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Features of the Use of Digital Educational Technologies During the COVID-19 Pandemic*

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Abstract

The article is devoted to a comparative analysis of digital educational technologies used in Russian educational institutions at different levels in the conditions of self-isolation caused by the coronavirus pandemic in the world. Based on the analysis of the results of the study, the authors conclude that the pandemic accelerated the transition to distance learning and at the same time exposed pedagogical, psychological and medical problems associated with the introduction of digital learning technologies. The positive results of digitalization of education are: the possibility of introducing new approaches, methods, models of teaching and upbringing in the educational process; the possibility of choosing an individual educational trajectory for students; increasing interest and more active involvement of schoolchildren and students in the process of obtaining and consolidation of knowledge; the ability to use a variety of mobile platforms, electronic textbooks, modern automated learning systems and augmented reality technologies that allow students to evaluate their knowledge and track their learning progress through a system of assessments and proposed test tasks.

Keywords: Digitalization of Education, Learning Technologies, Mental and Somatic Health, Coronavirus, Pandemic.

Introduction

The coronavirus pandemic around the world has pushed many sectors of the economy to digital transformation and transfer the work of employees to the online space. First of all, it affected the sphere of education. Thus, the educational institutions at all levels were transferred to distance learning in the first days after the announcement of the self-isolation regime in order to ensure the safety of life and health of students, professors, teachers and educators.

The transfer to online education, which was almost instantaneous, was facilitated by the creation of a passport for the priority project "Modern digital educational environment", developed in October 2016 by the Presidium of the presidential Council of the Russian Federation and the course adopted by the Government of the Russian Federation

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in 2019 on digitalization of the Russian economy (including education) and the signing of the corresponding national project. In addition, in recent years, one of the priority areas for improving secondary and higher education systems has been identified as the formation of an innovative educational environment based on information and communication technologies in order to improve the availability and quality of education. In order to solve this problem, the significant funds were allocated for technical and technological support of the educational process: for the development of digital zones; automation of management activities; digital support for libraries; introduction of digital educational resources in the educational process; Informatization of educational and extracurricular activities, introduction of distance learning to improve the skills and retraining of teachers and employees.

In General, such an educational environment should provide graduates with competitive advantages when entering universities, and in the future it should help them achieve significant success in their professional activities throughout their life (Akbar, 2016; Collins, 2009; Lonka K., Cho V., 2015). At the same time, there are practically no studies aimed at studying the impact of digitalization in the educational system on the health indicators of participants in the process: teachers and pupils, students and professors.

This problem remains relevant for all countries of the world that have entered the path of digital transformation. For example, digital security is the subject of annual discussion at meetings of the European Parliament. For example, the report of the Commission on culture and education in 2018 (speaker – Yana Toom) "on learning in the era of digitalization "[13] considered the challenges, opportunities and lessons to be learned when determining the Union's policy in this direction in the near future. The resolution of the European Parliament, along with the development of the nomenclature of digital competencies, the development of information infrastructure, the transformation of the system of professional training of teachers, made proposals on digital security and personal development. They discussed investing in interdisciplinary research on the various effects of digital technologies on education, combining education, pedagogy, psychology, sociology, neurology and computer technology; minimizing the risks associated with digital technologies; improving the safety of children on the Internet and addressing the cyber impact of harmful and destructive content and other threats through the development and implementation of prevention programs and awareness campaigns, etc. (Khabibullina, 2019; Khabibullina, Ivanova, 2020).

Based on the above, the purpose of this study was to identify psychological, pedagogical and medical problems associated with the introduction of digital technologies in the educational process.

Material and Methods of Research

To collect primary information, we used: a method of analyzing documents related to the introduction of digital technologies, a questionnaire and a recitation of students, teachers, secondary and higher professional teachers to determine their attitude to the digitalization of education and assess the positive and negative consequences of the introduction of distance learning.

The object of the study was participants in the system of secondary and higher professional education: students, teachers, research and teaching staff, representatives of the administration of educational institutions.

The subject of the study was the parameters of changes in well-being and individual indications of mental and somatic health of participants in the educational process when implementing digital technologies and distance learning.

Research Results

The introduction of distance learning after the announcement of the self-isolation regime in Russia has affected the change in the role and place of the teacher in the new educational environment. As a result, in the new reality, the teacher gradually turns into a kind of a consultant or a mentor, whose main task is to teach students algorithmic thinking and work with big data, as well as the ability to independent setting and realizing goals and tasks, evaluating the quality of work performed and developing needs, and self-education skills.

In a very short period, the pandemic coronavirus resulted in a request for the creation of new digital educational resources (DER), innovative scientific-methodical base for preparation of new generation of specialists and retraining of the already employed, and for the upgrade of the existing logistics.

If at the initial stages of digitalization of education only the text documents and other educational materials necessary for the organization of the educational process were used as DER, then during the transition to distance learning, digital educational resources were supplemented with digitally presented photos, presentations, films and video clips, static and dynamic models, virtual reality and interactive modeling objects, sound recordings and other visual materials (Sappey J. Dr, Relf St., 2010; Saykili, 2019; Tulinayo, Ssentume, Najjuma, 2018).

