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METHODICAL APPROACHES TO IMPLEMENTATION OF ELECTRONIC EDUCATIONAL TECHNOLOGIES IN PROFESSIONAL ACADEMIC TEACHER TRAINING

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Purpose of the research is to study and consider methodological approaches to implementation of electronic educational technologies in the professional academic training of teachers in the conditions of ethno-electronic training. The main method in this study is organizing experimental work (ascertaining, forming, and control stages of the experiment), as well as the method of statistical processing of the quantitative research results. From general analysis of theoretical approaches and implementation of empirical methods, mechanisms for organizing training based on electronic educational technologies have been identified. Based on literature analysis and the research conducted, the definition of blended learning, ethno-electronic training has been provided. An experiment was conducted with 106 students enrolled in the undergraduate program majoring in 'Pedagogical Education' participating therein. Part of the experiment to identify the effectiveness of using the blended learning technology was held in studies of the 'Computer Graphics' course with partial course digitalization using online course organizing toolkit iSpring. The quantitative measure was based on grades scored by the students of the control and experimental groups for the first control week in the context of the academic grade-rating system implementation. The empirical data obtained in the course of this experiment and the increase in the average grade of the experimental group ($\Delta = 14.6$) allow for the conclusion that the mechanisms for implementing the blended learning technology have a certain effectiveness and are quite efficient in organizing the academic activity.

Keywords: educational technologies, activity approach, information technologies, distance learning, e-learning, electronic educational technologies, blended learning.

1. INTRODUCTION

The existing vocational training system in Russia due to various factors (such as increasing workload of teachers, variable federal educational standards, and insufficient level of funding) has few opportunities to respond promptly to the time challenges and current changes in the society.

At the same time, the education system functions in the face of increasingly obviously manifesting features of an owner of the educational services in the person of a student, which makes it necessary to seek ways of promptly dealing with such a fundamental process of education development. Students do not only have the right to choose an educational establishment that provides learning services but also influence the formation of a set of academic disciplines and competences that form their professional identity.

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In such conditions, with evolving technologies, the instruction methods and principles necessary to remain up to date and to meet the educational needs of society are changing and improving. Conventional study modes are being modernized; e-learning, distance learning technologies being used both separately and together are gaining in popularity and magnitude. At the same time, the pedagogical component of these processes has not been adequately investigated.

Modern conditions for college undergraduate studies, ubiquitous digitalization (digital processing) of education impose ever higher requirements for quality, which necessitates application of modern educational technologies in teacher training. The most promising of them are definitely those that are implemented with the use of information technology.

E-learning combines a number of different educational technologies, the application of which in one way or another is based on the application of information technology.

The global presence of e-learning means that each education college graduate must have a number of competences aimed at deployment, organization, and support of e-learning, the use of electronic educational technologies (EET).

However, until now, in the process of training a future teacher, their consistent sensitization to common usage of electronic educational technologies has not been established. To a greater extent, this serves as guidelines and is not presented in the form of well-thought-out methods with the necessary scientific and methodological support.

For example, M. Natarajan (2005) notes in his paper that before the actual training at college, students should study materials on computer literacy, on the Internet work and web search, on information loading. As an option for evaluating the results, it is proposed to use such appraisal approaches as preparation of presentations. The author comes to the conclusion that implementation of problem-based learning puts students in the position of an active participant and immerses them in reality situations.

The issues of development and adoption of modern educational technologies in Russia and internationally have been in progress for many years, a number of them being related to technologies implemented using information and communication technologies. In the study, the authors have relied on pedagogical concepts about the role of modern educational technologies in ensuring educational process (Stukalenko et al., (2016), Stanisavljevic et al., (2015), and others).

For many years, the issues of education computerization have been dealt with by S.E. Higgins (2010), E. Allen and J. Seaman (2013), and other scholars. The problems of integrating e-learning into educational process have also been reflected in the works of G. Falloon (2011), S. Alumu, and P. Thiagarajan (2016), Michael W. Allen, J. Ballou and J. Chinappi (2011), A. Bajak (2014) and others.

The papers of S.L. Rubinstein, A.N. Leontiev, V.P. Bespalko, P.Ya. Galperin, B.S. Gershunsky, V.A. Slastyonin, B. Yadav, A. Benard Festus, E. Fallon, St. Walsh, T. Prendergast, J.L. Loveland, and others have been taken as a theoretical basis for the activity approach implementation in the framework of this study.

The experience of using electronic educational technologies around the world has been quite conclusive. For example, S.E. Higgins (2010) provides a critical analysis of the results of a large-scale research project in the UK where electronic and interactive whiteboards were available in more than 200 classes of teachers of 9-11-year-olds in England. By reference to the conducted research, the author summarizes that in general, these technologies do not change pedagogy in and of themselves. From inspection it is clear that the characteristic interaction patterns in the UK primary school classes remain unchanged when teaching with or without the use of interactive whiteboard technology. These forms of interaction are led by teachers. It has been revealed that both school and subject pedagogy is more stable than the opportunities offered by technology (Higgins, 2010).

