

Application and development of IT technologies in Russian education: problems and solutions

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Abstract. Lately the role of information technology in education has grown significantly. One of the most important reasons for the use of information and communication technologies in the education system is undoubtedly a global tendency, which finds its expression in a huge number of online courses, trainings, individual consultations, applied through the use of various technical devices, which have become usual and quite common phenomenon in recent two or three decades. Another important reason for the transition to the online education system is associated with the COVID pandemic, since it is very logical to use online technologies for studies to prevent increased infection rates. It should also be noted that, in addition to the above obvious reasons for the use of information technology in the field of education, it is necessary to include such as the inability of the student to attend the teacher, or if the student does not want to attend an educational institution full-time for any reason, it can also be any psychological complexes of being in a large classroom, or lack of discipline in the student. All of the above strongly pushes and warms up society to the introduction and use of online technologies in education. This work is devoted to the study of the development and formation of information and communication technologies in the Russian education system, as well as the detailed analysis and discussion of the problems of the implementation and application of IT in Russia and ways of solving various kinds of problems arising in this area.

1 Introduction

Nowadays it is difficult to imagine public relations without the large-scale use of information technologies and all kinds of information processing tools in various spheres of public life. The digital revolution has brought all sorts of means to meet all sorts of goals it faces. Labor productivity of people has grown exponentially in many areas. Politicians and economists often believe that a similar effect should be observed in the field of education, and the only obstacle to improving the quality of educational organizations is the technological digital divide caused by the lack of Centralized Testing funds [6]. It is necessary to state the fact that for the majority of Russian citizens these technologies and various kinds of technical means such as tablets, computers, telephones, and much more

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have become quite natural. But nevertheless, as far as education is concerned, many citizens perceive online learning using various kinds of information technologies as props, profanation of the domestic education system, ersatz training or the fifth wheel for the Russian alma mater. Such an attitude towards innovation will undoubtedly hinder the development of the education system in Russia, which may negatively affect the development of the domestic economy. Based on this, it is necessary to form a positive image of online education among the majority of citizens of the Russian Federation.

The purpose of the study is to solve the problem of public trust to the large-scale use of information and communication technologies in the field of Russian education, as well as its effectiveness. To solve this goal, it is necessary to solve the following tasks:

- give a general description of digital online education and formulate the feasibility of introducing information technologies into Russian society;
- to consider all the key and most important problems of the application of IT technologies in the field of education in Russia;
- to identify promising ways of solving the problems of introducing digital technologies into the Russian alma mater.

2 Methods

The issues of large-scale application of online education through the use of various technical devices have been the subject of all kinds of scientific research. So, for example, N.V. Kuznetsov studied the issue of transition from the traditional classroom education system to online learning «Online education: key trends and obstacles» [1]. It should also be noted that in the work of N.B. Strelakova «Risks of introducing digital technologies in education» touches upon very important issues of the introduction of electronic informational and educational system and the use of its resources in educational activities [2]. In the work of N.V. Stetsenko and E.A. Shirobakina «Digitalization in the field of physical education and sports» considered topical issues of training highly qualified specialists in the sports field [3]. In their work «Preparing teachers for online learning: the role of competence, content» researchers M.F. Galimkhanov and G.F. Khasanov which touches on topical issues related to the quality of training of teachers themselves and their skills in the use of information technologies in the field of education [4]. Actual problems of digitalization of education and the use of relevant information technologies are analyzed in the work of N.V. Dneprovskaya, «Assessment of the readiness of Russian higher education for the digital economy» which clearly postulates the idea that if you do not create the necessary conditions for the development of online education for higher education in Russia, then this will inevitably lead to an outflow of specialists from universities to commercial educational structures or to foreign online platforms [5]. In addition, modern Russian science contains other studies on this problem, but nevertheless, until now these issues are not fully worked out and resolved.

In the course of this research, various general scientific and private scientific methods of cognition were consistently applied. So, for example, at the initial stage of the study, when studying the formation and development of the use of information and communication technologies in the historical stage, as well as abroad, historical and comparative legal methods of scientific knowledge were used. This made it possible to formulate the unequivocal advantages of using digital technologies in the field of domestic education.

At the second stage of the study, when analyzing the problems of mass introduction and application of digital technologies in the domestic alma mater, the method of theoretical analysis and generalization of scientific publications was used, and the empirical research method was also actively applied. This made it possible to identify the most pressing

problems associated with the use of digital technologies that the training system faces today.

