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THE USE OF VR-TECHNOLOGIES IN HUMANITIES EDUCATION AT SCHOOL

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Abstract

This article discusses the problem of forming an idea about the possibilities and limitations of introducing virtual reality into the educational process for teachers of the humanities. Since the experience of using visualization is more elaborated and organically fits into the teaching of natural sciences, special attention is paid to understanding the differences and the specifics of these areas in the field of goals and methods of using virtual reality. Methods of analysis of pedagogical literature on research issues, experiment and polling method were used. The study was conducted in February-March 2020. Teachers (N = 44) took part in the study, teaching History, Russian, Foreign languages, Literature and other subjects in the cities of Veliky Novgorod, Vyksa, Pavlovo, Nizhny Novgorod, Moscow, Prokopyevsk at the levels of primary and secondary general education. The article analyzes the guidelines of modern visualistics to include them in the target part of the lesson development. The study revealed that in general, teachers positively assess opportunities, especially for project activities. Despite the abundance of existing platforms and programs, even teachers who positively assess the capabilities of VR for conducting lessons know few (14%), suitable for their subject, and 68% do not know the content as a whole. The article describes the authors' experience in using VR in educational activities, which can serve as a primary guide for teachers in setting goals and identifying the first steps to introduce technology into the educational process.

Keywords: Educational process, humanities, virtual reality, visualization

1. Introduction

The rapid development of information and communication technologies, their increasing accessibility and attractiveness for the younger generation poses the education system with the difficult task of creating a new educational environment that can provide high-quality training for students. A virtual educational environment, which has rich opportunities for activating and including students in educational activities within the framework of studying the educational field "Social Sciences" with the aim of achieving the planned educational results by students, can become a great success.

On the other hand, there is a shortage of teaching materials about which virtual technologies are appropriate for conducting lessons or which does not allow them to be included in the technological map of lessons. It is necessary to form a field of teachers' ideas about the opportunities and difficulties that await them when introducing this technology into lesson activities to confidently say that virtual reality has become part of the school educational environment.

If in the natural sciences the experience and methodology of using process visualization is well developed, which organically falls on any reality, including augmented and virtual, then in the humanitarian areas there is no unequivocal idea of how and what will become productive for teaching students, due to the specifics of subject area.

2. Problem Statement

The very concept of VR-technologies and the virtual educational environment is not well-established, and their opportunities for training, education and development of students are poorly studied and, as a result, little used by teachers. VR-technologies provide almost unlimited possibilities, which also become a problem in the absence of a conscious orientation in them. This is also a difficult task for a teacher in a school focused on norms and regulations, because despite the abundance of existing programs, there are no developed guidelines for how to fit them into school subjects. In many ways, the teacher's own awareness of the goals of using virtual reality in the lesson is the key to the success of the process, but still there is an unexplored attitude by teachers of the humanities to the introduction of virtual reality technologies in the educational process in educational institutions.

3. Research Questions

3.1. What are the differences in the use of visualization in the natural sciences and the humanities?

3.2. How do teachers of humanitarian subjects assess the possibilities and limitations of virtual reality in school subjects?

3.3. What analogues of experience with visual objects can be used?

4. Purpose of the Study

The aim of the research was to study the attitude of humanities teachers to the introduction of virtual reality technologies in the educational process in educational institutions, identifying common expected problems and finding approaches to solving them.

5. Research Methods

5.1. The following methods were used in the study: analysis of pedagogical literature on research issues; experiment (hypothesis); survey method (questionnaire).

5.2. The study was conducted in February-March 2020. Teachers (N = 44) took part in the study, teaching Geography, History, Russian, Foreign languages, Literature, Music, and Fine Arts in the cities of Veliky Novgorod, Vyksa, Pavlovo, Nizhny Novgorod, Moscow, Prokopyevsk at the levels of primary and secondary general education.

