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# Formation of University Teacher's Readiness to Use Electronic Information and Education Environment

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**ABSTRACT**
The problem under study is current and relevant due to the contradiction between the understanding of the need to digitalize the educational process, to overcome the "digital gap" in the student-teacher relationship, and the lack of an effective method for improving the skills of the teaching staff that allows them to organize their professional activities using digital technologies.
The teaching load of the university teacher, the variety of digital technologies and methods of their use in the educational process do not allow to organize advanced training courses in a mode parallel to the main educational process of the university and in isolation from the electronic information and education environment of the institution.
In this regard, this article is aimed at testing the hypothesis that the successful digitalization of the educational process in a separate educational institution is facilitated by mass training courses organized with direct immersion of participants in the digital environment.
The leading method of studying this problem was a pedagogical experiment conducted among university teachers and students, which allowed us to identify a positive trend in the readiness of teachers to use the possibilities of the electronic information and education environment of the university based on the results of the proposed method.

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digitalization, university teacher's readiness, electronic information and education environment, immersion technology, professional development.

## INTRODUCTION

### Relevance of the study

The current stage of development of society in technical, social and economic terms, along with other indicators, is characterized by a comprehensive development of digitalization. Digitalization is steadily replacing informatization and computerization of society in all areas of man's activity. It allows you to create entire systems, platforms, and technological environments within which there are partnerships between participants in these environments. The advantages and benefits of [1; 10; 11] digitalization are no longer denied. It covers production and business, science and the social sphere, and its results are used by both specialists and ordinary citizens. The introduction of digitalization in all spheres of society forces the education system to change, and sets new challenges for education.

The President of the Russian Federation emphasized the need to digitalize the education system in his address to the Federal Assembly. He noted that in 2021 it will be possible to fully start the digital transformation of the national school.
Of course, the digitalization of the education system has not just begun and it will not end overnight. On the scale of the Russian Federation, this is a fairly lengthy process. And this process was launched a long time ago. Schools, technical schools, universities are institutions where a large number of people interact. And a person who knows how to use digital technologies will definitely transfer the skills that are convenient for him to all areas of his life, including educational activities.
At the same time the "digital gap" between generations is becoming obvious. Today's

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schoolchildren and students were born in the age of modern information technologies. They can easily use the Internet, cloud and digital technologies from an early age. They are ready to study using all these tools.

Teachers, on the other hand, learn digital technologies in the course of their activities. It is safe to say that teachers understand digital technologies. It is unlikely that there will be people who will reprint the text if it can be found in an electronic version, and various types of schemes and printed posters have been replaced by electronic presentations. Many teachers use digital technologies for teaching, which makes it easier to control the learning process and increase the productivity of classes [2,3]. Educational institutions have almost abandoned paper document management; they have electronic diaries, electronic test books and statements. However, it is not possible to completely abandon the classical teaching of subjects.

Digitalization of the educational process in the university environment is most naturally carried out through the electronic information and education environment.

**Electronic information and education environment**

In universities in accordance with the Federal State Standard of the third generation, the electronic information and education environment of higher education institutions is one of the system-wide requirements for the implementation of the program in any field of training.

The electronic information and education environment has all the main characteristics that are important for the organization of the learning process. These include openness which is provided by the interaction of the environment with the information and educational system; integrity which provides a reasonable logic for the deployment of the learning process; setting learning goals, related activities of the teacher and students and the planned result. It is modeled taking into account the invariant content of the training material, optimal methods and methods of training. Such a dynamically developing environment, which is replenished with new resources, information and telecommunication technologies, can serve as a foundation for digitalization of the educational process in the university. To date, there is no clear definition of the concept of electronic information and education environment either in normative documents or in scientific publications. However, the purpose of this environment is clearly indicated. Its main functions are to provide students with access to documents regulating the educational process, electronic educational publications and educational resources; creating and maintaining an up-to-date electronic portfolio; recording the progress of the educational process and its results; organizing online and offline interaction between participants in the educational process, including classes themselves. Taking into account these functions and art. 16 of the Federal law "On education in the Russian Federation" in the statute of the Amur State University, electronic information and education environment is defined as "the totality of information and telecommunication technologies, appropriate technological tools, electronic informational and educational resources necessary and sufficient for the organization of indirect (at a distance) interaction of learners with pedagogical, educational and administrative staff, and among themselves" [4].

