COLLABORATIVE SPACES AS LEARNING ENVIRONMENTS

How Schools of Architecture may find their Way into the Virtual World

JOCHEN HOOG, CHRISTOPH FALKNER, PHILIPP SEIFRIED
Institute of Architecture and Design, Vienna University of Technology
hoog@atelierprozess.net
falkner@tuwien.ac.at

Abstract: 3D virtual environments provided by current information and communication technologies offer new opportunities for architecture, potentially opening a completely new domain for architectural practice. Within this paper we describe scenarios for the use of 3D virtual environments at schools of architecture based on experiences from an EC-funded research project for the establishment of 3D - virtual campus for VIPA (Virtual campus for virtual space design Provided for European Architects). The campus was conceived as an extension of the existing learning management system used at TU-Vienna, Moodle. Within VIPA three virtual environments were tested as collaborative labs, for teaching architecture, and as digital environmental design tools: Open Croquet, Blender and Second Life.

1. Introduction

The performance and user acceptance of the state of the art technology for three-dimensional virtual environments, like multi-user virtual environments (MUVEs) or massive multiplayer online role playing games (MMORPGs) is increasing. Within this paper we are going to describe how schools of architecture may find their way to use these new technologies as 3D learning environments (e.g.: to use the synergy effects), as well as a potentially new domain for architectural design practice. The main focus thereby lies on the experiences made within an EC-funded research project VIPA. The project started using Open Croquet, changed to Blender as a stand alone application and ended up using Second Life.

From the mid-nineties until now there is a multiplicity of MUVEs in the range between massive multiplayer online role playing games (MMORPGs) with an emphasis on a game-like story background like World of Warcraft

(1994), Ultima Online (1997), EverQuest (1999) or The Sims Online (2002), and multiplayer online platforms which have an emphasis on social interaction, communication and collaboration like Open Croquet Project (1994), AlphaWorld (1995), WorldsChat Environment (1995), The Palace (1996), There (1998), or Second Life (2003).

MUVEs like There (www.there.com), Kaneva (http://www.kaneva.com/), Active Worlds (www.activeworlds.com), IMVU (http://www.imvu.com/) or Second Life (http://secondlife.com/) are a constantly growing domain, mostly developed by the computer game industry over the last twenty years.

Three steps of spatialization of the Internet are distinguishable: firstly the MUD games, secondly the introduction of the internet protocol VRML (Virtual reality Modelling Language), and thirdly the success of 3D computer games, MMORPGs, and MUVEs. (cp. Kim 2007) "The defining element in computer games is spatiality. Computer games are essentially concerned with spatial representation and negotiation" (Aarseth 2001) Balkin wrote about the upcoming 'Internet with Avatars' "a richly rendered general purpose platform" (Balkin 2006:183) and Damer emphasized already 1995: "the Internet took a step into the third dimension with the introduction of the VRML as a commercial standard." (Damer 1996).

2. VIPA - VIrtual campus for virtual space design Provided for European Architects

The objective of the last two years was the development of a virtual campus containing an e-learning and research platform for architecture universities. For the learning management aspects a Moodle software environment was installed. It supports many of the course management and administration features needed, as well as standard courseware, assessment functionality, communication tools and a resource repository. The idea of a collaborative and immersive lab was the additional focus of the project. Within the VIPA project, we experimented with the following solutions.

2.1 IMMERSIVE FULL-SERVICE ENVIRONMENT (OPEN CROQUET)

Croquet is a collaborative, multi-user online application, thereby enhancing the sensation of collaborative learning by transmitting the well known computer lab situation, several users sharing a computer and thereby augmenting the learning experience, into virtual space (Lombardi, 2005). The possibility for several users to manipulate the code for the three-dimensional environment in a collaborative manner is especially compelling. The Software is built upon Squeak, an implementation of Smalltalk, an

object-orientated programming language well suited for beginners. Indeed, Croquet, as well as Squeak, is primarily targeted at the educational sector. And finally, Croquets distribution is based on an open source licence.

For the first run of the VIPA courses two applications were developed in smalltalk and embedded in the croquet environment. One for cellulare automata, and another one for an agent simulation.
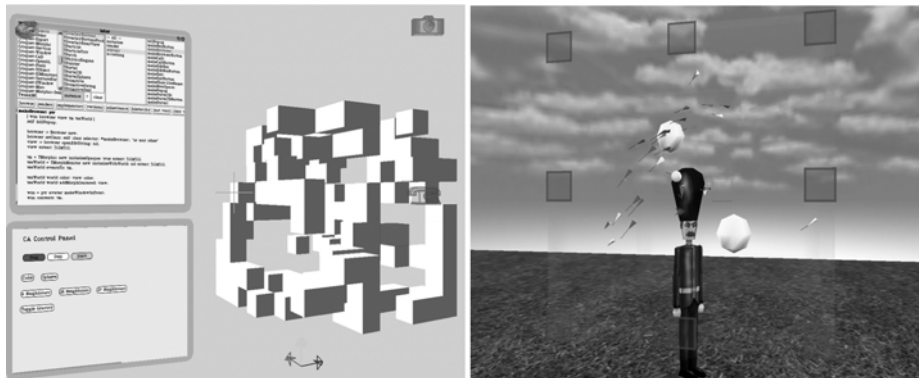

Figure 1. Croquet: CA application with code editor and two avatars viewing flocking boids.

