A Formation of IT and Digital Competence in High School: A Contemporary State and Prospects

Ekaterina Budnik[1], Polina Veselova[2]

Moscow State Linguistic University, Russian Federation[1, 2]

Abstract

The rapid growth in the number of digital resources and devices over the past decade has practically shaped the landscape of a new era - the era of digital devices, resources and services, on the one hand, and the deployment of a global information media environment on the other. At the same time, there is an increase in the influence of the global media environment on humanity as a system of broadcasting, transmission, accumulation, creation and dissemination of knowledge in the information society. Carrying out a digitalization policy in modern conditions requires higher education to develop new ways of organizing training for a new formation training personnel. Moreover, the state should take the necessary organizational and incentive measures for their speedy widespread implementation. The study of research works in the field of digital education, as well as conversations with teachers and students, made it possible to determine that among the problems associated with training personnel for the digital environment, the leading ones are: the ongoing changes in the cognitive capabilities of modern young people; the imperfection of the organization and methods of teaching digital competencies; the lag of the level of professional training of the teaching staff of educational organizations from the speed of development of digital technologies and some others. To solve these problems, the authors of the article summarize the positive experience of the activities of domestic and foreign enterprises and educational organizations in the formation of digital competencies in young people. The characteristic of modern trends in corporate training in digital competencies is given. Their correlation with the cognitive and behavioural characteristics of the younger generation is determined. The author identifies the most effective ways of developing competencies in digital technologies, depending on the psychological characteristics of modern youth. Given the impossibility of meeting the modern digital labour market's needs only by specialized institutions, proposals are made for organizing a digital environment for students in other educational organizations.

Keywords: Digital, IT competence, high education.

1. Introduction

In the 21st century, education, like, indeed, all other spheres of public life, was overwhelmed by a wave of digitalization, which, if properly understood, provided enormous advantages for both teachers and students: the level of academic mobility has sharply increased, education in leading universities of the world has become available from almost any points of the globe, the educational environment has embraced such new forms of education as video consultations, webinars and online courses, a digital community has formed in social networks and media without borders between states and people. Digital classroom, digital school have become a reality. The very concept of the school and the university as a “building” in which students learn while sitting in classrooms has changed. According to the international creative agency "We Are Social", the role of digital technology in our lives has grown incredibly: in 2020, the number of people worldwide using the Internet has grown to 4.54 billion, which is 7 per cent (298 million new users) compared with January 2019 (You can see this in Infographic 1.) [5]. All this was impossible to imagine 10 years ago.

Infogr.1. Digital around the world in 2020 (from wearesocial.com).

However, a modern university teacher as a source of obtaining new knowledge today, unfortunately, cannot withstand competition with the constantly updated information environment of the Internet. Also, as noted by Sharma, the students themselves are more confident in terms of searching for new information in open Internet sources, and, accordingly, more demanding of their teachers [10].
In this regard, many employers in the field of higher education make ever higher demands on specialists, expecting that their employees will have the skills that allow them to quickly navigate in the constantly improving digital environment, to know how to apply the newest and most effective technologies in teaching and also be an active participant in the life of the digital professional community.
Therefore, it seems to us that today the question of the formation and development of digital competencies of a modern university teacher is very relevant, on which the level of training of future specialists directly depends.

2. Research results

Ideally, university teachers should be active participants in the process of interaction "environment - teacher", introduce variety and interest in the activities of students, constantly improve. However, the massive transition to distance learning due to the Covid-19 pandemic has demonstrated that not all teachers understand how to use various components of electronic information and the educational environment to organize the educational process. Teachers gained access to a wide range of digital technologies, but many still experienced serious difficulties in organizing the learning process associated with large volumes of new information and low awareness of how to competently apply various digital tools and electronic didactic resources in practice, create electronic educational content, organize the conduct of synchronous and asynchronous classes.
In our opinion, the electronic information and educational environment of the university will harmoniously exist, and its main purpose will be realized only in the case of the activity of each teacher, his constant interaction as a subject of educational activity with other subjects within this environment, the willingness and ability to help, guide and coordinate the activities of students.
Professional training of university teachers should be carried out by modern trends in the socio-economic development of Russia - the development of the digital economy and the digital transformation of the educational environment. Therefore, part of the university's priority policy should be the transformation of the educational environment of the university following digital technologies, as well as the formation and development of digital competencies of the teaching staff.
Currently, the processes of digital transformation in the field of education are regulated by two main documents: the project "Modern digital educational environment in the Russian Federation", which was concretized by the federal project "Digital educational environment" as part of the implementation of the national project "Education" [8] and "Development strategy information society in the Russian Federation for 2017–2030" [1]. According to the federal project "Digital Educational Environment", the education system should prepare competent and competent personnel who can use digital technologies and have digital competencies [8]. Its implementation has actualized the problem of preparing students and teachers of higher education institutions who can be fluent in digital technologies and be successful in the digital age.
Modern students are the generation that grew up in the environment of developed information technologies, saturated with digital devices - computers, smartphones, gadgets, etc. This generation "Z" is "digital natives", their most important life coordinate is information and communication technologies that determine the direction and the nature, forms and ways of development, types of activities and ways of behaviour, including in their professional future. The global network is the environment of their daily life, they are ready to work in multitasking mode, they have a completely different, networked type of thinking.
But does a modern educator match the level of students - their way of thinking, their digital skills, requests to learn in a new educational environment?
According to a statistical study of Russian colleagues, teachers represent three generations in higher education. You can see this in Figure 1. The first generation is educators aged 50 and over, and they are the same age as the technology that predated the Internet. They make up more than a third of the university professors (41.8%). The second group is generation “X”, the largest part of teachers are today from 35 to 50 years old (50.9%). Sociologists call this generation a distinctive feature of a high level of education and a unique ability to adapt. The next group is "Y", which included teachers from 21 to 35 years old (7.3%). These are young specialists - representatives of the era of the emergence and early development of the Internet [12].