In a study by G. Fallon (Falloon, 2011), the use of the Web, Adobe Connect Pro virtual environment in online teacher training at the University of Waikato was studied. In that study, the issues of creating a virtual environment, synchronous distance learning were considered in order to prevent the feeling of isolation many students developed when studying remotely. That research was mainly focused on learning how synchronized learning could help overcome the sense of isolation that many experienced in distance learning. It also made it possible to evaluate the effectiveness of using a 'virtual classroom' to enhance interaction in the learning process. The study identifies trends in the use of synchronous distance learning tools, as well as the way synchronicity affects the autonomy of students.

Pioneering studies on various forms of distance learning revealed that those technologies did not differ much from ordinary classroom instruction in terms of learning outcomes. However, now that web learning has become a major trend in both school and college, the authors of the study (Means et al., 2013) deem it necessary to reconsider the relative effectiveness of online learning and intramural education. Meta-analysis designed to produce a statistical summary of studies comparing online or blended learning outcomes with full-time classroom activities has served as a goal of research for authors B. Means, Y. Toyama, R. Murphy, M. Baki. The meta-analysis showed that, on the average, the students studying online performed better than those who studied intra-murally (Means et al., 2013). By contrasting blended learning and full-time education, a significant advantage of blended learning over full-time training was revealed. It should be noted that blended learning assumes that there is additional time for learning, learning resources, and course elements that facilitate interaction between students.

Distance education technologies as a target of research are also considered by M. Burns (2011). Qualitative distance education should provide continuous

professional development based on proven best practices; render constant support; help teachers in organizing a community of professionals who practice distant learning. The author notes the need to train teachers and students for successful work in the distance environment through orientation, preparation, support, and guidance; he notes the importance of formal and overall evaluation of teachers' work in distance learning programs so that they can receive the necessary assistance as applicable (Burns, 2011). Evaluation of teacher's and student's activities will be the object of future research by the authors.

This experience of various studies defines a range of issues for further research, which determines the importance of investigating a number of electronic educational technologies as a possible tool for addressing these issues.

In this regard, let us point out that the main purpose of the study is determined by the need to inquire into and to consider methodological approaches to the implementation of electronic educational technologies in professional academic teacher training in the context of ethno-electronic training.

To achieve this goal, it is necessary to meet the following challenges:

- to identify the types and consider the specifics of electronic educational technology implementation in college;
- to analyze international best practices of implementing electronic educational technologies, ethno-electronic training, to analyze the literature on the problem;
- to clarify the concept of the term 'electronic educational technologies';
- to consider the psychological and pedagogical features of implementing electronic educational technologies;
- to describe methodological approaches to the implementation of electronic educational technologies in professional academic training of teachers;
- to implement and summarize the results of the experimental work on implementation of electronic educational technologies in professional academic training of teachers in the context of ethno-electronic training.

In this paper, the authors consider the implementation features of electronic educational technologies, such as blended learning, distance education technologies, flipped classroom, and others based on the use of information technology, elements of e-learning in one way or another.

The research hypothesis is the statement that implementation of electronic educational technologies in professional academic training on the basis of certain methodological approaches has a high effectiveness in comparison with conventional teaching; it is quite effective in organizing the educational process in higher school for teacher training, while the study of EET is necessary for further implementation by teachers in their professional activities. In this regard, one should note the need to find ways to transition to instruction based on e-learning

technologies as a modern solution in improving the quality and accessibility of education.

The relevance of this study is determined by the need to search for methodological approaches to implementation of electronic educational technologies in professional teacher academic training. A special feature of the study is the conditions under which the process of training teachers who are participants in the experimental work is organized, where training is of a national and cultural specificity and is implemented in specific situations defined by the authors as ethno-electronic training.

2. MATERIALS AND METHODS

To study the use of electronic educational technologies, a set of theoretical and practical research methods tested in pedagogy and psychology was used: analysis of psychological, pedagogical literature; mathematical and empirical methods (pedagogical observation, testing, self-assessment, analysis of educational programs, summative and formative assessment).

2.1. Electronic educational technologies and ethno-electronic training

The best practice shows a number of advantages of applying e-learning over conventional teaching methods. E-learning, or learning in electronic information educational environments, provides a wide range of opportunities in transfer of knowledge, experience, formation and development of competences.

