacity to manage and accomplish the current need to shift the learning materials to the online conditions.

The purpose of the article is to analyse the current state of higher education during a pandemic and forecast possible changes in the information technology market. One of the main challenges in the current circumstances is the need to move an education process to the distance mode. The paper analyses how universities respond to the new need and debates about the advantages and disadvantages of distance learning. More

interestingly, despite many challenges regarding the development of the institutional response to the sudden circumstances, the shift to a distance learning creates some opportunities for the innovations, including a fundamentally new concept of a virtual university. The paper uses methods of scientific knowledge, system analysis, and comparative analysis. The methodological basis of the study considers modern trends of the analysis of the impact of crisis phenomena on the formation of the educational services market and the creation of demand for new software products in the field of education. This paper employs a theoretical framework which is based on the literature about a distance learning and an empirical framework which reflects responses from international universities and focusing on the Ukrainian example of the Taras Shevchenko National University of Kyiv. The hypothesis of this paper is that, under the turbulence time, universities need to find innovative ways to maintain their educational activities in order to sustain as an organisation. The structure of this paper is arranged as follows. Section 1 includes introduction and actuality of the topic. Section 2 presents a literature review and theoretical background of this paper, including an overview of the concept of distance learning and a discussion of its debatable nature. Section 3 represents methodological considerations of this paper (data and methods). Section 4 gives a brief analysis of the current responses of HEIs to the move to distance mode, highlighting an example of Taras Shevchenko National University of Kyiv. Section 5 includes discussion part. Finally, Section 6 presents conclusions and some recommendations.

2. Literature review

To begin with, it is important to understand the terminology associated with both online and distance learning. The issue of clarification of these concepts provoked many discussions within the academic community (Johnson et al., 2020; Niculina, 2020). In Johnson et al. (2020), authors agreed with the opinion that there is a difference between two notions, such as online education and distance education. They supported the idea that online learning is more than just a mode of delivery, it is rather a course that has been designed purposely to deliver learning contents via online tools. Contrary, now distance learning is considered more as a delivery mode, following the explanation given in (Hodges et al., 2020): “a short-term shift of delivering learning content, which includes the utilisation of remote teaching tools for education process that would alternatively be delivered face-to-face, and that will return to the form used before the emergency”. However, what is similar between distance and online learning

is that they both utilise a variety of digital tools, where learning content is delivered through the Web (Xu & Xu, 2020). These digital tools include digital learning management systems (LMS) (Canvas, Moodle, Google Classroom), virtual classroom tools (Zoom, Hangouts Meets, DingTalk), student information systems (PowerSchool SIS, Gradelink), self-directed learning content (Khan Academy, Quizlet, British Council), Massive Open Online Course Platforms (Canvas Network, Coursera, EdX, Udemy, Prometheus), etc. (Polianovskyi et al., 2019; Oleksiv et al., 2021; Liuta et al., 2021).

The literature on the topic of distance learning emphasises two main reasons why students prefer online mode of delivery education materials. The first is that it offers greater flexibility for students to learn when it is convenient for them (California Community Colleges, 2017; Daymont et al., 2011; Polianovskyi et al., 2019; Stukalo & Dluhopolskyi, 2020). The second is that it aligns with students' desires and preferences about the mode of delivering learning materials (Jaggars, 2014; Klapkiv & Dluhopolska, 2020). In other words, distance learning offers students the choice of how they will organise an education process, including the pace of learning.

With the fast growth of distance learning, especially in the time of the pandemic, questions arise regarding its influence on the learning outcomes (Hammond et al., 2020; OECD, 2020a). There have been many observations tried to examine the effectiveness of distance learning and its difference to face-to-face format before the pandemic, and results were mixed (Xu & Xu, 2020).

One of the supporters of distance learning is the US Department of Education that conducted a metanalysis suggesting that on average students show better results in online conditions than in face-to-face format (Evaluation of evidence-based practices, 2009). However, this analysis was criticised by Jaggars and Bailey (2010), who debated about whether the findings of the metanalysis done by the Department of Education could be generalisable because of the lengths of the analysed courses and focus only on the received grades, ignoring the drop-out rates (Jaggars & Bailey, 2010).

