

VI International Forum on Teacher Education

Role of Digital Technologies in The Process of Future Teachers' Professional Development

Irina V. Kuzina* (a), Valentina F. Mironycheva (b)

(a), (b) *Federal State Autonomous Educational Institution of Higher Education "National Research Nizhny Novgorod State University. N.I.Lobachevsky" Arzamas branch, 607220 Arzamas city (Russia), 36 Karl Marks street, irinaival52@mail.ru*

Abstract

Digitalizing of Higher pedagogic education and consequent changes taking place in modern society are an important, but understudied, cause for concern. Active implementation of information and communication technologies in almost all spheres of life requires a new approach to the training of the 21st century teacher. This is a teacher who determines students' socialization and adaptation to independent life, meaning that such teacher has to meet all the challenges of the time.

The purpose of the article is to determine the role of digital technologies in the process of future teacher's professional development and the impact on the effectiveness of pedagogical activity of a young specialist in the digital educational environment at school.

The leading methods for determining the role of digital technologies in the process of professional development used in the study are the following: analysis of pedagogical activities, observations, questionnaires, survey and testing. Modern Russian educational space in the last few years is undergoing major changes associated with the development and active implementation of digital technologies in schools, with the transformation of experience in learning and education concerning the younger generation. The goal of Higher education is to train teachers of a new format, able to integrate traditional methods and innovations related to the digitalization of education. The results showed that digital technologies make it possible to achieve goals twice as fast and make teaching more productive. Also, students are more motivated to acquire knowledge.

Keywords: modern education, pedagogical activity, digital technologies, professional formation, digital educational environment, education digitalization.

© 2020 Irina V. Kuzina, Valentina F. Mironycheva

This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Published by Kazan federal university and peer-reviewed under responsibility of IFTE-2020 (VI International Forum on Teacher Education)

* Corresponding author. E-mail: irinaival52@mail.ru

Introduction

The changes taking place in modern society are associated with the rapid digitalization in all spheres of life. Active implementation of information and communication technologies in everyday life requires new approaches to the development of activities that make it possible for a person to be a full-fledged citizen of the state. At present, it is not enough to understand that the world around you is becoming different, that many things, for example, can be done without leaving home, you need to understand, that, for instance, many things can be done without leaving your house, such as self-improvement, accepting the importance of changes and inclusion in digital space development. If an adult is able to analyze and objectively evaluate the advantages of digital services due to his own life experience (the idea of which, in our opinion, is to free up time and distribute it efficiently for productive work), then it can be difficult for a child to understand all the nuances of integrating real and virtual spaces. It is the school in its mission that has one of the most important tasks – socialization and adaptation of the younger generation to independent life, so the teacher must meet all the challenges of the time. In the system of professional development of a teacher, a large role is given to digital technologies as a connecting element between the rapidly changing world towards digitalization and mediatization and forming a personality able to function and develop harmoniously.

Purpose and objectives of the study

The purpose of the research is to determine the role of digital technologies in the process of of a future teachers' professional development and their impact on the effectiveness of young specialists' teaching activities in the digital educational environment at school.

Literature review

Modern Russian educational space is undergoing major changes associated with developing and active implementing digital technologies in schools, with the transformation of experience in learning and education concerning the younger generation. Attempts are being actively made to merge intramural forms of education with virtual ones, and digital schools are being developed for the productive interaction of all participants of the studying process.

Research on the impact of informatization on the education system, conducted by scientists and teachers in the early twenty-first century, shows its effectiveness in solving personal, social, economic and other questions. Thus, Zakharova (2005, 2008), discussing the role of informatization in the learning process, focuses on the need to change the content of education, which is associated with acquiring information

culture. It is not so much about including elements of information and communication technologies in a lesson or an educational event, as about professional training teachers and the qualitative growth of pedagogical professionalism. The scientist connects this with the enrichment of pedagogical education with information and communication technologies, aimed at developing key competencies: social, communicative, informational, cognitive and special. Describing the software means of information technology training, the researcher emphasizes that they open up new opportunities for the teacher to transfer knowledge, and make it possible for a student to perceive them effectively.

Computer telecommunications play an important role in the process of training a modern teacher. Analyzing their capabilities, Petrov (2008) assigns a large role to the Internet, one of the main functions of which is to search for information on queries. It is the Internet, according to the author, that makes it possible to personalize any text, including visual material that begins to acquire a personal character. Telecommunications technologies help us look at the relationship between distance and traditional learning in a different way. The problem of their reasonable ratio depends mainly on how much the teacher knows modern training technologies and techniques for developing didactic materials. A modern teacher should be able to create multimedia textbooks, so one of the tasks of Higher Professional Pedagogic Education is to unify the ways of working with a variety of programs and services, including all the features of the Internet in the learning process. It is important to emphasize that the Internet is considered as an applied means for organizing students' activities, but as a system that has didactic properties and functions. Polat (1997, 2005, 2008), designating the Internet as an information environment, draws attention to the increasing role of telecommunications influence on the integral pedagogical process, including the development of future teachers' professional competencies.

