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Functioning of education in remote teaching mode – practice and exchange of experiences

Funkcjonowanie edukacji w zdalnym trybie nauczania – praktyka i wymiana doświadczeń

ABSTRACT

This study aims to determine the practical aspects and functioning of higher education over distance in Ukraine.
The subject of the work is the systematic approach to the analysis of the organization of higher education as a subject of research, the identification of problems and challenges by presenting higher education as an economic, market, management, and operational subsystem. During the investigation it was established that the dominance of asynchronous educational technologies, identified and characterized the thin sides within each of the subsystems of higher education, among which the most vulnerable are: technological support of optical networks and wide-format access for Internet users, especially in rural areas; weak infrastructure in universities for video conferencing and other forms of remote work; low digital competencies of teachers (up to 60% of surveyed teachers), low quality of university management and adaptation to change; slow use of innovative offline learning technologies. The introduction of the systematic approach to improving the quality of education through the strategic definition of goals, mission, and priorities of university development is substantiated; introduction of pedagogical design; creating a comfortable environment for students to study and research; providing EdTech tools for training and assessment; regular monitoring of the content and making sure that the design of educational courses were grounded. Among the applied steps, it is recommended to intensify the implementation of a dual education system adopted by the author of innovative teaching methods, particularly "flipped learning" technology.

Keywords: higher education, distance learning, system approach, flipped learning.

STRESZCZENIE

Celem artykułu było określenie praktycznych aspektów nauczania na odległość i doświadczeń szkolnictwa wyższego w tym zakresie funkcjonującego na Ukrainie. Jego wkład naukowy to zastosowanie systematycznego podejścia do analizy organizacji szkolnictwa wyższego jako przedmiotu badań oraz identyfikacja problemów i wyzwań poprzez ukazanie szkolnictwa wyższego jako podsystemu ekonomicznego, rynkowego, zarządczego i operacyjnego. W trakcie badań zaobserwowano dominację asynchronicznych technologii edukacyjnych, zidentyfikowano i scharakteryzowano słabe strony w ramach każdego z podsystemów szkolnictwa wyższego, wśród których najbardziej narażone są: wsparcie technologiczne, sieci światłowodowe oraz dostęp użytkowników do szerokopasmowego Internetu, zwłaszcza na obszarach wiejskich, słaba infrastruktura uczelni przeznaczona do wideokonferencji i innych form pracy zdalnej, niskie kompetencje cyfrowe nauczycieli akademickich (do 60% badanych nauczycieli), niska jakość zarządzania uczelnią i możliwość adaptacji do zmian, powolne wprowadzanie innowacyjnych technologii uczenia się offline. Uzasadnione jest więc zaproponowanie systematycznego podejścia do podnoszenia jakości kształcenia poprzez strategiczne określenie celów, misji i priorytetów rozwoju uczelni, wprowadzenie projektowania pedagogicznego, stworzenie dla studentów sprzyjającego środowiska do nauki i badań, dostarczanie narzędzi EdTech do szkolenia i oceny oraz regularne monitorowanie treści i konstrukcji kursów edukacyjnych. Wśród zastosowanych kroków zaleca się zintensyfikowanie wdrażania dualnego systemu edukacji do innowacyjnych metod nauczania, w szczególności technologii „odwróconego uczenia się".

Słowa kluczowe: szkolnictwo wyższe, kształcenie na odległość, podejście systemowe, odwrócone uczenie się.

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INTRODUCTION

The UNESCO International Commission on the Futures of Education notes that for several reasons the world will no longer be as it used to be (UNESCO, 2020). According to the international organization Chegg.org, the functioning problems of education, questioning more than 16 thousand students from 21 countries, are related to the strategy and tactics of university ousting (Chegg, 2021). Thus, according to the study by Banco Santander and the IAUP "Managements response to COVID-19", more than 700 rectors are concerned about the effects of the pandemic. The study, which involved rectors from 90 countries, shows the strong impact of the COVID-19 on the financial situation of the universities and predicts a decrease in the number of applications of education. About 70% of the educational establishments intend to launch an educational program based on a hybrid model and emphasize the need to invest additional funds. The study was divided into three sections: Initial reactions focused on the first half of 2020; preparation for the 2020-21 academic year, immediately after the beginning of the autumn semester and prospects for the next three years.

The principal conclusions were: 37% of institutions state they were ready to fight COVID-19. Asia and Oceania reported the highest levels (49%) and North America the lowest (29%). Covid-19 had a profound impact on university-business partnerships, and 56% of educational institutions expect deteriorating relationships; rectors focused on a broad internationalization program, expanding their "virtual mobility" programs and emphasizing the importance of alliances between universities.

