

Basic Principles of Using Virtual and Augmented Reality Technologies in the Process of Teacher Training in Ukraine

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Abstract. In our opinion, in all aspects, education should correspond to the modern realities of the world, for life and communication with which we prepare a person. We propose to pay attention to the preparation of the individual, because without the readiness of the teacher to fulfil his or her responsibilities for socialization and development of skills necessary for self-realization, we lose not only a favourable period. We lose time and opportunities for a person's success in life.

For example, teachers' lack of skills or knowledge of currently popular audio-visual content programs, building effective communication in social networks, and their quality use in the educational process create a «generation gap». After all, «gaps» in the knowledge, skills, and capabilities of a teacher or professor are immediately «striking» to children and young people, causing them to reject the teacher's personality and, as a result, the information they broadcast. In addition, a modern young person, fascinated by the possibilities of gadgets and gamification in education, constantly needs new impressions, sensations that will allow them to engage in the educational process, and will interest young people who are oversaturated with various types of information. That is why, in this review, we outlined the main points of our use of currently available virtual and augmented reality technologies, in particular the AltspaceVR program, in the practice of training primary school teachers. We also presented our experience and various aspects of using these technologies in the Ukrainian educational space.

Keywords: AltspaceVR, augmented reality, educational technology, virtual reality, teacher training.

I. INTRODUCTION

We would like to start our research with a quote from: «Current development of digital society is based on

improvement of information technologies and their introduction in all industries. In the source [1] term «digitalization» defines process of saturation of the physical world by electronic-digital devices, facilities, systems and establishment of electronic-communication exchange between them, which in fact makes possible to integrate virtual and physical and to create cyber-physical space. Main purpose of digitalization is to achieve digital transformation of existing and creation of new industries, as well as transformation of life spheres into new more efficient and modern ones» [2].

The same applies to the most sluggish sphere of education (for Ukrainian society, according to our subjective assessment). After all, we must not only move to new components of teacher training for different levels of education (preschool, primary, secondary or basic, higher), which will influence the «intellectual development» of a child or teenager in the future. In particular, the formation of skills and readiness to use high-quality educational content and its creation in the digital world. But we, the teachers who train future educators, also need to become more comfortable with IT.

And in this we fully agree with the thesis «I think in this case it is a whole new field and I think that there is a lot for all of us to learn» [3]. And this applies not only to the digital world around us, to digital education, it is something that is growing as a problem of understanding the transformed demand of modern students, i.e. «Young people want to build their individual learning trajectory by choosing both academic and non-academic courses; both offline and online [4]» [5]. That is why, according to the team of authors, «teachers often use the method of educational projects to further interest students in the

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university» [5]. This has not escaped our interaction with higher education students.

But before we move on to the project that was «completed», we would like to draw your attention to a few points.

Firstly, «*virtual reality (VR) has been around for many years... The high price, complex technology, and lack of accessibility have made it unattractive to many educators... Nevertheless, in 2017, full immersion VR became mainstream with the Oculus Rift [6]. The emergence of this more accessible VR device can allow for high results in virtual interaction «regardless of technical background, as long as a support team is present to train participants and monitor progress during such recordings» [7].* We fully agree with this, as we ourselves had the opportunity to participate in the mentoring programme and, with the support of the programme's teachers, to hold our own event.

Secondly, «*virtual and augmented reality technologies occupy an important place in the new stage of innovative development of the society, named Industry 4.0. These technologies possess both common and distinctive features, which are reflected in the specifics of their use by companies in process of relevant products creation. Virtual and augmented- reality technologies involve creation of thematic visualized content that can be used by intended audience to meet specific needs through modern electronic devices. Presented technologies are implemented in production processes, in marketing companies, in medical sphere, in educational processes, etc. In Ukraine, virtual reality technology is more common than augmented reality [8]» [2].*

Thirdly, it is the experience that mentors and future users should gain related to the skills of «using libraries», which is a «*basic skill needed in today's information society, and is considered a basic literacy-related skill» [3].* And in our case, it is a basic competence that allows not only to develop skills, but also to ensure a high-quality search for «suitable materials» for working with children with special educational needs, to model and find solutions for interaction between different participants in the educational process, and to find the necessary points of contact to realise the potential of each student.

