



EDUCATIONAL AND INFORMATIONAL ELECTRONIC ENVIRONMENT ORGANIZATION FOR APPLICANTS OF THE PROFESSIONAL MA PROGRAM, “MANAGEMENT OF E-LEARNING IN THE INTERCULTURAL SPACE”

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Abstract: *The article substantiates the need for the training of specialists who can provide the quality organization of e-learning for e-learning managers, it also presents the main components of the educational program. The concept of the information-educational environment in modern conditions of the digital transformation of education is analyzed, with modern models of the introduction of e-learning in the educational process are considered. The necessity of the creation and use of the information-educational electronic environment for the formation of necessary competencies of designing of e-learning is proven, the model of the organization of educational environment for applicants of the educational program which includes the program, innovative pedagogical techniques and digital technologies is also provided. During the study of the creation and use of an effective information and educational environment in the training of e-learning managers, a set of theoretical (analysis and synthesis of Ukrainian and foreign scientific, pedagogical and methodological sources on the topic of the article) and empirical (student surveys, modeling of educational and information environment) methods and analysis of the obtained data were obtained. The authors describe the results of a survey of students on their satisfaction with the created electronic environment, as well suggestions for improving its components, determining the list of digital tools and services that they often use, along with improvements in the features of the educational process for an educational program at the Borys Grinchenko Kyiv University.*

Keywords: e-learning, e-learning manager, educational and informational environment, communication, collaboration.

INTRODUCTION

Problem statement: The containment of the COVID-19 pandemic led to the closure of educational institutions, 1.57 billion pupils and students (90% of the world's population) were forced to study remotely. Such conditions have led to serious challenges for the educational system including: adaptation of educational policy to today's requirements, strengthening the financial support of educational institutions, modernization of their material and technical base, organization of effective distance or blended learning, problems of objectivity of intermediate and final control of students, the unpreparedness of the majority of participants in the educational process for forms of distance and home learning, etc. (Hrynevych, Ilyich, Morze, Proshkin, Shemelnyets, Linyov, & Riy, 2020).

At the same time, there is a question of the quality of e-learning, so the report, 2021 EDUCAUSE Horizon Report (Pelletier et al., 2021) focuses on the quality of online learning as a technology, the use of analytics, open resources, a combination of mixed and hybrid models of training courses.

The forced mass transition to e-learning during the quarantine period has become a global challenge for the entire educational environment, including higher education. On the one hand, universities are developing IT infrastructures (Spivakovsky, Vinyk, & Tarasich, 2014; Morze, Glazunova, & Smyrnova-Trybulska, 2017), including functioning electronic libraries, e-research centres (for example, Oxford e-Research Centre), the digital is being developed into an environment and investigations into the training of specialists in e-learning, e-science, e-democracy and the implementation of e-management approach at the university environment (Raho, Al-Ani, & Al-Heeti, 2015) are being considered. On the other hand, the results of the survey obtained by the Ministry of Digital Transformation of Ukraine (Ministry and the Committee for Digital Transformation of Ukraine, 2019) show that 37.9% of Ukrainians aged 18–70 have digital skills below average, another 15.1%, in general, do not own digital devices. Thus, 53% of the population of Ukraine according to the methodology of digital skills assessment used by the European Commission is below the “average level”. At the same time, insufficient attention is paid to the training of specialists who can effectively manage the e-learning process in the educational field to ensure the quality of education in educational institutions and the corporate sector. The importance of the task of training specialists who will be able to:

- analyze the market offerings of available information systems and technologies for the construction and development of IT infrastructure and information-educational e-environment;
- test, implement and evaluate IT technologies for the e-learning system;
- choose the forms and digital tools for presenting educational e-content;
- develop instructions for the use of digital tools and e-content;
- organize the educational process using the information-educational e-environment, which includes LMS, and evaluate its effectiveness;

- monitor the use and satisfaction of participants in the educational process with components of the information and educational e-environment;
- manage the educational process using the resources of information and educational e-environment to provide quality educational services 24 * 6 * 365, etc.

The solution to the problem of training relevant specialists in the development and implementation of a special master's program, and the organization for applicants for effective information in the educational environment with the formation of the necessary competencies of e-learning design, its methodological support and support in the current technological state is utmost urgency.

The article aims to theoretically substantiate and analyze the creation and use of electronic information and the educational environment in the preparation of the MA program, "Management of e-learning in intercultural space" at the Borys Grinchenko Kyiv University based on the model and survey results.

BACKGROUND OF RESEARCH

An analysis of the recent research and publications shows that scientists have been working in the field of distance learning for many years. In particular, the research of experts is devoted to the theoretical concepts of distance learning, an analysis of the features of the use of different LMS and forms of presentation and delivery to students of didactic teaching materials (Kukhareno, Rybalko, & Syrotenko, 2002; Smyrnova-Trybulska, 2018; Spirin & Naumuk, 2020), among others.

The interesting conclusion concerning teaching successful online courses in higher education based on a review of the literature using Cooper's framework was developed by Kebritchi, Lipschuetz, & Santiago (2017). They concluded that „to address these challenges in online education, higher education institutions need to provide professional development for instructors, trainings for learners, and technical support for content development.” (Kebritchi et al., 2017).