In a number of cases, the conceptual framework and specific e-learning tools turn out to be almost uncontested for solving educational problems in the conditions of non-uniform in time and space access of students to educational resources. For example, such conditions have developed in the vastest region of Russia, the Republic of Sakha (Yakutia). A characteristic feature of this subject of the Russian Federation is a huge area with a fairly low population density and settlements strewn across the vast expanse including relatively small ones (uluses). These conditions contributed to the formation of ungraded, nomad schools (here both ungraded schools and nomad schools on a standalone basis are meant) that preserve the values of the national culture and the native language. In these conditions, the need for implementation of modern pedagogical and information technologies training is very acute (Kornilov and Gosudarev, 2015).

Ethno-electronic teaching as a pedagogical process of organizing training, preparation, independent activity with the use of information and communication technologies in electronic information educational environments, having a pronounced national and cultural specificity is considered herein as a system aimed at supporting learning in specific situations (Kornilov and Gosudarev, 2015) similar to those that have also developed in rural schools of Yakutia. A teacher makes a sustained effort on preparing information and communication

facilities and supplementing them with materials relevant to the learning goal and the technology of using them in class. As a result, a computer has informative function (allows storing huge amounts of information), training function (contains the method of training communicative actions in the process of teaching conversational practice) and a number of others. Thus, with the help of a computer and information technologies, the studied material is presented being aimed at the formation and development of necessary skills in students, individualization of learning.

The experimental work has been carried out on the basis of the North-Eastern Federal University (NEFU), Yakutsk, where conditions have developed, and their description corresponding to ethno-electronic training. The practice of combining higher professional education with the use of distance educational technologies has been successfully implemented in this university. In 2014, a project was launched to establish the Yakutsk Global University with the goal to provide everyone with an opportunity to acquire quality education on the basis of modern educational technologies including distance learning.

Anticipating the consideration of certain educational technologies, it is necessary to define the concept of electronic educational technologies (EETs) hereinafter *educational technologies are referred to as, the application of which is based or organized with the use of information technology, hardware, as well as information and telecommunication networks that provide teaching information data transfer through telecommunication lines.* It should be clarified that in this respect, the term 'educational technologies' characterizes rather the mode of educational process organization that admits to the application of certain methods and means of training and education, as well as one of the approaches within the framework of a particular method or means of instruction used.

The experimental work on the implementation of a number of EETs was conducted between 2014 and 2016 in academic groups for information technology teacher training, to train technology teachers. A total of 106 students took part in the experiment. Of them, 76 were students pursuing a degree as information technology teachers, 30 were future technology teachers. In the course of long-term experience, the authors of the article have developed results on training organization using various electronic educational technologies (Danilov et al., 2016; Kornilov and Gosudarev, 2015), which will be discussed hereafter.

Student academic groups of the Ammosov North-Eastern Federal University (NEFU) were defined as experimental groups, their age composition being within the range from 18 to 22 years old.

With regard to the gender composition, the analysis of student academic groups is not presented due to a uniform distribution of the male and female ratios and the absence of identified links to impact effectiveness of the technologies under consideration on each gender.

The ethnic composition of the groups should be noted, which is quite significant in this study (Figure 1). The composition of the academic groups is mainly represented by the nationality of Sakha (Yakuts) and indigenous minorities of the North (97%), while the rest are represented by Russians (3%). Ethnic composition plays an important role in the analysis of the effectiveness of electronic educational technologies in the educational process organization as language difficulties experienced by representatives of the Sakha (Yakuts) and the indigenous small-numbered peoples of the North force them to develop other ways of communication than verbal. This is due to the fact that training is generally conducted in the Russian language. This allows Yakut-speaking students to be good at implementing interaction (based on the activity approach) and at work related to the use of information technology, to succeed in project activities.

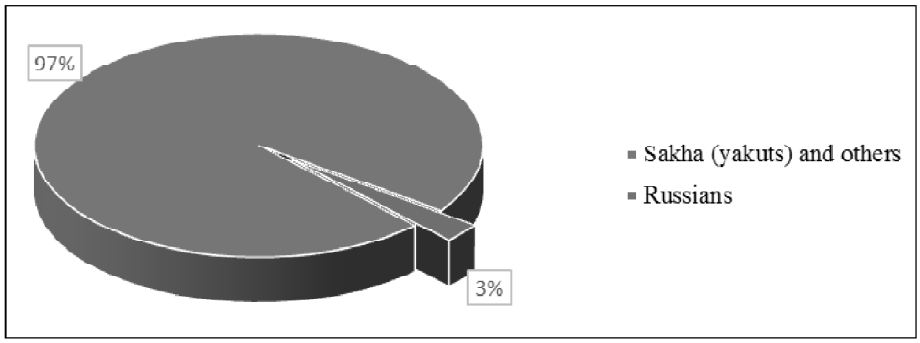

Figure 1: Ethnic composition of academic groups

According to the authors, it was important to appraise in advance the overall level of computer literacy among all the participants in the experiment in terms of high, middle, and low level. This is necessary for the avoidance of any influence of the computer literacy level on successful implementation of EETs in the framework of pilot testing. According to the results of the research conducted to identify the level of computer literacy among the students who participated in the experimental work, the overall result turned out to be above average – 96 students showed an average and a high level of computer skills (high – 31 people, middle – 65 people) (Figure 2).