At the final stage of the research, the dialectical method of cognition was used. The same method, along with the method of formal logic, was applied to determine the ultimate goals related to the use and application of digital technologies in the system of national education.

3 Results

This work clearly demonstrated to us the obvious inevitability of the use of various kinds of information technologies in the system of national education, since this will provide tremendous opportunities for the development of the genetically determined potential of an individual and of society as a whole. Ignoring these trends can lead to stagnation of the domestic economy and emigration of qualified personnel to foreign countries. And there are serious prerequisites for that. The online education market has grown in recent years all over the world and continues to grow (Figure 1), and if Russia wants to successfully compete with foreign countries, it is necessary to take a very active set of measures to develop and introduce IT technologies in the domestic segment of education. The study showed that the transition of the Russian education system to information development contains a large number of difficulties of a different nature, which this study analyses.

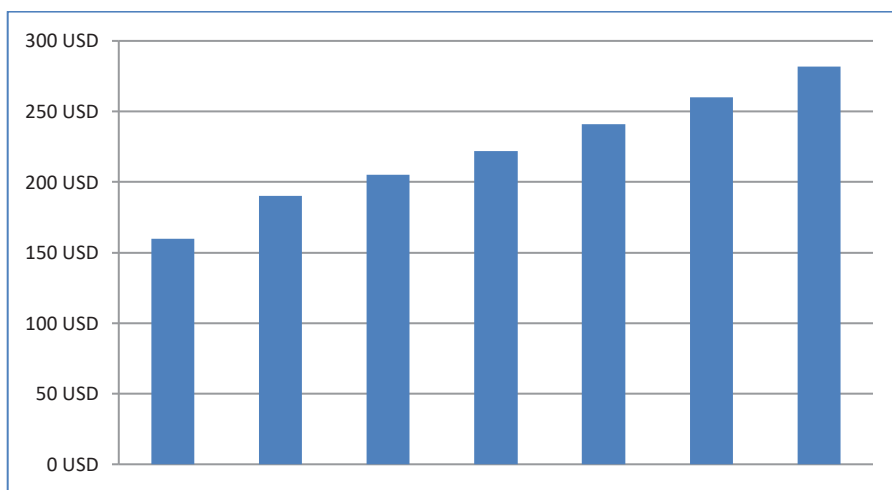


Fig. 1. The scope of the global online education market in billions (\$)

4 Discussion

The development of information technologies in the education system began almost a century ago. So the first device for automating learning is considered to be the Automatic Teacher, invented in 1924 at Ohio State University by professor of educational psychology Sidney Pressy. It was designed so that students can independently exercise and test themselves using questions with a single-correct-answer between multiple choices [7].

In the strategy for the development of the information society in the Russian Federation for 2017–2030, approved by Decree of the President of the Russian Federation No. 203 of May 9, 2017, many new terms appear, which provoked the emergence of such definitions as digital education, which is understood as a learning process with the necessary digital

competencies, training human capital for the digital economy and it all comes down to the subject area of digital technologies [5]. It should be noted that it is quite difficult to draw a clear distinction between digital and information technologies, since at the moment the formation of a new stage in the IT sphere is taking place. Analyzing the experience of using digital and information technologies in practice, it is impossible to unequivocally assert their fundamental difference, therefore, within the framework of our research, we will adhere to the point of view that these concepts are synonymous. If we talk about specifics, then in practice these technologies are expressed in all kinds of digital educational platforms, electronic textbooks, additive technologies and technical devices through which information can be displayed, as well as all kinds of online communication between the subjects of the learning process and many other forms of electronic interaction and related software.

