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The Ways of Using the Resources of the Digital Educational Environment in Preparing a Primary School Teacher at a University

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Abstract

The importance of the study rises from the need to change training of future primary school teachers at the university in connection with updating the content, changing methods, forms and means of training in the conditions of digitalization of education and the development of the digital educational environment.

This article aims at identifying the opportunities and problems of using resources of digital educational environment of the university while training primary school teachers.

The research methods applied are analysis of scientific publications on the problem of digitalization of education; questionnaires of students-future primary school teachers and in-service primary school teachers; comparative research methods.

The experiment involved 88 full-time university students studying the course 44.03.01 Pedagogical education (primary education) and 22 of primary school teachers in Cherepovets.

The article underlines that currently, the priority is given to mixed learning which involves combining learning in the classroom and electronic interaction between the teacher and the student.

The results of the study show that the process of digitalization in education is contradictory and ambiguous from the resource and methodological points of view. The teaching community, parents and employers point at the risks of reducing the quality of education in the digital environment.

Positive effects of using the resources of the digital educational environment appear if the student is motivated to study, has the ability to self-education, and is able to differentiate digital resources.

Keywords: digitalization in education, digital educational environment, digital educational resources, digital technologies, digital literacy.

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Introduction

In recent years, there have been significant changes in the equipment of schools with computer and multimedia equipment, and some progress has been made in the development of software for the educational process in primary schools. The Federal state educational standards of primary general education indicate the importance of preparing younger students for life and activity in the information society.

Solving the problems of informatization of primary education is the professional responsibility of a primary school teacher. Only the resource usage of all subjects in elementary school ensures the implementation of the requirements of the standard primary education and ICT as means of formation of students' universal learning activities which ensure the mastery of key competencies that form the basis of the ability to learn.

The primary school teacher should be prepared to update the content of education, change methods, forms and means of education in the context of informatization of education. In other words, the teacher should be ready for professional activity in a dynamically developing digital educational environment.

The professional standard of a teacher states that a teacher must possess ICT competences and be able to form ICT-related skills in children (Order of the Ministry of labor of Russia, 2013).

There are competencies that a bachelor's degree graduate should have which are enumerated in the Federal state educational standards of higher education (The Ministry of education of Russia, 2018). They are the ability to participate in the development of basic and additional educational programs, to develop their individual components, including the use of ICT.

Thus, it is objectively relevant to have a high professional level in the field of working with digital devices, knowledge of pedagogical technologies and methods of using information educational resources for modern primary school teachers. In this regard, there is a need to transform training of future primary school teachers at the university.

Purpose and objectives of the study

The purpose of the study is to identify opportunities and problems of using the resources of the digital educational environment of the University in the preparation of primary school teachers.

Literature review

The analysis of scientific literature has shown that there are a significant number of studies devoted to the issues of professional training of future teachers in the conditions of informatization of education. The issues of professional training of future teachers in the conditions of informatization of education are discussed in the works of Agibova (2010), Baklanova (2013), Barabanova, Trofimov, and Trofimova (2018), Bosova (2009), Chernobay (2014), Gikas and Grant (2013), Mishchenko (2003) and others.

The studies of Bosova (2009), Molokova (2008), Mylova (2007), Ustyuzhanina and Evsyukov (2018), Zaitseva (2011) deserve particular attention.

Bosova (2009) offers general recommendations for preparing primary school teachers to teach computer science to primary school children. Mylova (2007) emphasizes that it is necessary to take into account the specifics of the future profession in the training of primary school teachers. The methodological system developed by her for teaching computer science to students is based on their solving various types of educational and methodological problems. In the research of Zaitseva (2011) ICT competence of primary school teachers is considered in three aspects. They are: the universal personal competence in higher education; the part of the general professional pedagogical competence and the methodological competence as the special professional competence of primary school teachers. The research of Molokova (2008) is devoted to solving the problem of improving the training of primary school teachers in the use of didactic capabilities of Informatization tools. Baklanova (2013) analyzes the problem of forming the readiness of future primary school teachers to use digital educational resources. In the work of Mishchenko (2003) the focus is on the formation of professional readiness of future primary school teachers to use information technologies in teaching younger students.

