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Virtual Reality in Education

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Abstract: Virtual reality learning is based on immersive technologies - a virtual extension of reality that allows you to better perceive and understand the surrounding reality. That is, they literally immerse a person in a given event environment Observing the processes of the real world, we first describe them verbally, trying to understand the essence of phenomena, then we build mathematical models. However, we do not want to limit ourselves to building formal models, but we want to get a qualitative and quantitative idea of the processes under study, to see them on graphs.

Keywords: Numerical methods, mathematics, computer calculations, solutions, complex problems, numbers, arithmetic, geometry, formula, technical.

The rapid development of technology could not but affect the educational process. And although VR (virtual reality) technologies are no longer something new, they have been used in education relatively recently. Within the framework of the educational programs "Fundamentals of creating games", our graduates of the Tashkent University of Information Technologies make projects, including those using virtual reality technologies, so in this article we want to analyze in detail one of the areas of application of VR, namely VR in education. There are several reasons for the spread of virtual reality technologies in the field of education:

Reducing the price of technical equipment. Over the past few years, the prices of modern VR devices designed for home and professional use have come down significantly, making them more affordable.

The rapid growth of the amount of software for VR. To date, there are already several thousand of the most diverse applications for VR, and their number is increasing every day.

Growth of investments in VR - more than 2.5 billion dollars a year. This figure has been steadily rising since 2012 and does not appear to be significantly stopping its growth any time soon.

Increase in the number of large companies working in the field of VR. There are already more than 300 of them on the European market, and such giants as Oculus, HTC, Sony, Microsoft, Samsung and many others have been introducing their technologies in this area for a long time.

Implementation of VR technologies in a number of areas: oil and gas industry, mechanical engineering, energy, metallurgy, telecommunications, advertising and much more. Virtual reality has long ceased to be just a game story and is being actively introduced into all spheres of human activity.

We invite you to take a closer look at how VR is used in the educational field today and why this technology is the future, as well as what its prospects are.

FIVE REASONS TO USE VR IN EDUCATION TODAY

Virtual reality learning is based on immersive technologies - a virtual extension of reality that allows you to better perceive and understand the surrounding reality. That is, they literally immerse a person in a given event environment.

There are several advantages to the immersive approach:

Visibility. Virtual space allows you to examine in detail objects and processes that are impossible or very difficult to trace in the real world. For example, the anatomical features of the human body, the

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work of various mechanisms, and the like. Flights into space, diving hundreds of meters under water, traveling through the human body - VR opens up tremendous opportunities.

Concentration. In the virtual world, a person is practically not affected by external stimuli. He can fully concentrate on the material and absorb it better.

Engagement. The scenario of the learning process can be programmed and controlled with high accuracy. In virtual reality, students can conduct chemistry experiments, see outstanding historical events and solve complex problems in a more fun and understandable way.

Safety. In virtual reality, you can carry out complex operations without any risks, hone your transport management skills, experiment, and much more. Regardless of the complexity of the scenario, the student will not harm himself or others.

Efficiency. Based on the experiments already conducted, it can be argued that the effectiveness of training using VR is at least 10% higher than the classical format.

Separately, it is worth mentioning that virtual reality contributes to the gamification of the learning process. A significant part of the information can be presented in a playful way. And in the same way to consolidate the material, conduct practical exercises and much more. Thus, dry theory becomes visual, understandable and much more interesting, which further engages students and increases the effectiveness of education. Separately, there is the issue of price. Despite the rapid spread and cheapening of VR equipment, buying it for personal use still does not look like the cheapest pleasure. But, if we are talking about an acquisition for an educational institution, then this is a completely different matter. So, for example, in the Virtual Glasses online store you can purchase a wide variety of virtual and augmented reality devices at various prices: from the most affordable glasses for smartphones or the beloved Oculus Rift S, Oculus Quest to such innovative and rather expensive devices, like Microsoft Hololens 2 and Magic Leap One. Of course, the principle of operation and functionality of all devices are different, as well as the intended purpose, which directly affects their price.