There have been academic papers that took into consideration the duration of the analysed courses, and the results were neutral, showing no significant benefits or drawbacks for the students' learning outcomes (Cavus et al., 2007; Mentzer et al., 2007). The problem of these two studies that they were conducted at large and highly ranked universities, ignoring unprepared students from the low ranked public HEIs (Xu & Xu, 2020). In other words, students with poor educational experience may struggle more in learning via online settings because of their weak technical or time-management skills

(Bambara et al., 2009). Moreover, students with feeble educational background withdraw from online courses at a higher rate (Bailey et al., 2010). Besides, higher drop-out rates were identified in online programs in comparison to similar face-to-face programs (Xu & Jaggars, 2011). It should be noted that not many studies analysed the outcomes of the different modes of learning on underprepared students' performance. Some authors argued that the underprepared students performed better in the face-to-face format rather than in the distance one (Peterson & Bond, 2004).

Many studies identified neutral or negative effects of changing face-to-face settings to distance format. There is a null difference in education results between the offline settings and blended format (Bowen et al., 2014; Boyko et al., 2021). Many academics point out that the distance format may have negative effects on student performance, taking into consideration grades (Figlio et al., 2013; Means et al., 2010), completion rates (Johnson & Mejia, 2014), and passing test scores (Bowen et al., 2014). Some of these studies focused on a small group of respondents in a particular course, causing limitations to generalise the results (Xu & Xu, 2020). Nevertheless, some studies address this issue, including a broad sample of students from different HEIs and a different set of courses (Bettinger et al., 2017; Hart et al., 2018). These studies also highlighted that students' performance in distance learning was worse than those in the offline format of the same course.

Overall, all this knowledge points to the fact that on average students have worse performance in the distance mode of education rather than in face-to-face classes. It raises the concern that the current massive and rapid transition to the distance mode at HEIs may be at the cost of learning quality.

The international significance of this article is that the use of educational platforms such as "KNU Online" in a pandemic time and unpredictable lockdowns in the educational services provision solves several important tasks: 1) removal of social tension in society regarding access to education as one of the main public services (public good); 2) ensuring the continuity of educational services under different conditions; 3) guaranteeing the inclusiveness of education for all; 4) reduction of inequality in receiving educational services; 5) involvement of the maximum number of stakeholders in the educational process in active communication on platforms.

3. Data and methods

As it was mentioned before, the paper employs methods of scientific knowledge, system analysis, and comparative analysis. The methodological basis of the study considers modern trends of the analysis of the impact of crisis phenomena on the formation of the educational services market and the creation of demand for new software products in the field of education. This paper uses a theoretical framework which is based on the literature about a distance learning and an empirical framework which reflects responses from international universities and focusing on the Ukrainian example of the Taras Shevchenko National University of Kyiv. Therefore, a literature review has been done to comprehensively examine and systematize all needed information on a given topic. To achieve the objectives of this paper, the authors also used a scientific abstraction method in clarifying the categorical framework to observe the essential characteristics of distance learning under the context of COVID-19. Besides, both historical and logical methods are used for a comprehensive examination of HEIs' responses for the ongoing shift in the learning mode. In addition, logical generalization is another method utilized in this paper to identify trends and common and distinctive features of universities' responses to external pressures. Finally, the hypothesis of this paper is that, under the turbulence time, universities need to find innovative ways to maintain their educational activities in order to sustain as an organisation.

4. Results

Most universities across the globe have closed their campuses beginning from March to June (Tab. 1). Some countries struggled with the country-wide policy on the closure of educational institutions, including Brazil, the Russian Federation, the United States of America and Singapore (UNESCO, 2020). Closing campuses means that higher education systems had to provide an alternative way of studying, and a shift to distance learning has been seemed inevitable. From Table 1, almost all developed countries reported a move towards distance learning during the pandemic, while developing countries showed mixed responses. According to the European University Association (EUA) survey "Digitally enhanced learning" conducted almost in all European Higher Education Area (EHEA) countries, including both developed and developing countries, 95% of respondents confirmed the move to distance learning within the institution and 4% reported the move at the faculty level (European University Association, 2020). Additionally, the mentioned reported examined that 70% of HEIs have intentions for altering digital capacity, 87% of surveyed universities

stated that they are going to search for new ways of teaching, while 66% of them have a desire to increase online library utilisation (EUA, 2020).

Table 1. The response of higher education sectors by countries

Category	Country	Reported campus closure	Reported move to distance learning
Developed economies	Australia	All	All
	Germany	All	All
	UK	All	All
	USA	Some	Some
Developing economies	Brazil	Some	Some
	China	All	All
	India	All	Some
	Singapore	Some	Some

Source: compiled by the authors based on (Crawford et al., 2020)

In general, most universities in EHEA provide some type of distance learning and some of them offer online degree programs. According to the “Trends 2018 in Learning and Teaching in the European Higher Education Area” report, during past few years, distance education has been spread faster than ever before in the higher education sector (Gaebel & Zhang, 2018). The report based on an online survey conducted in 2017 that includes 303 HEIs from 48 EHEA countries. The report confirms that universities demonstrate a high level of acceptance of distance learning (93%), and its enhanced utilisation in the education process (87%) (Fig. 1). Moreover, HEIs tend to implement distance learning into their institutional strategies (85%) (Fig. 1). The latest might be explained by the support of ministers for higher education in the EHEA in using digital technologies for education, and this support has been enhanced in the 2018 Paris Communiqué (European Commission, 2015; 2018).