**Modern approaches to the research of readiness**

The functioning of the electronic information and education environment of the university is provided not only by material-technical and technological conditions and educational and methodological resources. The fundamental factor of successful functioning of the electronic information and education environment is the readiness of teachers to work in this environment [5]. To define the concept of readiness of the teaching staff to work in this digital environment, it was necessary to study the terms "readiness" and "readiness for professional activity".

The analysis of scientific papers allows us to identify various aspects of the study of "readiness": from the position of the theory of reflexes and attitudes (I. P. Pavlov [12], I. M. Sechenov [13]); at the level of neurophysiological mechanisms of regulation and self-regulation (G. Sh. Gabdreeva [14], L. G. Dikaya [15]); from the position of activity at the level of physiological and psychological mechanisms (V. G. Leontiev [16], N. A. Bershtein [17]). All these aspects consider the internal mechanisms of readiness for activity in general and define the term under study as the possession by a person of some complex quality that contributes to the performance of certain functions. The specific definition of readiness depending on the type of activity is considered from the point of view of the conditions of its formation and manifestation in the activity [6]. In Russian pedagogical studies, professional readiness is considered as a result of professional training (K.M. Durai-Novakova [19], V.A. Slastenin [18], and others). In the works of these authors, it is noted that "readiness for professional activity" is manifested in the form of integral education which includes the level of knowledge, skills and abilities in work, as well as the formation of motives, needs and abilities at the individual level and determines the attitude to the activity and its effectiveness. Based on this, the teacher's readiness to use the electronic

information and education environment must be viewed through the prism of his / her professional activity.

The professional activity of a teacher in bachelor's, specialist's, and master's programs is multifaceted. The work functions of a teacher include research and innovation activities, international cooperation, and the organization of psychological and pedagogical support for students [7]. But, a priori, the main ones are the organization of students' activities for the development of competencies, the creation of pedagogical conditions for the development of students, the creation of educational and methodological support [8], which are components of the teacher's educational activity.

The higher-education teaching personnel and teaching staff understand that in order to remain competitive and educate a modern generation of specialists, it is necessary to create a digital educational environment and actively join it. To do this, teachers attend various master classes, online training schools, advanced training courses (full-time, part-time, distance), study terminology, create courses themselves and post them on various platforms. There are already quite a lot of materials that touch on various aspects of digital technologies and their use in educational activities. Each teacher with educational activities is not able to analyze all the available material. Therefore, self-learning is isolated and inefficient.

In this regard, there was a contradiction between the understanding of the need to digitalize the educational process, to overcome the "digital gap" in the student-teacher relationship, and the lack of an effective method for improving the skills of the teaching staff that allows them to organize their professional activities using digital technologies.

The presented contradiction determined the problem of the research: to develop the method of forming the readiness of the teaching staff to use the electronic information and education environment. Among the forms of professional development that are used for teachers engaged in educational activities, most often distinguished ones are the following: distance learning, personalized system of professional development, electronic, modular, project-based training, training in the format of an internship. Each of these forms has its own advantages, for example, distance learning allows you to organize interactive communication between participants of the distance course; when organizing a personalized system, an individual training route is made for each student; in e-learning, all media resources are combined; in modular training, each student can choose the modules they need, and in project training, the process of obtaining the necessary competencies is carried out in the process of activity. All these forms of professional development require the teacher to be separated from the continuous educational process or they lead to creation of an additional load for the teacher when performing tasks necessary for completing advanced training courses.

Due to the need for mass training of teachers and at the same time the need to conduct a continuous educational process at the university, it was decided to develop a methodology for forming readiness based on the technology of "immersion in the subject". This technology is based on the well-known technology of concentrated learning [9]. The essence of the technology of "immersion in the subject" is that the organization of the educational process is realized by concentrating on one subject of study for a certain time period. At the same time, there is no distraction to the study of other disciplines. The studying of the same content is carried out in different forms of activity. According to numerous studies, this technology allows you to optimize the learning process by increasing the amount of material being studied, without increasing the time (G.I. Ibragimov [21], M.P. Shchetinin [22], A.A. Ostapenko [20]).

The hypothesis of the study is that successful digitalization of the educational process in a separate educational institution is facilitated by mass training courses organized with direct immersion of participants in the digital environment.

## RESEARCH METHODS

### Purpose of the study

To develop and experimentally test the methodology for forming the readiness of the university's teaching staff to conduct educational activities in the electronic information and education environment of the university.

### Research methods and techniques

To achieve this goal, there were used theoretical (method of analysis of scientific sources, experience of leading experts; analysis of normative documents) and empirical (questionnaire; testing; method of expert assessments; pedagogical experiment) methods, as well as methods of mathematical processing of experiment results.

