Enhancing foreign language learning in 3D immersive worlds – a study report

Paweł Topol

Adam Mickiewicz University, Poznań, Poland
topol@amu.edu.pl

Abstract. The popularity of 3D virtual worlds among 'massive' users has decreased within the last five years – this is the fact. However, they seem not to lose much of their educational value as learning and teaching environments.

The article describes a 3-step project on educational functionality of 3D immersive virtual environments that was/is performed at Adam Mickiewicz University (AMU) in Poznań, Poland: Main Project One in 2011-2012, current Mid-Project in this academic year 2016-2017, and Main Project Two in 2017-2018. This year's edition (Mid-Project) uses some of the methodology of the previous Main Study and serves as a mid-stage before the next large research project which is scheduled for the next academic year 2017-18. All the three projects focus mainly on foreign language learning in serious virtual worlds, though the study is performed within the ICT class among students of humanities.

This academic year's mid-stage study has involved so far (the Fall semester) 60 students at AMU in Poznań, Poland, too. The students were involved in different learning and communicative activities in the virtual world of Second Life. They took some formal and informal foreign language classes in two destinations in Second Life where volunteer teachers give classes free of charge. They took part in the so-called 3D classes run by the author. They also explored the world of Second Life in search of potential educationally functional places for foreign language learning. The students performed their activities both individually and in teamwork. Similar activities are planned for the Spring semester, which just started in February. Here, a group of another 60 students are involved now. The next 60 are planned for the second half of the semester.

The article presents a general overview of the three stages. It includes: (1) a description of the activities and methodology used in Main Project One, (2) a short report from the current Mid-Stage Project together with results gathered so far and conclusions, and (3) some implications for the next year's Main Project Two.

Keywords: immersive education, virtual worlds, situated learning, foreign language learning, higher education, Second Life, action research.

1   Introduction

Three-dimensional virtual worlds gained their popularity throughout the first decade of the 21st century. Many kinds of worlds came into being: games and non-games, all-purpose and serving specific purposes, worlds for kids and adults, etc. In this article, we will focus on the so-called 'serious' immersive worlds, i.e. environments that are not games [see: Freitas 2008]. Second Life is still the largest world in this category. It is not a game, at least not a central game, as it does not fulfill the characteristic features of a game: there are no pre-programmed scenarios to follow, no consecutive levels to reach, no forfeits to collect, no scores, etc. A serious virtual world simply IS: with its towns and villages, houses and fields, hills and islands – all raised by the users/residents themselves [Topol 2016b, p. 73]. Residents stay inworld for their own reasons, whichever they are: for fun, business, entertainment, trade, work, education… [compare: Leigh, 2014, Chapter 1].

Second Life did not fully prove functional as an all-purpose social environment. Its popularity started decreasing with the turn of the first and second decade of the 21st century. The reasons were different. Many users withdrew due to technical difficulties. First, the application required high-quality hardware: a fast processor, an efficient graphics card and broadband access to the internet. Others gave up because of the steep learning curve in handling the software: moving the avatar simultaneously with controlling the camera, the text chat, the voice channel, pop-up windows, and the SL browser menus [see: *technical and competency threshold* in: Warburton, 2008]. Many left Second Life for applications like Facebook, which, as social environments, served their needs better. The total number of accounts in Second Life is estimated approximately 40 million nowadays, however, Linden Labs, the owner of SL, do not reveal how many of them are active users.

The educational sector seems to be unthreatened. Many universities and schools maintain their virtual campuses. It is true that a number of educational institutions as well as individual educators have given up Second Life, however, many of them not because of poor educational functionality of SL but mostly because of costs. Linden Labs decided to cancel its 50% land-owning discount for educational and non-profit institutions in the year 2010. Some institutions simply could not afford the high rent to own land, in Poland, too[1].

The following parts of the article give brief descriptions of research projects on Second Life, performed at the Faculty of Educational Studies at Adam Mickiewicz University in Poznań, Poland. All the three projects deal with the educational functionality of serious virtual worlds in foreign language learning. The Faculty has never owned land in SL. Actually, the experiment did not require putting up a virtual campus. The projects made use of numerous open-access and free-access spots across the virtual world [see: the social context in language learning in VW's in: Lan, 2015, p. 17].