The basic problems embraced were academic achievements (68%); financial stability of the institution (57%); involvement of students in participation (51%); inclusions (49%); and a decrease in the number of enrolled students (44%) among public and private institutions in all regions where the study was conducted, most institutions deal with temporary demands (47%) and do not restructure (49%) or rethink themselves (36%). Rectors believe that future programs will most likely combine online, mixed, and in classroom education (71%). Mixed education constituted 70%, online education 67%, and use of alternative methods of education 66% (Santander, 2020). At the same time, it was agreed with the opinion of scientists that in a crisis the key task of managers was not administration, but communication (Interfax, 2020), and this is a matter of learning technology, didactics, and pedagogical design. The conditions of the pandemic only emphasize the public demand for innovative teaching methods, so this study seems relevant.

1. IDENTYFICATION OF EDUCATIONAL REQUESTS IN UKRAINE

Pandemic education systems need to be radically transformed to be more flexible, equitable, and inclusive to society and the market. While studying the educational process development in conditions of the pandemic in Ukraine based on a systems approach, one should be focused on several aspects. Firstly, education is an element of the national economy, namely the socio-economic subsystem, which means the relationship of influences as a part and whole, individual and general. Secondly, the subsystem of education interacts directly with the subsystem of the economy, namely the labor market on the principles of the supply and demand equilibrium. The primary concern is the market transformation, which prompted higher education institutions and the educational process to change under the influence of the pandemic. Thirdly, at the process level of management, the transformation concerned the change of both the behavioral patterns of the participants in the educational process: teacher, student, administration, stakeholder, employer, student parents, and the relationships and connections between them.

A cursory analysis of these aspects of the problem of adapting education to new challenges and threats revealed problems in infrastructural support of the educational process at all levels: from preschool education to higher education and employee retraining. In particular, according to the data of the Ministry of Digital Transformation of Ukraine in July 2020, access to broadband high-speed Internet (broadband) showed that more than 17 thousand settlements out of 28 thousand at the height of the pandemic did not have optic networks at all, and about 65% of villages are not covered by high-quality broadband. The problem remains the fact that 5.75 million citizens do not have the opportunity to connect to high-quality fixed broadband, and more than 4 million Ukrainians live in villages where there is no high-quality fixed Internet. Among all social institutions, 40% of schools, 92% of libraries, and 37% of hospitals do not have access to the Internet; they are located in villages and small towns (Ministry of Digital Transformation of Ukraine, 2020).

Distance learning is a set of technologies that provide students with the basic amount of educational material, interaction of students and teachers in the learning process and allow students to work independently with educational materials. However, educational institutions, including universities, especially in the regions, were not prepared to move to online classes due to technical problems (availability of modern computers, video cameras, etc.), lack of special competencies, inexperience in an online format (familiarity with the features of Google Classroom, Microsoft Teams, Cisco Webex, Zoom, Class Dojo, Classtime, etc., posting materials, monitoring, and journaling, etc.), the presence of psychological barriers (readiness for social communication, language training, etc.). Thus, according to existing research, teachers rated their level of mastery of cloud technologies at 3.2 points out of 5 possible. Lectures and classes in distance or webinar format were rarely or never mentioned by 60% of surveyed high school teachers (Barannikov et al., 2020). At the same time, digital volunteers assisted teachers in set-

ting up and using online platforms, as well as providing assistance in solving related technical problems. About 20% of teachers at National University "Zaporizhzhya Polytechnic" received such assistance. Moreover, only 21% of teachers use the online courses Prometheus and others for their subjects.

At the level of operational processes in education, we note that in general, our opinion coincides with that presented in the literature: online education is not the worst in preparation, it is different, and enriched with new soft skills competencies that will be useful to students in professional life (Grynevych et al., 2020, p. 62). The positive aspect of distance learning is that students acquire new digital competencies, and therefore it is allowing them to use it with employers or in further education.

It ought to be remarked that the informational and methodological support of educational programs on the Moodle platform was partly presented in all universities, mainly to provide the educational process for distance and evening education. After all, only 49% of universities are fully equipped with digital library resources from all educational programs, and only 11% of these resources can be integrated with foreign databases. In synchronous learning, the means of digital communication were actively used. Already in March, 57% of students studied using video communication.

At the same time the 2020-2021 academic year was dominated by asynchronous learning technologies, when students were sent assignments, and then the work was collected for verification by e-mail. Our student surveys showed that more than half of the students encountered this approach at least in part, and 55% received only a list of literature recommended for self-study in at least one discipline (15% of them say that this format is chosen by teachers of all educational components). That means in the context of distance learning, the effectiveness of online education in the absence of alternatives was ineffective.