6. Findings

6.1. Approaches to using visualization in the Humanities

Visualization is more important in the study of natural sciences in the established view (Daineko et al., 2017). The use of virtual objects in learning as special models leads not only to the formation of correct representations among students, but can also enhance their cognitive activity by connecting the studied subject with wildlife, practical activity, as well as improving understanding of the essence of the studied phenomena and objects. The literature provides examples of improving the teaching methodology of natural sciences using 3D graphics (Fatikhova & Sayfutdiyarova, 2017).

At the same time, the observance of the principle of visualization is equally important for the humanities, in which visualization can contribute to the activation of thinking in strengthening attention and the development of theoretical thinking (Alekseeva, 2016; Usoltsev & Shamalo, 2014). The peculiarity of the subjects of the humanitarian cycle is the access of students to the cultural experience of mankind, as well as familiarity of students not only with the methods of natural science, but also with humanitarian knowledge. In contrast to the natural sciences, the subject of which are really existing objects and phenomena of surrounding reality, existing independently of the cognizer, the subject of social and humanitarian knowledge is the sphere of human activity, which is reproduced by it and does not exist without it (Lektorskiy, 2018).

The differences in natural science and socio-humanitarian knowledge are also due to the specifics of studying the cultural and historical heritage. Natural science cognition is carried out, according to scientists, using rationally logical methods of cognition, where the result, subject to the necessary conditions and strict adherence to the methodology, will always be the same, and any studied theoretical position will be confirmed experimentally. The result of such knowledge is objective facts, laws, and rules.

The study of the specifics of socio-humanitarian knowledge requires an appeal to a cultural approach. This type of cognition is based not so much on objective facts as on texts in the broad sense, as a special sociocultural phenomenon. Interpreting a text, a person first of all tries to understand its meaning on the basis of experience and context. The result of socio-humanitarian knowledge is subjective ideas not only about the world, but also about oneself. Unlike natural science, this result may be ambiguous.

From the position of a culturological approach, the student acts as an active researcher of culture, the subject of educational and cognitive activity, capable of actualizing personal meanings, cultural development, familiarizing with cultural values with the support and mediation of a teacher. A field is

created for possible interpretations of the meaning of the texts depending on the context and personal properties of the perceiver. "The meanings are not contained exclusively in the image itself, but are acquired at the moment of their "consumption", vision and interpretation. The meanings of each image are plural; they are created whenever they are looked at" (Sturken & Cartwright, 2011, p. 42).

Comparison of different interpretations by students from the position of both the cultural and historical context of the studied socio-cultural objects or phenomena, and from the position of personal meanings, generates educational dialogs (polylogues). Such dialogues can be sources of students' development when they study the educational disciplines of the humanitarian cycle.

The study of the socio-cultural heritage of students should take place in the process of active educational communication, which is an interactive interaction between subjects of education in the process of information processing, aimed at value-semantic coordination and understanding of the content of education with a view to assigning it (Dautova, 2018; Mckenney & Visscher, 2019). Important conditions for the organization of educational communication are not only the implementation of a dialogue model of learning, but also the inclusion of students in various types of sociocultural and social practices. The variety of sociocultural practices includes the use of virtual reality technologies (VR technologies) in the lessons of the humanities.

The use of VR - technologies in the teaching of the disciplines of the humanitarian cycle corresponds to modern recommendations on the use of visualistic experience, which develops the methodological foundations for using visual images as a resource, object and main plot of the study (Ghosh, 2019; Zaatari, 2019). There are two discrepancies within it: according to the phenomena studied, these are either unique phenomena or typical ones; on the etiology of the object - photo and videoography or analytics and interpretation of finished materials (Pechurina, 2007; Vasileva, 2018). Virtual reality (VR) - is a variant of perceived reality, devoid of physical existence, realized through the use of special equipment and the use of information technology in computer conditions, in fantasy, etc. Some intermittent, dynamic computer objects are also called virtual. The authors prove the thesis that the advantage of immersive virtual environments (VE) is that it allows the user to test the computer-generated world as if it were real - creating a sense of presence or "presence" in the user's mind (Bowman & McMahan, 2007).