---

[1]   The Faculty of Arts at Maria Curie-Skłodowska University in Lublin, Poland used to run their virtual campus up till 2011.

2   Initial Project (Main Stage One)

Three-dimensional serious virtual worlds are and have been little known in Poland – among educational institutions as well as educators and students. Hence the idea of measuring its functionality in academic education in Poland. The Stage One project was organized in the academic year 2011-2012 and lasted the whole semester. It involved 70 students of humanities at the Faculty of Educational Studies at AMU.

The aim of the study was to measure the students' achievements in language learning in 3D serious virtual worlds on the example of Second Life. There were two specific goals: (1) to measure students' achievements in their language learning, and (2) to measure students' emotions, motivations and opinions about SL as a learning environment.

The methodology covered different techniques and tools, as the students were involved in various activities [Topol, 2016a, p. 47]. The main part was a classical pedagogical experiment with control and experimental groups. Two virtual environments were examined and compared: the 3D virtual world and 2D WWW spaces in language learning. The rotation method was applied: the experimental and control groups switched in the middle of the experiment.

The project was actually divided into three parts: (A) culture part – pedagogical experiment – where the students collected data on culture and lifestyle, (B) language part where the students took part in formal and informal foreign language classes (English and/or German, according their language courses at AMU), and (C) exploration part where they visited cultural centers (Second British Council and Second Goethe Institut). They also explored the world of Second Life in search of educationally functional locations.

2.1   Part A

In Part A, the students in the experimental groups performed individually in two main tasks in Second Life. Task one was to visit the virtual replica of real life Dresden Gallery. The students were asked to walk around and get to know the building, the rooms and some paintings. They had to find the exhibition of paintings by Canaletto. The task was to collect data about Canaletto and his pictures by interacting with the exhibits. Task two was virtual shopping: the students were asked to visit virtual emporia in Second Life and plan how to equip their hypothetical apartments.

The control groups did the same in both tasks but used WWW for data collection. The tasks were organized the way that control and experimental groups did not interfere with each other, i.e. they performed their tasks at different times. The reason was that the groups would not contact each other while performing their tasks.

The students' language gain was measured with vocabulary tests (multiple choice and sentence building in meaningful contexts). The students' cultural gain was measured with knowledge tests that included closed, semi-closed and open questions. Both control and experimental groups received the same tests and questionnaires.

Table 1. Part A. Student tasks in the pedagogical experiment for the control and experimental groups

Category / Objective	Experimental groups (3D environment)	Control groups (2D environment)
Culture gain and language gain / Please collect information about Canaletto, his paintings and Dresden Gallery.	Visit Dresden Gallery in Second Life and explore it. Walk around, read the descriptions and collect the information.	Browse the web or other electronic resources for information about the painter, his paintings and Dresden Gallery itself.
Language gain / Please plan how to equip your house (apartment) with furniture and items.	Shopping task in English Village in Second Life. Walk, talk and shop. (simulation)	Shopping task in online WWW shops, excluding auctions. (simulation)

2.2 Parts B and C

Part B was devoted to formal and informal foreign language classes in Second Life. All students were involved – both from experimental and control groups. They were send to two main language learning islands in Second Life: Virtlantis and Cypris Chat (known also as Cypris Village). They had to familiarize with class schedules there and choose one or two classes per each island to take part in. They could participate in the selected classes individually or in small groups of three to five. The students received special forms to fill after each class. They gave short reports with reference to the content of the class, the teaching methods, the atmosphere, interaction, and the virtual environment itself. At the end of Part B, the students' language gain was again measured with vocabulary tests.

Part C was teamwork. All students formed small teams of 3-4 people. First, they were asked to visit and explore the islands of British Council and Goethe Institut in Second Life. One could find general information about the mission of both institutions, as well as walk around and play with language due to some interactive 3D installations there. The teams then shared their experiences and impressions with the other students in class discussions at AMU. Second, each team was to explore the world of Second Life in search of places that – in their opinions – would be potentially functional for language learning, for culture gain or in general education [comp.: Topol, 2015].