Many scientists have studied the concept of the "information and educational environment". It is interpreted differently in modern pedagogical science. This demonstrates the semantic capacity of the essence of this term and the alternative views of researchers. Scientists believe that the information and educational environment is:

- a set of different subsystems: informational, technical and educational-methodical, the implementation of which provides support for the educational process and its participants (Tsymbal-Slatvinska, 2019).
- a system capable of self-development created by the subjects of education, in which connections and relations are established between the subjects and components based on information activities to achieve educational tasks (Kopnyak, Korytska, Litvinova, & Nosenko, 2015);
- organizational and methodological tools, a set of technical and software means of storage, processing, the transmission of information that provide operational access to information and the implementation of educational scientific communications (Gurevich, 2013).

Also in the scientific literature, there is the concept of the *electronic educational environment* (EEE). The order of the Ministry of Education and Science states that,

“The Electronic educational environment is a set of conditions for [the] teaching, education and development of students, provided by modern educational, information and communication (digital) technologies”. (Ministry of Education and Science of Ukraine, 2020). Many universities already have a legal framework for creating and organizing such environments. In particular, NUBIB of Ukraine defines the EEE as a systemically organized set of information, technical, educational and methodological support in the form of technical and software means of the accumulation, storage, processing and transmission of information that provides operational access to educational resources and provides educational or scientific communications between university administration, research and teaching staff, students and listeners (Kvasha, Zazymko, Klich, & Trakai, 2016).

Also, the information and educational environment is developing in BGKU and accordance with the Concept of digitalization for 2020–2022, a Digital Campus is created, where all participants in the educational process have constant access to information, and digital technology solutions are so intertwined with basic management and educational processes, that employees and applicants for higher education can no longer do without the services provided in *the information and educational environment* (IEE). The information and educational environment is, in essence, an adaptive model of global, national, information spaces, which inherits their most characteristic functional properties, in particular the space of joint learning activities based on digital tools in the communicative aspect, joint actions by establishing appropriate rules and regulations documents – in the integration aspect (Buynytska, 2019).

Distance learning in Ukraine has been implemented for about twenty years, starting with the introduction of public policy in 2000 in this direction, which is specified in the Concept of Distance Education, continuing with the adoption of other legislation, such as the “Regulations on Distance Learning” in 2015. There is a discussion of its updated version and the recognition of distance learning in the new version of the law “On Higher Education” in 2019. However, distance learning became most relevant during the pandemic. Distance learning means an individualized process of acquiring the knowledge, skills, abilities and methods of human cognitive activity, which occurs mainly through the indirect interaction of distant participants in the educational process in an open environment, which operates based on modern psychological, pedagogical and information and communication technologies. (Regulations on Distance Learning, 2015).

Today, along with the concept of distance learning, e-learning is used. In our study, we will follow an approach to the definition of e-learning, such as the use of digital tools to ensure the quality of the educational process by improving access to learning resources and tools, as well as electronic communication and collaboration.

The learning format is divided into traditional (f2f – face to face), hybrid (or mixed) and distance (online). If the area of traditional didactics is a low level of the use of technological tools in teaching and learning, learning in this format is traditional – mainly in f2f format, the e-learning area goes beyond the traditional boundaries of learning in the direction of the virtual space with digital tools, interactive multimedia tools and control systems for distance learning.

With the introduction of distance and e-learning, there is a need to have professionals who have the skills to effectively implement this form of education in educational institutions to ensure its quality. Foreign research shows that the issue of determining the competencies of such specialists has been considered by scientists and educators for a long time.

Most researchers in the field of e-learning implementation pay attention to preparing students for the use of digital technologies. For example, Keengwe & Kidd (2010) summarize e-learning best practices, identify how a teacher can help students develop skills in research, problem-solving, critical thinking, and knowledge management through web-based collaboration tools using virtual spaces, “knowledge rooms” in which students collaborate. Freeman, Patel, Ryan, & Scott (2013) on behalf of the Austrian Ministry of Education, Science and Culture present the results of a study on the content management system in the field of e-learning. To meet this requirement, the authors provide an overview of the market for manufacturers of individual systems and various evaluation procedures and selection criteria for e-content management systems.

However, researchers in the use of digital tools in the educational process outline the problem of training for the organization of e-learning, including in the corporate sector. In particular, Cardoso Vasile and Tiron-Tudor (2009) identified that one of the most important competencies that an e-learning manager should have is the ability to manage an e-learning project within the framework of the quality of the continuous activity. They estimate that poor knowledge-sharing practices cost Fortune 500 companies \$31.5 billion annually.

Keramida (2016) identifies six basic skills inherent in e-learning managers: a general understanding of how e-learning works; support in the current state of e-learning by industry trends and labour market requirements, leadership skills; communication skills, asset management and placement of electronic resources; time management skills, mastery of innovative teaching methods and technologies, design of the electronic educational environment. Leadership, communication, interpersonal, technical, presentation skills (soft skills) distinguishes them from project managers in e-learning and researches (Dhondi, 2014).

The training of e-learning managers in different countries is carried out in different ways. For example, the training of e-learning managers at the Holon Institute of Technology (Israel) is organized in the following main areas: Technology, databases and programming; Design, user interfaces, work with graphics and video; Psychology, work with people, presentation and presentation of information materials.

When training a manager (England), attention is paid to the following functions: E-learning organizer, responsible for creating an e-learning strategy and managing individual projects; Strategist; Learning analyst; Project manager; Marketeer; Developer responsible for developing e-learning programs and structuring content; Instructional designer; Writer; Graphic designer; Programmer; Audio-visual specialist; Tester; E-tutor or mentor (tutor), responsible for counselling in the process of training online students; Administrator; Coach; Subject-matter expert; Expert (Assessor).