### Experimental base of the study

The study was conducted on the basis of the Amur State University (AmSU). The study involved 250 people from the higher-education teaching personnel and 420 students enrolled in the first and third years of the university.

### Stages of the research

In the first theoretical phase of the study there was done the analysis of scientific, methodological

literature on the problem; the definition of scientific terms of the research; selection of research methods ascertaining the phase of the experiment.
The second experimental stage was devoted to clarifying the research hypothesis and generalizing theoretical propositions. At this stage, a method of forming the readiness of the university's teaching staff to conduct educational activities in the electronic information and education environment of the university was created, and a forming stage of the experiment was conducted.
The third stage, a generalizing one, included the final stage of the experiment, mathematical processing, analysis of research results, summing up and drawing conclusions.

## RESULTS

Based on the activity nature of readiness, motivation, information and operation components were identified in its structure. The presence of these components in the structure of readiness for professional activity was noted by the authors of all key works studying professional training.
The information component characterizes the set of knowledge about the elements, functions of the electronic information and education environment, and methods of organizing educational activities through the elements.
To assess the formation of the information component, indicators that correlate with the didactic units of the course content were determined. Direct assessment was carried out using testing in the Moodle system. Thereby large-scale involvement of test results and automatization of their processing was done. The operation component characterizes the skills and knowledge of the execution technology. To assess the formation of this component in the electronic information and education environment of the university, a survey of students was conducted through the student's personal account. The questionnaire included questions to assess the ability of teachers in various subjects to use the capabilities of the electronic information and education environment in their activities when teaching students. There was analyzed the statistics of electronic journals, the use of self-created and publicly available courses. The third motivation component (needs) characterizes the awareness of the role of digitalization in the formation of professional qualities, the system of beliefs, motivations of teachers, expressions of interest in improving knowledge and skills for using electronic information and education environment in educational activities. To assess the formation of this component of readiness, there was measured the manifestation of interest in the possibilities of the electronic information and education environment and digitalization of their educational process, the need to consciously use the electronic information and education environment in their professional activities, and awareness of the importance of digitalization for the educational process.
At the ascertaining stage of the experiment, there was conducted a survey of the entire higher-education teaching personnel of the university in order to find out what teachers think about the use of electronic information and education environment in their professional activities. The practice of conducting contact work of teachers with students in the electronic information and education environment of the university was also studied. Due to the fact that each teacher must fully possess the skills of working in the electronic information and education environment and involve their students in its use, a thorough survey of the entire teaching staff and students was conducted. Using a continuous survey of university teachers, it was found out that at the beginning of the experiment only 28% of respondents confidently used the means of electronic information and education environment, understood the basic terms and the content of structural components and principles of this environment; just over 50% of teachers had a negative attitude to the use of electronic information and education environment for organizing their classes.
In addition, using the survey of students, it was found out that third-year students in general used the electronic information and education environment of the university only as a library resource to find the necessary textbooks and study guides. First-year students did not understand how to communicate and learn within the electronic information and education environment of the university. All students noted that teachers could not help them fully adapt to the electronic information and education environment of the university and did not often use it when organizing contact work.
Analysis of the results of the first stage of the experimental work showed that it is necessary to help teachers effectively use the electronic information and education environment with the help of advanced training courses.
At the second stage of the experiment, the university management created a working group from among the leading teachers of the university and they developed a program of advanced training courses "Use and support of the electronic information and education environment and information and communication technologies in an educational organization" (https://aem.amursu.ru/enrol/index.php?id=17).
The transformation of the "immersion" technology for advanced training courses was that the

information received by the teacher was applied immediately during the actual educational process conducted by this teacher with students. The entire teaching staff of the university needed to improve their skills in these courses.

All participants were randomly divided into two groups: control and experimental. In the control group, the teaching of advanced training courses was carried out in the classical way. Teachers were trained in lectures and practical classes, students were not involved in this educational process.

In the experimental group, the training of teachers was carried out using the technology of immersion in the electronic information and education environment. Teachers had to improve their skills in the course and carry out the educational process in their subject within this environment. Thus, students were also immersed in the electronic information and education environment.

In the experimental group, courses were conducted in distance and face-to-face forms. The distance part of the course was located in Moodle. Each teacher received a username and password to sign up for the course via messages to their personal account. The time of the course was chosen by the teacher individually, taking into account their teaching load in the educational process. Each student became a member of the electronic information and education environment of the university. In the process of professional development, teachers not only trained themselves in this environment, but also when completing the course tasks they provided training to students in their classes on the subject in this environment.