Each team developed a PowerPoint presentation which they then presented in front of the other students in class at AMU. The presentations were supposed to include: a short description of the place, the SLURL, some pictures taken inworld and a few reasons why they recommended that place.

Table 2. Selection of tasks in Parts B and C.

Category	Task	Output
Exploring Culture Islands, Individual task	Individual exploring the islands of the British Council and Goethe Institut in Second Life. Walking, gathering information, playing with language on interactive virtual objects (virtual worlds as a culture learning environment)	• Individual written reports: descriptions and open questions. • Group debates and individual interviews.
Language lessons, individual tasks	Joining a given number of lessons of English or German at Virtlantis and Cypris Chat in Second Life. (virtual world for learning language skills)	As above
„Class3D" by Pawlus Twine[2], group participation	Each of the 6 groups joined lessons of English that take the most of the immersive environment of a virtual world (Second Life): holodecks, interaction with objects, etc.	Survey, comparing virtual classes to their physical life language classes at AMU.
Exploring SL, team work	In search of places of potential educational functionality in Second Life – for foreign language learning as well as general education or specific educational purposes	• 3-4 people teams explore SL. • Teams give PPT presentations to their groups.

2.3   Methodology of examining educational functionality[3]

The author developed a four-category typology of functionality with reference to immersive virtual environments [Topol, 2013, p. 147-174]. The typology includes:

1. **cognitional** and **instructional** functionality,

---

[2]   Author's name in Second Life.

[3]   Both the methodology and the statistical analysis were presented at two virtual conferences (not in print):

VWBPE 2013: "Virtual Worlds – Best Practices in Education" – a worldwide virtual conference which takes place in Second Life, OpenSim and other serious virtual worlds [https://vwbpe.org];

"7th SLANUGAGES Annual Symposium" on language learning in virtual worlds. Venue: EduNation in Second Life, Feb. 28 – Mar. 1, 2014. The video recording available at: http://youtu.be/LtypiX0WMgs or https://www.youtube.com/watch?v=LtypiX0WMgs.

2. **emotional** and **motivational** functionality,
3. **performative** and **interactive** functionality,
4. **technical** and **tool** functionality.

Each of the four categories was divided into two sub-categories. The research hypotheses were based on those eight sub-categories:

 1. *cognitional and instructional:*
    (a) cultural-cognitional functionality: students will have higher culture gain in 3D than in 2D learning environments,
    (b) effective functionality: students will have higher language gain in 3D than in 2D learning environments,
 2. *emotional and motivational:*
    (a) students will have higher emotional impressions from 3D environments (and from learning there) than from 2D learning environments,
    (b) students will declare higher motivation when performing learning tasks in 3D than in 2D learning environments,
 3. *performative and interactive:*
    (a) students will give higher value to the virtual world as an environment for educational tasks and linguistic activeness during lessons. Studens will prefer voice to text communication in group classes (language lessons),
    (b) students will assess positively the VW as a socio-interactive environment in language learning tasks,
 4. *technical and tool:*
    (a) students will estimate the technical threshold of Second Life on the medium level (getting around in SL, avatar movement, etc.),
    (b) students will estimate the tool threshold of SL browser on the high level (interface functionality).

Each sub-category was divided into two consecutive elements. That allowed to distinguish as many as 16 variables in the study.

Data collecting went threefold through:

— tests and quizzes (for measuring the students' achievements),
— questionnaires (for estimating the students' motivation, emotions and opinions),
— group (panel) discussions and individual interviews (for gathering the students' personal reflections from the virtual world).

2.4   Results and statistical analysis

The majority of the hypotheses (based on the 16 variables) confirmed the virtual world of Second Life to be educationally functional among the group of 70 Polish students:

• Second Life proved as a functional learning environment among Polish students of humanities,

- Second Life proved as a functional environment and teacher's tool in language teaching,
- Second Life proved as a successful environment in the light of Albert Bandura's Social Learning Theory,
- Second Life proved as a successful environment in the light of Jerome Bruner's Psycho-Cultural Approach to learning.