The most popular skills for working as an e-learning manager in the US are (E-Learning Specialist Salary, 2015):

- creation and maintenance of a database for the analysis of participants' learning outcomes, their feedback and resolution of technical issues;
- coordination and support of proposals for e-learning, marketing and technical infrastructure;
- developing new online courses and converting existing courses into an e-learning format, from curriculum analysis to final assessment;
- recommendation and search for special computer programs and network services, content creation and interactive media.

Standards of new professions and specialities that complement each other and in the integration of competencies can also be considered as competencies of the e-learning manager (Poland):

- Methodist of distance learning (235103).
- Designer of multimedia applications, animations and computer games (251302).
- Examiner online (235902).
- Multimedia educator (235901).
- Distance learning teacher. (235907) (Classification of occupations and specialities for the needs of the labor market, 2014).

In Ukraine, an analysis of vacancies, company websites, employee profiles on LinkedIn demonstrate the renewal of professions in the field of e-learning management and identify the following professions: producer of educational projects, pedagogical designer, designer of educational experience, curriculum management specialist, UX/UI designer, manager Product Manager, Community Development Manager, User Experience Researcher, Developer, Evaluation Manager, Creative Director, Learning Data Analyst, Tutor, Facilitator, Digital Resource Librarian, Content Strategist, Game Developer, Insight Manager, Multimedia Designer, Specialist in learning science, personalization manager, career consultant, course localization manager, content curator, expert, author, developer of educational solutions, screenwriter, psychometrician.

An analysis of international and domestic experience is the basis for determining the features of the training of e-learning managers in educational institutions, which (Morze, Kuzminska, & Glazunova, 2017):

- is based on global approaches to the training of specialists in the field of e-learning, provides for the delivery of relevant documents to graduates (taking into account the experience of training these specialists in different countries, including Israel, England, USA, Estonia);
- involves the study of modern Internet services, ways to manage the educational process based on them, the organization of formal, non-formal and informal learning based on modern digital technologies, the introduction of pair, collective project activities;
- based on competency principles;
- ensures the introduction of the basics of adaptive learning, which are close to the real «production» process.

To train such specialists, it is necessary to create special electronic information and an educational environment that would meet certain requirements. To develop

a model of such an environment for future e-learning managers, existing e-learning models were analyzed. In particular, Anderson's Online Learning Model (Anderson, 2004), and Picciano's Blending with Pedagogical Purpose Model (Picciano, 2017). The peculiarity of these models is that the educational environment in addition to the educational digital content (LMS, CMS, Media) should provide tools for cooperation, the content of which is formed by the subjects of educational activities, independent learning, dialogue, surveys, analysis, evaluation, social and emotional, reflection and reasoning (Picciano, 2017). And all these components must be taken into account when creating an electronic environment. The author believes that teachers' work in distance learning and even using means of electronic interaction cannot be separated from communication. These two aspects are closely interconnected and interdependent. In this way, communication and collaboration are connected in the same way. Bates more broadly describes the educational process in the period of digitization. Specifically, he considers learning as part of the culture and identifies the components of the relevant environment: learning characteristics, content, skills, learning support, resources and assessments (Bates, 2015).

1. RESEARCH METHODS

Investigate the creation and use of an effective information and educational environment in the training of e-learning managers (analysis and synthesis of Ukrainian and foreign scientific, pedagogical and methodological sources on the article's topic) and empirical (survey of students, modelling education and information environment) methods and analysis of the received data.

2. RESEARCH RESULTS

In 2017, the Borys Grinchenko Kyiv University of introduced an educational and professional program entitled, "Management of e-learning in the intercultural space", which was amended in 2020 and passed state accreditation.

The need for changes was identified after the introduction of the relevant State Standard (reference to the standard) and an analysis of the labour market of Ukraine and the definition of requirements for e-learning specialists, during consultations, including with heads of educational institutions and surveys of students and graduates of the speciality 073 Management (OPP Management of e-learning in the intercultural space of Borys Grinchenko Kyiv University) and the transition to distance learning of all educational institutions during the quarantine of 2020–2021.

The formation of professional competencies of specialists in e-learning management is based on a comprehensive approach, which includes: creating a favourable information and educational electronic environment and support system for educational communication, improving the content of education and research, and infrastructure of higher education. To use the appropriate electronic environment and its development, its structure was determined (Figure 1).

Additionally, we have determined that the organizational component includes: approval and accreditation of the educational program, its updating according to the the

needs of the market and the state standard; content component – filling with modern content, organization of cooperation, communication and selection of innovative pedagogical technologies, technological component – definition of the use of the best platforms necessary for the best outcomes in the educational process, and the definition of modern digital technologies for their application.

Organizational component	Content component	Technological component
<ul style="list-style-type: none"> • Organizational structures • Corporate standards 	<ul style="list-style-type: none"> • Training resources • Scientific resources • Methodical resources • Controlling resources • Reference resources 	<ul style="list-style-type: none"> • IT infrastructure • Centralized services • Decentralized services

Figure 1. The structure of the information and educational electronic environment

Source: Morze, Protsenko, & Kuzminska, 2017.

