

Collaborating in a Virtual Architectural Environment: The Las Americas Virtual Design Studio (LAVDS) populates Second Life

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Abstract. *The paper describes exploratory work in the design, construction, and habitation of a virtual structure (VS) nested within an Internet-based multi-user environment and serving a geographically distributed collective of architecture students and faculty. In addition to a discourse on the design and implementation parameters that were used, the paper seeks to provide findings that make reference to the quality of teaching/learning experience of users and the effectiveness of the interaction among users while working on a common architectural design project. This experience will further contribute to the knowledge base that will be needed in the design of virtual architecture.*

Keywords. *Virtual design studio, Second Life, Multi-user environment, Architectural design and learning.*

A critical assessment of previous LAVDS implementations

The Las Americas Virtual Design Studio (LAVDS) is a collaborative teaching/learning experience that has been in uninterrupted operation for the last 10 years. This makes the LAVDS not only one of the first implementations of its kind, but probably the oldest running studio of its kind in the world. In such a context, a number of studios in different universities makes the commitment of working in the same design subject and share the development of resulting projects through the Internet. The students work as usual within their local studios under the direction of their local instructors, but at the same time each student is assigned to an international virtual studio composed of students of different universities under the advisory of several virtual instructors. The instrumentation of the LAVDS has evolved in keeping with the evolution of Internet applications making use of: e-mail, ftp, www, chat, blogs, Skype, Polycom videoconferencing, etc. Every instrumental addition has resulted in additional transparency in our communication protocols but we were never able to simulate the very casual nature of the design studio environment where students and faculty can just “show-up”, check who is in, and actively engage the teaching/learning process without further formal communication protocols.

Conceptualization and Design

The initial design of the VS was commissioned to a group of architecture graduate students who belonged to the LAVDS 2008 class under the mentorship of Professor Guillermo Vásquez de Velasco and Professor Antonieta Angulo, from the College of Architecture and Planning (CAP) at Ball State University (BSU). The students in this group researched the subject by acknowledging a number of related developmental paths namely, virtual activities, virtual worlds (VirtualEnvironments.info, 2008) and virtual architecture (Vásquez de Velasco, and Akleman, 1998; Redi and Schrottner, 2005). The main objective of this exercise was to design the VS that would be contextual in SL and would serve a multinational group of more than 100 architecture students in 10

virtual studios operating individually and/or collectively. On general terms, the design proposals should stimulate the imagination of users and visitors and should provide an expression that celebrated the location, function, and nature of the LAVDS.

Designing the virtual environment posed specific constraints to the task, among them the site characteristics, accessibility, constructability rules, and overall functional requirements. The site was a limited portion of a SL “island” that pertains to the BSU Instructional Campus. It contained no other structures at the beginning of the design stage and this was interpreted as lack of context, but that served to stimulate the students to look for identity in other less material issues and served also to encourage them to produce solutions that could positively influence the design of other developments in the island. Access to the site (by teleporting) would allow users and visitors to arrive at ground level and at a certain distance easy for them to perceive and enjoy the main entrance of the building. On functional terms, the design proposals should provide areas that allow for the virtual interaction (work and play) of the participants of the LAVDS with a limit of 40 avatars interacting at any given time. In constructability terms, any design should be consistent with the performance framework offered by the SL environment. The design proposals should recognize the limitation of the number of polygons (15,000 maximum) used in the geometrical description of the building(s).

Some students produced creative and consistent design concepts that celebrated the spirit of the virtual design studio; others aimed to ingeniously exploit the “digital nature” of cyber-space; and others sought to define the interactions or suitable “behaviors” for all participants. Several design concepts entertained by the students included the use of adaptable spaces, multiple areas for collaboration, collaboration through visibility, movement, and distinction of levels of privacy. Most of these concepts aimed to satisfy the necessary functional flexibility that the different virtual design studio scenarios may require. As in any conventional design project, the design proposals varied in the way they have related to precedents cases and how they have exploited the nature of the digital context. Some proposals depicted the VS using iconic building images in order to bring familiarity to the use of the environment.

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Others depicted the VS in more abstract terms describing complex shapes and spaces. These proposals assumed that the conventional understanding of structural support for different building components gets diluted in a virtual environment, and also that while concepts related to walls, roofs, floors and other space defining elements may persist they can be disassociated from materiality. For instance, most of the design proposals disregarded the use of any kind of stairs and focused on exploiting the ability to fly in the SL world.

