

Didactic Limits of Teaching in Virtual Environments

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ABSTRACT The use of 3D multi-user virtual environment in teaching and its didactic limits in lifelong learning is analyzed in this paper. Since in a virtual space there are no geographical borders or time limitations, we consider this environment to be naturally suitable also for language learning at universities or in the lifelong learning courses. The aim of our preliminary research is to find out the appropriateness of its usage in mother tongue teaching of university students. For this purpose, the 3D virtual classroom and several 3D virtual teaching objects in MUVE Second Life were created. Mixed research design was used by the direct observation and semi-structured interview focused on examining the behavior and attitudes of respondents in MUVE as well as a quantitative method of questionnaire survey. The first observations and results are described and the possible didactic limits are discussed.

INTRODUCTION

Virtual Reality (VR) represents everything that really exists, but it is a form of simulated electronic media. This is the user interface designed to be closer to reality as much as possible in a computing environment, as captured by our senses (Brdicka 1995). Current applications are able to incorporate all senses into the user environment with not just sight, hearing or touch but also smell and taste (Vrtiška 2009). VR is currently in practice and is often used as a simulator of realistic situations such as driving a car, an aircraft, spacecraft, practicing emergency situations, accidents, medical procedures, etc.

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 discovered until now. If students spend their free time in a virtual environment, the use of traditional teaching methods usually become less motivating for them. The use 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 of-

fers many options for creative collaborative work that could be limited in the real world in classes such as border on the number of participants who can work at a given moment.

Multi-user virtual environment (MUVE) is defined as 2D or 3D virtual environment representing a simulation of real space (Brdicka 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. Ríha, 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 (Ríha 2006). In such collaborative hypermedia environment as MUVE, most of the above named aspects meet – 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, the communication in all these types of MUVE integrates and enhances the effect of online communication. MUVE allows students to simulate the real situations where they can learn for example, to work with objects and

demonstrate and just mastered the material in the virtual space, they can participate in activities and processes that will not be available for them in the real space (formation of molecular structures of the airplane, etc.).

The largest and currently most famous project with the community of more than 17 million registered users is the 3D multiuser virtual world Second Life (Marešová 2009). Users can communicate here in real time via avatars, they can build their own environment, can be educated, entertained, do shopping etc. SL is a “new dimension” of social interaction. Education is a very progressive area in SL. Meeting people from all over the world, different nationalities and social status allows the creation of an entirely new type of community and sharing knowledge and experience is easier than in real space. Many universities have discovered the way through which SL can provide for them here and have created virtual campuses, presentation rooms and organized training courses. We can find here virtual versions of more than 60 American universities, such as Oakland University, Ohio University, the University of Plymouth, Coventry University, Montana State University, Harvard University of Law School etc. Some faculties of Czech universities were already presented in in the Czechoslovakian “town” Bohemia in SL – Faculty of Economics and Public University of Economics in Prague, Faculty of Education University of West Bohemia, Faculty of Social Studies Masaryk University in Brno and the Philosophical Faculty and Faculty of Education of Palacky University in Olomouc.

Teaching in MUVE is provided in virtual buildings which are equipped as classrooms (some of which are in the buildings, some in open space or under the sea level). Teachers can build special class facilities according to the needs of their subjects. Instant communication can be provided by the form of text, audio or video in its actual form. Students can practice on particular virtual objects; they can work with and cooperate with each other to create these objects according to instruction of teachers. Students can also create the objects (devices, objects of their own imagination, teaching aids, animals etc.), they can think and discuss their descriptions. The teacher might have used the board available in the classroom which can work just like a real board – it is possible to write and delete notes on it, which can be read by any user. During the

courses in MUVE, it is possible to make a video – this feature is useful for the preparation of lectures and training and also as a feedback – teacher may return to the lecture later.