HOW VR WILL CHANGE THE FUTURE OF EDUCATION AND WHY TECHNOLOGY IS STILL NOT UBIQUITOUS

Looking at current trends, we can say with confidence that over time, VR equipment will become more affordable. One of the key factors in the spread of technology will be the increase in available VR content. Not only for schools, but also for universities and other institutions. At the same time, virtual reality can be used in education at any age - both for primary school students and for older people who decide to learn a new profession or improve existing skills. But if VR technologies are already so developed today, why haven't they become widespread? The first reason we have already mentioned is the price. The equipment is still quite expensive for the mass consumer, apart from smartphone devices. In addition, not everyone is ready to invest right now, as they fear that in six months or a year there may be a new rapid leap in technology development and the purchased equipment will become obsolete.

However, in addition to price, there are several other important factors:

The high cost of developing programs for VR. This process requires a lot of time, effort and investment. In addition, not all materials can be competently and effectively transferred to VR.

Possible difficulties of adaptation to virtual reality. Not all people perceive VR in the same way. Some people experience dizziness, nausea and disorientation after a couple of minutes. These are the individual characteristics of the body, from which there is no escape. But this problem in most modern devices is practically solved and will soon be completely defeated.

The need to significantly change the curriculum at the state level. So far, VR is being implemented at the level of experiments. To make technology a full-fledged part of the educational process, it is necessary to radically work on educational programs in schools and universities. But due to bureaucratic complexities, this can take years.

And despite this, many experts are confident that over the next 5 years we will see an intensive spread of virtual reality technologies in the educational sector. Of course, for the time being, there is no need to talk about mass holding of entire 45-minute school lessons entirely in VR. However, allocating 5-10 minutes for it is more than realistic and is already being gradually practiced in some schools.

HOW IS IT POSSIBLE TO USE VIRTUAL REALITY TECHNOLOGIES IN EDUCATION TODAY?

Many contemporaries perceive virtual reality as something far and inaccessible to the average user. Others are sure that VR is a technology exclusively for games. In fact, both are wrong. VR is already here and available to everyone. Even with the most budgetary glasses of virtual reality.

Educational VR content can now be found in a variety of sources, such as:

VR applications in the App Store, Google Play or Steam catalogues. These services contain several dozens of the most diverse applications aimed at learning and gaining new skills;

YouTube videos created specifically for VR. 360-degree video is becoming more popular every day, and YouTube is a great contributor to this;

special programs from developers working in the field of education. As a rule, they are made to order and created for specific tasks.

Many of the offers are available completely free of charge. Plus, there are demo versions that allow you to try out the technology and decide if you are ready to pay for a particular offer.

If you think that today there are too few VR programs for education, we hasten to assure you of the opposite. There are a lot of them in various fields. Some of them are quite specialized though. Yes, not many of them are available in Russian, but it's only a matter of time. We offer you to pay attention to several interesting educational programs that you can use right now.

Universe Sandbox A real space simulator where students can visually see how gravity, climate and physical interactions work in space.

The Body VR. Definitely one of the best simulations of travel inside the human body, designed for medical students. Allows you to go through the blood vessels, see real cells and deadly viruses.

Google Earth VR. It gives you the opportunity to see the world's attractions "in full growth" and consider them from all sides. Egyptian pyramids, the Eiffel Tower, Niagara Falls - all the most unique objects are closer than ever.

3D Organon VR Anatomy. This is the world's first atlas of human anatomy in VR. It contains more than 4,000 realistic anatomical models.

The VR Museum of Fine Art. Opens before you the most famous museum exhibits. Without protective glass, crowds of tourists and security. And with the ability to see every detail thanks to excellent graphics.

In addition, there are large companies that accept orders for the creation of educational content for learning. That is, a school or university may well order a unique program and use it in its educational process. Yes, this again rests on the issue of approval at the state level, but there are already a lot of precedents. We are on the threshold of a completely new stage in the development of the entire educational sphere. Technological, efficient and truly exciting. And you can take the first step towards this future now!

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