Forming Digital Education for Teachers with the Instruments of Virtual Reality

Gulyaeva Olga Andreevna[a], Gapsalamov Almaz Rafisovich[b], Bochkareva Tatyana Nikolaevna[c], Kuznetsov Maxim Sergyovich[d] and Ilin Alexander Genadievich[e]

Elabuga Institute, Kazan Federal University. 423604, Elabuga, st. Kazan 89

olgaandreevna_20@mail.ru, gapsalamov@yandex.ru, tatyana-n-boch@mail.ru, mixmax86@mail.ru, sashailin@mail.ru

Keywords: Virtual reality, Education, Teacher, Digital education, Students, Modern technologies, Primary school.

Abstract: The relevance of this article is due to the need to master skills working in the digital environment. Digital literacy contains skills, which a modern teacher should have for performing high-quality professional educational tasks. In this article we reviewed the technology of virtual reality, which is a prospective development for education. Also, we reviewed the problems and prospects of using virtual reality in the process of education. Survey data showing the level of digital education of primary school teachers are presented. Methodology is built on methods that allow us to qualitatively and quantitatively judge the level of digital education of primary school teachers. Purpose of the study: watch how instruments of virtual reality impact the development of digital literacy for teachers.

1 INTRODUCTION

The modern educational system has high demands on students, often it overcomes their ability to handle modern computer tools and technologies. Education is meant for students to practically use their knowledge in life, using internet resources and digital technologies. Without further to go, we should point out that the aspect of digital education effectively influences intellectual development.

Strategic goal of Russian education is to form a functionally literate individual, in other words "a person who is orientated in the world and who acts in accordance with public values, expectations and interests. An independent person, knowledgeable and able to live among others, who has certain qualities and core competencies" (The main stages of introducing functional literacy in educational institution). One of the main tasks of education is the need to teach children how to handle information, internet-technologies, obeying the laws, keeping your personal information secret and to distinguish real news from fake.

In 2019 a federal project "Digital educational environment" was accepted, aimed at studying the level of digital knowledge of the population and competencies using digital services, also on forming a digital educational environment in educational organizations. As the minister of education, Vasiliyeva O.Y. Considered that "the project will update the contents of education, giving students the ability to easily and safely, at the same time, to orient themselves in the digital environment. Thanks to the project parents will have an opportunity to learn the interests and abilities of their kids. For teachers, digitalization will reduce administrative burden" (Ministry of education of the Russian federation. National project "Education".).

Therefore, in frames of this project, before the end of its implementation (December 2024), its planned to provide 100% of schools that are fulfilling the basic educational programs, with high-speed internet,

[a] https://orcid.org/0000-0002-4174-3914
[b] https://orcid.org/0000-0002-8045-623X
[c] https://orcid.org/0000-0002-1232-1886
[d] https://orcid.org/0000-0002-6318-5837
[e] https://orcid.org/0000-0001-7106-2696

modern digital technologies, high-quality information technology infrastructure, also to carry out advanced training for teachers and leaders of the organization (Ministry of education of the Russian federation. National project “Education”.).

The topic of digital education is becoming more and more relevant, not everyone knows that the term came to us back in 1997. Expert in the field of digital literacy P. Gilster under the term he meant for us to understand, using information in different formats out of a big range of resources, when we can get it from computers (Gaisina, 2018). In modern scientific literature the term “digital literacy” is considered to use all opportunities that are available in modern life, with all the technologies, as well as a complex of skills, that allow us to easily and safely exist in the digital environment (Ministry of education of the Russian federation. National project “Education”).

The requirement of being functionally competent isn’t only for students, but for teachers as well. If you look through the professional skills of a modern teacher, you will notice that they have such characteristics as: hold of TTA and the newest methods of education; ability to fastly analyze information. Specific competence, providing digital literacy, are: holds of rational techniques and ways of independently searching and processing information; knowing how to filter Internet resources for organizing educational systems; knowledge of how to provide a safe internet search of information for students.

Therefore, we can say that digital literacy allows teachers to communicate in modern language with students without any barriers. World of technology is progressing everyday, in 2017 the first virtual reality headset was shown and automatically became popular in all aspects of a person's life, as well as in the field of education (Ivanova, 2018).

Virtual reality began progressing all the way in the 50’s of the last century. In 1961 the company Philco Corporation developed the first helmets of virtual reality Headsight for military purposes, that was the first time using technology in real life. In 1962 Morton Heilig invented the first virtual simulator “sensor frame”, at that time the device was as huge as a slot machine (Ivanova, 2018).