The works of Ivanova and Osmolovskaya (2011), Osmolovskaya (2010) are devoted to the theoretical foundations of training in the information society. They are based on the statement that in conditions when information becomes publicly available, the task of the teacher is to help the student to master knowledge independently. The need to develop the student's ability to solve a variety of problems that are associated with the search, interpretation and application of information in practice, necessitates changes in the attitude towards teacher training. According to the researchers, the learning process in the information society is a purposeful interaction between a teacher and a student, taking place in the information and educational environment of the lesson.

Chernobay (2014) in her work "Lesson preparation technology in the modern information educational environment" shows the advantages of using ICT tools for the learning process, among the variety of which the increase in interest and motivation to the subject, including independent work, are highlighted;

indicating the change in the role of didactic principles of lesson preparation in the information educational environment, the researcher sets the task connected with preparing a high-class specialist who meets the challenges of the time.

Modern researchers, taking into account the experience of implementing digital technologies in the system of national education, note the importance of training teachers to work under the new conditions of integrating distance and traditional learning. Thus, Kolykhmatov (2019) made an attempt to define the main requirements for developing the professional competencies for a teacher, which included digital culture. The scientist is convinced that a modern teacher should be able to manage the process of implementing digital technologies in the educational space. In his opinion, a teacher who understands the importance of professional development can reduce the gap between a rapidly developing society and a school that prepares the younger generation for independent adult life.

Thus, being a global social phenomenon and a rapid process of transforming the surrounding world, digitalization poses one of the most important tasks for Higher education – preparing a new format of teacher capable of reasonable and optimal integration of traditional methods and innovations related to digital technologies.

Methodology

The leading methods for determining the role of digital technologies in the process of future teachers' professional development are the following: studying psychological, pedagogic and methodological literature, analyzing pedagogical activities, current observation, questionnaires, and survey and testing.

The experiment was run at the Teachers' Continuous Professional Development Centre, Lobachevsky State University of Nizhny Novgorod, Arzamas branch.

To determine the role of digital technologies in the process of professional development and their impact on the effectiveness of teaching activities, a linear pedagogical experiment was conducted.

At the initial stage of the experiment, a group of senior students receiving Bachelor's degree in the field of Pedagogic education was selected. It should be taken into consideration that the participants carried out teaching activities in the educational environment of the school during their practical training, so they already had an idea about the specifics of the profession.

At the ascertaining stage, a questionnaire was developed, including questions that make it possible to identify the students' attitude towards digitalization in the broad sense of understanding, to digital

educational technologies; they helped to determine the role of digital technologies for professional development.

At the formative experiment stage, within the framework of the Teachers' Continuous Professional Development Centre, "Prospects for the national education system development" theoretical and practical course was developed and implemented, focusing on the forming digital literacy – classes were held using a modern interactive multimedia complex – Teach Touch.

The control stage of the experiment makes it possible to compare the performance of the course participants and make the following conclusion: training in a modern educational digital environment contributes to the development of a future teacher who accepts and understands the role of digital technologies and is able to use them in practice continuously.

Results

The linear time experiment was held for three months, and 65 graduate students studying in the field of Pedagogical education took part in it. At the control stage, future teachers were asked to answer 4 questions of the questionnaire, aimed at identifying the understanding of digitalization process in all spheres of society and determining the role of digital technologies for future teachers' professional development (and in the first two questions, they were offered options for answers, the wording of which was taken from various comments on the discussion of digitalization; from blogs and chats, where people of different professions expressed their opinions on the question of digitalizing the national education system):

1. What is digitalization in a broad sense? From the given options, choose one that you think reflects the essence of this phenomenon: a step into the future, the lack of paper documents, standardization, reduced mental activity, universal identification, the introduction of digital technologies in different areas of life, lack of creativity, low socialization, a means of achieving results, health problems, the emergence of new professions.
2. Digital technologies are... Choose one of the most important definitions in your opinion: a way to organize a modern educational environment; computers, tablets, panels; studying the material independently; virtual systems; specialized programs; the Internet as a means of studying; online services; computer and the Internet; automated learning technologies.
3. What is the significance of digital technologies for the professional development of future teachers?