When designing the model of the organization of information and educational environment for applicants, we took into account the main areas of acquisition of competencies and deepening and expanding knowledge in the areas – management and administration, digital technology and electronic didactics (Figure 2).

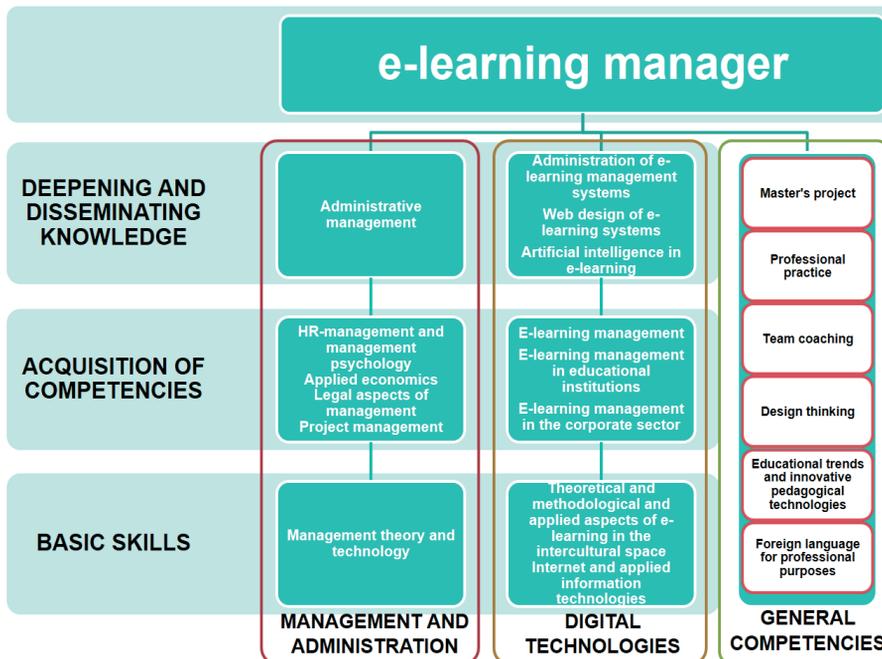


Figure 2. The main components of the educational program

Source: Own work.

In the course of the research, a model of the organization of information-educational electronic environment for applicants of the educational program was developed, which takes into account its peculiarities (Figure 3).

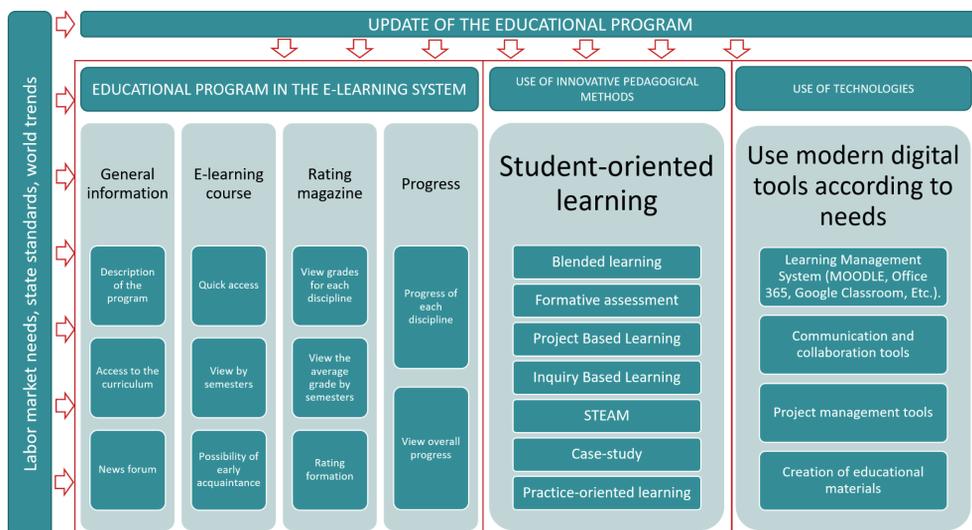


Figure 3. A model of the organization of informational and educational electronic environment for applicants of professional program

Source: Own work.

The University has been implementing e-learning in the educational process for over 10 years (www.kubg.edu.ua), respectively, the prerequisites for the training of e-learning managers and the introduction of a certain model of the e-learning environment. In particular, all students have personalized access to e-learning resources, for all subjects created in the learning management system (LMS Moodle) e-learning courses that meet the approved uniform requirements, registration for an e-learning courses is carried out following the educational program.

The course of the educational program contains its general description, references to normative documents, all *electronic learning courses* (ELC) of disciplines (during the semester) provided by the educational institution (Figure 4), configured journal of assessments (Figure 5) in which it is possible to track the assessments of each student throughout the semester. This course is displayed in the Personal Account of the applicant of the e-learning system.

In each ELC to monitor their activities, students have access to such elements as a journal of assessments, information about the submission of works, the presence of users in the ELC, announcements (news), as well as information about upcoming events. Thus, the built structure of the electronic environment allows not only e-learning but also a platform of distance learning for students.

The effectiveness the implementation of blended learning, the quality of the created electronic environment depends on the quality of the training materials, which, at present allows access from anywhere and at any time.

