3D Online Learning in Multi-User Environments

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Introduction

Over the last 2 years the MSc Virtual Environments course in the Bartlett School of Graduate Studies has used a 3-dimensional on-line multi-user environment to explore the possibilities for the architectural design of virtual environments. The 'Bartlett' virtual world is established as the environment where students undertake group design projects. After an initial computer based face-to-face workshop, students work from terminals at home and around the university. Using avatar representations of themselves, tutors and students meet in the on-line environment. The environment is used for student group discussions and demonstrations, tutorials and as the virtual 'site' for their design projects. The 'Bartlett' world is currently open to every internet user and so often has 'visitors'. These visitors often engage in discussions with the students resulting in interesting dynamics in the teaching pattern. This project has been very successful and is particularly popular with the students. Observations made over the 2 years the project has been running have resulted in interesting reflections on both the role of architectural design in virtual environments and the use of such environments to extend the pedagogical structure used in traditional studio teaching. This paper will review the educational experience gained by the project and propose the ideal software environment for further development. We are now examining similar types of environments currently on the market with a view to adapting them for use as a distance learning medium.

Context

This project forms part of the coursework for the MSc Virtual Environments course at the Bartlett School of Graduate Studies, UCL***.** The project is held within the first four weeks of the course and is seen as an introduction to a number of different aspects of the course.
In preparation for the group design project students are given two lectures on multi-user spaces. The first introduces the concept of multi-users online through

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text based Object Orientated Multi-User Domains (MUDs & MOOs). The second goes on to look at environments with a more 3-dimensional nature. The students are also given a three-hour workshop in how to use the software, how to communicate and how to build within the environment. The introductory lectures provide an important context for the work to take place. Indeed, the analysis of architectural content and game play displayed through text based environment can demonstrate not only the ability, but also the power of narrative, within a virtual world. Students are encouraged to participate in text based MOOs* before the introductory workshop in 3-dimensional environment, where 'building' and learning to 'build' can have overtones of conventional architectural CAD.

Project Aims and Objectives

The project aims to introduce students to a range of issues covered in more depth later in the course. These include exploring and analysing software, experiencing on-line multi-user communication, analysis of the design process and distributed working environments, and exploring architectural metaphor in virtual environments.

Restrictions of the software

ActiveWorlds software is normally available to subscribers and is targeted all user groups interested in global on-line communities *. ActiveWorlds, like most of the software available, uses avatar representation and text chat as the principle means of communications. ActiveWorlds, however, has an additional feature in that it provides a building feature. The 'Universe' consists of a number of different 'worlds', one of which is the 'building yard'. This is where users can select building elements such as roofs, walls, grass, water etc. with appropriate forms and texture maps. [Figs 1 & 2] Once selected the elements can be transported to the users world and compiled into virtual 'buildings'. In the commercial on-line environment it is the norm for these building to be direct representations of real world building types. [Fig3]
The first year the project ran utilised an 'ActiveWorlds' server based in the CASA* research centre in UCL. This allowed the 'Bartlett' world became part of the commercial universe. The following year ActiveWorlds offered an alternative educational universe called Eduverse*.

*** During the 99-00 session the text based MOO established at the Architectural Association, London was an invaluable resource. The Moo was established for the module 'Bitstream', tutored by Nick Dalton (alias Sheep). It is hoped that further and more extensive student collaboration may be possible in the future. http://www.arch-assoc.org.uk/nav/**

*** http://www.activeworlds.com**

*** Centre for Advanced Spatial Analysis, http://www.casa.ucl.ac.uk**

*** http://www.activeworlds.com/edu/**

Design Process issues raised:

Four groups of three students were established and allocated areas within the 'world' site. The students were given a design brief and asked to have all design discussions on-line. Most students worked from university networked residences or university computer clusters, but some did attempt to participate from home through their ISPs. The students connecting via the university network had almost no bandwidth difficulties, but the student connecting from home were, at certain times of the day, greatly hampered. The degree of difficulty was somewhat unexpected as the software is marketed at users connected through ISPs. It was noted that the communication features, i.e. text chat with some avatar representation was never really a problem. It was only when interacting with geometries that communication became difficult.
Although this project was not specifically set up as a investigative research project, there were some interesting and notable observations:
Some students found that design communication within the environment was greatly hampered by the lack of sketch facility and went to some length to add web pages to the environment in order to describe their ideas to the group [Fig.4]. This was somewhat expected, However, during the feedback session in the second year of the project there were a number of students who insisted that a sketch facility was not required. Their view was that sketch models and text descriptions were certainly adequate.
This may be explained by the differences in structure in the two years. In the first year the project duration was 10 days. Students had to come up with a group design relatively quickly and they produces one 'building' per group (i.e. 4 buildings). In the second year the project duration was extended to 3 weeks. In this situation students allowed themselves more time to experiment with the software on an individual basis before having group discussion (i.e. 12 buildings). This resulted in a loose group design philosophy and students all constructing individual structures around that theme. The design and building work was therefore devolved and so the groups would not have required such detailed geometry descriptions.
The students explained their resultant individual buildings scenario as an emerged decision. Once they had all individually experimented with the software they felt reluctant to tear down their models to start on a new communal design. In essence they became attached to their original design 'sketches' and did not want to throw them away. Although some design elements were created and subsequently hidden underground, and some were created in a remote location in order to test particular behaviours, the majority of design development emerged from the original geometries.

One unusual feature of the environment was the open nature of the worlds. Visitors were permitted into the worlds. In the first year, as we were using the commercial universe, visitors could have been anyone connected online. For the most part this was a positive contribution the process with students explaining what they were

doing to people who were non designers, but often ActiveWorlds software experts [Fig.5]. Visitors also tended to work as peer group tutors to some extent. Only one negative incident occurred when while in a design tutorial a maverick person came along and deleted the geometries around us.
In the second year the projects was conducted in the educational universe and so not open to the world in general. In instance the other worlds in the universe offered more interesting precedent and security was at a level where only Bartlett users could delete, but the peer tutors were lost.

Design Issues raised by the Environment

Environment has 'ground' and 'sky', it there fore has an 'up' and 'down' and the concept of 'gravity'. The gravity behaviour allows avatars to walk on the ground plane, and on built structures, but also accommodates a 'fly' mode. Bridges and Charitos (1997) outline a number of design parameters that require exploration when designing virtual environments. These are identified in their paper and incorporate a number of complex issues. The design issues involved in the design of real world buildings compared to virtual spaces can be substantially different. This environment, unlike VRML or other virtual environments, incorporates some fundamental real world parallels. This allows the students to focus their experimentation with a few of the design opportunities offered by virtual environments such as navigation, behaviours and interactions and, most importantly, levels of narrative. Students experimented with how much control they as designers have over the movements of the visitor, over the ways they are able to navigate and the resultant experiences they have. Much of the techniqaues employed are those currently used in film direction and set design.

Tutorial Observations

The project worked well as a group bonding session. Students in the class are normally from very disparate cultural and design backgrounds and are often struggling with having moved to a new country and a very large city. Although the students were theoretically working in groups of four, the environment encouraged more cross group working and therefore encouraged support on many levels.
It was also clear that at least one or two students a year who were shy in class and reticent to participate in group discussion, immediately lost their inhibitions on-line and became focal points of the group. In both years class group dynamics were radically altered after this project.

Design tutorials and group discussions worked well, particularly with the ability to experience an enhanced spatial perception, particularly in relation to avatar representation and relative scale.
The students reluctance to throw created objects away became an interesting

talking point. It raised questions relating to the idea of 'preciousness', particularly within the context that CAAD drawing had released the designer from any paper drawing being 'precious'.

Conclusions

In addition to being an introduction to some of the principle design issues relating to virtual environments, the project was a very good introduction to the area of Human Computer Interaction (HCI) in general. The HCI area and accompanying literature can fairly complex and is generally presented within the context of computer science. This project developed the students awareness of HCI through spatial means. Students explored interacting with objects and each other within an environment rather than just on an environment. This awareness of predominantly spatial issues allowed them to identify a role for themselves as architects in the development of HCI.

Finally, although the software was far from ideal as a distributed design environment, there were enough hindrances in the software to encourage students to undertake a critical evaluation offer suggestions for the features required for the 'ideal' distributed design environment.

Figure 4: Visitors

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