2. IMPROVING THE ORGANIZATION OF EDUCATING

Numerous studies in the field of educational technologies agree that online learning is based on a carefully designed and planned learning process, supported by a methodically sound and purposeful sequence of teaching materials and control and measuring materials that ensure learning outcomes in the format of e-learning. The key in this definition is pedagogical design, as a tool for designing an online course, which is absent in most cases in the abrupt transition to "distance". The most complete variants of pedagogical design in the design of an online course are reflected in the works of Means et al. (2017), Lynch et al. (2018), Shestopalyuk (2013), Shvecz (2016), and others.

In the conditions of online and mixed forms of education, new forms of independent work for students, and new methods of their pedagogical support are required. Particularly relevant is the issue of providing training for freshmen by presenting them with accurate and understandable basics of self-organization of education, proposals for the construction of individual trajectories for the acquisition of competencies, and the ability to learn. In the first years, special adaptation courses would also be useful for learning new digital tools for learning activities.

A systematic approach to the organization of the training courses designed for the online format should take into account the following components:

- choice of learning model within the university or autonomous department (exclusively e-learning, mixed learning with a different ratio of face-to-face and online formats, e-learning with the inclusion of webinars, etc.)
- taking into account the number of students and the correlation of the pace of teaching and learning development (development at any convenient pace, the pace of development set by the teacher, the set pace of development with the possibility of passing part of the course at any pace);
- choice of pedagogical technology based on target orientation (explanatory course, practice-oriented course, research course, course for organization of joint collective activity);
- the purpose of control measures and assessment (organization of adaptive learning, diagnosis of achieved learning outcomes, cumulative assessment system, etc.);
- defining the teacher's role (active interaction with students online, insignificant online presence, absence of the teacher in the online environment), the role of the student (reads and listens; solves problems and answers questions, active experimentation through simulators and other tools, interaction of other students) and synchronization of interaction (only asynchronous, only synchronous, mixed format of interaction).

All these parameters strongly influence the design of the online course: forms of content presentation, selection of creative tasks, creative independent tasks; choice of control-estimate tools; use of certain communication services. For example, traditional educational technologies are aimed at achieving a structural-logical paradigm of "knowledge – understanding – applying", which corresponded to the training of specialists with the competencies of performers and were inherent in the needs of the industrial method of production.

B. Bloom's taxonomy of productive educational technologies also takes into account the development of educational methods aimed at developing critical thinking and digital skills for the needs of the digital and robotic economy and society. Digital skills allow people to create and share digital content, communicate and solve problems for effective and creative self-realization in learning, work, and social activities in general. B. Bloom's taxonomy contains the content of educational whole definition "analysis – synthe-

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sis – evaluation" and is based on creative learning technologies: problem-based learning, intelligence maps, educational quest, storytelling, technologies of integrated, case, modular, and "inverted" lessons, ICT and many other educational innovations (Anderson & Krathwohl, 2001).

In summary, it can be noted that the coronavirus pandemic and digitalization have raised such questions in the field of modern education and human capital development as: development and implementation of a competency model for the digital economy in the context of continual learning, appointing and retraining academic staff in teaching digital skills, preparing IT professionals in the field of new digital technologies and robotics, transition to adaptive challenges to innovative models of education and advanced educational technologies, achieving educational outcomes through an optimal balance of digital, professional, "soft" and ethical skills.

We need to transform the very paradigm of education and review existing approaches and models of learning aimed at developing general digital literacy, and social and emotional skills for success in the new digital world. Technological innovations in the information environment (development of mobile networks, artificial intelligence, automation, advanced data analytics, etc.) allow expanding learning opportunities by combining traditional teaching methods and modern technologies, as implemented in the system of modern engineering education (École 42, n.d.).

3. WAYS TO SOLVE DIDACTIC BARRIERS

The educational process and pedagogical design are a consequence of the corporate culture, management model, and decision-making system adopted at the university. In our opinion, the modern content of solving university problems is in the structural and logical paradigm of "effective management - high organization of education". A systematic approach to university management involves definition: mission, culture, and priorities of the university, pedagogical design, comfortable learning and learning environment, digital infrastructure, EdTech-teaching tools, and effective systems. In particular, the pedagogical design allows you to choose properly selected course materials, based on the goals and objectives of learning and the characteristics of the learning process in the online environment, which will provide the learner with an educational result, and the teacher positive feedback. This approach implies that online learning is primarily a cognitive and social process, not just a process of transmitting information via the Internet.

In the vast majority of domestic universities, the forms and technologies of teaching are outdated, and the educational programs are detached from the requirements of the labor market. Thus, in 2019, 31% of students are dissatisfied with educational programs and consider them outdated, and 55% of students believe that there is little practice in universities. In 2020, the situation with the quality of education only worsened, as 41% of students noted the contradiction between the requirements of the labor market and today's studying, and 91% of employers say that university graduates lack practical knowledge and skills (Barannikov et al., 2020).