The list of questions related to appraising the knowledge of computer technology, revealing the skill level of information technology in students, identifying skills to work on the Internet, basic education in the field of computer science.

2.2. Flipped learning

In response to a call for improved technology targeting students in educational institutions, the approach based on flipped learning technology has attracted a lot

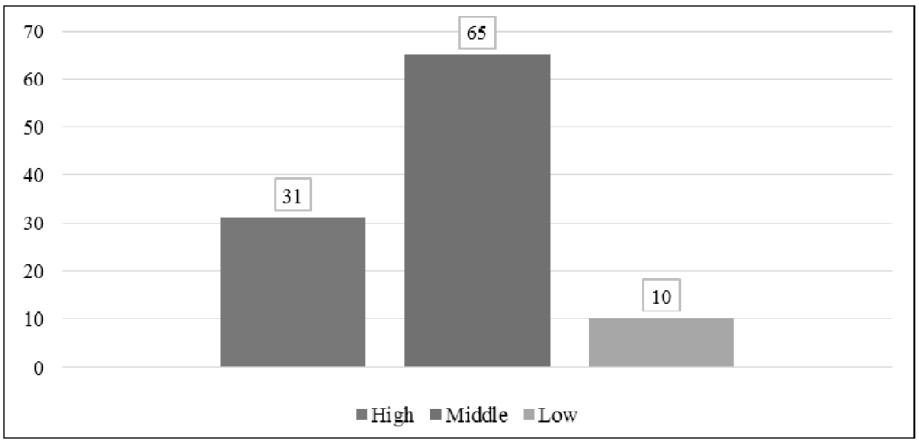

Figure 2: Results of the study to identify the computer literacy level

of scientists' attention, both from researchers and practitioners (Kim et al., 2014). Flipped learning (flipped classroom) is one of the forms of active learning that allows a teacher to enhance a student's desire to learn, develop independently, to work both at home and in class. Its essence lies in preliminary preparation and sending lecture learning material to students in the form of video lectures. Thus, students in their free time have the opportunity to independently study the materials of video-lectures and then, in limited class hours, to cooperate with the teacher in the form of joint activities.

Oftentimes, during conventional classes students try to catch on everything they hear from the teacher not having enough time for consideration, for understanding of what they have heard and thus, they often miss key points trying to note the information that is being reported, after which the organization and implementation of independent activities is significantly hampered.

The use of video lectures for early acquaintance with learning material allows a learner to study new information in a convenient environment reviewing individual fragments if necessary.

Thus, by devoting class hours to material analysis, teachers have the opportunity to detect gaps in retention and comprehension of the auditory material learnt and to immediately help in their filling, while activating the process of joint practical activities (Yuan et al., 2014).

The technology of flipped learning allows one to use study time wisely, keeping the class time for interaction with each other in practical activities, debates, and discussions. Meanwhile, the main role of a teacher is to act as a tutor when they answer questions that arise encouraging students to work together and to do an independent research.

This form of active learning has been applied so far only experimentally in Russia, and only a few teachers can implement it effectively enough. Many of them use flipped learning fragmentarily, but most regard this technology as the thing of the future. International best practices in the flipped learning technology in secondary and higher schools attest to its high efficiency. Some US schools have completely switched to flipped classroom because the statistics of its application effectiveness is quite high. At the same time, some scientists being familiar with this information even consider lecturing to be somewhat unethical favoring the prospects for flipped learning (Bajak, 2014).

2.3. Interactive technologies and interactive whiteboards

In organizing pedagogical process, visual methods are traditionally used. A common tool for this used to be, and sometimes has been, a chalkboard, which has advantages over other means of visualization, as it is possible to depict necessary objects, draw a diagram, etc. thereon when presenting educational material. In modern conditions of the society information development, along with a chalkboard, interactive whiteboard application is becoming effective, that is, a computer-based visual training tool used in the university where the experimental work has been conducted. As can be seen from the practice of its use, a combination of projection, of different forms of the material studied and their analysis is to be found in the essence of an interactive whiteboard. Otherwise speaking, the board does not only display content from the computer, a course outline but also allows one to make corrections, edit, etc. As modern young people acquire information from electronic media more easily and willingly, students actively participate in discussing the material presented on the interactive whiteboard, make their own amendments, etc.