The online education market in Russia has become very active in the past two years, due to the corona virus pandemic, which certainly provoked a large number of offers on the market of educational services and all kinds of courses, this all pushes the development of information technology to a new level. More and more people are choosing online education over classical classroom education. This, as already mentioned, is an absolutely obvious tendency, the resistance of which can lead the state to stagnation or even the loss of certain economic positions in the world as a result of its non-competitiveness. But the problem is that full-time education, which is customary for most Russians, is clumsy and rigid for objective reasons. At the same time, we do not question the effectiveness of classical education, it will certainly give a head start to online learning in some areas, but it is necessary to understand that it does not have time to reorganize itself to meet modern technologies and economic challenges facing modern Russia, and in this regard, the relevance of this study becomes special meaning. The expediency and objective necessity of the active use of information and communication technologies in the system of the Russian alma mater is due, in addition to the pandemic, and other reasons. So, for example, what should a student or his parents do if there are no educational institutions in the city in which they live. «Online» in this case will be the best salvation. Or, for example, in big cities, the actual problem is the loss of a large amount of time in traffic jams to the place of study and back, which will also require strength, money and motivation. In this case, the transition to online is also a relevant solution. It is also necessary to take into account the psychological characteristics and temperament of the student himself. The point is that some students do not feel comfortable in the classroom and this prevents them from concentrating. Due to the fact that the principle of adaptability of the education system to the needs of students operates in the Russian alma mater system, it would be logical to develop digital technologies for some of the above individuals. It is worth noting that the use of online technologies will allow a large number of undisciplined students to view the courses in the recording for many times at any time convenient for them. Therefore, the massive use of information technologies in the field of Russian education has long been brewed, in fact, from the very beginning of the emergence of the Internet, and in this regard, the realization and full-scale implementation of IT systems in Russian education is expedient, inevitable and unambiguous. Solving the problems of using new digital technologies in the Russian education system, which will be discussed below, will allow us to take a worthy place in the world of the domestic economy and develop the potential of the entire society and individual citizens of the Russian Federation.

So, the first problem of the transition to digital education is the extremely low quality of most of the online courses on the market [1], which undoubtedly undermines the credibility of innovative education and forces people to stay within the framework of traditional classroom learning. This is due to the fact that a large number of online courses are mainly focused on the commercialization of the process and those who develop such courses often

do not imagine what they should include in order for the user to learn something from its content. (An approximate scheme of a high-quality online course is shown in Figure 2). It should be noted that this state of affairs is also understood by employers, who, in turn, are ready to accept specialists with diplomas who have graduated from state universities, mainly full-time education. This problem can be solved using legislative mechanisms. So, for example, to recommend universities to take exams and tests from students who were preparing for certified online courses.