In General, the use of DER in the system of higher education made it possible to apply the full range of modern information and telecommunications technologies in the course of educational activities; to conduct objective diagnostics and assessment of students ' knowledge, skills and training level in accordance with the requirements of the state educational standard; to organize individual and independent educational activities, to form skills of self-study, self-development, self-improvement, self-education; to ensure constant and efficient communication between various participants in the educational process. It is interesting that the first and the most informative digital educational resources in Russia appeared and began to function successfully in non-state (commercial) universities and in regional branches of large universities. Therefore, they were the most prepared for the coronavirus pandemic and the complete transition to distance learning (Kirillov, 2018; Kirillov, 2019).

The analysis of the online format for organizing the educational process, conducted during the period of self-isolation in the regions of the Russian Federation (March-July), allows us to see not only positive aspects, but also significant problems and negative consequences of digitalization of education. Thus, the main positive role of digitalization was to increase the level of digital literacy or the ability to use modern information and telecommunications technologies by all participants in the process, both on the part of students and teachers, since today digital literacy is already a prerequisite for the possibility of obtaining additional knowledge, skills and self-education and self-development (Zaripova, Salekhova, Danilov, 2017; Klikunov, 2017; Maloshonok, 2016).

Among other positive aspects, we should highlight the opportunities provided by information technology. These are: the introduction of new approaches, methods, models of teaching and upbringing; the possibility of choosing an individual educational trajectory for students; more active involvement of schoolchildren and students in the educational process; the possibility of using mobile platforms, electronic textbooks, modern automated learning systems and augmented reality technologies. Thus, the introduction of distance learning in practice has shown that e-learning programs developed in a short period of time allow students to evaluate their knowledge and track their progress in learning through a system of assessments and proposed test tasks.

In particular, after the adoption of the Federal law of February 28, 2012 N 11-FZ "on amendments to the Law of the Russian Federation "on education" in terms of the use of e-learning, distance learning technologies", training of full-time and part-time students through interactive electronic means (Internet and local networks) has become an integral part of education at Mari State University. For example, French electronic resources were used to teach classical languages to foreign Francophone students (Khabibullina, Ivanova, 2019).Therefore, immediately after the announcement of the self-isolation regime, full-time students were able to continue classes with teachers according to a pre-arranged schedule in online mode.

Part-time students started distance learning later, according to the schedule of the educational process. In addition, they had the opportunity for self-study of educational materials (in any convenient place where there is Internet access) prepared in advance by the teacher and posted on the e-learning server of Mari state University, where a learning management system was formed in the form of a virtual learning environment.

For the use of the electronic educational and information system, students and teachers had only to register and get an individual user name and password. After authorization in the virtual environment, teachers were able to enter various educational materials in the form of texts and multimedia elements, view their training statistics, create tests to test their knowledge, and consult students remotely via video conference. At the same time, a student or a student of the courses held at the University could independently choose the appropriate form of training, as well as check the material they have mastered during the test tasks.

The educational electronic platform Moodle was used for conducting classes and self - study of disciplines at the University, and the Zoom platform was used for conducting lectures, practical and seminars, intermediate or repeated certification in the online mode.

In addition, students and teachers of Mari state University have 24/7 free access to educational literature, regulatory documents, multimedia materials in the electronic catalog of the MarSU library, the electronic library system "The student consultant", the electronic library system "YURAYT"; educational materials and fiction "LAN publishing house", the publishing center "Academy", and "WILEY" publishing houses (onlinelibrary wiley.com), "AMERICAN MATHEMATICAL SOCIETY (ams.org/mathscinet)," ENVOY POLPRED.COM»; electronic library system "IPRBOOKS"; electronic medical library "The doctor's consultant".

All employees and students of Mari state University can view and download the resources available on the following platforms: "SPRINGER LINK" (https://rd.springer.com), "NATURE" (https://www.nature.com), as well as in the SPRINGER MATERIALS databases (http://materials.springer.com), "SPRINGER PROTOCOLS" (http://www.springerprotocols.com), "ZBMATH" (https://zbmath.org), "NANO" (http://nano.nature.com). Thanks to this, students and teachers can use free textbooks, workbooks, scientific and popular science literature in the field of higher medical and pharmaceutical education, agricultural sciences, natural science, as well as a basic set of textbooks for all specialties and training areas.

Thanks to the existing learning platforms, students can interact with teachers on an ongoing basis, have the opportunity to express their suggestions, complaints or feedback, which contributes to the improvement of existing and functioning e-learning platforms. In the course of this collaboration, existing digital learning platforms are adapted to the specific needs of students and their teachers. For example, students can join separate groups to complete their academic and scientific tasks, and share their results and knowledge with each other.