The researchers have used the MUVE Second Life since 2008 in the seminar *New media and cyberculture*, which has been realized at the Pedagogical Faculty of Palacky University in Olomouc as an optional subject field of teaching the Czech language for secondary school and at the Department of Journalism Faculty of Arts, Palacky University in Olomouc (Marešová and Sláma 2010). To create technical support for teaching in SL, the researchers have implemented several projects, which were necessary for preparation of such type of education.

In 2007, a project was executed which aimed at building a computer lab at the Department of Czech Language and Literature UP (Project No. A 1175 Ministry of Education b: *Establishment of computer lab of the Department of Czech language and literature and multimedia classrooms Pedagogical Faculty of Palacky University in Olomouc*. University Development Fund, 2007), in which it was acquired 15 computer stations for student, 1 teacher station and an interactive Smart Board. This project was followed by an extension of existing software computer stations, allowing work in graphics-intensive 3D environment (*Development and innovation of computer classrooms*. University Development Fund 2011).

The next project was implemented to ensure the upgrading of existing study subjects, and the creation of new courses which allows for the use of MUVE in the classroom (*Course of Innovation and New Media and cyberculture*. University Development Fund 2011). As a result of these projects, the innovative syllabus *New media and cyberculture* including teaching in MUVE was prepared. Building on the gained experience, we have decided to build our own learning environment in the SL through the creation of virtual building in the Faculty of Education and also to extend our learning in a virtual environment in the area of lifelong learning courses in ICT Education Centre of the Department of Lifelong Learning FE UP. This goal was realized as a part of ESF project aimed at developing the ICT skills of teachers in a bid to further educate teachers (*Courses of ICT in education for teachers*. ESF project No. ECOP CZ.1.07/1.3.00/14.0011, 2010-2012).

METHODOLOGY

After the first experiences with teaching in Second Life, the researchers provided a pilot survey to explore the attitudes of students to virtual learning. For the pilot survey, respondents were selected within the study group of subject *New media and cyberculture*. The research objective was to determine whether today's generation of students can accept or will reject virtual education in their classrooms and also in their home preparation.

Research issues have been defined by the following questions: 1) *is there a relationship between respondents' level of ICT skills and their success at work in MUVE?* 2) *Is there a relationship between the level of ICT skills of respondents and their attitudes to the use of MUVE in teaching and learning?* Before the research realization, the researchers have set the following hypotheses:

H1: *Respondents belong to a group of digital natives; therefore, their experiences with ICT will be successful in solving tasks in the virtual space.*

H2: *Respondents belong to a group of digital natives; and thus will positively perceive the use of MUVE in teaching and learning.*

H3: *Respondents belong to a group of digital natives; thus they will use the MUVE in their own learning.*

The group of respondents consisted of 15 students aged 21-23 years (3 were 2nd year students and 12 were master's students of the program Primary School Teacher, study field - Czech language in combination with the Social science disciplines (7), Special education, (2) Music (3), German (1), Science (1) and Technical Education and Information (1)). Mixed research design was chosen for the pilot study – the method of short-term non-standardized direct observation (Chráska 2007) and semi-structured interview that focused on examining the behaviour and attitudes of respondents when teaching them in MUVE, a quantitative method of questionnaire survey and qualitative method of semi-structured interviews by written guiding questions.

Direct observation method was applied within the teaching of the subject: *New media and cyberculture*. After the registration process in SL, students gathered in the initial space SL environment in which they were instructed with basic information regarding the movement and

communication in a virtual environment. Then they performed the tasks assigned to focus on communication in SL and tasks focused on the ability to find information in the environment. Then, the presentations in the virtual classroom were provided to inform the students about the other possibilities of teaching in this environment (language learning opportunities, forms of visual presentation in SL etc.). After teaching in the SL environment, the controlled discussion was realized, which examined the immediate impressions of respondents on the teaching in SL. In the next phase, the respondents were made to analyze their impressions from SL by answering the semi-structured written questionnaire while they worked at home. The questionnaire survey was realized by answering 10 questions focused on attitudes to the use of virtual environments in education and private education.