The data was processed statistically with the use of the Statistica package. The statistical analysis used t-tests of significance of differences mean, based on Student's t-distribution. The significance level was set at the level accepted in social sciences, i.e. alpha = 0.05. The results were statistically significant (**in most cases p<0,005**) [4].

3   Current mid-Project

This year's project is a mid-stage study. It is a natural continuation of the Initial Main Project. The aim is/was – again – to study the educational functionality of serious virtual worlds in language learning on the example of Second Life [enhanced by other research studies, e.g. Paillat, 2014). The data collected would help to design the Main Project Stage Two, planned for the academic year 2017-2018.

The current Mid-Stage project started last November and will last till the end of the current academic year. Actually, they are three independent sub-projects due to the organization of the academic year. The length of ICT class is half semester this year. Some groups take it in the first half, the other in the second half of each semester. The project started last November – in the middle of the Fall semester. Thus, only groups from the second half could be involved. So far, four groups of approximately 15 students each have taken part in the current study (November – January), which made the total of N=60. The Spring semester has just started at AMU. Here, the project will cover both halves, so the number will be doubled. The total number of participants in the Mid-Stage 2016-2017 will then make approximately N=160.

3.1   Description

The current study uses some of the methodology of the 2011-2012 edition. This year, the students' activities include the following:

1. **Task Class1**. Obligatory participation in scheduled foreign language classes (English in most cases) on the two dedicated islands in SL: Virtlantis and Cypris Chat. As it was mentioned above, the two islands offer language classes free of charge. Their schedules are quite rich – classes are offered practically every day. They cover different aspects of language learning and different subjects: there are typical grammar and vocabulary lessons, discussions on current world events, language and arts, *ad hoc* free conversing and many others. Students can also choose between different

---

[4]   A detailed description of the methodology and the experiment itself were presented in three chapters in the author's book [Topol, 2013, pp. 290-373].

levels of difficulty: from beginners to upper-intermediate and occasionally advanced. The students were free to choose types of classes according to their preferences, however, obligatorily one class at Virtlantis and one at Cypris Chat.

The aim of Class1 task was to engage the students in scheduled foreign language lessons. The students will then summarize the lessons, describe their activities during class at AMU and give their opinions about the SL islands as learning environments.

2. **Task Class3D**. Participation in author's class of English. The aim of the task is to make the most of the 3D environment of the virtual world to enhance learning. The author leads the classes at Virtlantis and uses the holodecks there (holodecks are *ad hoc* rezzed sceneries adequate to the topic of the class). The model class is "The apartment" where a holodeck of a penthouse apartment is rezzed for the students to explore. Each group of students is divided into 3-4 people teams. Each team has a different task to perform (e.g. to describe the sleeping room to the whole of the group, to look into the fridge and discuss the menu for tonight's hypothetical dinner, to discuss possible refurnishing of the living room, etc.).

The aim of Class3D is to show to the students how the 3D environment could be used to enhance learning. The students are supposed to interact directly with the environment (inworld objects) and perform in the immersive three-dimensional setting. Then the students will compare the 3D class with their regular English classes in traditional classrooms in the physical world.

Fig. 1. Class3D: "Apartment". Myself in the center and students around exploring the kitchen. The menu for a hypothetical dinner tonight will be discussed. (picture taken by author)

3. **Task ExploreSL**. Each group of students are divided into 4-5 people teams. Each team is to explore the virtual world of Second Life in search of places which (in the opinions of the students) would be educationally functional in foreign language learning. The students are free to explore SL on their own, or they can use the *Destination Guide* available on SL homepage. The teams are free to divide responsibilities within the team. They can explore SL together or individually.

The aim of ExploreSL is to let the students wander across the virtual world on their own. Once they find a spot in SL they agree on to be functional in language learning, they are supposed to share their findings with the other teams within their group.