The negative consequences of digitalization of education, first of all, include the health deterioration of all participants in the educational process. First of all, this concerns school teachers and teachers of secondary and higher professional educational institutions, whose time in front of monitors has increased by at least two or even three times due to the introduction of distance learning. A survey which was conducted among 116 teachers and University professors of the Republic of Mari El and Chuvashia showed that visual acuity of the majority of respondents had been worsened significantly during the period of self-isolation, symptoms of existing chronic and exacerbation of some occupational diseases began to appear more severely. Moreover, in addition to somatic diseases, a significant number of respondents registered initial signs of mental disorders (sleep disorders, feelings of fear or anxiety, difficulties in clear thinking, pathological beliefs, memory impairment, inability to perform everyday functions, substance abuse) associated with the introduction of a self-isolation regime.

Students had even more health problems. Thus, digitalization has led to a significant decrease in interest in writing and the development of various types of creativity. In our opinion, this is due to the fact that writing involves parts of the brain which are responsible for sensory interpretation and for putting letters into words, as well as for recognizing them (Broca's center). Therefore, children lose the desire to read books, which is reflected not only in a decrease in the ability to recognize written texts, forgetting the rules of spelling, punctuation and grammar, but also in the appearance of problems associated with abstract thinking, the processes of imagination, perception, memorization and extraction of necessary information from memory.

It is also proven the fact of digital addiction during the prolonged use of gadgets, which causes depression, short temper and aggression in children. Isolation from peers and long time spent at computer monitors often replaces normal communication, which leads to the loss of social skills, the appearance of autism syndromes and reduced adaptive capabilities. Over time, for such people, the virtual world completely absorbs the real one, as in the case of severe forms of mental disability which are difficult to respond to today's available methods of mental influence or psychotherapy.

Even the very use of wireless Wi-Fi networks in schools and pre-school educational institutions can increase the risk of cancer, damage to hippocampal neurons, and negatively affect the blood-brain barrier.

Previously existing hygiene standards which were recommended by ophthalmologists prescribed sitting at a computer in the first class for no more than 10 minutes a day; in 2-4 grades -15 minutes; in grades 5-7 - 20 minutes; in grades 8-9 - 25 minutes and in grades 10-11 - 30 minutes, and when switching to distance learning, students were forced to stay with their parents at monitors for six or more hours. Therefore, the consequences of implementing distance learning in the future may not be quite rosy and beautiful. We have to evaluate them yet.

Many negative aspects of the introduction of digital technologies are noted by teachers and psychologists in the organization of the educational process. Thus, most researchers note that smartphones and gadgets distract children from the educational process, negatively affect the development of children's communication skills and social interaction (Robotova, 2017; Shestakov, Adzhemov, Manonina, 2018).

Teachers are particularly concerned about the problem of objective assessment of the results of educational activities and, especially, when performing control works, passing tests and exams, defending term papers and final qualifying works. The main ways to" deceive " the teacher in this case are copying and using other people's works, buying a ready-made abstract, term papers and theses. In addition, the quality of sources on the Internet does not always meet the expectations of users, although many educational organizations for students have formed a list of electronic educational resources that they should use in the educational process in a short period of time. It was facilitated by the creation of the National open education platform in Russia in 2015, WHICH operates on the basis of the best Russian Universities (MSU, ITMO University, nust MISIS, MIPT, HSE, Urfu, St. Petersburg state University). More than three hundred online training courses in various fields of training are currently available at these Universities.

It should be noted that existing educational resources can be used by both students and teachers. They are freely available and contain both educational and reference material: electronic tests, interactive models, video and audio materials, illustrations, ready-made developments, and other educational and methodological materials intended for preparing and conducting interesting classes, homework, course and research projects.

The self-isolation regime in Russia has also exposed the problem of unequal access of students from different regions of the country to electronic technological resources. It turned out that not all students have a tablet or laptop with constant Internet access. Therefore, schools, colleges and universities were forced to allocate money for their purchase from their own resources or recommend students to use libraries or other places of access to the world wide web for distance learning.

This is not a complete list of negative factors and consequences of the introduction of digital education, although it should be recognized that, despite these and other significant "disadvantages" of digital education, modern information technologies provide new opportunities, methods of transfer and dissemination of knowledge, and also contribute to the formation of necessary competencies based on the acquired knowledge, skills and abilities. They significantly simplify the process of managing the educational process and to a certain extent they can provide equal access to information and building of necessary skills.

Conclusions

Digitalization of education today is one of the conditions for the transformation of higher education institutions, the process of which has been accelerated due to the developing covid-19 coronavirus pandemic in the world. As a result of the imposition of a state of emergency or self-isolation, educational organizations at all levels of education were forced to switch to distance learning, which continues in some of them to this day or is being re-introduced in the new academic year. But even after the abolition of self-isolation, many universities continue to conduct some types of classroom lessons (primarily lectures) online, which may indicate both the effectiveness of e-education and the desire of educational institutions to "optimize" the educational process by reducing classroom lessons and teaching staff.

In General, the forced transition to distance learning has revealed not only positive aspects of e-learning, but also pedagogical, psychological and medical problems associated with the introduction of digital technologies on the part of both students and teachers. Therefore, we consider it necessary to conduct long-term research on the comprehensive study of the influence of electronic technical training resources introduced into the educational process on the mental and somatic health of teachers and students, and the full transition to digital education is premature.

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