It should be noted that in these works the main attention is paid to the theoretical and methodological training of students in computer science which allows future teachers to further use information technology in the educational process of primary schools. However these studies did not analyze the search for ways to use the resources of the digital educational environment in the preparation of a future primary school teacher at the university.

Digitalization of education changes the content of courses taught at the university as well as the way information is presented. It's not presentations or videos only. These are direct connections to information networks, databases and the use of social networks. Electronic publications and electronic versions of textbooks are becoming relevant in the training of the future primary school teacher.

The current stage of digitalization in education is to immerse all its subjects in the digital educational environment. The digital educational environment is an open set of information systems designed to support various tasks of the educational process.

At the same time the issue of the components of the digital educational environment is debatable. Many scientists study the problems of structuring digital educational environments. The researcher Chernobay (2014) notes that the digital educational environment should include a value-semantic component. It assumes the goals and objectives of the organization of the educational process in the conditions of the digital educational environment. The next component is represented by a software and methodological block that assumes normative support for the functioning of the educational system. The required component is the information and knowledge one which includes a set of competencies of the trainee. The communication component provides interaction of subjects of the educational process in the digital educational environment. The unquestionable component is a technology one that includes modern learning tools in such environment.

At the same time, we state the fact that the system of training future teachers lags behind the realities of modern society and schools. Many teachers realize that teachers are trained at best for the present but not for the future in the pedagogical areas of higher education. We need to focus on the changes that must occur in the system of training of future primary school teachers in order for the graduate to be competent in the field of using information technologies for the productive use of the digital educational environment in working with students.

Access to digital technologies is a relevant task of digital transformation of education. Based on this task we analyzed the resources of the digital educational environment of a university and identified a number of digital technologies that have a pronounced pedagogical potential in the preparation of primary school teacher.

Thus cloud technologies allow us to store a large amount of information and have convenient network access to information resources which can be used with the least management effort. The popularity of the cloud for creating an information environment is determined by the following characteristics: scalability, self-service, universal network access, pooling resources, and programmability (Agibova, 2010).

Online courses are mass educational training courses that are applied remotely. They help students to study in any form that is convenient for them and allow them to gain knowledge in a specific field of study. In Russia online courses are available on such educational platforms as "Open education" and "One window" (online.edu.ru), "We. Study", "Emdesell", "GetCourse", "Justclick", "Innovationbro", "Memberlux", "Zenclass", etc. These platforms contain mass online courses of leading Russian universities. They provide

the opportunity to register for these courses and study; to get a certificate and submit it to your University for transfer in the relevant discipline. The initiator of this project is "Open education" which offers its users more than 250 training courses in various disciplines (Analytical report of the Digital expert group, 2017).

Online learning involves synchronous and asynchronous learning in a digital educational environment. Synchronous learning involves electronic interaction between a student and a teacher at a specific time. When using asynchronous learning the educator puts theoretical materials and course assignments on the Internet and students work at a convenient time for them.

Currently, the priority is given to mixed learning which involves combining learning in the classroom and electronic interaction between the educator and the student. Thus, modern students and educators have unlimited opportunities to develop their educational space and share it. But we note that the huge potential of digital technologies which is in demand in education is not fully used. The dominant reason is the lack of digital literacy of higher school teachers which leads to the emergence of a digital divide and as a result to the need to overcome it.

Methodology

The research methods used were the analysis of scientific publications on the problem of digitalization of education to clarify the conceptual apparatus and to determine the methodological basis and theoretical base of the study; questionnaires of students as future primary school teachers and practicing primary school teachers to find out their readiness to use digital educational resources in teaching activities; comparative research method to identify common and individual positions of teachers and students on the issues of digitalization of education.

The experimental base of the research is the Institute of psychology and pedagogy of Cherepovets State University. The experiment involved 88 full-time university students, studying the course 44.03.01 Pedagogical education (primary education) and 22 teachers of primary classes from schools in Cherepovets.