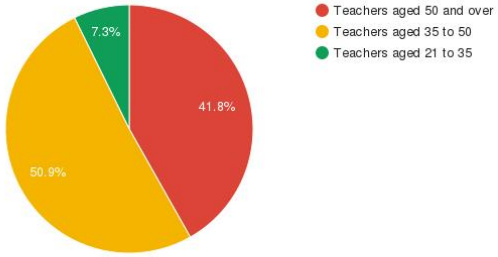

Fig.1. Three generations of teachers in the higher education system in Russia.

Statistics show that not all teachers are equally ready to actively use digital technologies in their work. Teachers of the older generation will acquire a high level of digital competence, although among them there are very active Internet users, mobile and creatively active, ready to respond to changes in time. There are also different categories of teachers among young professionals, and this was confirmed by another study: among today's graduates, as many as 20% are ready to leave the development of digital technologies and increase digital competence for a while after graduation [7].

Indeed, the realities today are such that there are teachers who simply do not know how to use the Internet, which means they do not have access to various scientific literature, to immediate feedback, to interact with students and, of course, are not able to apply electronic educational and information resources necessary for communication in the global network.

The role of the teacher must change today: he can no longer be just a translator of knowledge. It is necessary to constantly develop your digital competencies, use all possible techniques, methods, e-learning tools using digital educational technologies. Only then will the teacher be in demand in the new digital era.

One of the target indicators of the Federal project "Digital educational environment" is formulated as follows: "the implementation of retraining of the leading personnel of educational organizations in the technologies of digitalization of education" [8]. And the main goal is to ensure the updating of the knowledge, skills and abilities of the leading personnel in terms of the introduction and use of digitalization technologies in education. “Refusal to use digital technologies in certain elements of the educational process (used in life in similar situations) will require special analysis and justification” [11, pp. 2-3], and in all attestation and certification procedures, the competence of the teacher, his mastery of digital technologies operating in the educational information environment, and readiness for communication in the global network will be assessed.

Digital competencies are 21st-century skill. Scientists identify the most in-demand competencies during the transition to the digital economy. Thus, a group of American researchers [3] defines digital competencies and conditions necessary for their consistent development, including them in the transdisciplinary leadership skills of highly qualified students and faculty. Their attention is focused on the transdisciplinary educational environment of learning processes within the framework of a single educational program [3]. As noted by G. Rasko, E. Oborn, M. Barrett [9] and H. Barr, J. Ford, R. Gray, N. Helm and others [2], with the intensive development of information technology, the range of competencies of the future is expanding, among whose possession of digital technologies allows you to quickly adapt to the changing conditions of digital reality [9].

However, at present, neither in the scientific world nor in a specific field of activity, there is no single list of skills and abilities required for the safe and effective use of digital technologies and Internet resources. The most complete list of digital competencies is presented in the model of S. Carretero, R. Vuorikari, Y. Punie. The authors present a digital system of competencies for citizens with eight skill levels and examples of use [4]. Among the purely technical skills of working with digital devices they formulated, one can single out those that represent an integral part of the pedagogical competence of teachers.

Thus, the first group of competencies required by a teacher for the successful implementation of educational activities can include competencies related to information literacy: the ability to find, analyze, interpret and critically evaluate information and content in a digital environment. The second group includes the skills and abilities of communication and cooperation in the digital environment - this is the ability to interact through digital technologies, knowledge of the rules and norms of

behaviour in the process of their use and communication in digital environments, the ability to adapt communication strategies to a specific audience, take into account cultural and age diversity in a digital environment. The third group of competencies is determined by the ability to create and edit digital content in different formats, modify and improve the quality of information and content. In the fourth group of digital competencies, one can single out the skills and abilities to protect personal data, devices and digital content, ensuring the safety of the physical and psychological health of users. And, finally, the fifth group includes competencies related to the ability to identify technical problems that arise when working with digital devices and solve them [4].

The Russian education system as a whole considers the task of training teachers as one of the priorities. The self-direction of the teacher in the development of his career strategy and, in this regard, the increasing importance of the mechanisms of motivation and development of the personified qualities of the teacher, his mastery of digital competencies [6] - orient the scientific and pedagogical community towards the transformation of vocational and educational training, taking into account the challenges of digital education.

In foreign publications on education, the emphasis is often placed on the educational environment, and digital competencies are considered in the group of key interprofessional skills.

3. Conclusions

So, today it can be recognized that thanks to digitalization, the picture of the world is changing, all spheres of social life are changing, new types of activities appear, new technologies that change the role of the teacher's capabilities, affect his capabilities. These changes dictate new, more serious requirements for the teacher, on the one hand, and on the other, provide him with additional development opportunities, ensuring the continuity of the educational process.

Skilful use of digital competencies allows university teachers to apply system solutions in a digital environment in their activities: create and accumulate digital educational content, use educational communication tools, manage the educational process, conduct synchronous and asynchronous classes, and keep in touch with colleagues and students.

Also, possession of digital competencies is a good basis for successful pedagogical activity, significantly improves the qualifications of a teacher, and also positively affects his competitiveness in a professional environment.

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