Error!

Figure 1. Trends in distance learning

Source: compiled by the authors based on (Gaebel & Zhang, 2018)

According to Figure 1, most respondents viewed distance learning as an innovating method of education, including some sort of e-learning and digitalisation. The most popular learning innovation is the utilisation of digital tools (e-learning platforms, MOOCs, learning management systems, etc.) (Polianovskiy et al., 2019; Gaebel & Zhang, 2018). HEIs tend to include distance learning into their strategic view on the development of higher education. Despite that distance learning diversifies the pedagogical approaches, it also opens many discussions of its impact on the education process (Henderikx & Jansen, 2018). In this regard, a fruitful report has been done by European Students' Union (ESU) with the support of the Institute for the Development of Education in Croatia (IDE) and researchers from the University of Zadar (European Students' Union, 2020). The report includes more than 17 thousand respondents from 41 European countries. It is notable that most students were satisfied with the distance mode of teaching and administration, but they were less satisfied with the practical part of studying, including seminars. Both practical classes and seminars were held online with the teacher involved in real-time, and most students identified that they preferred the real inclusion of lecturer. Moreover, most students felt confident using digital tools, and they highlighted that the new way of learning is an interesting challenge (ESU, 2020). Therefore, despite many challenges regarding the development of the institutional response to

the sudden circumstances, the shift to distance learning creates great opportunities for the innovations.

The interesting data was released from Phil Hill's report about the learning management market analysis in the US and Canadian HEIs (Hill, 2020). The dominance of four LMS (Canvas, Blackboard, Brightspace, and Moodle) is incredibly significant (Fig. 2). The big four LMS corresponds to 80% to 95% of the overall market share in the past five years. Despite a big number of commercial LMS, many systems remain open for all users (Moodle, Sakai, Canvas) (Hill, 2019).

According to Grand View Research's report (Market Report, 2020), the global EdTech market size was valued at almost \$80 billion in 2019, and it is expected to increase at a compound annual growth rate (CAGR) of 18% till 2027 (Market Report, 2020). The reasons for such a significant growth can be the increasing demand for distance learning because of COVID-19, growing penetration in mobile devices, and greater internet access. Notwithstanding the significant level of CAGR, the EdTech market is opened for the new solutions which soon may move the university education on the new level of virtual learning.

One of the interesting examples of new solutions for distance learning is "KNU online". In July 2020, the Center for Innovation Development of Taras Shevchenko National University of Kyiv hosted a presentation of a new educational platform "KNU online". This solution was proposed by the initiative of L. Gubersky, Active Rector of the Taras Shevchenko National University of Kyiv, which envisages a comprehensive digitalization of the functioning of higher education. The presented platform currently consists of such modules as a teacher office module, a student office module, a module for electronic dean's office, a digital library module, an online reporting module, an online presentation module. Due to its structure and technical capabilities, the platform can be accessed from any region without any obstacles (KNU Education Online, n.d.). One of the most considerable advantages of distance learning is that students can access the learning process from any place at any time (Zatonatska et al., 2020).

Figure 2. LMS market share for US and Canadian HEIs

Source: (Hill, 2020)

The developers have demonstrated that the student's electronic office provides access in one place to all the tools needed for online and distance education: choice of disciplines, interactive schedule, access to lecture materials (in the format of presentations) in all disciplines according to the curriculum, access to digital libraries (university, all-Ukrainian and foreign), control of the received points, automatic check for the plagiarism of the executed tasks (essays, course papers, diplomas). The platform is based on Genially's technology that helps to create virtual interactive learning materials in all education sectors, including the higher education one. A composition of many functions incorporated in one platform shows opportunities for the EdTech market.

The electronic teacher's office is of no less interest. It provides an opportunity to share in one place the materials needed for learning: both lecture texts and presentations, tasks and tests for practical classes, literature

in the electronic format, video lectures, etc. It also allows teachers to access an interactive schedule, communicate with students (as well as send and receive assignments from them), faculty administration in the format of e-mail, generate information with points scored for the exam. Importantly, the student can evaluate teachers and subjects anonymously and maintain online contact with the supervisors, the dean's office and the dormitory administration. In this regard, the electronic dean's office includes automatic scheduling, control of financial issues and student performance, electronic document management, and control of students' data. An equally important part of the platform is the online presentation module, which allows students to use many modern digital tools to demonstrate any kind of prepared learning materials.