Term “virtual reality” belongs to the illegal activity of “hacking” Jaron Lanier. At that time, in the 80’s, he brought out the term “electronic devices, that place a person in a new dimension of existence, world of information, everything a person could get a sensory perception of reality in a totally unique and interactive environment of technological simulators (images that do not exist)”. In the 90’s Julie Martin connected virtual reality with television, after which gaming platforms using the technologies of virtual reality started to develop. At the same time gaming platforms using technologies of virtual reality began to develop (Ivanova, 2018).

Virtual reality isn’t just a game for playing, it's a three dimensional environment, simulated with computer technologies, in which a user immures with the help of sensor devices. Simulated conditions with objects, scenes are meant to imitate reality through the senses of sight, hearing and feel. To enter the three dimensional world you need to use special equipment and tools:

- helmet and glasses. These devices consist of two small screens, located across each eye, blinders that prevent external light and stereo headphones. Screens display a stereoscopic image (causing illusions of volume), allowing a realistic experience. Also the helmet has a movement detector;
- Joystick (game pads) - are special devices for interacting with the virtual environment, consisting of built-in position and movement sensors, as well as buttons and wheels for scrolling. Joysticks are wireless, preventing inconvenience and piles while connecting to the computer;
- Communication module - consists of a black small plastic box. The module connects the helmet of virtual reality with the computer;
- Base stations - for a full functional helmet, are placed at a height of 2 meters from the floor diagonally to the gaming zone.

Virtual reality in education is a new approach to the presentation and assimilation of scientific material. The perk of virtual reality technology is to turn out to be in a different place, perform actions that are impossible or difficult in reality. This dictates the options for educational apps, often virtual reality is only used for visualizing what is difficult to see, as well as for memorizing algorithms. Thanks to this technology, students can study in experimental laboratories, observe historical events and even participate in them, visit space, travel to any location in the world, build ginormous diagrams, conduct experiments and even try themselves in various professions.

2 METHODS OF RESEARCH

Methodology of research is based on methods that allow us to qualitatively and quantitatively judge the level of digital literacy of primary school teachers and their knowledge in technologies of virtual reality.

Methodological base of research is the work in developing theories and practices forming digital education S.G. Davidova (Davydov, 2015; Davydov, Logunova, 2015), E.Y. Zotova (Soldatova, Nestik, Rasskazova, Zotova, 2013) and others. Also, on the topic of progressing digital education of students worked: T.A. Boronenko (Boronenko, 2021), S.V. Gaysina (Gaisina, 2018), E.G. Potupchik (Potupchik, 2017) and others. Issues of digitalization weren't left behind from scientists of the Kazan (Privolzhsky) federal university, such as A.R. Gapsalamov (Gromov, Stroev, 2022), V.L. Vasilyeva (Gafurov, Safiullin, Akhmetshin, Vasilev, 2020; Vasilev, Akhmetshin, Yumashev, Anisimova, 2020), E.E. Merzon and M.S. Kuznetsova (Merzon, Kuznetsov, 2020) and others.

With the aim of figuring out the level of digital literacy of teachers, knowledge of virtual reality technologies a survey was conducted among primary school teachers in the republic of Tatarstan and the Perm region, with a free online-constructed form questionnum. Academy of Russian ministry of education.

Survey was made to identify the level of digital literacy of primary school teachers and their exposure to modern virtual reality technologies. The survey included such questions as: do teachers know the term “virtual reality”; have they ever used virtual reality technologies in gaming or educational apps; is it necessary to use virtual reality technologies in educating primary school students; does such technology has influence on improving the quality, motivation and simplicity of education; are teachers ready to master new technologies; what level of digital education do they rate themselves on.

3 RESULTS OF THE RESEARCH

Primary school teachers in the age of 22 to 58 years old, working in general education organizations of the Republic of Tatarstan and Perm region took part in the survey. Results of the study are presented in diagrams with the question and the percentage of responses received.

Figure 1 shows judgment of teachers' digital literacy.

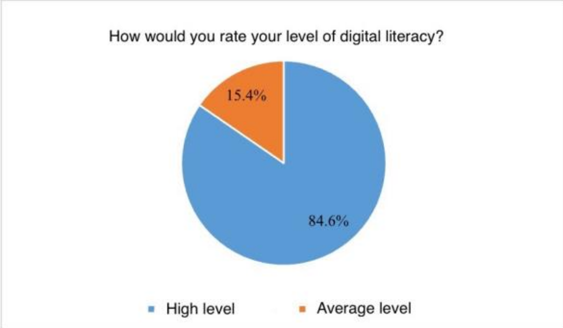

Figure 1: Teachers' judgment on their level of digital literacy.

According to image 1.1 more than half of school teaching staff (84.6%) consider themselves to have an average digital literacy level, and only some (15.4%) consider themselves to have a high level. It is important to note that none of the teachers considered themselves to have a low level. The reason for that could be that teachers have to take advanced training courses in the field of digital technologies.