The first stage is the analysis of psychological and pedagogical literature on the formation of professional readiness of future teachers to use the digital educational environment in the educational process. The second stage is to conduct a survey of students and teachers, systematization and generalization of theoretical and practical material on the research problem. The third stage is statistical data processing and systematization of research results.

Results

We conducted the study into the readiness of students as future teachers to work in the digital environment. Students were offered a questionnaire including 26 positions. Questions were offered for self-analysis of competencies in the field of information and communication technologies. There was carried out the analysis of the formation of user and subject-pedagogical ICT competencies and there were identified the opportunities and problems of using the resources of the digital educational environment of the university in the preparation of primary school teachers.

Analysis of the survey results showed that the total number of students who have basic computer and Internet skills is quite high. 71 % of respondents said that they consider themselves confident users, have a computer and software necessary for professional activities. All students who took part in the survey noted that they use ICT on a daily basis, mainly for preparing for classes (87.5% of respondents indicated this), for self-education (71%), directly during classes at the University (54%), as well as for communication with educators and other students (100%), to improve their own digital competence (50%).

However, there are some single positions in students' answers. Thus 18% of first- and second-year students consider themselves novice users while third- and fourth-year students show 29%. 21% of third- and fourth-year students reported a lack of digital literacy which is expressed in a lack of understanding of how digital technology and human interaction occurs, how digital information is distributed and what constitutes a network community as well as the features of social media. In comparison only 14% of undergraduates admit their lack of digital literacy. These differences cannot be considered critical but they reflect one essential feature of modern life and education: the informatization of public life is developing so rapidly that even second-year students who are not fundamentally different in age from third-year students have a large subjective social and educational experience of using digital technology.

The rating of technical means that future primary school teachers are more proficient in is as follows. The leading positions are occupied by such traditional means as TV, personal computer, printer, Internet access, scanner, DVD player. Students are less able to use a video projector, interactive whiteboard, or computer class. In some cases, students named special digital devices (digital microscope, sensors, measuring devices), interactive tablet, etc. But these devices are already widely used in teaching younger students.

These data indicates once again that the education system is still on the path of "digital" restructuring, as evidenced by foreign researchers (Gikas & Grant, 2013; Newman, 2017). There are about a quarter of teachers who use ICT seldom in educational organizations.

The process of digitalization of education in our country is not easy, first of all, from a resource and methodological point of view. At the same time it is worth noting that Russian universities try to introduce digital technologies into the educational process (Barabanova et al., 2018) though there are financial and technological difficulties.

The modern student is a "digital person" who already lives in a digital environment. Gadgets, tablets, smartphones, websites, IP protocols, web services, interfaces, etc. are simple and understandable everyday things for him. The main source of information, entertainment, and often the place of professional activity is the Internet for the modern student. In this case the university should be ready to use these properties of the modern student to organize effective training.

All students participating in the survey noted that they have the necessary electronic educational resources to solve educational tasks. 80% rate their knowledge of digital educational environment as sufficient. According to the respondents the use of ICT and e-learning resources in teaching promotes better learning (59% of first- and second-year students and 62% of third- and fourth-year students), reduces the time to prepare for the lesson (51% of students of first- and second-year students and 46% of students of third- and fourth-year students); increases interest in the subject (62% of all students), promotes computer literacy (57% of students of first- and second-year students and 50% of the students of third- and fourth-year students) with the opportunity to gain additional knowledge on the subject (49% of younger students and 42% of students of third- and fourth-year students).

Assessing the university's capabilities the most important obstacles to the use of ICT and electronic educational resources in education future primary school teachers consider the following: insufficient technical equipment of classrooms at the university (87.5%); lack of Internet at the University (33%); insufficient material support (46%).