According to a survey of students of Borys Grinchenko Kyiv University (<https://forms.gle/nZsjMt6wEmvrSVk8>), which was attended by 119 students of 4 different directions of study (eg masters, in which the qualification according to the diploma is «E-learning Manager» and students with the selective specialization «Management of e-learning» at the Faculty of Information Technology and Management and at the Pedagogical Institute), respondents use the following resources for learning: e-learning courses, massive open online courses, personalized educational materials, video channels, mobile applications, social networks, search engines, audiobooks, ebooks (Figure 7). The survey was conducted in 2020.

So, we see that students prefer structured online resources. An effective solution is to use e-learning and distance education technologies; the creation of e-learning courses and other types of e-learning content; standardization in the development of electronic content and e-learning environments and the global transition from LMS to TMS (Training Management System) (Morze, Buinytska, & Varchenko-Trotsenko, 2016). Students who participated in the survey identified the following benefits of e-learning (Figure 4):

- the opportunity to choose a convenient time to study;
- the ability to perform tasks online;
- the ability to perform tasks in parts;
- possibility to return to the passed material;
- availability of materials of different formats.

What digital learning instruments do you prefer?

119 answers

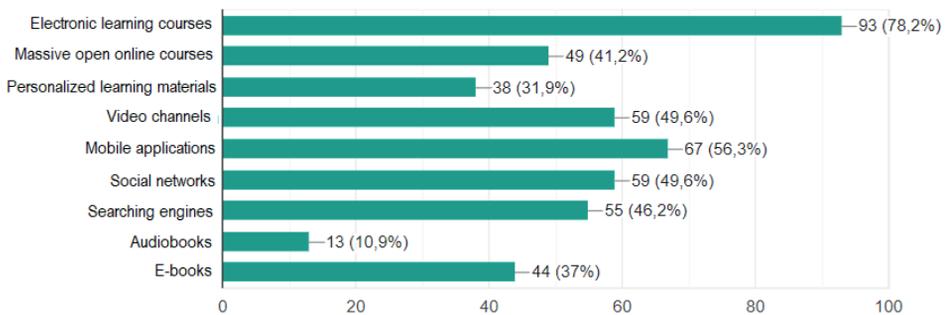


Figure 4. Distribution of respondents' answers to the question, 'What digital learning instruments do you prefer?'

Source: Own Work.

Therefore, the introduction of e-learning courses helps to personalize the educational process. However, unified ELCs do not fully address the students' requests for an individualized learning approach. In particular, respondents to the survey noted among the main disadvantages of the ELCs are the limited training periods and the lack of consideration of individual training features in the selection of materials. Some of the respondents also noted that they lacked personalization in the educational process and noted the uniformity of tests among the negative factors (Figure 6).

At Borys Grinchenko Kyiv University e-learning system is used. Please mark advantages of using e-learning courses:

119 answers

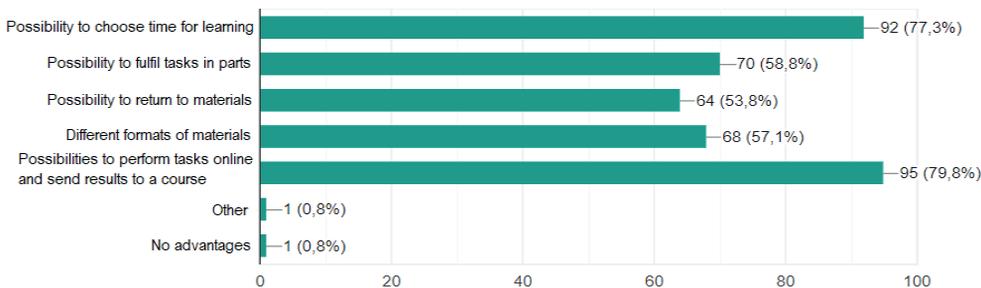


Figure 5. Distribution of respondents' answers to the question concerning the Advantages of e-learning courses

Source: Own Survey.

Mark disadvantages in utilization of e-learning courses:

119 answers

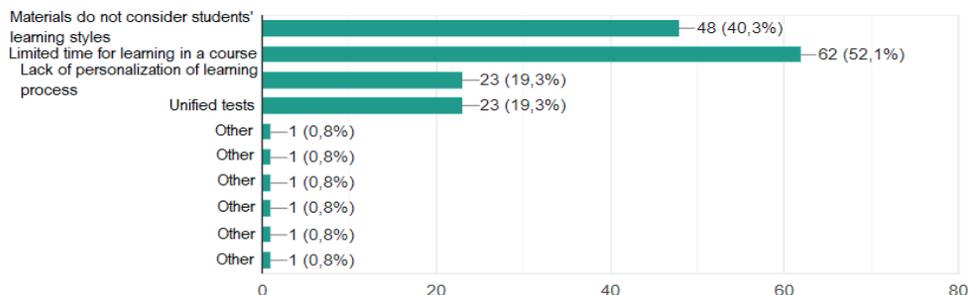


Figure 6. Distribution of respondents' answers concerning the disadvantages in the utilization of e-learning courses

Source: Own Survey.

E-learning developers are challenged to take into account the needs of users to ensure better learning outcomes. The main challenges of the survey are to ensure the diversity of presentation formats, the choice of training periods, the complexity of the tasks and tests, the level of complexity of the course and the sequence of study of the material. Implementing adaptive learning can ensure that these needs are met (Figure 7). During the educational process, teachers and practitioners use innovative pedagogical methods for the use of ELC:

Blended Learning involves a combination of different forms and methods, actively using the “inverted classroom” from which teachers provide students with new material in the form of video lectures or other digital learning developments, which students review in advance. The classes themselves are “turned over” with the help of digital media materials; usual activities in the classroom and outside of it changes places, i.e., there is a transformation of the classroom and the independent phases of learning – learning the material takes place outside the classroom, and the checking

of the understanding of the material – together with teachers, where they answer questions raised by applicants during video lectures.