4. Can you say that during your teaching activities you combined traditional teaching methods with digital technologies?

The results of the survey revealed serious problems related to understanding what digitalization is: most often (38 people – 58%) of the proposed options chose negatively colored ones, thereby showing their attitude towards the process as a whole. Digital technologies were identified with computers and the Internet by 26% of graduates (17 people), and 32% (21 people) chose automated learning technologies and related to programming. 42% of the experiment participants (27 people) left the first two questions unanswered, referring to the fact that "they did not seriously think about this question" and believe that "the school should remain an original social institution, in which there is no place for digitalization".

The third question also caused difficulties: students were not able to determine the significance of digital technologies for professional development. It should be noted that none of the participants identified digital technologies with information and communication and media technologies, which was already an indicator of understanding the difference between them.

The fourth question was answered in the affirmative by 19% (12 people) of future teachers; 35% (23 people) preferred traditional teaching methods, and 46% (30 people) pointed to the importance of developing multimedia presentations to implement the principle of visibility in teaching.

The formative stage is aimed at forming digital literacy among future teachers, the degree of development, in its turn, depends on the productivity of work in the modern educational environment of the institution. For this purpose, graduates were offered to take the "Prospects for the national education system development" practical course, which consists of ten classes in the classrooms of the Centre, where modern interactive multimedia equipment is installed. It is important to note that no special tasks aimed at studying the theory of digitalization or digital technologies were included in the course plan. The purpose of the classes was to ensure that the students of the course could actively use all the features of the TeachTouch complex. Its main distinguishing feature is its versatility: it integrates both traditional, proven for centuries, learning tools (blackboard and chalk), and digital (computer programs; operative Internet access, therefore, using educational resources and much more). Undergraduate students had the opportunity not only to listen to visualized lectures, analyze regulatory documents and scientific articles, but also to carry out projects, actively using all the possibilities of interactive multimedia technology. As a result, through various activities and direct work with modern equipment, the students developed an understanding of the essence and nature of digitalization in the broad sense, digital technologies, and their role in forming professional competencies.

The effectiveness of the developed course was confirmed by a survey that took place at the control stage of the experiment. Students who have mastered the "Prospects for the national education system development" program were asked to answer questions they already know. Nothing was modified in the wording or in the answers to the first two questions. It was important to compare how the attitude to the obvious (digitalization and digital technologies in professional teaching) changed.

Of the 65 graduates, 89% (58 people) wrote comments to the questionnaire itself, noting that for the first two questions, the answer options practically did not reflect "the essence of digitalization and digital technologies", that "most of the answer options are of everyday nature". 11% (7 people) suggested reviewing the answers, excluding all those that "obviously contain negative information". Future teachers motivated this by saying that "if a person does not understand or accept digitalization as a result of the society development or if they fill in the questionnaire in bad mood, they intuitively choose an answer that reflects their attitude to the environment, thus being biased".

Comments and clarifications showed the interest of all participants in the experiment. It was important for them, before giving specific answers to the questions, to express their professional position in relation to the document they were working on (the questionnaire itself).

In this regard, it can be stated that the analysis of the survey results showed that all 100% of graduate students (65 people) believe that digitalization is the introduction of digital technologies in different spheres of life. 83% (54 people) left the answer without argument. 3% of respondents (2 people) clarified that digitalization is "first of all, a process aimed at the transformation of society." 6% (4 people) associated digitalization in the broad sense of its understanding with economic activity, with the processing of large amounts of information. 7% (5 people) stressed that digitalization helps us to reach a more complex technological level of the economy.

Thus, it is possible to state that undergraduate students were able to separate themselves from their mood and negative statements about digitalization and formulate objective judgments.

Analysis of the answers to the second question shows that 68% of the participants (44 people) understand the differences between digital and information-and-communication technologies, but still emphasize that "it is not quite correct to limit yourself to one of the answers given." 26% (17 people) believe that digital technologies are a way to organize a modern educational environment; 6% (4 people) - that this is a machine learning technology.

The answers to the third question show that graduates were able to determine the significance of digital technologies for the professional development. Thus, 40% (26 people) believe that "modern school requires training for a modern teacher"; "the teacher should be able to use all modern teaching tools and create understandable, scientifically reliable and attractive didactic material"; "the teacher should not be more stupid than the student, he should go a hundred steps ahead". 35% of the experiment participants (23 people) see the significance of digital technologies in the "teacher's mobility", in his "ability to professional development". 12% (8 people) believe that at present "teachers should not only have a broad outlook, but be able to manage time, which is almost impossible without digital technologies" According to another 12% of the participants (8 people), digital technologies are "artificially isolated from computer science as a field of scientific knowledge and therefore cannot be independent". They emphasize that "time has changed the very approach to the concept", so now "it is appropriate to talk about digital technologies in the context of modernizing society."