It should be noted that, basically, the core of the technologies under consideration is the subject-subject learning model that is characterized by orientation towards independent cognitive activity of students. Also, the main criterion for selecting training technologies for specific conditions is their functioning according to the principles of interactive learning. Interactive learning is defined by experts (Anisimova and Krasnova, 2015) as training organized on the basis of interaction of pedagogical process subjects among themselves (students with each other, with teachers, and with various sources of information) in the form of discussions, business games, in analyzing certain situations, implementing projects. In the course of the experimental work carried out by the authors at the university, the use of interactive teaching methods takes one of the leading places.

While interactive methods are put in game forms in elementary school, presented in the form of business games among students of the secondary school age, whereby the activity of all students is manifested and high school students are engaged in self-reflection, the use of interactive teaching methods in college is

carried out in various forms. In particular, students are asked to prepare for the next class: a) the topic and the main questions posed at the lecture are indicated; b) on the Internet, in the media, they are to find material that addresses certain answers, judgments on these issues. A class begins with statements of the students on the materials they have studied; the other students ask questions, discuss how substantively an answer to the question raised has been explored, and so on. After discussing the issue, the teacher proceeds to their presentation using the electronic material prepared by the students in course of their unsupervised activities while emphasizing the students' correct approaches to the issue under study. All this stimulates students to search for information individually based on interaction, develops skills to independently obtain the necessary, relevant information, analyze it, and apply it to solve new cognitive tasks.

It should be emphasized that in the experimental work, the rationality of cooperation and interaction of students in cognitive activities in small groups, where it is easier to communicate and discuss, has been identified. In general, the means of the interactive method help students gain new knowledge and master new experience in the educational process.

2.4. Blended learning

The combination of the advantages of e-learning with the advantages of conventional forms of education formed the basis of the blended learning technology (Allen, 2006), which has been used for over ten years in schools in Europe and the USA. Blended learning is understood as a systematic approach to the organization of educational process expressed in a combination of classroom instruction and e-learning (Kondakova and Latypova, 2013). In the blended technology, e-learning can be applied directly to classroom work if a teacher interacts with students through an electronic information and educational environment. This can be implemented, for example, to receive feedback, to evaluate the learning outcomes, to exchange comments to the lesson, to distribute the content used in the classroom.

Depending on the intensity degree of the educational process with online content delivery technologies and the nature of participants' interaction, experts distinguish:

- conventional teaching (instruction without a use of electronic technologies);
- web-supported conventional teaching (1-29% of the course is implemented online: content delivery, minimal interaction via Learning Management System (LMS) in the execution students' individual work);
- blended learning (30-79% of the course is implemented online: combines classroom instruction with online classes);
- fully online training (over 80% of the course is delivered online, often without any face-to-face interaction) (Allen and Seaman, 2013).

In these terms, what is meant by the blended learning technology is an interaction model of participants in the educational process aimed at achieving the planned results and using various degrees of integrating conventional teaching forms with the use of modern tools for implementing e-learning.

The implementation of blended learning has been defined by many authors as quite effective and inviting further investigations (Moskal et al., 2013; Means et al., 2013; Porter et al., 2014). The application of blended learning in college classes has identified this technology as the most favorable for training future teachers, who in their professional activities should be able to use EETs on a daily basis as a sort of the most promising technologies. Its advantage lies in an appropriate combination of classroom and online instruction with an access to all the necessary didactic information.

Today, the use of blended learning holds a great potential, and the distribution of conventional studies combined with elements of e-learning allows a wide variety of tools and means to be used to solve teaching tasks.

In the furtherance of the experimental work on blended learning implementation, learning efficiency of the 'Computer Graphics' course among students in the field of 'Pedagogical Education' was studied. This course was selected as being delivered in class hours on the basis of ICT room. A full-fledged implementation of the blended learning technologies in organizing classroom work without a computer lab is quite difficult. The use of BYOD technology is a possible alternative under such conditions.

The iSpring toolkit for organizing online courses was used as a tool. The iSpring system is a set of software products designed to create online presentations, e-courses, tests, e-books and interactivities; it also includes iSpring Online, a full-fledged e-learning environment of its own (LMS iSpring Online, 2017). The selected toolkit is the most convenient to use both for face-to-face and remote interaction due to the flash component generality.

The 'Computer Graphics' course was partially digitalized and uploaded to the website http://ivt.ispringonline.ru. For each student, a user account was created and the status of a learner was assigned, their activities being monitored through an administrator or teacher account.

In the exercise of the experiment, the authors compared the training efficiency of the control group T-12 (15 students) where the training was organized in a conventional way and the experimental group T-13 (15 students) where the training was carried out using electronic educational technologies in the form of blended learning, distance educational technologies, and multimedia technologies.

The students of the group T-13 studied the discipline during one control week (half of an academic semester) in the blended learning mode. The progress in studying the training materials was measured by accounting the points scored within the grade-rating system of the college. According to the regulations, for one control

week at the summative assessment passed as a credit for the current work, a student could score up to 50 points.