Mark what can improve quality of e-learning courses:

119 answers

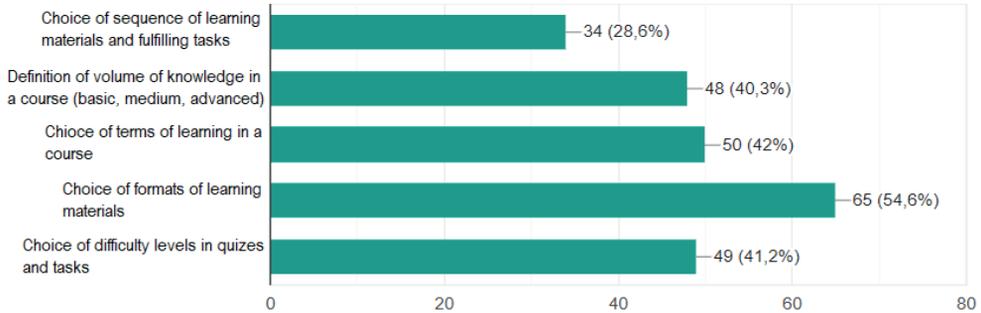


Figure 7. Distribution of respondents' answers concerning the question of improving the quality of e-learning courses

Source: Own Survey.

Formative assessment involves tracking the personal development of applicants and the course of their learning experience and competencies; furthermore, they can independently monitor their progress and realize what points should be emphasized. Project-Based Learning is based on the use of real problems that need to be solved. Working in teams with peers, applicants identify the steps that are needed to solve problems and then implement these steps.

Inquiry-Based Learning is based on increasing the involvement of applicants through active independent work to find answers to theoretical and practical questions.

STEAM provides for the integration of learning content and the use of various forms of activities, researching to test the hypotheses through the use of the equipment and virtual laboratories. The conduct of STEAM classes in the organization of project activities of applicants uses group work, where each group must work at the same time on different parts of the project – to conduct an experiment, hypothesize, discuss problems, search for information and more.

A case-study involves the study of simulated situations and real examples of the introduction of electrical training (cases); collection and analysis of insufficient information; discussion of possible solutions to problems; and, determining the best solutions. In general, in all disciplines, training is practice-oriented to ensure that applicants acquire effective skills.

The formation of the masters program contains not only certain competencies but also personal characteristics and skills of interpersonal interaction (soft skills), which is based on the embedded model (Sustainable Employability Skills for Engineering Professionals...). Training according to this model does not require the introduction of additional courses – soft skills are formed in the process of discussions, brainstorming, teamwork, role-playing games, educational and social projects, field trips and internships in schools and more.

DISCUSSION

This study is in line with the current trends and directions of research in the field of the e-environment and its quality evaluation.

The experts from different countries discovered an e-learning educational environment. In particular, a new instrument for assessing e-students' perception of the educational environment and e-learning educational atmosphere measure (EEAM) was researched by Mousavia, Mohammadia, Mojtahedzadeha, Shirazib, & Rashidic. In their study, they stressed that „Assessing [the] educational atmosphere in e-learning settings by EEAM could provide managers and investors with useful information to settle an effective education system by prioritising the necessary changes.” (Mousavia et al., 2020). The tool, which was elaborated by researchers and presented in this study could use future research in various e-environments in different universities and countries. A research report on some aspects of increasing the effectiveness and comfort of the scientific and educational process in university electronic environment was described in a study by Smyrnova-Trybulska (2016).

Other experts conducted a review of „all the instruments to propose a new framework conceptualizing technology-supported learning environments (TSLEs) for future instructional designs, and research on learning environments” (Chang et al., 2015). Described “studies took more into consideration the technical, cognitive and social dimensions... The results provide insights into an overview of the instruments used for TSLEs, implications for the instructional design of TSLEs, and trends in the current and future research on perceptions of TSLEs” (Chang et al., 2015).

CONCLUSIONS AND FURTHER RESEARCH PERSPECTIVES

The outlined problem of training relevant specialists for the organization of e-learning is solved by the stages described in the article on the development and implementation of a special master's program, as well as the organization of an effective informational and educational environment for entrants to form the necessary e-learning design competencies. Based on the competencies defined in the e-learning manager training model, a model of the organization of information-educational electronic environment for educational program seekers was created, which includes not only an educational-professional program with a list of basic and optional components, but also innovative pedagogical technologies and resources. During the research, a set of theoretical (analysis and synthesis of scientific, pedagogical and methodological sources on the topic) and empirical (student surveys, modeling of educational and information environment) methods and analysis of the data were performed. The created model was tested and a study of its effectiveness was conducted by surveying students on the quality of education. The results of the survey will be used not only to analyze the educational process but also to improve and modernize the educational program. In particular, taking into account the needs of students allowed for the creation of an information and educational electronic environment, which includes e-courses on the LMS MOODLE platform, corporate accounts in Microsoft and Google clouds, access to tools and services, including services for independent

and individual work, educational communication, the creation of electronic didactic materials, the control and diagnostics of students' academic achievements, tools for organizing independent research activities, joint applications and virtual classes. We see the prospects for further research in a detailed analysis of students' needs for the use of mobile applications, research on the features of the introduction of adaptive systems and taking into account the individual characteristics of students in the implementation of distance learning.