Figure 2 shows the main factors that motivate teachers to use information communication technologies and digital educational resources in the process of educating.

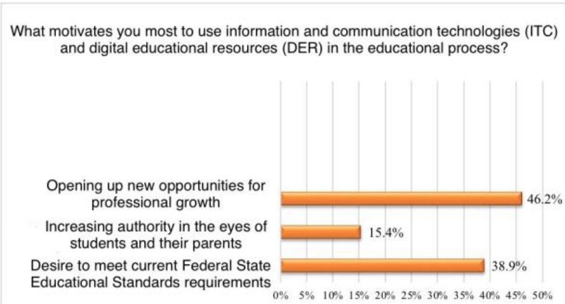

Figure 2: Teachers' motivation to use ICT and digital education resources in the educational process.

According to the figure you can come to a conclusion that 46.2% of the asked teachers are motivated to use DER for the potential opportunities for professional growth, 38.9% use DER with the desire to meet the current requirements of FSES and only 15.4% use it to increase their authority in the eyes of students and their parents. The positive part is that there are no teachers that don't have the motivation in using digital platforms in the process of education.

Figure 3 shows their opinion on the need of introducing younger students with virtual reality.

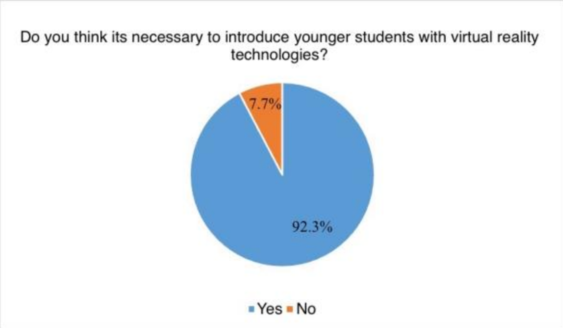

Figure 3: The need to introduce younger students with virtual reality.

According to figure 3 you can tell that the majority of the teachers consider it necessary to introduce primary school students with technologies of virtual reality, because they believe that technologies are to increase quality (46.2%) as well as the level of motivation to study (84%) of young students. On the other hand there are those (7.7%) that consider it nonsense to introduce, because they don't find a connection between motivation (14%) and quality of the educational process (53,8%).

Figure 4 shows data on the complication with virtual reality technologies in schools.

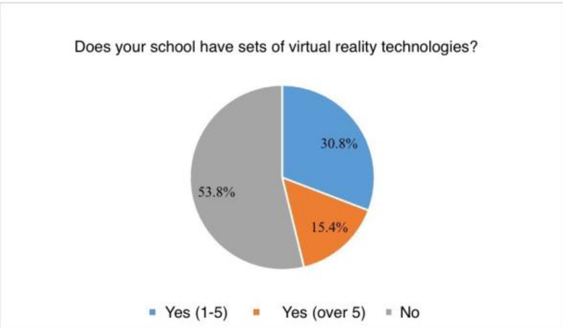

Figure 4: Schools being equipped with virtual reality technologies.

In figure 4 we see that most of the asked teachers (53.8%) don't have sets of virtual reality technologies in their schools, which becomes a barrier in using this technology in the educational process, as well as including visual elements in teaching young students. Partially (30.8%) have sets of virtual reality technologies, but not enough to work with a full class of kids, only (15.4%) of schools have more than 5 sets to use in educating.

Analyzing the results of the data show that the majority of the teachers try to actively develop their level of digital literacy, are ready to attend advanced training courses to master skills in this area and find it necessary to include students in the digital world.

4 CONCLUSIONS

For the research teachers were questioned to figure out the level of digital literacy. Due to the results we can make a conclusion that teachers are motivated by certain factors, such as: desire to meet the current requirements of the FSES; new opportunities for professional growth. Teachers are developing digital competencies, ready to take courses and to use new technologies in their lessons.

To sum up, general education schools in the republic of Tatarstan and Perm region, at the moment do not have enough sets of virtual reality technologies, which doesn't allow teachers to use them in full value for educational purposes. At the same time, schools have teachers who want to self-develop and add new technologies in their classes.

