New technologies in education

Victor Larchenko and Olga Barynikova*
Don State Technical University, 344000, Rostov-on-Don, Russia

Abstract. This article contains a study on the topic "Digitalization and education: the current state and prospects." It has analyzed such aspects of digital education as digital literacy, mobile digital education, and the ethics of artificial intelligence in education, VR and AR technologies in digital education, robotics training in educational institutions. Electronic textbooks, digital education software are very useful in development of foreign language learning right now. The purpose of this article is to familiarize with the results of the study on the introduction of digitalization in the educational process. The most attention is paid to its growing role attention in the condition of pandemic, when the processes of learning and teaching have to be changed in form of new material giving and finding. As it turned out the students have obtained better knowledge thanks to new digital approaches in educational process. As for teachers, they were more effective in monitoring student knowledge allowing them more independence. Conclusions have been drawn on the effectiveness of each aspect and digital education in general. Statistics on access to digital technologies, frequency of software use, percentage of digital technology ownership has also identified

1 Introduction

Research by TASS and other publishers and large sites for the publication of scientific articles such as Paternity, Scopus and other sites has been agreed and proved that digitalization in our life is an important part of our time not only in economy but in education too. Now we cannot exist without electronic dictionaries and textbooks in specialized libraries, and also different training courses online which alleviate and simplify the educational process for teachers and students. Without leaving home we can pay find various sites, where all necessary information is stored digitally for a long time. Also thanks special passwords, secret keys and codes, a new digital system - blockchain you are able to keep information about yourself (mailbox, etc.) and a lot of higher schools protect their own programs and training courses from hackers. Digitalization also influences on the educational level of primary and secondary schools. Electronic textbooks and games, digital education software more study more informative and various, funny and independent in many cases. The purpose of our study is to compare the results of the study on the introduction of digitalization in the educational process.

* Corresponding author: sunshine_lera@mail.ru
2 Materials and Methods

2.1 Digital literacy in digital education

Digital education technologies are greatly changing the educational system in higher education institutions, so the level of. Due to the pandemic, the educational sphere is now forced to move away from traditional teaching structures and quickly switch to digital form. To do this, teachers and students in all educational institutions must have a certain level of digital literacy and the ability to use digital equipment by appointment [1]. Digital literacy means people's awareness, attitudes and ability to properly use digital tools and tools to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources. There are two problems of digital higher education: literacy skills and the intention to use digital technologies for teaching and learning purposes [2].

In this sense, the software can be considered as part of a hidden curriculum [2]. A platform (LMS) has been created to help teachers get used to the electronic environment. It facilitates the tracking of student achievement and performance, provides online communication between teachers and students, and records the student's achievements. A technology (UTAUT) was also created to assess the intention of university students to use portable learning devices. These two technologies will give rise to further solutions to the two problems we discussed above [1].

2.2 Mobile Digital Education

Nanyang University of Technology Singapore conducted a study on the use of mobile devices in the educational environment in medical specialties. The studies included mobile devices, tablets, players and other portable devices. The same problems were identified as in the traditional educational process [3].

2.3 Ethics of artificial intelligence in education

At the AIED conferences in 2018 and 2019, the seminar "AIED Ethics What Difference?" Little was expressed about the problem of the ethics of artificial intelligence. There was a striking small number of published papers in the AIED community that explicitly focus on AI NO ethics. As with any modifying AI technology, new ethical standards and legal issues can be raised. Therefore, ethical standards should be more illuminated. In general, attention was focused on ethical standards such as informed consent or non-consent, privacy of personal data, transparency, teacher attitude to AI, student attitude to AI, AI as a teacher, storage of personal data of students and teachers, collection of information [4].

