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Formation of the University Teachers' Readiness for Organizing the Process Based on Using Digital Educational Environment Resources

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***Abstract* — The article actualizes the problems of forming the university teacher's readiness for organizing the educational process in a digital educational environment. The author considers this problem as a problem of forming the integrative quality of a university teacher, which combines the various readiness components. The article discusses the development of modern education. The author highlights the requirements of openness, accessibility, and compliance with innovative development trends. The article indicates the need to implement innovative and high-tech systems for teaching students at a university. The teacher must be prepared to organize such an educational process. The purpose of the study is to identify ways of forming the university teachers' readiness for organizing the educational process based on the use of digital educational resources. Research methods are a method of theoretical analysis, a method of isolating synthesis structures of model characteristics, methods for diagnosing psychological states, mathematical statistics methods. The article defines the components of the university teacher's readiness for organizing the educational process based on the resources of the digital educational environment. The essence of each component is disclosed. The ways and approaches of forming the university teacher's readiness for organizing the educational process based on the resources of the digital educational environment are identified; the results of experimental activity are presented.**

Keywords* — *university teachers; readiness; component; formation; digital educational environment; electronic educational resources; motivational readiness; expert and technological readiness.

I. INTRODUCTION

One of the requirements for the development of modern education is the requirement of its openness, accessibility and compliance with innovative development trends. Today, these principles are determined by the international interaction of universities and professional communities. For the educational system to be characterized by its readiness for these changes and to be able to ensure the successful solution of training problems, it is necessary to implement innovative and high-tech student learning systems. Such systems are modern information and communication and telecommunication technologies [1].

These systems form the modern university's digital educational environment. Education's digitalization makes the educational process accessible, open and innovative. This allows students to gain experience in self-organization and professional self-education in order to realize professional self-realization at the stage of training [2].

II. SETTING RESEARCH PURPOSE AND TASKS

A. Research purpose

A digital educational environment is a combination of effectively functioning information systems and communication networks integrated into it. Such a system necessarily contains information, communication and telecommunication tools, which ensures the effectiveness of solving many problems of the modern universities' educational process [3].

The relevance of this issue determined the purpose of the study. The purpose of the study was to identify ways of forming the university teachers' readiness for organizing the educational process based on the use of digital educational environment resources.

B. Research tasks

To achieve this purpose, the following tasks were formulated:

- to reveal the importance of creating a digital educational environment for modern education;

- to identify the prospects for the development of the educational process' organization based on the digital educational environment's resources;
- to reveal the teacher's new functions' essence in the process of organizing the educational process in the framework of the digital educational environment;
- to make an analysis of theoretical studies on the digitalization of domestic education and the university teacher's activities in these conditions;
- to identify the main components that must be considered when developing and using digital educational resources; reveal their essence;
- to study the main university teachers' difficulties in the framework of the educational process based on the use of digital educational resources;
- to identify the factors that determine the university teachers' readiness for organizing the educational process based on the use of digital educational resources;
- to identify ways of forming the university teachers' readiness for organizing the educational process based on the use of digital educational environment resources;
- to substantiate the forming ways' effectiveness the university teachers' readiness for organizing the educational process based on the use of digital educational environment resources.

III. MATERIALS AND METHODS

The use of various information systems in the university's digital educational environment makes it possible to create and implement convenient, effective and promising (in terms of the use of students and teachers) digital educational resources. This specificity of the modern digital educational space is due to the transformational dynamics and the need for continuous improvement of the educational environment in connection with the introduction of information and technological innovations. In turn, information and technological innovations are a condition for updating and developing didactic and methodological foundations of education's digitalization.

Today, the modern education's digitalization determines the following development trends:
- the transition from traditional forms and training's organization to innovative ones related to the development and implementation of digital educational resources in the educational process;
- the transition of most traditional education's forms to the independent students' work (for example, classroom instruction with electronic's elements, blended learning, MOOC, etc., which use special information technologies and digital educational resources);
- increased functions of the university teacher (new functions include moderator, tutor, mentor, guide, etc.).

The new functions of a university teacher must include the digital educational resources developer's functions, as well as the teacher's ability to realize these educational resources in the educational process. The successful implementation of this function is determined by the university teacher's readiness for organizing the educational process based on the use of digital educational resources.