This approach should be basic, because based on the skills of searching for and adapting information, a future teacher can choose which tool to use to work with a particular group of children.

For example, when choosing augmented reality (AR), we should understand that «*is an advanced technology that merges elements of a physical real-world environment with virtual computer-generated imagery» [9]. Thus, AR allows users to interact with two-dimensional (2D) or three-dimensional (3D) virtual objects integrated with a real-world environment» [10].*

But if we take the simplest tools available to a teacher who does not have technical skills, we can see the following. In total, we counted 34 children's books of various content, form and content and 2 augmented reality board games that are currently available in Ukrainian

bookstores (Russian-language content has been removed due to military aggression). In addition, these are quite expensive products that can only be afforded by a «part of the population» of Ukraine and individual libraries participating in various projects. Therefore, this type of product can only be shown to students in an online format, especially when it comes to online learning, when there is no opportunity to meet either in a library or a bookstore for «live communication with the source of information - a book».

However, quite a few authors «*highlight the need to use AR technologies in education because it can provide modern education with new didactic measurements and tools, will facilitate the co-creation of students and teachers, contribute to a better understanding of subjects, visualize hidden processes, and make it acceptable for adults and people with disabilities. The researchers define an AR textbook as a new educational tool which can contain fragments of video lectures, electronic pads (for example, Padlet), augmented quizzes, 3D models, animated tours in the history of the studied problem, in-depth exercises, didactics games etc» [11].*

We partially agree with the above, noting that there are more AR options, but... AR is something that «catches the eye of the teacher», as it is the most familiar and does not require serious training and additional efforts.

At the same time, we understand that the first thing that «catches the eye of young people» is virtual reality (VR) technology. «*This is a system that allows you to 'move' a person into a simulated virtual world», and «immersion in a virtual environment makes the communication process much easier, because it is a spatial spectacular form in which each user-visitor can create not only their own image (choice of gender (!), anthropometric data, clothes), but also to form/choose the environment for virtual stay and virtual communication [12]» [13],* which became an invaluable achievement for the Ukrainian teacher-innovator «*during the 2020 pandemic, where the virtual environment has fully become a communication tool» [13].*

At the same time, we should keep in mind several prerequisites for the success of the latter technology – «*stand-alone head-mounted displays, quality over quantity, recognition of the complexity, educating the educators and social VR» [14],* as well as what users themselves highlight. These are «*full body mirroring activities, doing mundane and essential everyday activities in new ways, activities for social and mental self-improvement, immersive cultural appreciation and educational activities, and engaging in immersive events» [14].*

And we, as teachers who prepare future teachers, are interested in technologies that influence «*increased interest in learning, high level of understanding and persistence in learning, high learning achievement, improved laboratory skills, positive attitude of students towards laboratory work, effective improvement of visual thinking skills, greater enthusiasm» [15].*

II. MATERIALS AND METHODS

That is why, after analysing the scientific research, we turned to a *topic* that was close to us and could not only «catch» the student, but also create conditions for the development of his skills in the digital educational environment, which can be directly used in practice. In fact, this and the above defined the main task for the research on this topic.

The *task* is to present the inclusive component of teacher competencies in the digital educational space, which will «smoothly» move from passive student skills to active skills during their own professional activities

This contributed to the planning of involving 2nd year bachelor's degree students taking the course «Special Pedagogy» in the final stage of presenting the results of participation in the Mentoring programme of the Media Literacy Workshop «New tool - new opportunities: meet AltSpaceVR» 3.0!

III. RESULTS AND DISCUSSION

As part of our cooperation with the participants of the Ukrainian project «Study and Distinguish: Infomedia Literacy», we had the opportunity to attend events held by colleagues from different cities of Ukraine as part of the Mentoring programme of the Media Literacy Workshop «New tool - new opportunities: meet AltSpaceVR» 3.0! There were thirteen events in total, organised by school teachers and university professors. The results of this programme are available on the Mentor Programme channel [16].

At the same time, we also joined a similar event with our audience of 2nd year bachelor's degree students who were taking the Special Pedagogy course. A total of 26 people took part in this course. Students were invited to join a «journey» through the virtual world. To do this, we developed 5 lessons within the discipline step by step:

1. The first meeting. Acquaintance and setting up for work in VR space, explanation of the differences between virtual and augmented reality, a brief history of the development and features of virtual reality in the modern world, as well as a discussion on the possibilities and «dangers» of using this technology to implement the tasks of inclusive education (7 December 2021).
2. The second meeting (10 December 2021) was devoted to the technical side of interaction with the virtual space in the AltSpaceVR programme, connecting, and troubleshooting connection problems.