RESULTS

When defining the research problems, the researchers assumed that respondents will be successful in work with MUVE and therefore will be able to evaluate the work in such environment in a positive way. This generation of students belong already to the generation of digital natives (Prensky 2001), which means children who grew up from their childhood under the influence of ICT and therefore have no serious problem with the work and movement in a virtual space. Similarly, Sak et al. (2004) argue that today we can see a difference between young and old generations in the ability to move in cyberspace and use it properly. On this basis, the researchers defined the term "digital natives" as a student, who uses the digital technology from early childhood and is competence-proficient in at least basic ICT skills (such as working with the mouse, the ability to lead a smooth virtual characters in the MUVE, the ability of quick orientation in a virtual environment, the ability to quickly find information and the skill for fast synthesis of information obtained through multimedia sources of information (text, video, animation, etc.)).

These conditions predispose the respondent to be successful in the tasks within the virtual environment; he does not expend mental effort to master the basic skills as he navigates in the MUVE, and can thus concentrate mainly on the content of assigned tasks. As a result of the

successful management of work in a virtual environment, he then has a sense of greater personal involvement in the tasks and the motivation to be successful as well, which can generate a positive stimulation in further learning in MUVE. Similar observation is described in the study of Yuju (2015), in which was found that almost all the participants loved to learn English in the virtual contexts and had no problems with using this 3D multiuser environment.

According to the results of this study, the researchers can confirm by direct observation method their first hypothesis, because respondents mostly had no problems with the issue of communication and solving of tasks and they have differed only in the speed with which they were able to fulfil the assigned tasks. A different situation was in the searching for specific locations or information, where some of the respondents were unable to navigate in a virtual environment to complete and finished the requested operation. The reasons that three respondents gave in the discussion indicated their lack of experience in playing computer games which has generally led to a not very positive attitude to the virtual environment. Results of qualitative research also confirmed that some problems of respondents were based on their lack of previous experience in virtual environment.

In contrast, the researchers have failed to confirm hypothesis No. 2. The results of a questionnaire survey which is focused on the preference of learning technologies clearly indicated that students continued to prefer the traditional use of new media, which was confirmed by the results of the popularity of using the information on the website (86 % for education, 80 % for self-education). According to the researchers, this attitude may occur due to the persistence of the stereotype of traditional teaching strategies (especially work with a book/text), which are still prevailing in the Czech secondary schools and universities, while the actual turn to the constructivist methods of learning through problem-solving or simulations of real situations is still in our schools in the Czech Republic a rather rare phenomenon.

DISCUSSION

However, the above presented results can be influenced by the field of study of respondents because, they were students of humanities-oriented field (moreover, they were future mother tongue teachers, which meant people

who preferred working with books and reading literature). This argument can be supported also by the results of other studies that have examined the influence of SL on student motivation of scientific disciplines such as informatics (Esteves 2010), for which the teaching of programming in SL was a strongly motivating factor when compared to the traditional educational practices, because students of informatics usually stay at programming in social isolation, while in SL they worked in close contact with other students, which motivated them better to work. Preference for traditional teaching before teaching in digital environment also confirmed the results regarding the use of traditional teaching and LMS Unifor. LMS Unifor is the e-learning environment in which the majority of surveyed respondents had worked at least 3 years at faculty, so they have sufficient experience with work in this environment. This is what Gregory (2015) calls the “institutional barriers” regarding the policy of ICT support services for education which are centralized and focused on one chosen system for educational purpose and usually there are not many possibilities for teachers to go “outside of the box”.

As a surprising result the researchers can describe an entirely negative assessment of motivation to learn through SL (0 positive responses, 0 %). A possible explanation of such result is insufficient knowledge of the environment when compared to the traditional teaching methods or learning in LMS Unifor in which students were familiar with. This tendency, along with very low numbers of positive responses for self-study in SL, cannot confirm our third hypothesis. This result can be interpreted as the consequence of humanities-oriented students who prefer working with the book as well as a short period of working in SL. Similar results also showed in the study of Hornik (2010), who provided the teaching of financial management in SL at the University of Central Florida, where he conducted a longitudinal study based on data analysis and feedback from students by interview in 2007–2010. He worked with groups of different sizes (200 to 800 students) and found out that only 1/3 of students like to work in SL, the remaining of 2/3 worked with a negative attitude to SL, or worked in it just because it was a part of the task. However, his data showed that the longer the students worked in the SL, the more they grew in the awareness that SL could actually be for them an effective learning tool.