Responding to the market needs, innovator-educators and change leaders are actively implementing modern learning technologies, interactive techniques, and digital support. The practice is showing that the development of an online course takes an average of 6-9 months, and the skills of the teacher on the online platform are formed during the first 5-6 launches of the course. The most popular among universities were LMS platforms for posting content and testing students' knowledge, webinar services for online lectures and consultations, social networks and messengers for communicating with students and teachers, and e-mails for content delivery. There are many LMS on the market, but the top ten include the following: iSpring Learn, Teachbase, eTutorium, Mirapolis, GetCourse, WebTutor, and Unicraft.

According to the "learning the future" concept, proposed by J. Delors, the individual must master 5 skills to meet the demands of change in the external environment:

- learning to know - awareness of the information nature, mastery of learning tools, not just the acquisition of structured knowledge;
- learning to do - the development of a set of skills for those types of work that are needed now and will be needed in the future, including innovation and adaptation of learning to future working conditions;
- learning to live together, and with others – to communicate constructively, resolve conflicts peacefully, discover other people and their cultures, strengthen the potential of the community, individual competence and abilities, economic stability, and social integration;
- learning to be - education that promotes comprehensive and full human development: mind and body, intelligence, sensitivity, aesthetic evaluation, spirituality, etc.;
- learning to learn and continue to learn throughout life (Saienko et al., 2020).

A relatively new approach is flipped learning, it is a learning technology where the direct transfer of knowledge is moved from the group educational space to the individual one, and the group learning space is transformed into a dynamic, interactive environment in which the teacher takes on the role of facilitator, tutor, consultant and helps learners to apply the studied theory in practice, developed a skill and deeply reflects the subject for further independent learning and development.

The key components of the flipped learning technology are:

- online platform for communication in connection with educational content; interactive instructions and simulators for work in typical learning contexts;

– providing monitoring systems for teachers and management to provide feedback to staff;
– forms of feedback for students for operative educational program correction (Table 1).

Table 1. The scheme of the "flipped learning" system

	Made by students	Made by teacher
synchronously	1. Demonstration and applying - "What is now?" Due to creative and personified projects and presentations	2. Involving due to experience - "Activity" Games, simulations Discussions Tasks Experiments The case solving
asynchronously	3. The creation of sense – "And what?" Blogs Tests Reflection videos Photoessay Audio-visual reflection Reflection podcasts, webcasts	4. The studying of theory – "What?" Videolections Audilections Websites with content Online chat Longreads E-courses

Source: Bergmann & Sams (2012)

If the traditional model teaching is based on the logic of theoretical substantiation of new knowledge with the subsequent practical use,

4 → 3 → 2 → 3 → 1

the technology of the flipped classroom by the initial pedagogical method determines the practice.

1 → 2 → 3 → 4

These educational methods are typical mainly for dual education and corporate education, where there is practice-oriented learning.

The introduction of flipped learning technology in incorporate education is directly related to the integration with the learning matrix and performance management and involves the use of training methods such as business simulations, case studies, and electronic programs for each unit.

CONCLUSIONS

The traditional model of education is hopelessly outdated and aimed only at acquiring knowledge and reproducing it. We need to transform the very paradigm of education and review existing approaches and models of learning aimed at developing general digital literacy, and social and emotional skills for success in the new digital world. Much of the traditional university curriculum can be effectively implemented in a face-to-face format outside of university classrooms. During long distance work, the demand for digital didactics becames obvious. We need a program for the development of digital tools and digital content needed to organize and conduct online practical training, virtual laboratories, the use of simulators, and virtual and augmented reality. It is necessary to form networks of internship sites based on consortia of universities, research organizations, and businesses to disseminate new educational practices and improve the skills of research and teaching staff. The most effective mechanism for disseminating innovative practices is not orders or even methodological recommendations of regulators, but the most successful precedents of best practices on digital platforms: Zoom, Skype, Teams, etc., and digital online services - Prometheus, Coursera, Futurelearn, LinkedIn Learning, and others.

During the research, a low level of reflection of the university management on the functioning of the quality system of education and the educational process were established. The applied competencies are significantly lacking for students. Different subjects of education management lack of educational statistics and analytics, sociology of educational changes to make deliberate decisions. The operating system of universities in the teaching and research processes is dominated by the asynchronous type of education, and the structure of universities does not meet the needs of change and funding of information technology specialists, individual consultants, project curators, etc. University autonomy is more abstract than real. There is a lack of coordination and correlation between employment in the labor market for full-time students and the organization of the learning process. National University "Zaporizhzhia Polytechnik" is one of the participants in the national experiment on the introduction of a dual education system, which should solve this problem. There is also a need for a more flexible environment such as: organizational, creative, and informational to implement the latest methods and technologies of long distance learning as game methods, "flipped classes", case studies, hackathons, etc.

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