

Digital Educational Environment as a Tool for Continuing Professional Development of the University's Academic Personnel

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ABSTRACT

The digitalisation of the economy required the training of specialists with competencies to develop and implement digital technologies. The purpose of the study is to characterise the digital educational environment as a tool for improving the university's academic personnel's skills. The study's methodological basis was the digital approach, which provides digital content as an objective condition for personal and continuing professional development in the digital economy. The study's main results are to identify and scientifically substantiate the structural components of the digital educational environment (content, technology, administrative), criteria for evaluating its effectiveness (pedagogical, subject, innovative). The content component provides for the focus of content on the development of competencies. Technology component includes software that allows you to organise continuing professional development using distance learning technologies. The administrative component provides for the possibility of offline training. Criteria (pedagogical, professional, innovative) allow us to assess the digital educational environment's effectiveness in developing pedagogical culture, professional competencies, and abilities to innovations. The research limitations are in a random sample of respondents. Practical significance is the experience of organising professional development with the use of a digital educational environment. The research's uniqueness substantiates the digital educational environment as a multidimensional and multifunctional reality characterised by continuity, processability, and openness for the effective tasks' solution.

Keywords: *Digital approach, Digital educational environment, Digital educational resources, Continuing professional development of academic personnel, Offline training, Ability to innovations.*

1. INTRODUCTION

The university's academic personnel's professional activity is aimed at training future specialists who possess the skills of the 21st century and are ready for education throughout their lives. To fulfil these tasks, academic personnel should be in the trend: to be aware of the socio-economic role of the university in the process of digitalisation of society, to be able to establish interdisciplinary connections and develop subject-subject relationships with students, to master the mechanisms of

intellectualisation of the educational process [1,2]. A modern tool for improving the skills of academic personnel is a digital educational environment.

In the context of the 2020 pandemic, the problem of improving the skills of academic personnel of the university with the help of a digital educational environment has become particularly relevant [3]. Scientific discussions' subjects are digital technologies in teaching and research [4,5,6]; intellectualisation of professional and pedagogical activity in the digital

educational environment [7,8]. In a study by Liu et al. noted: An important feature of the digital universe is the peer-to-peer information sources from the point of view of the receiver, who, based on his experience and world model, builds a ranking of these sources. Thus, there is a need to create a learning environment where participants of different social, religious, ethnic groups have the opportunity to interact with each other for common goals and for the common good [9, p.35].

The digitalisation of the economy required the training of specialists with competencies to develop and implement digital technologies. In a study by Pugacheva et al. it is emphasised that the development of digital education management tools has been updated: the creation of educational programs that can provide digital literacy; the development of cloud educational systems and open educational resources based on digital content; the adaptation of virtual reality technologies to the educational process; the introduction of electronic portfolios and personal electronic cabinets [10, p.98]. A similar point of view is expressed in the article Rea & Yeates: graduates increasingly need to understand the collaborative, technology-driven practices inspired by open-source software development that are fundamentally changing today's workplace. To meet this challenge, instructors must bring open source principles and technologies to active learning experiences [11, p. 1]. The result of a study by Zabolotniaia et al. is the model of the organisation of the university's digital educational environment on the Moodle LMS (Learning Management System) platform has become [12]. In a study by Zabolotniaia et al. is noted that Moodle LMS is a tool for ensuring the university's innovation policy within the framework of the digital transformation of the social space [12, p.172].

The conclusions made by the listed authors allow us to identify general and national trends in the process of continuing professional development using the digital educational environment. General trends include identifying methods for improving digital literacy, creating digital learning models, and designing and implementing a technology integration mechanism [13,14]. National trends include clarifying the features of adaptation of automated education management systems, creating learning models in a digital environment, and developing a mechanism for implementing a computer communications portal [15]. Studying the experience of organising a digital educational environment as a tool for improving the university's academic personnel's skills allows you to avoid risks in practice and determine scientific research prospects.

The purpose of the study is to characterise the digital educational environment as a tool for improving the university's academic personnel's skills.