The use of VR technology can increase learning effectiveness (Krokos et al., 2019). In a number of works, some methodological issues of the application of VR technologies are disclosed in order to improve the quality of education (Chernysheva et al., 2017). A teacher must improve not only in terms of improving skills, but also in studying innovative information and communication technologies to become leaders in their industry *(*Altınay et al., 2018). At the same time, there is no systematic description of the methodological support for using VR technologies in the lessons of the subjects of the humanitarian cycle, considering the specifics of these subjects in the pedagogical scientific and methodological literature.

6.2. Humanities teacher's perspective on VR

The results of a survey of teachers confirmed the hypothesis that there is no integral understanding of virtual reality as a teacher's tool. Teachers present the strengths of using virtual reality (VR) in the lessons mainly as a tool to improve perception (24.4%) and increase cognitive interest (20%). More than half of the answers were made up of the "I don't know" option, which once again confirms the hypothesis

that most educators are not guided by the available opportunities. A certain number of answers gives, as a strength, just a description of the technology itself, such as the answer "three-dimensional representation of objects" (13%), "interactivity" (6.7%).

Even those who positively assess the capabilities of VR in their professional activities did not show an understanding of the visualization methodology in the pedagogical process or pedagogical design. The goal-setting of the use of VR-technology for teachers teaching humanitarian subjects, literally remained at the level of domestic representations. This leads to an increase in the risk of substitution of the target with a means, which is just noted as the largest of the existing risks in this area. First of all, the purpose of training should determine the place of visual aids in the learning process. The effectiveness of visualization tools is determined not by their conformity or inconsistency with modern technology or tribute to fashion, but by whether its perception contributes to the activity for which the tool was used (Usoltsev & Shamalo, 2014).

Judging by the answers, teachers are more aware of the advantages than disadvantages, since the answer "I don't know" made 51% in the first case and 61% in the second. To some extent, this suggests that teachers are more likely to look positively at VR capabilities. The teacher's answers about the weaknesses of using virtual reality (VR) in the lessons were divided into groups: high price (61%), high price (16%), deteriorating children's health, and increased time costs (9% each). Fewer teachers are concerned about technical difficulties (7%) and student withdrawal from reality (5%). Time costs are assessed by educators ambiguously. If four people evaluate them in the direction of increase (weak point), then along with this, it was suggested that the use of VR "saves time". Many teachers believe that with the help of VR it is possible to develop imagination, but the opposite single opinion is expressed about the deterioration of this ability of students when introducing this technology into teaching.

The emotional context is found in the formulations of teachers (unrealistic sensations) when assessing the possibilities of virtual reality, which is less observed when it comes to other tools. This can both help in the work, creating an emotional upsurge, both increasing motivation for learning, and interfere, entering into resonance with the emotions of students and interfering with the constructiveness of the lesson. There are teachers' responses and negative emotional responses to virtual reality technologies as "an expensive toy, a costly pleasure".

The problems of using virtual reality are formulated in a similar way with the VR weaknesses noted above. What is noteworthy, the category "distracting children from the content of the lesson" appears (18% of answers), which to some extent suggests that teachers need methodological assistance both in the organic integration of virtual reality in the lesson and in managing the process during preparation and the use of a virtual reality helmet, especially in conditions of a limited amount of equipment compared to the fullness of classes, which is expected to lead to the problem of employment of the remaining students in the classroom and an increase in class downtime in the lesson.

One of the questions on the questionnaire answered by teachers was "Can virtual reality (VR) be used to organize students' project activities?" due to the requirements of federal educational standards to introduce project activities in educational programs and the process. An optimistic forecast is given by 93% of respondents; one of them categorically states that it is "necessary." And only two do not know the answer

to this question. Thus, even skeptics regarding the technical capabilities of schools fall into the category of those who believe in the possibility of embedding VR precisely in the project activities of students.

