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3D Virtual Reality in Education

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Introduction

Virtual learning is a teaching in an educational environment where teacher and student are separated in time or space (or both) and the teacher provides course content through control applications, multimedia resources, Internet, video conferencing, etc.

Transferring this method of communication in 3D virtual worlds is still an innovation in teaching and learning, which, however, still offers many opportunities which was not fully recovered until now. If students spend their free time in a virtual environment, the use of traditional teaching methods usually become less motivating for them.

Using of Virtual Worlds can give the teachers the opportunity to gain a greater involvement of students as learners, who are not only put into the role of passive recipient of information transmitted – a virtual world offers many options for creative collaborative work that could be limited in the real world in classes such as borders, or the number of participants who can work at the moment.

The advantages of virtual learning include time and spatial flexibility, the ability to dynamically grow and adapt the needs of users, possibility of feedback, and work on tasks that are not often possible in the real world due to constraints of time or space. Virtual worlds allow cooperation which is not limited by boundaries of physical space; significant strengths include the vast majority of cases, low costs and easily upgradeable teaching materials. The disadvantages can be categorized mainly into health reasons, as the current generation of student spends too much time on ICT, which has a negative impact on both eyes and on the human musculoskeletal system. Frequently repeated arguments are also sense of alienation, because human beings do not communicate directly (face to face), but by machines which can have an impact on social skills. The virtual communication is also losing body language and other personal aspects.

3D Multi-user virtual environmet

Multi-user virtual environment (Multi-User Virtual Environment, MUVE) is defined as 2D or 3D virtual environment representing a simulation of real space (Brdička, 1999). It represents the integration of the previously used forms of online communication and becomes the medium

through which it is possible to create social interaction and very close communication in real space. According to D. Říha (2006), efficiency of communication increases when the characteristics of the media is in accordance with the communication process – that is, the immediacy of feedback, variability of symbols (number of possible ways of communication), testability (make adjustments before shipment), replicability and others. In such collaborative hypermedia environment as MUVE meet most of the above named aspects – these are object-oriented systems, where communication takes place in real time, such as through an audio or video conference or in direct interaction via its 3D graphical representations (avatars). Unlike previous types of communication (e-mail, text or video), which are mostly used for isolated communication, communication in all these types of MUVE integrates and enhances the effect of online communication. User moving in MUVE can monitor communications of individual participants; can move to a specific participant in time, the work of which would be much complicated in the real environment. MUVE facilitate mutual cooperation, it helps work on joint projects to physically remote users whose cooperation would be difficult and expensive in the real world. Unlike an online education support, which represent the learning management systems, websites or blogs, MUVE allows students to simulate real situations where they can learn for example to work with objects and demonstrate just mastered the material the virtual space, they can participate in activities and processes that would not be available for them in the real space (e.g., formation of molecular structures of the airplane, etc.).

Our experience with teaching Civics and History in 3D virtual reality

Historical developments, events and processes are often taught in class via texts or videos. Virtual reality offers an alternative and complementary access to the experiential worlds of events.

Within the Erasmus+ project NAETINEM, we decided to use 3D virtual reality as a non-traditional teaching tool to better present the reality of historical events to students. 3D virtual reality took a part of a month-long mobility, which was attended by students from 3 countries – the Czech Republic, the Federal Republic of Germany and the Slovak Republic.



Our students spent 3 weeks learning together in this environment, each at home in their own country, and the last week they all met in Olomouc as part of the mobility to get to know each other in a real environment, while continuing to learn in a 3D environment.



As these were students – future teachers, we prepared several representative environments for them in the 3D multi-user virtual environment in Kitley (kitley.com), a free online environment where users can also create their own learning environments. The first option was hands-on learning, where students were divided into teams according to each partner school and completed tasks together. Thus, they had to coordinate their movements and arrange to work together. At the same time, they learned to manipulate 3D objects and move around in the environment, communicating through sound, chat or non-verbal means.



The second type of lesson was an escape game, based on students' knowledge of European countries and the European Union. After completing the tasks in each room, students were allowed into other rooms and gradually got out. Whoever completed all the tasks correctly and the fastest won the game. Cooperation was also needed here as students competed as teams. In addition to testing their knowledge, they had to learn to communicate in order to complete the tasks together as quickly as possible. This meets the parameters of so-called community learning.



The most complex task awaited the students at the end – when a complex game on the topic of the First World War was prepared. The students gradually walked through a virtual replica of the battlefield and had to search the field for clues – information boards that introduced them to various authors – poets and writers who dealt with the theme of World War I in their works.



The information was multimedia – text, images, video clips. At the same time, they had to look for a certain clue in each demonstration, which was to lead them to the main task – they had to find a specific animal in the battlefield, which they had to rescue from the battlefield.



The first one who correctly went through each station and found the necessary clues was the first to reach the successful end and won the game. This type of learning combines a multimedia source of information, experiential learning as the student simulates the conditions of the war front, elements of game-competition, and also elements of problem-based learning and information search. Thus, the emotions associated with the feelings of war, competition and problem search can enhance the amount of information remembered, as some research has shown.



Conclusion

With further improvement of 3D multiuser virtual environments, other options that enable successful usage of the rapidly developing “worlds” for education, or at least that from time to time enrich the teaching process, will be certainly added.

3D learning can be a good motivational tool and an emotionally enriching dimension of learning. Last but not least, it is also a learning by doing approach, as students moving in a virtual simulation of a real environment engage most of their senses in a similar way as they would in reality - sight, hearing, touch, simulated movement. It is thus a multi-sensory learning that involves all types of learners (visual, auditory, kinesthetic) in the learning process. All of this can serve to increase the amount of memorized knowledge.

Literature

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