The fourth question did not reveal any serious problems. 94% of students (61 people) analyzed their own teaching experience during teaching practice, and came to the conclusion that "they intuitively did everything correctly"; "were able to integrate digital technologies into the lesson"; "managed to find the «happy medium»". 6% of the participants (4 people) considered that during the pedagogic practice they "preferred traditional teaching methods", because they "did not understand the advantages of digital technologies in implementing the principles of clarity and science".

Thus, it can be concluded that the classes held in the Centre helped graduate students to understand the problems of digitalization, including in the education system.

Discussions

The linear experiment makes it possible to determine the level of Pedagogic education graduate students' preparedness for working in the digital educational environment.

The "Prospects for the national education system development" course, held in classrooms with modern interactive multimedia equipment of the Centre, was one of the important links in the awareness of the need for continuous professional development. The classes were designed in such a way that students not only understood that the modern educational space is currently inseparable from the process of digitalization, but also actively use the opportunities of digital technologies in solving professional tasks.

Questionnaires at the control and ascertaining stages of the experiment revealed dynamics in the awareness of the importance of digital technologies for the professional development. The results of the second survey

show that digital literacy development is one of the links in the process of forming professional competencies and, to some extent, a mechanism for integrating traditional teaching methods and digital technologies.

The experiment also reveals that the questionnaire needs to increase the number of answer options for the first and second questions. Moreover, it is advisable to divide them into three types: positively, negatively and neutrally emotionally colored. This was discussed at formative and ascertaining stages.

In general, it is possible to conclude that a teacher who meets the challenges of the time should be trained under the conditions close to real pedagogical activity.

Conclusion

The experiment was caused by the need to determine the role of digital technologies in the process of future teachers' professional development and their impact on forming professional competencies in digital educational environment. It was important to understand how graduates studying in the field of Pedagogic education are integrated into the real educational process of the school; whether they are aware that the modern educational space is changing dynamically.

Analysis of psychological and pedagogic scientific literature helped to formulate the purpose of the experiment and select effective research methods. The result of the study was a questionnaire and a theoretical and "Prospects for the national education system development" practical course, implemented in the classrooms Centre. The classes were designed in such a way that the participants could actively use digital technologies in various activities in a real natural environment. Thus, indirectly, through the use of modern interactive multimedia equipment, graduate students, future subject teachers, developed digital literacy as an integral quality of a person living in the 21st century.

During the experiment, it was experimentally concluded that, first, digital technologies make it possible to achieve the goals twice as fast; secondly, they make learning (and teaching as well) productive. It is important that all subjects of the educational process are more motivated to acquire knowledge.

The survey conducted at the ascertaining stage of the experiment led to the conclusion that digital technologies play a worldview role and contribute to the adaptation of a young specialist to new professional activities in the context of global digitalization of society.

References

- Chernobay, Ye. V. (2014). *Lesson preparation technology in a modern information educational environment*. Moscow: Enlightenment.
- Ivanova, Ye. O., & Osmolovskaya, I. M. (2011). *Theory of education in the information society*. Moscow: Education.
- Kolykhmatov, V. I. (2019). Professional development of a teacher in the context of education digitalization. *Scientific Notes of The Lesgaft National State University*, 8(174), 91-94.
- Kuzina, I. V., & Mironycheva, V. F. (2013). Media education in the context of the implementation of the FGOS. *Nizhny Novgorod education*, 3, 108-112.
- Osmolovskaya, I. M. (2010). Training in the educational information environment. *Head teacher*, 5(148), 64-68.
- Petrov, A. Ye. (2008). What is telecommunications? In Ye. S. Polat (Ed.), *New pedagogical and information technologies in the education system* (pp. 146-183). Moscow: «Academy» publishing center.
- Polat, Ye. S. (1997). Technology of telecommunication projects. *Science and School*, 4, 8-13.
- Polat, Ye. S. (2005). To the problem of determining the effectiveness of distance learning. *Open Education*, 3, 71-77.
- Polat, Ye. S. (2008). Didactic properties and functions of the Internet. In Ye. S. Polat (Ed.), *New pedagogical and information technologies in the education system* (pp.183-197). Moscow: «Academy» publishing center.
- Zakharova, I. G. (2005). Schooling in the era of informatization. *Education and Science*, 3(33), 63-69.
- Zakharova, I. G. (2008). *Information technologies in education*. Moscow: «Academy» publishing center.