The university's website (100% of students), electronic library system (71% of first- and second-year students and 87.5% of third- and fourth-year students), distance learning system (75%) and, to a lesser extent, electronic student portfolio (22% of first- and second-year students and 33% of third- and fourth-year students) are more popular among the components of the university's digital educational environment. 83% of the first-year and the fourth-year students regularly work with components of the university's digital educational environment. In the course of the study the contradiction between the objective need to train a future primary school teacher in the use of ICT, the ability to methodically correctly apply the digital educational resources for effective teaching of students and the attitude to the digitalization of education on the part of the professional community was clearly revealed. There is some distrust among

teachers, parents, and employers about the digitalization of education and the changes it entails. Distrust is associated with three parameters – the quality of education of a future professional, personal career growth and human well-being.

For example distrust of the quality of education of a future teacher is associated with poor motivation, the student's unwillingness to be responsible for the results of their training, and the danger of "digital dependence" on external information to the detriment of the knowledge. The modern student is sure that he will find everything necessary on the Internet "when it is necessary". Of course in fully digital education there are possible consequences of communication "through the machine": poorly developed speech, psychological problems in interpersonal communication, "Internet education" (due to the freedom to choose sources of information, the spiritual and moral side of the individual, civil position, worldview, beliefs, etc.) (Ustyuzhanina & Evsyukov, 2018). These qualities are unacceptable for a teacher because he works with children forms their personality

Students adequately assess these risks, so more than 90 % of all students surveyed believe that electronic educational resources cannot be the only means to train teachers, and 40 % admit electronic educational resources and traditional means equivalent in their effectiveness in terms of the formation of professional competencies required for primary school teachers. At the same time part of the future teacher's training may well be carried out in a digital environment. The teacher's ability to work with devices and resources owned by children and to master new technical means is also important

Therefore, their application in the student environment is not only useful but also necessary. In the course of working with students at lectures, practical classes, consultations, and course work we monitored students' use of digital resources and ICT. Observations show that the effects of digital education appear in cases when the student has a high motivation to master professional knowledge, formed skills of self-organization of educational activities, adequate self-esteem, the ability to find the necessary information in various sources, and not only using the Internet.

In this case the future primary school teacher develops not only the skills to work with digital devices but also with other educational resources; skills related to professional self-development and self-education. At the same time it is possible to get an education by building an individual educational trajectory that meets their interests and needs.

However, the information educational trajectory is a significant problem for the university. The curriculum has mandatory and variable subjects the set of which is also limited. It is important to ensure knowledge

control when learning remotely. Therefore, the current preference is for mixed learning combining traditional face - to-face and online and offline learning. Fully distance learning is more of a forced option.

In our opinion, a mixed option is possible for teacher education only since it is impossible to learn how to work with children remotely even with the help of telecommunications networks. Mixed learning assumes that the study of theoretical material is mainly carried out independently (in the classroom or outside of it) and practical skills are formed mainly in practical classes held in the classroom using interactive forms of learning and in practice in general education organizations. In this case the educator is assigned the role of a tutor, directing, advising and organizing educational situations.

However, a student who uses technologies is just the beginning. In a digital university, it should be possible to independently form an educational route by the student himself, choosing the time, pace, and sequence of passing the educational material. To do this, the University should develop educational content that includes digital learning environment resources, self-monitoring and control tools, links to electronic library system, etc. The university should provide a computer-based place of study and tutor support.

The next important aspect that affects learning outcomes is the student's ability to self-organize and take responsibility for their learning. In mixed learning a significant part of the theoretical material is studied by the student independently. This raises the question of the quality of knowledge acquisition, the ability to use them in solving practical professional tasks related to the preparation and conduct of lessons, extracurricular activities, and the selection of teaching technologies, education and development of pupils.

The results of a survey of working primary school teachers also showed that few teachers have pedagogical techniques for organizing students' activities using digital technologies and resources. For example only 14% of teachers said that they use "cloud" technologies for professional activities.

100% of working teachers answered that they consider themselves confident users, have a computer and software necessary for professional activities, but 68 % noted their awareness of the digital educational environment of the school as insufficient.