A. The development of the problem and its discussion in the scientific literature

The relevance of this problem has a high level of significance today. The process of designing a digital educational environment is considered in the scientific studies of E. P. Krupoderova, E. K. Samerkhanova, K. McAndrew and others. The authors reveal the digitalization of education's prospects, substantiate the advantages based on the use of information and communication technologies in the university's educational process [4; 5; 6].

The problems associated with the digitalization of national education are revealed in the works of V. B. Betelin [7].

The problems of the digitalization process' resource and technological support are considered in the studies of T. Yu. Bystrova, R. Stein, T. V. Nikulina and others. The articles of these authors present the educational process designing's possibilities; indicate the growing market share of online learning in recent years. The authors also reveal the importance processes' digitalization for the formation of students' cognitive preferences [3; 8].

The role of educational and methodological educational process' support based on the use of digital educational environment resources and the formation on this basis of the teacher's professional competencies in the field of digital resource design is revealed in the scientific studies of A. V. Ponachugin, D. Keyek-Franssen, T. Yu. Bystrova and others [8; 9; 10].

All this necessitates the formation of the university teacher's readiness for organizing the educational process based on digital educational resources, as well as improving the professional competence of the university teacher in the development of these resources.

B. Identification of the problem's main aspects

The main components that must be considered when developing and using digital educational resources are:
- access of students to educational resources at anytime and anywhere; this requires the development of a teacher's readiness to be mobile, ready to communicate and accompany, using modern communication technologies. This is also ensured by the constant involvement of the teacher in supporting the students' independent work; on this basis, students can at any time have the teacher's educational support: ask a question, ask for help correcting errors, etc.;
- high quality software; this allows digital education to be open, integrative, multi-level and meet the individual educational needs of students. This concept determines the university teacher's readiness to manage knowledge; knowledge management consists in integrating the following components of pedagogical activity: value-motivational, interactive-communication, academic and entrepreneurial, evaluation-analytical, research, instrumental-digital. These activity's components determine the effectiveness of the teacher in accordance with the requirements of the digital educational environment [11];

- active assistance of the university teacher to the formation of electronic resources with access to libraries in various languages of the world. This suggests that in the context of the digital educational environment's development, international relations of educational institutions are increasing. This determines the development of interaction between universities, in which electronic resources are becoming necessary, having lexicographic support for students (native speakers and foreign citizens); this makes the learning process convenient, fast and efficient;
- the university teacher's ability to provide the educational process with training software. Electronic educational resources should allow the management of real objects, implement various virtual models, have integrative scientific content of an applied nature.

In addition, the development and management of digital educational resources in the educational process should be based on the process' flexibility and the teacher's ability to ensure this by improving their own professional mobility.

IV. RESEARCH RESULTS AND DISCUSSION

An analysis of the main forming's problem's aspects of a university teacher's readiness for organizing the educational process based on the use of digital educational environment resources showed (129 teachers from regional universities participated in the study). They

- have a psychological barrier (this barrier is associated with established values) that determines the teacher's involvement in the development of information and communication technologies that regulate the digital educational environment (32.6%);
- have difficulties in mastering the technology for the development of e-learning's educational and methodological support and its technological implementation (development of work programs in an electronic designer, development of test material for the Moodle platform, electronic literature designer, etc.) (47.29%);
- have difficulties in developing educational resources for the digital educational environment (53.49%);
- they find it difficult to use ready-made electronic educational resources (provide feedback with students, implement the testing process, etc.) (29.46%);
- have difficulties in developing electronic courses for students (55.04%).

Nevertheless, many university professors recognize the need to be prepared for digital educational environment's innovations and are characterized by their readiness to improve their own professional competencies, which provide the ability's teacher to organize the educational process based on the digital educational environment's resources (68.9%).

A theoretical analysis of the literature on the research topic showed that the following factors and components should be considered in the basis of the university teacher's readiness for organizing the educational process based on the use of digital educational environment resources:

- *motivation and value component (motivation factor)* that determines the beliefs and need of the university teacher to improve their own professional competencies, which affect the success of the teacher in digital innovation. This component is supported by the professional activity's motives, which determine the continuous self-education of the teacher, which corresponds to innovative trends in the development of modern education technology. This component determines the motivational readiness of the teacher;
- *cognitive process component (cognitive factor)*; within the framework of this component, the cognitive activity of the teacher is implemented, which ensures constant inclusion in the new synthetic knowledge necessary for the successful implementation of information and communication technologies in the educational process and the functioning of digital educational resources based on them. Free operation of acquired knowledge allows the teacher to develop the content of educational resources and own the technologies and teaching methods based on the use of digital educational resources. The component reflects the systemic level of the teacher's knowledge and the ability to effectively apply it in practice; this component determines the cognitive and methodological readiness of the teacher;
- *operational-technological component (activity factor)*; this component determines the presence of skills of the university teacher in the development technology, the use of electronic educational resources, as well as the ability to carry out effective professional activities in electronic content format. This component determines the technological readiness of the teacher;
- *evaluative-reflective component (self-esteem factor)*; the basis of this component was the university teachers' ability to self-evaluate their own activities in the development and use of electronic educational resources in the educational process. It also reflects the ability of the teacher to objectively evaluate his own contribution to the creation of a digital educational environment, his role in the use of electronic educational resources in the educational environment. This component implies an increase in the university teacher's professional experience, determines the readiness for the progressive development of this experience, as well as the teacher's ability to evaluate the effectiveness of educational resources and the effectiveness of their use in their professional activities. This component determines the university teacher's expert readiness for organizing the educational process based on the use of digital educational environment resources.

In the process of forming the university teacher's readiness for organizing the educational process based on the digital educational environment's resources, ways have been developed to improve the performance of each component.

Motivational readiness was provided by familiarizing university professors with target indicators, their content and appropriateness for optimizing the educational process. The possibilities of optimizing the professional activities of teachers were revealed: saving time, the convenience of electronic educational resources in the framework of office work, the convenience of using electronic educational resources in the work of teachers and students. Also, a teacher incentive system was developed that takes into account the level of competency in the creation and use of electronic educational resources.

Cognitive readiness was ensured by the introduction of a system of continuing education courses in the professional activity's process. Further training included the experience of academic exchanges in international programs (as part of a research problem), training in the context of professional activities organized according to the type of educational process using digital educational resources. Such training allowed the teacher to be in the role of a student and be included in the educational process, which was organized on the basis of the digitalization of the educational environment.

The formation of technological readiness was carried out as follows:

- provision of information accessibility; creation of information support for university teachers;
- demonstration of the ease of use of the electronic educational platform; development of electronic designers to create a database of electronic library resources of academic disciplines; development of convenient electronic designers of work programs for academic disciplines; development of an electronic designer for creating electronic textbooks, etc.;
- ensuring flexibility of settings in the process of working with an electronic educational platform: each teacher can make settings convenient for himself;
- extending the platform's functionality for the creation and use of electronic educational resources and the educational process' organization in a digital educational environment;
- educational materials' functional support; availability within the electronic educational platform of means for developing educational content and educational documentation without using a third-party editor;
- creation a unified and convenient reporting system for teachers with the aim of assessing the educational results of educational activities of students;
- development a convenient system for organizing course users; convenient management of flows and groups of students, the ability to distribute students among flows and groups.

The formation of university teachers' expert readiness was carried out in the process of their preparation for using the resources of the digital educational environment in a system that reflects modern trends in the development of education. This approach allowed us to ensure the development of the university teachers' ability to maintain a high level of competence based on constantly updated experience and the attraction of new practical innovative experience, as well as new theoretical knowledge in the field of professional activity.

This allowed the formation of university teachers' professional competencies, which reflect the ability to support the process of improvement and a high level of professional self-development, which allows you to maintain a high interest in the profession, ensures the teacher's self-identification in professional activities carried out in a digital educational environment. The teacher is improving based on the critical and heuristic thinking's development, which determines the success of reflection, self-esteem, and self-examination of oneself in the activity.

To reveal such teachers' abilities, the organization of measures was taken in the framework of these areas:

- changing one's own perception of one's professional experience by familiarizing oneself with innovative trends to increase self-esteem in activities;
- help in the formation of planning skills for self-education and creative activity in the digital educational environment of the university;
- support the teachers' creative activities in the master classes' organization on various issues of development and use of digital educational environment resources in the educational process.

Table I shows the personal qualities development dynamics that determine the success of forming the university teacher's readiness for organizing the educational process based on the use of digital educational environment resources (Tab. I).

TABLE I. PERSONAL QUALITIES DEVELOPMENT DYNAMICS

№	Development Qualities Dynamics, points		
	Qualities	***Ascert. Ex.***	***Form. Ex.***
I	Low self-esteem	6.41	4.88
II	Stress resistance	8.72	7.29
III	Teachers' resistance reaction	8.35	6.77

As a result of assessing the university teachers' psychological barriers' state, determining their involvement in the process of mastering the information and communication technologies that regulate the digital educational environment, there was a tendency to increase the self-esteem of teachers' own professional activities.