During the experiment, the training materials were studied, and practical work was organized according to the topics presented in Table 1.

TABLE 1: CURRICULUM TOPICS IN THE 1ST CONTROL WEEK FOR THE 'COMPUTER GRAPHICS' COURSE

No	*Subject name*	*Number of hours*
1.	Introduction. Subject of computer graphics. Types of computer graphics	2
2.	Color basics in computer. The notion of color. Color models	2
3.	Image representation ways in computer	2
4.	The notion of resolution. Image file formats	4
5.	The basics of raster computer graphics	4
6.	Getting acquainted with raster graphic editors. Work in Adobe Photoshop environment	4
7.	Practical exercise lesson in Adobe Photoshop environment	10
	TOTAL	28

In each class, learning materials in LMS iSpringonline were uploaded for students in the form of interactive learning materials, which were studied in the blended learning mode. Students had unlimited access to all the training materials on the website http://ivt.ispringonline.ru both in class time and in spare time to have the possibility of additional training.

For all activities, students had the opportunity to receive grades according to the grade-rating system of the college. Weighted scores for each activity were pre-allocated to LMS iSpringonline. Depending on task performance, a student received a certain number of points.

2.5. Psychological specifics of the EET implementation

What is of great importance is the psychological aspect of the use of electronic educational technologies in teaching. Undoubtedly, the use of information technologies in educational process improves the activity of both the teacher and the students. The impact of electronic educational technologies on the visual, auditory comprehension forms in students a holistic reflection of an object under consideration, increases the intellectual capacity of students, broadens the horizon, shapes the world view, facilitates the search and systematization of new information, mediates communication, guides them into virtual life.

For a better understanding of the positive application features of electronic educational technologies in training, a survey was conducted among students that has revealed that the use of technologies significantly changes the spatial and temporal boundaries of interaction; a system of motivational regulation of interaction with computer technologies is formed, which includes cognitive, communicative,

socially-normative, and creative motives. Interaction with electronic technologies becomes an important new source of mental formations, an identity construction for students.

Given the age composition, formation of an enabling environment is an important factor in the preparation of students. In this regard, it should be noted that the use of electronic educational technologies for frontal and group work helps in solving this issue. For example, a peculiarity of implementing ethno-electronic training is also the observance of parity between a student and a teacher. Teachers should, instead of criticizing and pointing out to mistakes, provide advice and assist in finding the right solutions. Public criticism of a student in such conditions is sometimes poorly perceived and creates an adverse learning environment, which often leads to a disruption in communication. However, this does not absolve the teacher from their responsibility to lead the student to an understanding of their mistakes. Teachers can inform students about mistakes and maintain a positive environment by providing feedback to students through email correspondence (Ballou and Chinappi, 2015).

The students also noted negative aspects of the application of electronic educational technologies in education. These include: stress, new computer software phobia, Internet addiction, curbing of interests.

In order for electronic technologies in education to make a positive contribution, the following psychological and pedagogical conditions must be observed:

- taking into account the psychological and physiological maker of students;
- a combination of training with a comprehensive teaching and educational process;
- an expedient application of information technologies at each stage of training;
- the use of various means of electronic technology should depend on the goals of education, which are determined by educational institutions;
- the level of knowledge acquisition by students in the subject area of a course should be taken into account when choosing a learning strategy and its computer supporting tools;
- when designing electronic educational technologies, it is necessary to take into account the variability of experience types, age categories, and educational background of students.

It is obvious that in order to use the new opportunities in training, it is necessary to organize, research, and carry out methodical work on introducing modern strategies of the forms and methods of electronic educational technology application in the educational process.

A variety of electronic educational technologies in teaching must be applied through access to global networks, which will allow one to visit necessary websites,

to exchange e-mails, to forward required information websites; passing tests within electronic resources allows students to independently control the level of subject knowledge; electronic textbooks offer the opportunity to receive new information regardless of time and the location of a student; the possibility to play sound, graphic, and video files gives them further capabilities, special aspects of a course study.

The next condition for the effective use of electronic technologies in education is to ensure computer security of the learning process, which is usually construed in two ways: as a way to ensure technological security of information storage and access to it, of operations with various training programs, as well as a system of measures aimed at overcoming or minimizing psychophysiological after-effects of electronic technology application.

3. RESULTS

To determine the effectiveness of the electronic educational technology application, the grades received by the students of academic groups T-12 and T-13 in the first controlled assessment were taken as a basis (Figure 3).