One of the essential constructive components of the idea of the possibilities of virtual reality is awareness of existing content available for use. Despite the fact that the survey was conducted among teachers open to implementation, 68% of respondents do not know the answer to the question. 14% of people mentioned applications and platforms that can be used in history lessons (Virtual Museum, Museum.rf, Colosseum VR, Google Arts and Culture, etc.) that are relevant to the subjects taught. 7% do not know VR applications suitable for conducting the subjects taught by them, but they call known applications for conducting biology, chemistry and other lessons. Among teachers' answers are the following applications - digital laboratories for conducting chemical experiments - MEL Science, solar system simulator - Universe Sandbox 2, anatomy study app - Anatomy VR etc.). 9% of the teachers surveyed named programs and platforms that allow developing VR content (360 ° Video Editor, Movie Creator) and successfully incorporate them into any of the disciplines, both as demonstration and as test material (voice-over of videos by students, open finale stories). Such platforms provide unlimited opportunities for project activities to study social, historical phenomena through visual images. The same can be said about Vtime - a social network in virtual reality that allows working with 360° photos. One answer is given about the use of ready-made platforms for teaching students behavior in extreme situations (VR Professionals platform, Zarnitsa).

In addition to those called by the teachers themselves, one can designate reality simulators among the most frequently used in search queries and those that can be used for certain topics of history and social studies: DCS World Steam Edition, IL-2 Sturmovik: Battle for Stalingrad, Nefertari: Journey to Eternity. Ancient Journey VR is often considered for a broader study of the subject. Geography content is easily detected: the Blue, SpaceEngine.

6.3. General methodological approaches in the use of VR in training

General guidelines for teachers based on the experience of the authors can be distinguished despite the marked difference between natural science and humanitarian subjects. The most common problem that a teacher encounters when using virtual reality is to limit the amount of equipment purchased. In this situation, the involvement of the entire class in the learning process should be especially seriously worked out in terms of the methodology of the lesson.

The option is well established when a student in virtual reality becomes an intermediary between visual and verbal images. The direction of the broadcast can be either one way, when classmates name the object or part of it in turn, and the observer finds them, or the other way, when the description is made by the one who is the observer, and classmates answer what is being discussed.

Work was done in small groups to intensify the work. This solves several problems of both a classical nature (active listening skills, in particular), and specific for this form of training - to enable all members of a small group to feel like a mediator, most attractive to all participants. This imposes an exact calculated restriction on the size of the group (the ratio of the time of the part of the lesson allocated for working in virtual reality to the planned working time of one student plus the necessary manipulations (putting on, fitting, setting up, taking off)).

The competent formation of the group's composition is also a crucial moment, since the beginning of the possibility of using virtual reality tools falls on 12-13 years old, which corresponds to the initial teenage period. At this moment, they may unexpectedly show their attitude to the appearance of their peers and in an unusual appearance in a helmet, keen attention to the opinions of others. The age limits of virtual reality glasses from "the device is not intended for children" (HTC Vive), to more specific 12 (Sony) and 13 years (Oculus Rift) also impose restrictions on the scope of virtual reality for using VR in elementary and high school. In any case, it is expected that the use causes inevitable emotional responses of students, which must be kept in a constructive manner. They will be especially bright in the first lessons; therefore, if you work out the feedback at this moment, it will productively affect further work.

7.   Conclusion

Currently, there are reviews of VR programs and platforms that reveal some of the features of these products. Unfortunately, these reviews do not solve the questions of the methodology for achieving student educational results. The issue of developing a methodology for incorporating existing simulators into the educational process to form specific knowledge and educational competencies remains relevant. Some points: the organization of the use of a limited number of helmets per class, the calculation of the size of a small group, the development of emotional reactions can be transmitted to the study of the humanities. Moreover, the same program can be used in different subjects with a clear understanding of the teacher, why this is done and what the advantages are of virtual reality compared to the classical approach. Given the cost of technology, the constant increase in the amount of content and the quality of technical means, the use of virtual reality in education is most likely a matter of time; therefore, developments in methodologies are a promising area of research.