2. RESEARCH METHODOLOGY

The study's methodological basis was the digital approach, which provides digital content as an objective condition for personal and continuing professional development in the digital economy [16]. The digital approach's main concepts are the digitalisation of education, digital educational resources, digital educational environment, and e-learning. The essence and content of these concepts is the subject of academic research. The criteria for evaluating academic research include the digital approach to the formation of competencies of the 21st century, the creation of digital educational resources, and the introduction of an adaptive learning system. These criteria determine the practical significance of the research. As a value, the digital approach promotes digital didactics, digital competencies, digital learning tools, student learning independence, distance learning, and autonomous learning. Based on these values, the scientific novelty of the research is determined. The digital approach's conceptual ideas determined our research subject: the digital educational environment as a tool for improving the university's academic personnel's skills.

Theoretical (analysis, generalisation, systematisation) and empirical (observation, surveys) methods were used in the study. The experimental work involved 450 teachers of the technical university, who are studying under the advanced training programs "Modern approaches to the design of educational programs based on professional standards", "Application of information and communication technologies in the educational process and scientific research", "Intellectualisation of professional and pedagogical activities in the digital educational environment". A random sample of teachers was compiled. The sample included 240 professors (average age 56 years) and 210 associate professors (average age 41 years). None of the teachers refused to participate in the experimental work.

The experimental work on testing the digital educational environment's effectiveness as a professional development tool was carried out in three stages (ascertaining, forming, control). At the ascertaining stage, teachers' attitude to the digital educational environment was clarified by the survey, and the criteria for its effectiveness were determined. The questionnaire includes two closed questions with several answer options (refer to table 1).

The survey showed that teachers have a positive attitude to the digital educational environment. The results of the survey were discussed in 3 focus groups. All focus groups consisted of 5 people. Based on the results of the discussion, the participants of the focus groups: (1) found out the criteria (pedagogical, subject, innovative) for evaluating the effectiveness of the digital educational environment as a tool for professional

Table 1. Results of a survey of teachers about their attitude to the digital educational environment at the ascertaining stage of experimental work (%)

Content of the question	Answer options	%
1. Why is a digital educational environment needed?	1.1. For the formation of competencies of the 21st century	91
	1.2. To provide all with equal access to educational programs	96
	1.3. For the organisation of the educational process with the use of distance and e-learning technologies	98
2. What components can be in the structure of the digital educational environment?	2.1. Electronic Portfolio	97
	Electronic educational programs for offline training	96
	2.3. Digital educational complexes	97

development, and (2) developed a plan for organising the digital educational environment as a tool for improving the university's academic personnel's skills. At the formative stage, the plan was implemented. At the control stage, the digital educational environment's effectiveness as a professional development tool was evaluated.

3. RESULTS

The study's main results are to identify and scientifically substantiate the structural components (content, technological, administrative) of the digital educational environment as a tool for improving the skills of academic personnel, criteria for evaluating its effectiveness (pedagogical, subject, innovative).

The content, technological, and administrative components are identified in the structure of the digital educational environment.

The content component provides for the focus of the content on developing the competencies of academic personnel. The following competencies are highlighted:

- pedagogical, combining knowledge of didactics and methods of teaching the discipline; skills for the development of subject-subject relations with students; skills of the independent solution of pedagogical tasks; and such personal qualities as tolerance, exactingness, empathy;

- subject, including subject knowledge; skills to acquire new knowledge; skills to find new approaches to solving known problems; and such personal qualities as purposefulness, creativity, independence;

- innovative, involving knowledge of innovation; the ability to work in a highly competitive environment and adequately relate to innovations; critical thinking skills, teamwork; and personal qualities such as the desire for self-realisation, self-confidence.

In practice, the content component provides for the availability of special digital resources for targeted continuing professional development: software, information, technical and organisational support; electronic publications posted on the web; multimedia manuals; digitised photos, video clips; objects of immersive reality and interactive modelling.