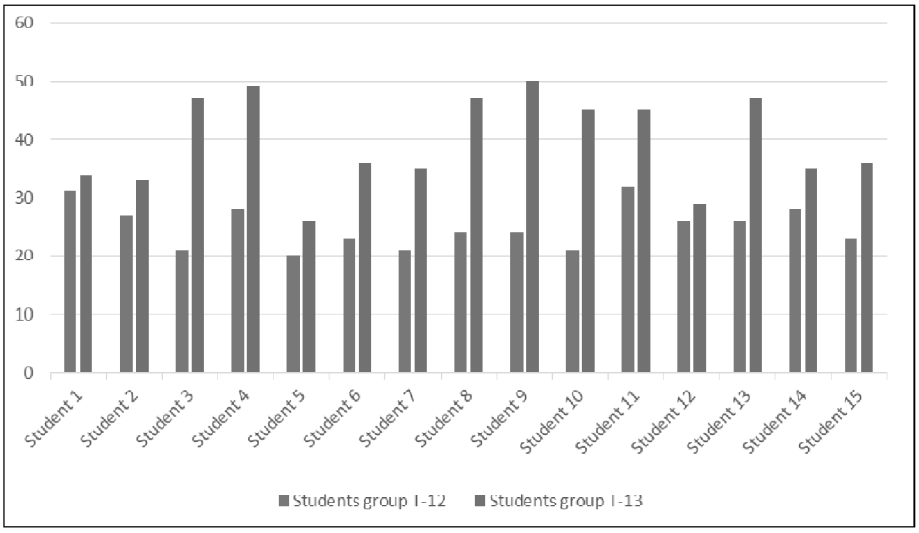

Figure 3: Comparison of the first controlled assessment results of groups T-12 and T-13 in the subject 'Computer Graphics'

In accordance with the results of the 1st controlled assessment on the subject 'Computer Graphics' it was revealed that the average score for the control group (T-12) was 25 points. The average score for the first controlled assessment in the experimental group (T-13) was 39.6 points.

The empirical data obtained in the course of this experiment and the increase in the average score of the experimental group ($\Delta = 14.6$) allow for the conclusion that the mechanisms for implementing the blended learning technology have a certain effectiveness and are quite instrumental in organizing the educational process.

According to the authors, the success of the blended learning implementation by the selected means is premised on a balance between the measure of applying modern e-learning tools and conventional teaching. At the same time, the distribution of balance between conventional teaching and e-learning can be tilted depending on the learning objectives achieved. According to this approach, work on implementing the blended learning technology is based on combined parallel or sequential application of elements of conventional teaching and e-learning organized by the teacher. However, it should not be presumed that the learners' activities become passive; on the contrary, the cooperative effort of the students and the teacher is of the most effective active nature.

In the framework of this experiment, some other electronic educational technologies were used as well:

- distance educational technologies (online learning technologies using the iSpringOnline distance learning environment);
- multimedia technologies (application of interactive presentation materials and iSpring multimedia courses).

Thus, the hypothesis suggesting that the implementation of electronic educational technologies in professional university education on the basis of certain methodological approaches has a higher effectiveness in comparison with conventional teaching, that it is quite effective in the organization of educational process in higher school training of teachers has been experimentally confirmed. It has been proved that such training is quite effective in organizing the educational process in academic training of teachers. The study of EETs is an indispensable element for further successful implementation by teachers in their professional activities.

The use of electronic educational technologies allows one to achieve a sufficiently high level of interaction between a teacher and the students. In these conditions, the teacher has the opportunity to exercise control over the acquisition of knowledge and, in accordance with this, to vary the intensity of the educational material delivery monitoring the efficiency of the learners. In turn, the most favorable conditions for access to educational material in electronic form are fulfilled for students; online interaction is established while working in a distance learning environment. The use of blended learning today has a great potential, while the distribution of conventional studies in combination with elements of e-learning allows a wide variety of means and tools to be used to solve didactic tasks.

4. DISCUSSION

The data obtained during the experimental work testify to the achievement of positive results in the implementation of electronic educational technologies in the university. Taking into account the fact that the experimental work was carried out in academic groups, where teachers of technology and information technology were trained, it is important to note not only the educational effect of the assimilation of these technologies but also the professional aspect that helps to apply the developed competences in the implementation of electronic educational technologies in further professional pedagogical work.

Despite a variety of scientific research where the work is based on the use of other LMSs (MOODLE, Sakai, BlackBoard, etc.), the choice of this system is justified by a number of factors. First of all, this system is domestic and has an intuitive interface for quick mastering by both students and teachers. For the first attempt, a 30-day grace period is available when no monthly fee is charged. Support for the resource operation is provided by a teacher themselves and is reduced to user and educational content management. Presumably, in the near future, the spread of this environment will be increasing in the segment of domestic LMSs.