2.4 VR Technologies and Gamification in Digital Education

Virtual Reality (VR) is a technology that allows a user to manipulate computer. In digital education, it can serve to gain practical knowledge that can be used in clinical practice. Nanyang University of Technology Singapore has conducted research in the application of VR technologies in digital education in medicine. The study was conducted in 7 databases from 1990 to August 2017. Randomized controlled trials and cluster randomized trials were included. Self-selected studies, extracted data and assessed the risk of error, and then compared the information in pairs. Contact was also maintained with the authors of these studies to obtain additional information. VR technology has been revealed to help better assimilate the process of cognition of medical subjects [5].
Another study on digital education was also conducted. It studied the problem and the potential of online gamification to gain practical entrepreneurship skills. A special online game has been developed for students, in it they acquired entrepreneurship skills. As the study showed, the game positively affected the acquisition of entrepreneurial abilities from students [6].

2.5 Augmented Reality in Digital Education

According to the Horizon Report 2011 of the Consortium of New Media, augmented reality (AR) is a nascent field of higher education; offering a combination of virtual and real technologies in education. In the study of South Ural State University, a ready-made mobile AR application was presented, the possibilities of using AR technology in practical classes for students of engineering specialties were investigated, as educational material based on augmented reality technology helps students in studying engineering specialties. In general, the result satisfied both the students of the university and its teachers [7].

2.6 Robotics training for educational institutions

Institute of Mechanical Engineering of the Russian Academy of Sciences, St. Petersburg provided research on the program they developed in the field of robotics training. Their study provides an overview of robotics learning experiences for schoolchildren. The program consists of several robotics training courses, robotics competitions and a robofestival. Training took place on the platforms LEGO Mindstorms NXT, EV3, TRIK Studio, based on the TRIK microcontroller, also on the bases of microcontrollers: Arduino, Raspberry Pi [8].

The same study was conducted by Italian colleagues, only it was calculated more for elementary school children and could not boast of the diversity of education, unlike Russian research [9].

The purpose of the study of both programs was to test residual knowledge in schoolchildren after the completion of these programs. The study showed that both programs scope

2.7 Electronic textbooks in digital education

Luai Chebib's research describes the role of a digital textbook today. According to the study, the role of digital textbooks will take great importance in education for a long time, but a holistic approach to the problem of introducing digital textbooks into the educational process was not provided [10].

3 Results

In the process of studying the topic of digital literacy, the following were identified: statistics on access to digital technologies, frequency of software use, percentage of digital technology ownership.

| Table 1. Digital Access |
|-------------------------|
| Access to digital technologies (%) |
| Self-rating report |
| Smart phone | Tablet | Desktop PC | Laptop | Wearable devices |


### Table 2. Frequency of Software Use

| Self-rating report | Frequency of software (application) use (%) |
|-------------------|-------------------------------------------|
|                   | Word processor | Spreadsheet | PPTS slides | Files sharing | Photo editing | Web site management | Mobile calendar | Email application | Social media |
| I do not use      | 0              | 7.8         | 2.7         | 1.9          | 35.0          | 63.4               | 11.3            | 0               | 3.1         |
| A few times a month or less | 12.1          | 31.5        | 51.4        | 26.1         | 42.0          | 27.2               | 15.2            | .4              | 2.7         |
| A few times a week | 33.5          | 30.4        | 29.2        | 34.2         | 16.7          | 4.7                | 20.6            | 2.7             | 3.9         |
| About on ceeday  | 13.6          | 10.9        | 8.2         | 18.7         | 2.7           | 3.1                | 21.8            | 16.7            | 14.4        |
| Several times each day | 40.9        | 19.5        | 8.6         | 19.1         | 3.5           | 1.6                | 31.1            | 80.2            | 75.9        |
| Mean & Std. deviation | 4.83       | 3.03        | 2.68        | 3.27         | 1.97          | 1.52               | 3.46            | 4.77            | 4.57        |