The technological component includes software that allows you to organise continuing professional development using distance and electronic educational technologies. In practice, the technological component includes computing and communication equipment that allows the introduction of information and content systems for updating the content of education; automated management systems for operational collection, accounting, analysis of learning outcomes and systematisation of data; automation of planning and organisation of advanced training; computer support systems for digital equipment to provide Internet video communication, a local network of the university, unified e-mail service.

The administrative component provides for the possibility of offline training. In practice, the administrative component includes a platform for posting educational material; online proctoring for identifying the student's identity and monitoring learning outcomes.

The plan for the organisation of the digital educational environment as a tool for improving the university's academic personnel's skills included the following activities:

- as part of the content component, a professional and public examination of educational programs and special digital resources (electronic publications, multimedia manuals, objects of immersive reality and interactive modelling, presentations) was carried out; a multifunctional platform was created to consolidate the educational opportunities of all subjects of continuing

professional development, to unify the forms and methods of competence development;

- as part of the technological component, the Blackboard information and the content system was introduced to study educational programs, perform tasks and tests, participate in discussions, present engineering products; develop subject-subject interaction; promptly collect, record, analyse learning outcomes and systematise data; accumulate digital educational resources and provide remote access to them;

- as part of the administrative component, the ProctorEdu proctoring system is organised for online monitoring, logging, and evaluating user behaviour during significant online events.

Criteria (pedagogical, subject, innovative) and indicators for evaluating the digital educational environment's effectiveness as a professional development tool allow us to identify the results achieved with academic personnel competencies.

To assess the digital educational environment's effectiveness as a tool for professional development, teachers were asked to answer questions and complete tasks evaluated on a 5-point system (refer to table 2).

Table 2 shows that the digital educational environment's organisation as a tool for improving the academic personnel's skills has positive results.

4. DISCUSSIONS

The digital educational environment as a multidimensional and multifunctional reality is

characterised by continuity, processability, openness, manageability for the effective solution of tasks. The structural components of the digital educational environment are associated with national trends in continuing professional development: the introduction of information and content systems, their semantic optimisation for targeted continuing professional development (content component); modernisation of digital equipment, software, (technological component); the use of automated control systems, online proctoring (administrative component). General trends in continuing professional development determine the criteria for evaluating the effectiveness of the digital educational environment: the development of digital literacy (pedagogical criterion), the design and implementation of digital learning models (subject criterion), the ability to relate to innovations (innovation criterion) adequately. Continuing professional development can be considered as a purposeful system capable of self-organisation and self-management. The digital educational environment provides intellectualisation of continuing professional development, diversity and accessibility of educational material, and information interaction between the university's academic personnel.

5. CONCLUSION

Academic personnel's continuing professional development aims to develop a pedagogical culture to ensure sustainable positive results in students' education; improvement of professional competencies to ensure the effectiveness of research activities; formation of the ability to innovate to ensure personal competitiveness

Table 2. The results of the responses to the questions and assignments of teachers at the control stage of the experimental work (average score)

Criteria and indicators	the average score
Pedagogical criterion (P)	
1. Know the basic concepts of digital didactics and the methodology of teaching the discipline in the Blackboard system	4.6
2. They are able to organise subject-subject interaction in the digital educational environment	4.7
3. Have the skills to organise online proctoring	4.6
Subject criterion (S)	
4. Know industry digital platforms	4.9
5. They are able to carry out an information search for scientific knowledge	4.7
6. Possess the skills of searching for digital technologies to solve known problems	4.5
The innovation criterion (I)	
7. Know the basics of innovation	4.6
8. They can work in the Blackboard system and adequately relate to innovations	4.8
9. Have the skills to work in a team	4.9

and the introduction of relevant innovations. The digital educational environment as a multidimensional and multifunctional reality provides digital resources and technologies for improving academic personnel's skills and provides a digital transformation of education based on the mutual adaptation of pedagogical and digital technologies. The structure-forming components of the digital educational environment (content, technological, administrative) ensure the improvement of academic personnel's competencies following the digital economy's requirements, the development of digital literacy and the ability to innovate. Evaluation criteria (pedagogical, subject, innovative) of the digital educational environment's effectiveness allow us to make a comprehensive description of the results of continuing professional development and timely adjust its process.

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