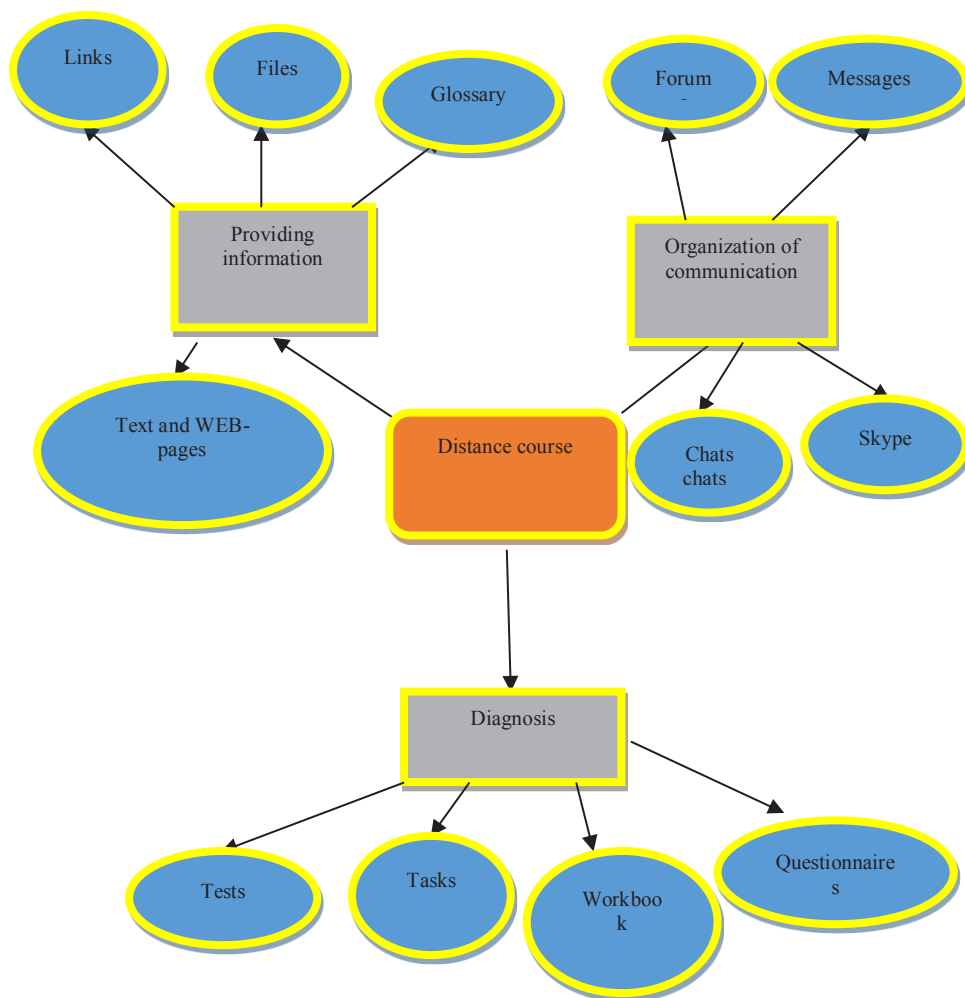


Fig. 2. Structure of distance course

The next problem in the topic under consideration is the insufficient number of qualified personnel who are well versed in information technology and online resources in particular. But it is these specialists who should become guides to the world of knowledge for the masses. The introduction of digital technologies will require a revision of the content of professional training of modern specialists, including scientific and pedagogical workers [2]. The transition to online learning places significant demands on teachers, for which not all teachers are ready. So, for example, it takes a significant amount of time to prepare

materials in electronic form for training, there is also the problem of lack of technical support in an educational institution of digital platforms on which educational materials need to be uploaded. It was found that it takes teachers twice as long to prepare online content than their traditional counterparts. At the same time, it should be noted that many teachers had to perform functions that were not typical for them, such as a consultant, moderator or other technical specialist, which was unacceptable for some of them. It should be said that teachers traditionally have extensive knowledge in the field of their disciplines and much less knowledge in the field of information technology and electronic pedagogy [4]. In modern conditions of digital education, the teacher must have modern methods of preparing students for online education and must be ready to interact in an electronic educational environment, as well as to form intuitive skills in using educational platforms, to develop the design of online courses, and to be ready to use various forms of digital content and a variety of multimedia, as well as other competencies necessary for the effective use of the entire arsenal of digital education. An important disadvantage of online learning, according to many teachers, is resource consumption, that is, the high time spent on the production of the course, and on communication with the listeners when the course is launched; large financial costs and labor costs; high level of stress during course development [8].

It should be noted that a big problem in the use of online technologies is the sphere of physical education and sports in educational institutions. If it is quite possible to teach legal disciplines or foreign languages, literature, history online and does not present any particular difficulties, then conducting sports training online and studying in this way on the other side of the screen causes a lot of controversial discussions, not to mention the holding of competitions. Of course, it is hardly possible to hold all kinds of sports tournaments other than cyber sports online, but nevertheless, the health of the nation is a priority, and a set of measures must be taken to address this problem. Certainly, the use of electronic educational resources can mitigate this problem in universities, but this requires special options in the software of educational platforms, while the problem of timing the performance of certain sports exercises by students, the problem of monitoring students during the lesson and others. To solve this problem, it is necessary to introduce special software into electronic educational environments. It must also be said that until now only every second university in Russia has the necessary IT infrastructure for the use of information and communication technologies. At the same time, it should be noted that the widespread introduction of a distance education system in universities with a sports orientation will allow athletes to systematically and continuously carry out educational activities without interrupting training and training camps. In general, for the organization of the educational process in the context of digitalization, it is necessary to fully use the possibilities of e-learning and distance educational technologies [3].

It is necessary to touch upon the problem of the sluggishness of educational programs that do not keep pace with modern information technologies. The fact is that the importance of higher education lies in providing the national economy of Russia with qualified personnel, as well as developing high-quality educational and research programs for the innovative economy of our state. All this requires the prompt training of specialists using modern educational programs, which, in turn, must be converted into digital format. And this takes time and resources, and it should be noted that not every educational institution has such opportunities. To solve this problem, it is necessary to consolidate the efforts of the entire state, allocate funds and attract technical specialists throughout the country to solve this problem.

Another important problem in this area is that electronic educational resources in universities and schools are in a very deplorable state. This is expressed primarily in the fact that the Electronic Educational Environment is rather difficult to use, unlike, for

example, social networks, which are intuitive and understandable a priori. This discourages citizens from using information and communication technologies in education. To solve this problem, it is necessary to make the Electronic Educational Environment unified and understandable for the user. It should be such that in a maximum of three clicks it would be possible to get to the section necessary for the user.