5 DISCUSSION

It's better to point out the pros and cons in developing virtual reality technologies and adding them in the process of education. First of all, its best to point out the most obvious problems of modern technologies:

1. First and most valuable problem is the cost of virtual reality sets. Introducing new technologies to schools asks for high costs, because you need to buy many sets to arrange a full class. It costs a lot not only to buy sets, but to develop programs. Because the price depends on other factors: salary for the specialists team (quantity of specialists depends on the difficulty of the project, amount of tasks and due dates); specifics of the project (location, quantity of scenes, 3D - models, mechanics, realism of the objects, helmets and other equipment).
2. Adaptation to virtual reality depends on the individual. A person is unique, which is why there are body specifics, some can get nauseous after a couple minutes, some can get dizzy, disorientated in space. Such things can happen due to: discrepancy between the scales of the physical and virtual worlds; space distortion that a person is used to in real world; violation of the vestibular system (the person is at rest, the organs of sight are seeing movements). Also, not many people are capable to fastly switching from the virtual world to reality, therefore a person can get too accustomed to a role that would affect his behavior in reality, the skills a person gets in the virtual world aren't often completely mastered in reality.
3. Ability to learn technologies, virtual reality development. Virtual reality is gradually being

introduced into various spheres of human life, partly as an experiment, in order to introduce technology into a full-fledged educational process, it is necessary to develop training programs for all levels of education (primary, basic, secondary, higher) and this requires enormous resources and a long time to create quality content.

4. Low mobility of virtual reality sets. Bulky headsets, an abundance of wires, a limited tracking area, huge and heavy helmets and components, limited space for movement. For a high-quality lesson using virtual reality you need an equipped office: available space for movement without fragile objects, availability of PC devices and sufficient light.

5. Lack of Russified app versions. Nowadays there are a limited number of programs in Russian, since most countries in the world study English. As well as sets of equipment, programs, games are created foreign companies. The Russian virtual reality market is represented by small companies that create their projects based on foreign developments. Prominent representatives of Russian companies are: AR Prodaction, Boxglass, VE Group.

Despite the difficulties caused only by the fact that virtual reality technologies appeared not so long ago and are in the process of mastering, refinement and development, the use of technology can bring the education sector to a high level. The use of virtual reality technologies in educational institutions is growing every year, so by 2024, as part of the "Digital School" project, it is planned to increase the amount of virtual reality equipment. The potential of using technology is enormous as it is an ideal learning assistant. Virtual reality can be used in various fields (geography, history, chemistry, biology, life safety and others), using it you can add illustrations, video clips that students will definitely appreciate.

The technology has an amount of benefits in using it at schools:

1. Visibility. Virtual reality gives the ability to watch in detail the objects and processes in detail that are difficult to trace in the real world.using applications you can view photos and videos of the real world in 360, it's an easily accessible alternative to traveling. (Flying into space, diving underwater, traveling around the human body).

2. Focus. A person is not affected by external irritants, he can concentrate on the material and understand it better.

3. Engagement. You can program and control the scenery in the process of education. (Chemical experiments, historical events).

4. Safety. Carry out complex operations without any risks, perfect your skills regardless of the complexity of the scenario, students will not harm themselves or others.

5. Children with disabilities discover new sensations, therapeutic assistance and expanded opportunities for those who are deprived of the opportunity to move freely.

6. Motivation. Using modern technologies, children get more interested in the process of education.

Separately it can be noted that virtual reality contributes to the gamification of the learning process, which means that information can be presented in a game form. In the same way, you can reinforce the material and conduct practical lessons, so that the theories become visual, understandable and interesting and this further involves students in the educational process.

Virtual reality technology allows you to appear in a different place and perform actions that are impossible or difficult to achieve in real life. This dictates the options for educational applications, therefore virtual reality is often used only to visualize what is difficult to see, as well as for memorizing action algorithms.

However, tech experts predict that virtual reality devices will become mainstream and popular like smartphones in the next 5 years, because they have bright long term prospects and the flaws will be eliminated in the upcoming year. Technology market is rapidly growing and developing, virtual reality is capturing the niche of gaming and entertainment. Opens up new opportunities in modeling, education, experience and communication.

6 CLOSING

Formation of digital literacy in the modern world must be considered as a key element of functional literacy, ensuring an effective use of digital technologies in practical life and human competitiveness in the modern world.

The formation of digital literacy of an individual consists of the following elements: digital technologies, social aspects of digital interactions, obtaining and using skills in digital information, network behavior and others. Mastering digital literacy skills must be organized in accordance with regulatory documents, federal state educational standards, as well as the methodological literature.

The development of technology has also affected the educational process, so virtual reality technologies began to be included in it. With it help, they dive inside living cells, take excursions to museums, become participants in historical events and master foreign languages.

Information technologies are being actively introduced into educational organizations, therefore there is a need for their competent use for educational purposes. Digitalization of education allows students to expand their horizons in internet technologies and mobile opportunities. Meaningful use of digital technologies, independent search for information, participation in project activities form the competencies of a 21'st century student.

ACKNOWLEDGMENTS

This paper has been supported by the Kazan Federal University Strategic Academic Leadership Program.

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