References

Alekseeva, O. V. (2016). Pedagogicheskaya model' razvitiya uchebno-poznavatel'noy kompetentnosti mladshikh shkol'nikov v protsesse intellektual'no-khudozhestvennoy deyatel'nosti [Pedagogical model for development of educational and cognitive competence of primary school pupil in intellectual and art activities]. *Vestnik Novgorodskogo gosudarstvennogo universiteta imeni Yaroslava Mudrogo* [Bulletin of the Yaroslav-the-Wise Novgorod state university], *5*(96), 10–13.

Altınay, F., Altınay, M., Dagli, G., & Altıay, Z. (2018). Being leader in global citizenship at the information technology age. *Quality & Quantity, 52*(1), 31–42. https://doi.org/10.1007/s11135-017-0585-5

Bowman, D. A., & McMahan, R. P. (2007). Virtual Reality: How Much Immersion Is Enough? *Computer, 40*(7), 36–43. https://doi.org/10.1109/MC.2007.257

Chernysheva, M. V., L'vov, L. V., & Chernov, V. A. (2017). Primeneniye tekhnologiy virtual'nogo obucheniya dlya povysheniya kachestva obrazovaniya [The use of virtual learning technologies to improve the quality of education]. *Sovremennaya vysshaya shkola: innovatsionnyy aspekt* [Modern Higher School: innovative aspect], *9*(2), 54–63.

Daineko, Y., Ipalakova, M., & Dmitriyev, V. (2017). Using virtual laboratories in teaching natural sciences: an example of physics courses in university. *Computer Applications in Engineering Education, 25*(1), 39–47. https://doi.org/10.002/cae.21777

Dautova, O. B. (2018). *Obrazovatel'naya kommunikatsiya: traditsionnyye i innovatsionnyye tekhnologii* [Educational communication: traditional and innovative technologies]: Study guide. KARO.

Fatikhova, L., & Sayfutdiyarova, E. (2017). Improvement of methodology of teaching natural science for students with intellectual disabilities by means of 3D-graphics. *European journal of contemporary education, 6*(2), 229–239. https://doi.org/10.13187/ejced.2017.2.229

Ghosh, T. (2019). Witnessing famine: the testimonial work of famine photographs and anti-colonial spectatorship. *Journal of visual culture, 18*(3), 327–357. https://doi.org/10.1177/1470412919879067

Krokos, E., Plaisant, C., & Varshney, A. (2019). Virtual memory palaces: immersion aids recall. *Virtual Reality, 23*(1), 17–17. https:// doi.org/10.1007/s10055-018-0346-3

Lektorskiy, V. A. (2018). Yestestvennoye, iskusstvennoye i nauki o cheloveke [Natural, artificial and human sciences]. *Kul'turno-istoricheskaya psikhologiya* [Cultural-historical psychology], *14*(3), 31–35. https://doi.org/10.17759/chp.2018140303

Mckenney, S., & Visscher, A. I. (2019). Technology for teacher learning and performance. *Technology, pedagogy and information, 28*(2), 129–132. https://doi.org/10.1080/1475939X.2019.1600859

Pechurina, A. V. (2007). Vizualizatsiya sotsial'nykh issledovaniy: novyye dannyye ili novyye znaniya? [Visualization of social research: new data or new knowledge?]. *Sotsiologicheskiy zhurnal* [Sociological Journal], *3,* 81–89.

Sturken, M., & Cartwright, L. (2011). *Practices of Looking: An Introduction in Visual Culture.* Oxford University Press.

Usoltsev, A. P., & Shamalo, T. N. (2014). Formirovaniye innovatsionnogo myshleniya shkol'nikov v uchebnom protsesse [Formation of innovative thinking of students in the educational process]. *Obrazovaniye i nauka* [Education and science], *113*(4), 17–30.

Vasileva, V. (2018). Collective and collected memory: photography as family history reclamation in soviet and post-soviet Russia. *Visual ethnography, 7*(2), 45–60. https://doi.org/10.12835/ve2018.1-0112

Zaatari, A. (2019). History and photographic memory. *Journal of visual culture, 18*(2), 169–186. https://doi.org/10.1177/1470412919864501