3.2   Data collection

1. **Task Class1**. The students were asked to take an active part in language classes and then fill a special form which included a short description/report of the class, together with the students' opinions and reflections. The students brought their filled paper forms to the class at AMU. First, an open debate was performed where the students could share their experiences from the language classes. Then, the author collected their forms for further analysis. Additionally, the students filled an anonymous questionnaire which measured their opinions and emotions with reference to learning in 3D immersive virtual environment.
2. **Task Class3D**. Again, an open discussion was performed at AMU class where the students could share their experiences from interacting with the 3D virtual environment. Additionally, the students filled an anonymous questionnaire where they compared a 3D virtual class with their regular intramural language classes in the physical world at AMU.
3. **Task ExploreSL**. Each team was to prepare a multimedia presentation (PowerPoint or others) which would present the educationally functional SL spot of their choice. The presentation was supposed to include: the name of the spot together with the SLURL, a few pictures of the spot taken inworld, a short description of the spot, a short report of why they considered the spot to be functional in foreign language learning. Each team showed their presentation to the whole group and commented on it. The presentations were followed by a discussion among the group. Note: all the PPT files are made available from the AMU computer server to all the 60 student participants. Additionally, the students filled an anonymous questionnaire where they gave their opinions and attitudes towards 3D immersive environments in language learning and generally in education.

3.3   Results

The data collected underwent statistical analysis. So far, the results from the November-January part have been analyzed (N=60). The initial analysis indicates that the educational functionality of the virtual world of Second Life has been confirmed in most variables again. As the Mid-Stage project is still running, only rough conclusions can be drawn:

- students confirm the attractiveness of the immersive virtual environment for foreign language learning,
- many students were rather passive during classes at Virtlantis and Cypris Chat. They admitted that it was a totally new experience for them,
- students interacted both with the teacher, with each other, and with the virtual objects in Second Life during Class3D,
- students were very active and had fun in the ExploreSL task. They enjoyed team-work type of learning.
- students had positive attitudes toward the virtual world as a learning environment (anonymous survey).
- majority of students declare they may make use of Second Life for educational purposes (not only language learning) in the future (anonymous survey; the students will be surveyed again a few months after the project is closed, and the results will be compared to those of today).

This year's positive results gathered so far lay out a good perspective for future research undertakings. The data to be collected in the spring semester 2017 will undergo statistical analysis in April (after the first half) and in June/July (after the second half of the semester). As the total will be about 160 participants, a deeper analysis may be provided than that of today.

4   Next year's Project (Main Stage Two)

Second Life proved to be educationally functional in foreign language learning in both editions of the project: in 2011-12 and currently in 2016-17. Main research Project Stage 2 is initially planned for the next academic year 2017-2108. It shall be performed on the students of AMU again, but it would possibly engage students of another university in Poland, in Europe or worldwide[5]. The project shall last full semester and shall be organized in two independent parts for the first and the second halves of the semester.

As far as methodology is concerned, the future study would probably include the following areas and consecutive hypotheses (selection):

- cultural-cognitional functionality: students will have higher culture gain in 3D than in 2D learning environments;
- effective functionality: students will have higher language gain in 3D than in 2D learning environments;
- students will have higher emotional impressions from 3D environments (and from learning there) than from 2D learning environments;
- students will assess positively the 3D virtual world as a socio-interactive environment in language learning tasks.

---

[5] It might be one of the US universities that AMU has already had a collaboration project with, which involved Polish and American students in online activities [Topol, 2008].

The study shall involve different student activities (selection[6]):

— obligatory language lessons participation,
— discussion panels inworld with students of the other university involved in the project,
— individual tasks to be performed inworld,
— teamwork and sharing responsibilities while performing group activities in the virtual world,
— exploring the virtual world in international teams (plus sharing the results),
— panel discussions gathering all the participating members (both faculty and students) on the 'real' or 'hypothetical' added value(s) of 3D immersive virtual environments.

There will be two new elements added to the methodology and performed by the author:

— Virtlantis and Cypris Chat (or other SIMs that offer language classes free of charge[7]) – also the teachers will be surveyed or interviewed, and asked to share opinions from their perspective on students' learning in the virtual world;
— other places in SL where the students will be sent to perform their tasks and activities – also the owners or administrators of those SIMs will be interviewed prior to the students tasks in order to obtain a more detailed description of the spot, e.g. by guided tours. That might help the teacher and researcher prepare the activities better[8].