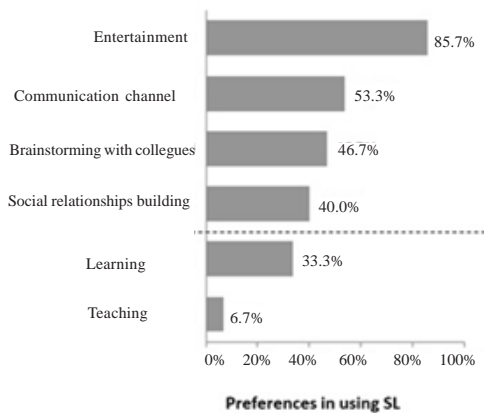


Fig. 1. Preferences of respondents in using SL

In 2007, when Hornik started using SL for education, only 17.3 percent of students reported that it helped them to understand the SL basic concepts of financial accounting, while in 2009, after 3 years of systematic teaching, it grew to 40.7 percent. Ninety-four percent of our respondents did not consider SL useful for classroom teaching and 67 percent did not consider it useful for self-education. According to the views of respondents (see Fig. 1), the SL in education is more suitable for interaction with colleagues, either in the form of discussions and presentations of their work, and less suitable for conducting the formal teaching or practicing the discussed phenomena. The similar conclusions were drawn by Heaney et al. (2011), who examined the qualitative survey attitudes of teachers and students in SL. Both group of respondents highlighted the potentials of SL for activities such as exercises, role playing, solutions-based learning scenarios and student presentations, but they were less sure of its effectiveness and suitability for frontal teaching or other forms of group instruction.

CONCLUSION

The results of our preliminary study showed that though the university students described SL as an interactive tool which is capable of arousing interest, they also saw it as more of a medium for playing computer games – that is, something which could be used mainly for entertainment and communication purposes with colleagues, but which does not motivate them in their educational pursuits because they found

it confusing when trying to use it to retrieve information.

RECOMMENDATIONS

Learning and teaching in 3D virtual worlds can enhance the principles of constructivist approach which is based on building the knowledge on the use of real problems, self-organization, monitoring and correction as well as interactions with others. The virtual worlds can help to simulate the environment for learning similar to the reality. Comparing to the traditional teaching in the classroom, virtual worlds provides students more interactive and experiential learning experience. It helps teachers to prepare the educational situations based on “learning-by-doing” which is the best way for deeper understanding of the learning context. But there are some didactic limitation of use these environments, such as technical problems (internet connectivity etc.) or the lower levels of digital skills of students.

FOR FUTURE STUDIES

According to the results obtained from the study, using the MUVE for learning is generally not a problem for students belonging to the generation of digital natives. But further investigation on how to design appropriate feedback to inspire students to be more motivated for study in such environment as well as to continuously involve themselves into self-directed learning in virtual context is recommended. However, this study was only the pilot step and the group of respondents was very small. Thus, there is still a need to expand the results by more groups of respondents as well as designing of comparative study with a control group to distinguish the causal relationships between the learning outcomes and virtual context. Moreover, the systematic long-term study, which can assess the effects of a long-term and systematic study of the MUVE should be the goal of our following research that would indicate any changes in the attitudes of students over a longer systematic work in this environment.

LIMITATIONS

Our results might have been distorted by an insufficient knowledge of the MUVE by respondents (except for a small numerical sample of respondents), thereby leading to an overall feel-

ing of uncertainty in the environment. However, this was a pilot and partial study, whose aim is to indicate a trend in the attitude of students to this new possible teaching method.

NOTE

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