The educational platform “KNU Online” is currently being tested by two faculties, in particular, economics and law. According to the administration data, 60-65% of teachers of these departments already use it for the education process, and currently, the platform has almost 6,300 registered users, including both teachers and students. The platform provides a mobile application that is compatible with Android and iOS, both versions of the application are currently available in a test mode. The use of the platform by all educational units of Taras Shevchenko National University was planned for September 1, 2020 (KNU Education Online).

Despite many benefits of introduction “KNU Online”, there are some issues that should be taken into consideration. Firstly, students and teachers must obtain appropriate skills in order to understand how to use the new technology. To put it another way, students and teachers with poor educational experience may struggle more in studying process through online mode than through tradition face-to-face mode (KNU Education Online). Nevertheless, “KNU Online” provides an opportunity to complete a guide explaining how to use the system that can positively influence overall satisfaction with the system. Secondly, a high reliance on technology may cause some disruptions in the learning process. In other words, if any software tools show a dysfunctionality, the studying process will be interrupted and suspended. Lastly, such rapid introduction of “KNU Online” and overall situation with the pandemic may cause students to feel isolated and to lose physical interaction with other students and teachers (fig. 3). Consequently, the lack of verbal connection in the education process through the online mode may provoke isolation and anxiety (Zatonatska et al., 2020).

Figure 3. Example of “KNU Online”

Source: (Digital University, 2021)

All in all, the Taras Shevchenko National University of Kyiv is one of the first universities in Ukraine to introduce a powerful distance educational platform, which provides an opportunity for online communication between teachers and students and quality organisation of the educational process, even under the quarantine circumstances. “KNU online” is the university in the smartphone and is the platform where both students and teachers can get all needed services in a fast, convenient, and accessible way. Currently, there is no analogue of this complex solution of the virtual university in the smartphone in Ukraine.

5. Discussion

Today’s circumstances may create a fundamentally new concept of a virtual university, where new competitive advantages for universities are created. The pandemic has significantly influenced the approaches of learning and teaching and the competition between universities that are starting to provide distance learning services, namely, connecting to platforms that have access to virtual libraries, personal accounts for both students and teachers, webinars, online lectures, etc. All this can lead to the creation of more modern and technologically advanced virtual platforms

(this will give an impetus to the emergence of a new class of software products). If earlier, most IT companies were focused on creating information systems for enterprises of the class of ERP-systems, now a new milestone may begin, namely the development of information solutions in the field of distance learning (EdTech). There are many examples of digital tools that offer a possibility to learn virtually, including Flipgrid, Canvas, Google Classroom, Genially, etc. The analyzed “KNU Online” case is a good example of promoting the best practices of leading universities of Ukraine in the system of distance learning nationally and internationally.

6. Conclusion

The purpose of the article is to analyse the current state of higher education during the pandemic and forecast possible changes in the information technology market. The discussed challenges provoked universities to respond as quickly as they could. HEIs all around the world faced the need to move their activities to the distance mode because of the pandemic. Consequently, a rapid change of the learning process is an exam for HEIs of their organisational capacity to move their operations to the distance mode.

Previous studies highlight that on average students have worse performance in the distance mode of education rather than in face-to-face classes. Therefore, it raises concerns that the current massive and unexpected move to the distance mode of learning may be at the cost of the quality of education. However, there were no alternatives for universities to sustain their operations expect of moving online. Notwithstanding many challenges regarding the institutional response to the pandemic, the shift to distance learning was perceived positively by students.

Today's situation provokes universities to find efficient ways of the transformation and to create new competitive advantages in the form of innovation and technology. The virus stimulated a competition between HEIs that began to enhance the utilisation of digital tools, namely, virtual libraries and databases, LMS, online lectures, webinars, etc. However, more technologically advanced systems may appear in the future, connecting many services in the one virtual platform. Undoubtedly, it may give a push to the emergence of new software products in the EdTech market.

Talking about the Ukrainian context, the interesting examples of how Taras Shevchenko National University of Kyiv responded to the pandemic is recognised. The university presented a fundamentally new solution for distance learning, a platform called “KNU online”. The

platform consists of many modules, offering a big number of different functions for students, teachers, and university's managers. The platform incorporates a Genially's technology that helps to build a virtual interactive education. A closer look at the Ukrainian example leads to the conclusions that a combination of many services integrated into one platform offers opportunities for the EdTech market.

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