In the process of forming the university teachers' readiness for organizing the educational process based on the use of digital educational resources, an increase in self-esteem – 1.53 ($p > 0.05$).

This, in our opinion, indicates that teachers themselves, in the context of the digitalization of the educational environment, have become more resistant to the reasons that necessitate systematic professional development. Teachers began a readiness to overcome various kinds of difficulties in the process of creating a digital educational environment, developing and using electronic educational resources. Teachers have become more confident in organizing the educational process in a digital educational environment.

Also, during the study, an increase in resistance to stress was observed, which provoked an unfavorable perception of digital innovations in the traditional educational process (in most cases this was due to transformations of the teacher's traditional functions and the pedagogical activity's style). The university teachers' stress resistance was characterized by positive dynamics – 1.43 ($p < 0.05$).

Probably, this may be due to increased teachers' self-esteem. It can also be the result of the manifestation of the teachers' useful stubbornness in the development and use of electronic educational resources and electronic documentation in a digital educational environment.

It should be noted that the of teachers' resistance reaction to work in the digital educational environment and the use of its tools in the educational process tended to decrease – 1.58 ($p < 0.05$).

V. CONCLUSIONS

This suggests that the approaches used (andragogical, contextual, productive (independent development of an electronic educational product), activity, competence, acmeological) were effective in solving the problem under study.

During the study, the results were also achieved:

- the number of teachers who overcame the psychological barrier to work in a digital educational environment increased (88.1%). By the end of the experiment, they had a psychological barrier (this barrier is associated with the established values of the traditional teaching style), which determines the teacher's involvement in the process of mastering the information and communication technologies that regulate the digital educational environment 11.9%;

- overcame the difficulties associated with mastering the development of educational and methodological support for e-learning and its technological implementation (development of work programs in an electronic designer, development of test material for the Moodle platform, electronic literature designer, etc.), 78.4% of teachers; 21.6% of university teachers still have such difficulties;

- the number of teachers who have difficulties in developing educational resources for the digital educational environment decreased and amounted to 29.45%. 70.55% of teachers overcame these difficulties;

- the number of teachers who had difficulties in using ready-made educational resources decreased significantly – 7.12%. 92.88% of teachers successfully use ready-made electronic educational resources and training documentation;

- the number of teachers who can independently develop an electronic educational resource in the framework of the university's functioning electronic educational platform has increased – 76.44%. 23.56% of teachers still have difficulties in development, but can successfully organize the educational process based on the available resources of the digital educational environment of the university;

- many university professors recognize the need to be prepared for innovations in the digital educational environment and are characterized by their willingness to improve their own professional competencies, which provide the teacher with the ability to organize the educational process based on the resources of the digital educational environment (96.1%).

In the context of modern digital realities, the pedagogical activity of a university teacher should be based on the specifics and characteristics of methodological activities as leading activities. It is necessary to be guided by the principle of identifying the teacher's duties in the field of new requirements of educational standards and development trends of the digital educational environment. This provides a vision of the prospects for forming the university teacher's readiness to use the digital resources of the educational environment in the educational process.

The university teacher's readiness for organizing the educational process based on the use of the digital educational environment's resources is an integrative personality profile that reflects the systemic level of knowledge of the methodological and methodological e-learning foundations.

Readiness is supported by the ability to apply innovative methods, technologies and e-learning tools, as well as effectively and reliably evaluate learning outcomes in electronic content format. This determines the need to conduct a systematic analysis of electronic educational resources, to carry out the development of electronic educational content based on effective teaching methods.

The modern digital educational space, formed based on continuous innovation in didactic-methodological, conceptual-ideological, technological and other fields, is becoming an area governed by the imperatives of competitive advantage. The implementation of these opportunities at the level of educational systems implies the need to ensure the university teacher's readiness or these transformations. The results of the teacher's readiness for organizing the educational process based on the resources of the digital educational environment are reflected in the development of innovative scientific activities, research, as well as in the teachers' professional self-education.

One of the most important conditions for the implementation of these development strategies is the formation of systems (national, regional, etc.) that are innovations, initiate innovations and facilitate their future distribution.

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