Overall, «*AltSpaceVR is one of the first social VR platforms of the modern virtual reality era. AltSpaceVR is a free virtual reality platform that can be used in 2D mode (without glasses) from a computer or laptop*», and to work in the program, the computer must meet the specific characteristics of «*64-bit version of Windows 10*» [17].

Therefore, there were enough «problems» and we listed these problems in separate publications (not related in particular to the program, but only to the availability of equipment or a stable connection to the Internet).

But the main and first problem was «low-quality software», i.e. pirated or «limited» copies of the Windows operating system. The second biggest problem of our VR trip was the high «load» of laptops, which meant that we had to wait a long time for the application to load and for the group members to connect to our virtual room. And, perhaps, the biggest «indignation» among students was the fact that this application was not available on other gadgets, so only a few were able to use it.

Thus, out of 26 students in the group, only five were able to log in, register and try the journey for the first time in a pair. Their task of «super-high» difficulty was to go through several «worlds» and take a selfie in one of them.

3. The next meeting was devoted to learning the main «moves» that we needed during the final event of the project. This meeting took place on 13 December 2021 and provided an opportunity to discuss the «injustice of this world» and talk about the feelings of participants who were unable to join our trip due to technical «inaccessibility», which coincided with the topic of our class on the accessibility of educational space for different categories of children with special educational needs. In addition, we were able to relieve the psycho-emotional stress of those participants who were unable to do so due to the lack of equipment that would meet the parameters of the AltSpaceVR application. After all, even the fact that we demonstrated the screen of a teacher who was working with students in the app in parallel did not give a «full sense of involvement in the journey». Although, such a double demonstration created a temporary effect of presence. But, at the same time, it limited the participants of the online meeting in Google Meet to be observing and discussing what was happening on the screen.
4. At the fourth test meeting on 14 December 2021, seven representatives of the group were able to «break through» into the VR audience. They also took part in the final event, which we reported to as part of the Mentor Programme. Here we had 3 rooms with transitions between them through teleportation, buttons with questions on inclusive topics.
5. The final event with representatives of the Inclusive Education Final Camp mentoring programme took place on 20 December 2021. The event was attended by 7 students and 4 mentors of the programme. The event was unofficially called the «Rat Race» because it was built in the format of a competition, where students and guests (by the way, we also had foreigners who were watching and looking at the world we created) had to choose an answer. And depending on whether it was the right answer or not, they either got to the next stage of the event with questions, or they were thrown out into the previous room, or even into a «clean space» (tabula

rasa). In the case of the latter, the participants had to re-enter the room code they remembered last and go all the way from the point of return to the game.

At the same time, the students who remained «out of the game» also had their own task - to keep track of the questions and write a critical comment and feedback on the rooms and the goals that each of them pursued. In addition, the 19 students' attention was held by the fact that, in addition to observing, they watched video clips with the VR users and left correct (in their opinion) answers in the chat.

Thus, despite the limitations artificially created by the students' technical capabilities, we were able to give them a sense of involvement in the race process. Of course, at the end of the project, in the absence of the guests, we discussed the issues that arose during the video and game questions at the next meeting.

In this way, we were able to implement not only the project's intention, but also to demonstrate and engage the future generation of primary school teachers with a specialisation in inclusive education in modern technologies of inclusion in the educational process through VR.

IV. CONCLUSIONS

To summarise the theoretical work done to find the background of introducing virtual reality into the educational process or vice versa, we can note that this is basic information that students of our specialisation should know, but not necessarily. As for the practical component, today this audience of students is more involved in the process of using online games, simulations and simple test tasks than those who have not taken this course. In addition, this gives future professionals an advantage over others, as they can consciously discuss ethical, technical and other issues of interest to children of primary school age (who today have a fairly high level of skills in using gadgets to develop their soft skills) with children of primary school age. This will help to overcome the «generation barrier» and act as a mentor rather than a teacher in the educational process, ensuring its inclusiveness even in the digital educational space.

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