86% of respondents believe that the school is provided with all the necessary software and it is enough for work. Information and communication technologies and electronic educational resources used by teachers (100% of respondents) primarily for presenting educational information (demonstration objects, phenomena and processes, etc.). But these resources are used less often for independent work of pupils on studying of a new material (reference providing all types of classes; modeling of objects, phenomena and processes, etc.) (45% of respondents). Information and communication technologies and electronic

educational resources are used to automate the monitoring and evaluation of pupils' knowledge (conducting tests, tests, etc.) (45% noted) and for practical work of pupils when fixing the material (forming skills and abilities of various types, solving problems, laboratory work, etc.) (32% of respondents).

In general, 77% believe that the use of information and communication technologies and electronic educational resources in teaching reduces the time for preparing a teacher for a lesson and gives pupils the opportunity to gain additional knowledge on the subject. 54.5% of teachers believe that this increases pupils' interest in the subject and 45 % note their stimulating function in learning material.

Opinions are divided on the effectiveness of electronic educational resources. Thus 50% of teachers believe that e-learning resources and traditional tools are the same in efficiency, while the other 50% believe that e-learning resources are significantly more effective.

In the classroom and in extracurricular activities, teachers (45%) give their pupils tasks that require the use of electronic educational resources that are an Appendix to the used textbook, educational and methodological kit and the use of resources posted on Federal educational websites (32%).

The Internet is used mainly for communication with participants in the educational process (pupils, parents, colleagues) (68% of respondents); search for necessary information (100% of teachers); support for distance learning of schoolchildren (54,5% of respondents); professional development in remote form (68% of teachers).

The main factors which motivate teachers to use information and communication technologies and electronic educational resources in teaching are the following. The first one is that use opens up opportunities for professional development – 68% of respondents. The second one is that teachers believe that any modern teacher should use information and communication technologies and electronic educational resources in the educational process – 77% of respondents. The third one is that it is a requirement of Federal state educational standards – 68% of respondents.

Note some features of using the resources of the digital educational environment in the activities of students and teachers. A comparison of the results of the study of students and teachers of primary schools showed the following.

Students and teachers use the resources of the digital educational environment widely to interact with each other, with colleagues, with teachers as well as to master the university's academic disciplines and teach academic subjects in primary school. For the most part teachers and students agree that the resources of the

digital educational environment contribute to the better assimilation of educational material, stimulate cognitive interest. But students widely use digital resources to organize independent work but primary school teachers are much less likely to use them for independent work of pupils.

Discussions

The study has shown that there are used different ways of application the resources of the digital educational environment at a university. The most common ones are the university's website, electronic library system, distance learning system. Less popular is electronic student portfolio.

Most students participating in the survey note the positive effects of electronic educational resources in solving educational tasks, in reducing the time to prepare for the lesson, in increasing interest in the subject, in promoting computer literacy and others.

Students widely use digital resources to organize independent work. As well as students teachers participating in the research believe that the use of information and communication technologies and electronic educational resources in teaching reduces the time for preparing a teacher for a lesson and gives pupils the opportunity to gain additional knowledge on the subject, increases pupils' interest in the subject.

Working primary school teachers use information and communication technologies and electronic educational resources for presenting educational information, for automatic testing of pupils' knowledge, for practical work of pupils but they use them for organization pupils' independent work very seldom.

The study has defined need for a combination of traditional face-to-face and online and offline learning with using the resources of the digital educational environment at a university.

Conclusion

The results of the study show that the process of digitalization in education is contradictory and ambiguous from the resource and methodological points of view. There is a lack of confidence in the digitalization of education and related changes in the structure of the educational process at the university in the teaching community, among parents and employers. There are risks of reducing the quality of education when using the digital environment. Although there is the large potential of digital technology which is in demand in education it is not fully used. This is due to the lack of digital literacy of teachers. Access to digital technologies is an urgent task of digital transformation of education. Positive effects of using the resources of the digital educational environment appear if the student is motivated to study; in case if they have the ability to self-education and to differentiate digital resources. Using the resources of the digital educational

environment, students and educators of the university get unlimited opportunities to develop their educational space and share it.

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