The study is planned initially for the Fall semester of the academic year to come, however, it might be extended to the whole academic year (including the Spring semester). The decisions will depend on consultations between the author (Adam Mickiewicz University) and other potential parties engaged in the project.

Bibliography

1. Freitas S. (2008). *Serious Virtual Worlds. A scoping study*, Report for "JISC", 3 November 2008.
2. Lan, Y. J. (2015). *Contextual EFL learning in a 3D virtual environment*. Language Learning & Technology, 19 (2), pp. 16–31.
3. Leigh M (2014). *Virtually real: being in cyberspace*. PhD thesis, University of Tasmania. Available under CC at: http://eprints.utas.edu.au/22422/.

---

[6] Based on the results of consultations with the other university partners.
[7] A general principle of all the editions of the project was and is that the students do not bear any costs in Second Life. Therefore, commercial language schools in SL have not been taken into consideration.
[8] Based on the author's previous experience in exploring SL for glottodidactic purposes, and the study of Rodrigues, et.al., 2015].

4. Paillat, E. (2014). *L2 immersion in 3D Virtual Worlds: The next thing to being there?* [In:] S. Jager, L. Bradley, E. J. Meima, & S. Thouësny (Eds), CALL Design: Principles and Practice; Proceedings of the 2014 EUROCALL Conference, Groningen, The Netherlands (pp. 290-295).

5. Rodrigues C. et.al. (2015). *Architectural design and language learning in Second Life*. S. Gregory, L.J.W. Lee, B. Dalgarno & B. Tynan. Virtual Worlds for Online Learning: Cases and Applications, NOVA Science Publishers, Inc., 2015.

6. Topol P. (2008). *E-co-Learning and Student Autonomy: the GLEX example*. [In:] T. Velders (ed.), Digital Communities for Global Education. Enschede, Holland: Saxion Universities of Applied Sciences, pp. 59-66.

7. Topol P. (2013). *Funkcjonalność edukacyjna światów wirtualnych*. Poznań: Wydawnictwo Naukowe UAM.

8. Topol P. (2015). *Shaping behaviors in virtual worlds – gender, culture, education. Teacher's reflections from Second Life*. „Journal of Gender and Power", Vol. 4, No. 2, 2015, pp. 91-102.

9. Topol P. (2016a). *Communication and language learning in virtual worlds – a Research Project in Second Life*. [In:] M. Wawrzak-Chodaczek, J. Kowal, A. Kuzio (eds.), *Social communication in the real and virtual world, vol. 2, Social dimensions of communication*. Saarbrűcken: Lambert Academic Publishing, pp. 39-53.

10. Topol P. (2016b). *Small School and 3D Virtual Worlds*. [In:] M. Wrońska (Red.), Mała szkoła w przestrzeni medialnej, Rzeszów: Wyd. Uniwersytetu Rzeszowskiego, pp. 72-84.

11. Warburton S. (2008). *Loving your avatar: identity, immersion and empathy*, Liquid Learning, January 28th 2008, http://warburton.typepad.com/liquidlearning/2008/01/loving-your-ava.html [latest access: 01.2017].

Netography

12. Cypris Chat V Welcome Area SLURL: http://maps.secondlife.com/secondlife/Mallo/194/139/23.

13. Cypris Chat info and schedule: http://cyprischat.org/.

14. Second Life Destination Guide: http://secondlife.com/destinations.

15. Topol P. (2014). *Measuring functionality of Second Life*. Presentation at "7th SLANUGAGES Annual Symposium" on language learning in virtual worlds. Venue: EduNation in Second Life, Feb. 28 – Mar. 1, 2014. The video recording available at: http://youtu.be/LtypiX0WMgs or https://www.youtube.com/watch?v=LtypiX0WMgs.

16. Virtlantis Welcome Area SLURL: http://maps.secondlife.com/secondlife/VIRTLANTIS%20Community/151/158/21.

17. Virtlantis info and schedule: http://www.virtlantis.com/.

18. VWBPE "Virtual Worlds – Best Practices in Education": https://vwbpe.org.