REFERENCES

- Bates, A.W. (Tony) (2015). *Teaching in a Digital Age. Guidelines for designing teaching and learning*. Vancouver BC: Tony Bates Associates LTD. ISBN 978-0-9952692-0-0, ISBN for the pdf version is 978-0-9952692-1-7 ISBN for the epub version it is 978-0-9952692-3-1. Retrieved from <https://opentextbc.ca/teachinginadigitalage/>.
- Buynytska, O.P. (2019). Structural-Functional Model of the University Information and Educational Environment. *Information Technologies and Learning Tools*, 69(1), 268–278. <https://doi.org/10.33407/itlt.v69i1.2313>.
- Cardos, V.D. & Tiron-Tudor, A. (2009). Managerial Skills Of An E-Learning Manager. *Annals of Faculty of Economics*, 4(1), 135–140, Retrieved from <http://EconPapers.repec.org/RePEc:ora:journl:v:4:y:2009:i:1:p:135-140>.
- Chang, H.-Y., Wang, C.-Y., Lee, M.-H., Wu, H.-K., Liang, J.-C., Lee, S.W.-Y., Chiou, G.-L., (...), & Tsai, C.-C. (2015). A review of features of technology-supported learning environments based on participants' perceptions *Computers in Human Behavior*, 53, 223–237. <https://doi.org/10.1016/j.chb.2015.06.042>.
- Classification of occupations and specialties for the needs of the labor market*, 2014, Warszawa, Ministry of Labor and Social Policy 2014. ISBN 978-8364309-49-6. <https://psz.praca.gov.pl/documents/10240/54723/Klasyfikacja%20zawod%C3%B3w%20i%20specjalno%C5%9Bci%20na%20potrzeby%20ryнку%20pracy%20-%202014.pdf/bca1e08c-6a33-494a-a75b-e2d7258ce796?t=1421667227000>.
- Dhondi, P. (2014). Skills of a Successful E-learning Project Manager. Retrieved from <http://blog.commlabindia.com/elearning-design/skills-of-elearning-project-manager>.
- Digital literacy of the population of Ukraine (2019). The Ministry and the Committee for Digital Transformation of Ukraine, 111 p. Retrieved from <https://thedigital.gov.ua/> (accessed on 19.12.2019).
- E-Learning Specialist Salary (2015). Retrieved from <https://www.salary.com/research/salary/posting/e-learning-specialist-salary>.
- Freeman, H., Patel, D., Ryan, D., & Scott, B. (2013). *The Virtual University: The Internet and Resource-based Learning*. Routledge, 218 p. ISBN 9780749425081.
- Gurevich, R. (2013). Innovative educational technology in the preparation of masters. *Theory and practice of social systems management: philosophy, psychology, pedagogy, sociology*. Kharkiv: NTU “KhPI”, 2, 100–105. Retrieved from http://nbuv.gov.ua/UJRN/Tipuss_2013_2_14 [in Ukraine].
- Hrynevych, L., Ilyich, L., Morze, N., Proshkin, V., Shemelynets, I., Linyov, K., & Riy, G. (2020). Organization of the educational process in schools of Ukraine in

- quarantine conditions: analytical note. Kyiv: Borys Grinchenko Kyiv University UDK 37.07:005.303 O-37 [in Ukraine].
- Kanuka, H. (2004). Understanding e-Learning Technologies-in-Practice through Philosophies-in-Practice (pp. 91–120). In T. Anderson (Ed.). *Theory and practice of online learning* (2nd Edition). Edmonton Press. ISBN 978-1-897425-08-4.
- Kebritchi, M., Lipschuetz, A., & Santiago, L. (2017). Issues and challenges for teaching successful online courses in higher education: a literature review, *Journal of Educational Technology Systems*, 46(1), 4–29. <https://doi.org/10.1177/0047239516661713>.
- Keengwe, J. & Kidd, T. (2010). Towards Best Practices in Online Learning and Teaching in Higher Education. *MERLOT Journal of Online Learning and Teaching*, 6(2). Retrieved from https://jolt.merlot.org/vol6no2/keengwe_0610.htm.
- Keramida, M. (2016). Top 6 Skills An Outstanding eLearning Project Manager Should Have. Retrieved from <https://elearningindustry.com/top-6-skills-outstanding-elearning-project-manager>.
- Kopnyak, N., Korytska, G., Lytvynova, S., Nosenko, Y. et al. (2015). Modeling and integration of cloud-oriented learning environment services: Monograph. S.G. Litvinova (Ed.). Kyiv: Komprint [in Ukraine].
- Kuharenko, V.M., Rybalko, O.V., Syrotenko, N.G. (2002). Dystancijne naučannâ: Umovy zastosuvannia. Dystancijny kurs. Navč. posibnyk, za red. V.M. Kuharenka. Charkiv: NTU „HPI”, „Torsing”. ISBN 966-670-011-5 [in Ukraine].
- Kvasha, S.M., Zazimko, O.V., Klich, L.V., & Trakai, V.G. (2016). Regulations on the electronic educational environment of the National University of Life and Environmental Sciences of Ukraine, Retrieved from https://nubip.edu.ua/sites/default/files/u34/8698_Положення_електронне_освітнє_середовище_для_друку.pdf [in Ukraine].
- Morze, N., Buinytska, O., Kuzminska, O., Glazunova, O., Protsenko, G., & Vorotnykova, I. (2017). E-learning Managers Training at Universities: Projection, Design and Efficiency Indicators. In V. Ermolayev, N. Bassiliades, H.-G. Fill, V. Yakovyna, H.C. Mayr, V. Kharchenko, V. Peschanenko, M. Shyshkina, M. Nikitchenko, A. Spivakovsky (Eds.). *ICT in Education, Research and Industrial Applications: Integration, Harmonization and Knowledge Transfer* (pp. 229–244). Proceedings of the 13th International Conference ICTERI 2017. Kyiv, Ukraine, May 15–18, 2017. ISSN 1613-0073.
- Morze, N., Balyk, N., & Smyrnova-Trybulska, E. (2014). Analysis of foreign and domestic training programs for e-learning managers *Edukacja Humanistyczna*, 2(31), 123–138. ISSN 1507-4943 [in Russian].
- Morze, N., Buinytska, O., & Varchenko-Trotsenko, L. (2016). Creation of a modern electronic training course in MOODLE: Tutorial. Kamenets-Podilsky: Private entrepreneur O.A. Buinitsky. ISBN 978-617-608-064-0 [in Ukrainian].
- Morze, N., Glazunova, O., & Kuzminska, O. (2017). Training of e-learning managers: competency approach. *Information Technologies and Learning Tools*, 60(4), 220–238. <https://doi.org/10.33407/itlt.v60i4.1761> [in Ukrainian].
- Morze, N., Smyrnova-Trybulska, E., & Glazunova, O. (2017). Design of a University Learning Environment for SMART Education. In *Smart Technology Applications in Business Environments*. IGI Global. ISBN13 9781522524922, ISBN10 1522524924,