In the course of the first run, problems with the early stage of development of VIPA's chosen courseware platform OpenCroquet became apparent, which caused us to look for alternatives:

On the one hand, Croquet's non-standard interface with little semblance of conventional desktop operating systems provides for a difficult learning experience. On the other hand, Croquet was not stable enough at the time, and its most promising asset, the possibility of sharing and manipulating objects over a network, was not functional. Furthermore, there appeared to be little active development on OpenCroquet. These factors led to our decision to develop our courseware on another platform, while keeping an eye on Croquet's status.

2.2 STAND ALONE APPLICATION LOOSELY COUPLED WITH LMS (BLENDER):

With development for OpenCroquet suspended, our objective was to find a platform for VIPA's courseware which was suitable to run interactive simulations in a virtual 3D environment, the parameters of which could be manipulated by students in order to obtain an understanding of the simulations' underlying principles. Students whose curricula include programming would be taught how to work with these simulations on a code level.

For the following reasons research about the open source software Blender made it the most promising solution:

Blender is the currently largest and most mature open source application for 3d modelling and animation, a field of work closely related to architecture. Students working with Blender-based courseware would benefit from being exposed to an application which would be re-usable outside of the scope of VIPA's courseware, be it as a rendering and visualisation tool within conventional architecture or as a general purpose software suite in a variety of related fields such as product design or game development.

Blender's free license is beneficial to both universities and students, while similar commercial software is often priced at several thousand Euros. It allows us to distribute the application within our Moodle platform, and Blender has an active and supportive community of both professionals and hobbyists, which proves to be helpful in mastering initial learning hurdles.

Blender's integrated scripting language Python allows to extend its functionality and access most of its features through code. In addition, Blender has an integrated game-engine which can run and export interactive content, and which can be scripted both in Python and through a graphical user interface. Assets for use within our simulations can be modelled directly within Blender, a synergy which not only benefits the end-user but enabled us to reduce development time by not having to add import/export facilities and the likes ourselves.
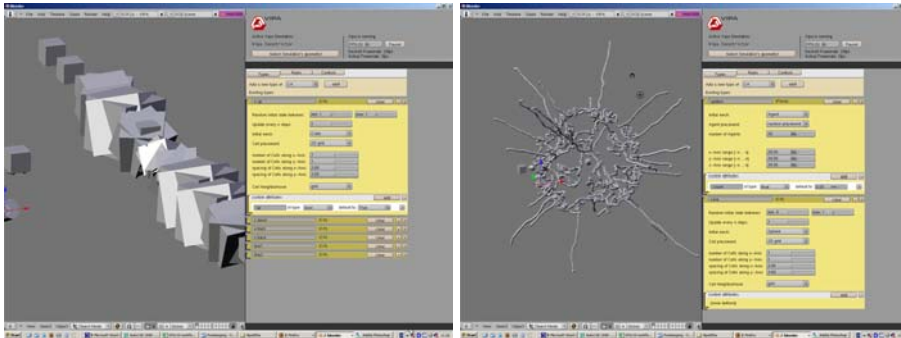

Figure 2. Screenshots: VIPA Constrictor

For the Vipa Project the Constrictor developments were an important step to refine the curricalar intention for teaching generative systems in the field of architecture.

At the final stage of the VIPA project the multi-user virtual environment (MUVE) Second Life was chosen to be tested as a virtual space to implement parts of the 3D virtual campus.

After our experience with Open Croquet, which has not reached broad distribution for students, the easy access and common interface of Second Life open up a new perspective for the realisation of our virtual campus

3. Moving into a Proprietary 3D-World (Second Life)

Second Life was launched in 2003 by Linden Lab and was originally designed out of the vision of the 'Metaverse' described in Neal Stephenson's novel Snow Crash (1992). Stephenson describes the Metaverse as an online environment that was a real space to its users, "one where they interacted using the real world as a metaphor and socialized, conducted business, and were entertained." (Ondrejka 2006). Second Life is a persistent virtual environment, build to be constructed by its users. Second Life provides people built-in tools to create objects or to model landscape.

These tools allow users to build or work on objects collaboratively in real-time within the game. Furthermore all the objects can be programmed with a script language (LSL). According to Ondrejka (who is one of the creators of Second Life) users have created more than one hundred million objects, over thirty million examples of script code, and over ten million pieces of clothing and avatars. Over 99 percent of the objects in SL are user created. Twenty percent of the users are in-world more than fifteen hours per week (Ondrejka 2006). According to the website of Second Life (SL) of the 14th of July, SL counts 8,040,758 residents; 1,732,159 of this residents were logged in during the last 60 days, and online were 37,489 users. Basic participation is free.