The distance part of the course contained the material that explained the main provisions; there were provided some links to regulations, and there was presented the experience of other universities in the electronic information and education environment. The material was presented in various formats: video lectures, presentations, text documents and podcasts. Each teacher could choose a convenient learning format.

The theoretical content of the course has generated interest among the audience. This can be seen by analyzing the messages of the forum, in which teachers actively discussed the possibility of using the electronic information and education environment in their professional activities. Methodical seminars were held at the faculties and departments where the issues of using and supporting the electronic information and education environment were considered. The perception and understanding of the theoretical material of the lectures was controlled by the working group using tests. The time for completing test tasks was limited, the number of attempts was not more than two (one or two, depending on the complexity of the question).

After studying each lecture, it was suggested to perform a small practical creative task. These tasks were associated with expanding the work in the personal account, with the ability to communicate with colleagues and students remotely via messages from the personal account, with creating elements of online courses or fragments of courses (lectures, tasks, tests), with searching for educational resources for your subject on open platforms, etc. After completing the task and sending responses to it, each teacher had to evaluate the response to the same task of several other colleagues. At this stage, the course developers helped the staff share their experience and identified groups that were ready to use the same technologies in different subjects. If necessary, teachers could ask the course administrator to help them and they also helped each other.

Teachers actively used their personal account every day not only to fill out an electronic journal, but also to communicate with students, colleagues, and view university news. In the personal account each teacher began to regularly update their portfolio, so that the personal accounts of teachers became a dynamic element of the electronic information and education environment of the university.

In addition, many teachers created online courses for their subjects while completing tasks during training courses and they still continue working on them at present time. All created courses are placed in Moodle. Students enroll in the courses and use them to gain a deeper understanding of the material being studied, to develop their skills in solving educational problems and to prepare for practical classes and various control activities.

The final certification of the course was conducted in full-time. After successful completion of the final certification, all teachers received a certificate of professional development.

At the end of the advanced training courses "Use and support of electronic information and education environment and information and communication technologies in an educational organization", all university teachers took part in the third and final stage of the experiment. At this stage, the indicators of teachers' readiness components were re-assessed and the results of the experiment were statistically processed. The survey and testing were carried out in the electronic information and education environment of the university.

Statistical processing of the received data was performed using the StatSoft STATISTICA package. To identify the differences between the values of the control and experimental groups, there was used parametric Student's criterion in the case where the indices obeyed normal distribution and nonparametric Mann-Whitney test in the case when

the distribution was statistically different from normal. For statistical analysis of shifts before and after the experiment, the Student's criterion for dependent samples and normal distribution and the Wilcoxon criterion for dependent samples and distribution that does not obey the normal distribution law were used separately in the control and experimental groups.

**Assessment of the significance of differences after the pedagogical experiment**

| Component of readiness | Group | | The level of significance |
|---|---|---|---|
| | Control | Experimental | |
| Motivation | 50.3±0.25 | 83.5±0.21 | p=0.00035 |
| Information | 70.4±2.85 | 90.5±0.03 | p=0.0005 |
| Operation | 48.5±1.21 | 98.3±0.55 | p=0.00001 |

The analysis of the results showed that among the teachers of the control group, the number of those who are ready to constantly use the electronic information and education environment of the university did not change statistically in comparison with the beginning of the experiment. However, in the experimental group there was a significant shift toward increasing the number of teachers who are willing to use electronic information and education environment of the university; 97% of teachers in the experimental group began to consider electronic information and education environment in their comfort zone. In addition, in the experimental group, there was no negative attitude among all the teachers to the use of electronic information and education environment for organizing classes, and in the control group this indicator did not change.

## DISCUSSION

Undoubtedly, personal characteristics of a teacher play a fundamental role in the teacher's readiness to conduct educational activities through the electronic information and education environment. However, this component of the teacher's readiness to use the electronic information and education environment was not taken into account. In our opinion, the qualities of personality are general, multi-faceted and even largely latent ones which are manifested as motives, knowledge and skills.

## CONCLUSION

After completing the advanced training course "Using and supporting the electronic information and education environment and information and communication technologies in an educational organization" using the methodology of creating readiness with immersion technology, teachers began to consider this environment their comfort zone. It is convenient for them to work in it. Therefore, we can assume that the hypothesis has been confirmed and advanced training courses organized with the direct immersion of teachers in the digital environment contribute to the successful digitization of the education process.

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