- EISBN13 9781522524939. Chapter 11. <https://doi.org/10.4018/978-1-5225-2492-2.ch011> (pp. 221–248).
- Mousavia, A., Mohammadia, A., Mojtahedzadeha, R., Shirazib, M., & Rashidic, H. (2020). E-learning educational atmosphere measure (EEAM): a new instrument for assessing e-students' perception of educational environment *Research in Learning Technology*, 28, 2308. <https://doi.org/10.25304/rlt.v28.2308>.
- Oxford e-Research Centre <http://www.oerc.ox.ac.uk/>.
- Pelletier, K., Brown, M., Brooks, D.C., McCormack, M., Reeves, J., Arbin, N., Bozkurt, A., Crawford, S., Czerniewicz, L., Gibson, R., Linder, K., Mason, J., & Mondelli, V. (2021). EDUCAUSE 2021 Horizon Report Teaching and Learning Edition. Boulder, CO: EDU. Retrieved August 22, 2021. <https://www.learntechlib.org/p/219489/>.
- Picciano, A.G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning*, 21(3), 166–190. <https://doi.org/10.24059/olj.v21i3.1225>.
- Raho, G.I., Al-Ani, M.S., & Al-Heeti, K.M.A. (2015). E-University Environment Based on E-management. *International Journal of Computational Engineering Research*, 5(4), 1–6. ISSN 2250-3005.
- Regulations on Distance Learning (2015). Retrieved from <https://zakon.rada.gov.ua/laws/show/z0703-13#Text>.
- Smyrnova-Trybulska, E. (2016). Some Aspects of Increasing the Effectiveness and Comfort of the Scientific and Educational Process in University Electronic Environment – A Research Report. *The New Educational Review*, 45, 259–270. <https://doi.org/10.15804/tner.2016.45.3.21>.
- Smyrnova-Trybulska, E. (2018). Technologie informacyjno-komunikacyjne i e-learning we współczesnej edukacji [Information and communication technologies and e-learning in contemporary education]. Katowice: Wydawnictwo Uniwersytetu Śląskiego [University of Silesia Press], 572 s. ISBN 978-83-226-3070-9.
- Spirin, O.M. & Naumuk, I., (2020). Adaptive learning based on LMS Moodle: problem statement. *Information technologies in education, science and technology: theses*. V International. scientific-practical Conference (Cherkasy, May 21–23, 2020) (pp. 179–180). Cherkasy State Technological University, Cherkasy. ISBN 978-966-9730-55-8 [in Ukraine].
- Spivakovsky, O.V., Vinnyk, M.O., & Tarasich, Yu. G. (2014). Construction of ICT of university infrastructure: problems and ways of solution. *Information technologies and teaching aids*, 1(39), 99–116. <https://doi.org/10.33407/itlt.v39i1.996>.
- Sustainable Employability Skills for Engineering Professionals, Sustainable Employability Skills for Engineering Professionals Retrieved from <https://pdfs.semanticscholar.org/9cb6/e933fef43504a7eee78e3bafb82da6e33d53.pdf>.
- The Law „On Higher Education” (2019). Retrieved from <https://zakon.rada.gov.ua/laws/show/1556-18#Text>.
- Tsymbal-Slatvinskaya, S. (2019). Designing the information and educational environment of a higher education institution *Pedagogical magazine of Volyn*, 3(14), 64–72. <https://doi.org/10.29038/2415-8143-2019-03-64-72> [in Ukraine].