One of the most important problems of digital education is the lack of some kind of unification and unity of electronic platforms for education throughout the country. Universities and other educational institutions chaotically use different platforms for teaching such as Skype, Zoom, Discord and other programs, which are mainly intended not for education, but for communication. And in the Russian version it all looks very chaotic. To solve this problem, it is necessary to create a single educational platform at the state level, to which all educational institutions will have access, where it will be possible to download massive open online courses in all disciplines that are uniform for the whole country. Massive open online courses seem to us the most promising for a smooth evolutionary transition to digital learning. This is primarily due to the availability and replicability of quality education provided by the world's leading universities, with the possibility of individualizing the educational process, with the development of joint learning and co-creation in the student network communities that are being created [10].

The massive use of online technologies in education will mainly solve the global problem of education regarding the interest of students. This is done through the use of gamification in education. As elements of the game and as a consequence of rivalry, it stirs up interest in the activity. And as well as possible, it is the use of gamification through the use of information and communication technologies in education that can instill an interest in learning for the lion's share of students, and this will also allow much more efficient career guidance for students, which will inevitably lead to a reduction in the time spent on training. It should be noted that the first in their pedagogical practice, the elements of gamification are used by teachers of informatics. The main reason for this is the problem that teachers of other specialties lack the necessary competencies and technologies for the creation and implementation of game elements [9]. Based on this, it is necessary to borrow this effective method as soon as possible for the teaching staff of other disciplines, and for this, in turn, it is necessary to form the appropriate technological competencies from teachers of other sciences.

The final problem that we will consider in this study is the psychological sluggishness and rigidity of a large number of our compatriots, who are very skeptical about the transition to innovative development rails. The fact is that a huge number of our compatriots are accustomed to the traditional full-time education model, which originates in the Soviet era, where, naturally, there could be no question of any online education. And of course, this is the format that is familiar and well-known to most people. Citizens in many ways believe that education on the other side of the screen is a surrogate, and the product obtained in this way has no prospects for use, which will only be used by irresponsible persons. The dramatic shift to digital education associated with the corona virus pandemic has only exacerbated these trends, knocking people out of their usual education model. The media claimed about the disadvantages of online learning, in which there was no ambiguous hint about the population about the need to return to traditional classroom education as quickly as possible. This archaic state of affairs, of course, does not contribute to Russia's transition to digital education with all its objective advantages. In our opinion, time will help to solve this problem. So, for example, at the end of the 90s of the last century in our country it was believed that making money through the Internet is something wonderful, not serious, or even generally infantile, and only a small number of people thought otherwise, and now imagine life without the Internet and those services which it carries is simply impossible. In the mass media, the agenda has also changed in recent

months regarding negative reporting on the use of online education. So, for example, the country's transition to distance learning is no longer something out of the ordinary for anyone. The advantages that education with the use of information and communication technologies brings will inevitably bear fruit over time and the population will radically change its attitude towards this phenomenon. And most likely, with the modern development of the technological sphere, a much faster transformation of the mentality of the population will take place, and thus information technologies in the field of education will become self-evident, promising a huge potential for development, which should happen relatively quick.

5 Conclusion

Summing up all of the above, it is necessary to state the fact that the transition of the Russian education system to digital, together with the solution of all the above problems through the use of information and communication technologies, will open up huge economic opportunities for our country and make it much more competitive. The processes of informatization of the education system are so large-scale and objective that those institutions and citizens who ignore modern technologies will be left out of the educational environment and will not be able to find a place for themselves in a rapidly changing environment. It should be noted that exactly the person who is able to operate with large flows of information in a short time will always have a competitive advantage over the person who is unable to do anything. And it is the digital online format allows people to realize their genetically determined potential to the maximum. It will be difficult to carry out such a painless and at the same time rather quick transition to fast methods of information processing using only classical traditional classroom education, and on this basis, the transition to the widespread use of information and communication technologies is more than justified and even natural. One of the primary tasks of our country in the field of education should be the creation of a flexible training system for quick adaptation to the constantly changing needs of the labor market, and it is the widespread use and implementation of digital technologies in the alma mater that will form the necessary set of competencies that students must study.

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