Summarizing many years of the experience, Michael V. Allen comes to the conclusion that "the true meaning of e-learning is to shape new, more effective behavior in providing individuals and organizations with better ways of acquiring skills and knowledge" (Allen, 2006). This suggests that not only the tools for educational process implementation should be reviewed but also the attitude towards it. "It's about making the changes necessary to achieve a compromise and results. Training is important for success, both individual and corporate. If you continue to do everything as of old, how can you expect improvements?" (Allen, 2006).

Thus, it is essential to constantly search for effective technologies in education. Information technology as a tool will not produce good results without accompanying methodological instructions and educational technologies described in detail. Analysis and generalization of the experimental work has led to the conclusion that the statements and findings obtained by different authors (Higgins, 2010; Falloon, 2011; Means et al., 2013; Burns, 2011; Natarajan, 2005; Porter et al., 2014) are valid also in the framework of the research carried out by the authors.

5. CONCLUSION

Under current conditions of technology development, change and improvement of teaching methods and principles, it is necessary to modernize conventional forms of education, to introduce electronic educational technologies as a powerful tool for solving problems. The study and consideration of methodological approaches to the implementation of electronic educational technologies in professional university training of teachers in the context of ethno-electronic training was accompanied by solving a number of tasks to identify special aspects of

implementing electronic educational technologies in the university, to analyze international practices, to describe methodological approaches to the implementation of electronic educational technologies and the summarization of the experimental work results.

Thus, in course of the study, the following electronic educational technologies were selected for consideration: the blended learning technology, the flipped classroom technology, distance education technologies, interactive technologies. In course of the research, it was proposed to ensure application of electronic educational technologies taking into account the specifics of ethno-electronic training implementation: orientation to the national and cultural specifics in teaching, supported training in specific situations (territory-, climate-, ethnics-related ones, etc.).

The analysis of international best practices in the implementation of electronic educational technologies has made it possible to specify the place of EETs in the system of teacher training in pedagogical university. The conditions of ethno-electronic training, its feature being the organization of learning process with the use of information and communication technologies in electronic information and educational environments and pronounced national and cultural specifics, have determined the priority of the activity approach option in working with students in the NEFU.

Clarifying the concept of the term 'electronic educational technologies' will allow one to ascertain that in this aspect, the concept of educational technologies to a greater degree characterizes the form of educational process organization that allows the application of certain methods and means of teaching and education, as well as one of the approaches within the framework of one or another method or means of instruction used.

The article deals with psychological features of electronic educational technology application in training, such as taking into account the psychological and physiological maker of students; a combination of learning with a comprehensive teaching and educational process, and a number of others. When designing the educational process using electronic educational technologies, the variability of experience types, age categories, and educational backgrounds of learners were taken into account.

It is obvious that in order to use the new opportunities in training, it is necessary to organize, to do research and methodical work on introducing modern strategies of the forms and methods of electronic educational technology application in teaching process. In this regard, it is also necessary to take into consideration the provision of computer security conditions for learning process, which is also construed as a system of measures aimed at overcoming or minimizing the psychophysiological after-effects of the use of electronic technologies.

The considered methodological approaches to the implementation of electronic educational technologies in the professional university training of teachers uphold the prevalence of the activity approach as the leading approach in education, inextricably intertwined with the competency-based approach widely applied in Russia and abroad.

The results of the experimental work on the implementation of electronic educational technologies in the professional university training of teachers in the context of ethno-electronic training have shown their high effectiveness in comparison with conventional teaching, which is confirmed by the difference in quantitative characteristics of the learning outcomes of the students in the control and experimental groups by the grade-rating system. Outcomes to identify the effectiveness of the EET application have been confirmed in other works as well.

These results validate the hypothesis, while the presented mathematical and statistical data are the basis for confirming the assumption empirically. The introduction of EET in higher education is quite effective in teacher training process organization, and the study of EET is necessary for its further introduction by teachers in their professional activities. The transition of many higher educational institutions to the use of EET training will expand the horizons of the educational process beyond classrooms, deepen the involvement of students in the educational process, increase motivation, enhance intra-group interaction among students and, as a result, improve the quality and accessibility of education.

The variety of forms, methods, and means of organizing a training session allows one to fully achieve their goals, and the ability to regulate the degree of integration of electronic and conventional forms of education contributes to the effective implementation of modern educational technologies enabling one to make an individual learning pathway while implementing an activity and student-centered approach.

Inclusion of e-learning technologies in the list of educational technologies for a future teacher to study is an indisputable condition. The education sector as an area that generates the intellectual potential of the country has chances for development only keeping pace with the times.

Practical implications: In the course of experimental work, positive results have been achieved in the use of electronic educational technologies based on the iSpring toolkit. The results allow for the conclusion that the mechanisms for implementation of electronic educational technologies have certain effectiveness and are quite instrumental in organizing the educational process in higher education subject to a balance between conventional teaching and electronic education. This balance should be tilted depending on the training objectives met.

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