Figure 3. (right) VIPA starting point in SL (left: Meeting of the Prototypical Cours – Synthettic Construction II in SL

VIPA has founded a virtual online group within Second Life. The group VIPA provides some basic information about the project and can be entered within the virtual world. Everyone can join the group to get contact with the

VIPA consortium. VIPA owns no parcel or island at the moment but it currently has a small piece of virtual land at Mi 223/48/99. (http://slurl.com/secondlife/Mi/223/48/99/)

At the end of the 2nd prototypical run "Synthetic Constructions II" SL was tested as a virtual online environment for the final presentation of the results of the student work. Another group was put up for this lecture, and the students had to join the online group to get information and to join the online meetings. At the end of the course the student projects had to be presented in SL. The projects were presented on pictures shown on a whiteboard. The students as well as the lecturers, and some visiting guests critics were standing around the screen visualised through their avatars.

Because of the lack of voice communication, (the planned Skype-cast did not work) it was only possible to communicate via the in-world chat system.

4. Summary

Second Life was accepted by the students. They entered the MUVE on their own, designed their personal avatar and got used to the movement and communication system. By creating a group within SL, it was possible to organise meetings, provide information and communicate with the students, e.g. by newsletters. Furthermore the lecturers had the opportunity to control when and if a student was online in SL.

The virtual environment in SL was used as a virtual online meeting place. We used a virtual whiteboard, a shared 3D space, and chat communication. But SL was used at this stage as a meeting place and not yet for a collaborative design process. To test and to use MUVEs (like SL) as effective immersive 3D spaces, the Institute of Architecture and Design has bought an island in SL to work with. This island is a virtual white plane surface. (It can be found in SL under: arch tuwien 161,82, 49).

As a start, an online exhibition space in Second Life for the archdiploma2007 is currently in the design process. The archdiploma2007 is an exhibition of the best diplomas, presented every second year at the TU Vienna. It is planned to present all the projects as 3D virtual objects, which can be entered and visited within SL. The visitors get some basic information about each project and they have the possibility to walk through the virtual project. The path of the virtual visitors through the exhibition will be visualized by virtual particle effects. The ground floor therefore is planned to be "sensible". The environment should be reactive. The virtual exhibition will be interlaced with the real exhibition space, by screens and webcams.

After this first experience in SL, a design course for students is planned for fall 2007 (see Future Work).
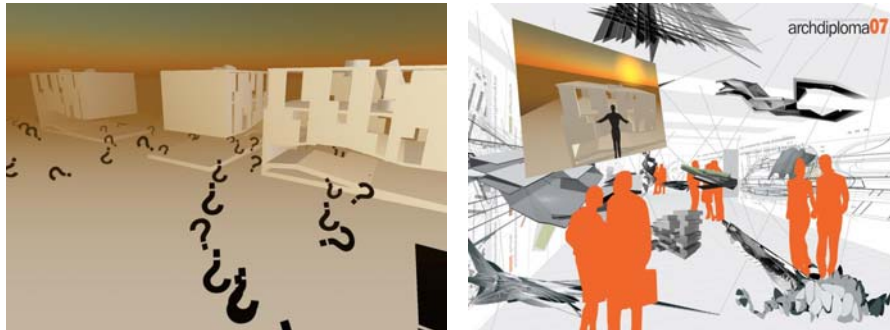
Figure 4. Archdiploma2007 in Second Life.

5. Conclusion

Second Life offers a working stable lively 3D virtual environment, beside all the know drawbacks concerning the Intellectual Property Rights (IPR), the fact that its not an open source software and the limitation in the amount of objects (prims) and users. 3D virtual environments like SL offer to its user's virtual space for real social interactions. The user gets not physically embodied in the virtual space, but he is part of the virtual environment. "The sociality of the space is not simply a matter of players talking to each other but a web of networks and relationships – something weaving between on- and offline life, in-game and out-game – developing, and disintegrating, over time." (Taylor 2006:30)

The virtual space is a social place, and not just a 3D virtual chat room. It provides a place for social networks, relationships and operational functions, which are core to architectural design. To build a sustainable collaborative immersive platform within a MUVE like Second Life, universities or institutions have to consider aspects of community building in times of web 2.0 (or web 3.0), aspects of property rights, and aspects of communication tools.

6. Future Work – Entering the Metaverse

After using Second Life as a eLearning environment, and as a virtual exhibition place the Institute of Architecture and Design will now use Second Life as a collaborative learning and working environment. On the island in SL a design course "Second Life – Entering the Metaverse" (5.0 ECTS) is currently prepared. This course will be held in fall 2007. The main topic will be the aesthetical and conceptional design of these new virtual environments. The students have to understand the technical frameworks of

MUVEs and MMORPGs, and learn how to use them as a tool and as a future domain. The aim is to design architecture under the conditions and framework of Second Life. These are: limited geometry, strict regulations and reactive systems. The students will have to work with code and algorithms, ideas of algorithmic design and generative architecture, but also with issues of community building, and social interaction. The aim is not to copy or rebuild real architecture, but to create new architecture and effective immersive 3D spaces for virtual environments.

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