### Table 3. Percent digital ownership

| Self-rating report | Proficiency with digital technology (%) |
|--------------------|----------------------------------------|
|                    | Word processor | Spreadsheet | PPTS slides | Files sharing | Photo editing | Web site management | Mobile calendar | Email application | Social media |
| 1: Not proficient at all | 0             | 3.1         | .4         | .8           | 21.4          | 41.2               | 4.3             | .4             | 3.5         |
| 2:                 | 0             | 8.9         | .8         | 4.7          | 17.5          | 14.0               | 5.1             | 0              | 1.9         |
| 3:                 | 1.2           | 17.5        | 5.4        | 7.0          | 17.9          | 16.3               | 7.4             | 0              | 4.7         |
| 4:                 | 6.6           | 21.4        | 19.5       | 11.7         | 17.9          | 15.2               | 13.6            | 6.2            | 8.9         |
| 5:                 | 24.1          | 20.6        | 30.0       | 24.9         | 11.7          | 5.8                | 19.1            | 15.6           | 20.6        |
| 6:                 | 36.6          | 16.3        | 24.9       | 26.5         | 10.1          | 3.9                | 24.1            | 37.4           | 30.4        |
| 7: Very proficient | 31.5          | 12.1        | 19.1       | 24.5         | 3.5           | 3.5                | 26.5            | 40.5           | 30.0        |
A study of mobile digital education in medicine did not reveal a difference between mobile and traditional education. A study of AI ethics in education has shown low interest in AI issues in education ethics in general. The use of VR technologies increases the digestibility of the material by 0.46%. The use of augmented reality technologies showed that 80% of the knowledge obtained in the lesson is delayed in the short-term memory of students, in traditional education this figure is 25%. The estimate of residual knowledge in both robotics training courses was 30% higher than the average. [11] The introduction of open educational resources has led to an increase in the digital literacy of students and teachers. The negative response to distance education in parents was caused by the fact that parents had to study children themselves. Parents were not ready for this [12]. The reason is that they are not very good at IT technologies in contrast with their children.

### 4 Discussion

In this research work an analysis of the digitalization of education in general was carried out, statistics on digital ownership in technology; software use and access to digital technologies were obtained. In general, the results obtained in this research work are positive. In the future, digitalization in education will only grow. The practices given in this study will be refined, which will allow more efficient use of AR and VR technologies, to teach robotics. But according to experts, "Digital solutions that are being made now in education are assistants to our real school, assistants to teachers and resources that provide great opportunities for children... We all fully understand and teachers first of all, that new methods are needed in spite of much money spending. It is very difficult for a teacher to rebuild the process of traditional education online; formats and principles are changing. Now it has been proved that the voice of a teacher, mentor is the most important in the development of digital didactics. The school that we have now, it is already qualitatively different. We need to stop opposing distance learning and real school and look: what are the possible ways of rapprochement and integration, and not make a choice only in favor of one or the other. " It is also believed that by applying gamification to the educational process, we can improve the educational process for students and raise their knowledge level. But it
is a rather difficult task, which is being developed both in the ideological and technological sense. We do not forget about parents, who are mostly against digital technologies in education, because they worry about vision and curvature of the spine. And truly speaking, most of them are not able to help their children in IT.

5 Conclusions

The purpose of the research work was to familiarize with the results of the study on the introduction of digitalization in the educational process. Digital technologies such as VR and AR, e-textbooks, mobile digital education, tests-online and training in sciences such as robotics were analyzed. In general, we can conclude that the subsequent growth of digitalization in the positive direction. Since the technologies have been analyzed in this study, they showed their effectiveness and readiness for their further use in the educational process. Further research in AI in the educational environment can be proposed, as few studies are written in this area, and the problem has not been studied. It is also necessary to continue research and make applications in the field of VR and AR, technologies since often their success is local. And first of all it is necessary for our government to raise the level of teacher salary at any educational institution, to provide the educational process with the newest educational digital devices and expensive software (electronic textbooks and tests, video courses and films, dictionaries for different directions in our society). The teachers need to attend special free courses for qualification rising in the sphere of IT technologies. The students also need to obtain additional lessons to be consulted for right usage of new digital educational systems and software.

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