The design proposals also specified the behavior of their virtual structures. Designers suggested the implementation of scripts that can be applied to different building components, not only to mimic conventional material textures and colors but also to produce visual transparency at different degrees and responding to a variety of stimuli in the environment. Other scripts suggested the availability of movable and transformable elements, and the use of light effects and sound.

The concept of the selected design was the creation of an interactive landmark. As described by the graduate student “the VS is a beacon that not only attracts visitors, but encourages interaction on multiple levels”. The beacon depicted an organic system in the shape of a lily pad with a radial configuration of pods or petals (spaces for small group use) and a large group meeting place at the center. A tall mast-like element (the stem) creates the landmark featuring a glowing light. Interactivity at many levels included the modification of visual and auditory components as well as different ways to exchange and display graphics and text. Adaptability and expansion of spaces were specified following metaphors of natural movement and reproduction of the organism.

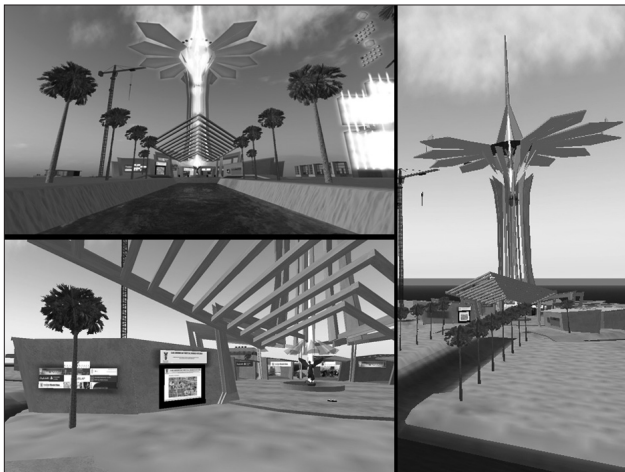


Figure 1. The LAVDS under construction

Construction

The Institute for Digital Intermedia Arts (IDIA) was invited into the project by Professor Vasquez de Velasco and Professor Angulo. The institute's role was to consult and construct the virtual building designed by the Las Americas Virtual Design Studio students. This experience began as a three-week charette in which John Fillwalk, the director of IDIA, surveyed the potentials and constraints of virtual worlds with the architecture students to understand design limitations and possibilities. Once a student design was chosen from the CAP-LAVDS competition work began with students from the IDIA Immersion Seminar in Virtual Worlds to begin the transformation of the design within a virtual environment.

The designed structure needed to enable a host of rich collaboration and communication experiences within the LAVDS environment. These capabilities were integrated by employing a range of technologies – such as text, data, video, audio and voice chat. The LAVDS virtual structure is a configurable, collaborative interface that

responds to its audience's needs via reactive data, media and form – all via an avatar's interactions.

Virtual worlds can provide opportunities that enable potent collaborative experiences beyond the material and spatial realities of our physical domain. Virtuality has the potential to be united and augmented by physicality - informing and transforming a participant's interaction with colleagues and information through compelling, immediate and elevated interactions collapsing constraints of time and distance for a dislocated work group. Our research and design of various means of interfacing within several virtual environments for hybrid-reality experiences has employed multiple approaches to bridging techniques such as media streaming, client-side interactions, external web servers, web service API's and human/computer interaction. Some of the collaborative technologies that were incorporated into the LAVDS structure include: virtual drawing and white boards; spatialized VOIP; RSS feeds; image sharing surfaces; interactive and collaborative text documents; video conferencing; streaming video and audio; public chat; instant messaging; email and an in-world web browsing.

The LAVDS project offered us ideal conditions for feedback to assess the efficacy of remote collaboration aided by virtual communication technology. IDIA is currently developing further immersive, avatar-based desktop and dynamic spatialized portals – uniting virtual worlds with the information metaverse – all initiated by avatar interactions. Critically important is the expanding number of modalities of interacting with content inside and out of the virtual world. Built environments in the virtual world within these hybrid spaces can for instance adapt to users profiles and group configuration files as needed, identifying users and work groups based on history of usage, and snap-shotted progress states of research. Virtual structure can then be configured in various ways to augment small or large group inquiry, collaboration, or presentation by dynamically changing form and content as needed.

Teaching and learning

Second Life (SL) is currently the most mature and popular multi-user virtual world platform being used in education (Warburton, 2009). Some have reported (Architectural Record, 2007) about the use of SL as a tool to complement the use of conventional CAD programs, to encourage the idea of architectural collaboration, and as ground for testing new design ideas. Others have also reported that some architectural practices have opted for a presence in the virtual world (Crescendo Design, 2009) to meet with long-distance clients, prototype and share design ideas, host open house events, educational workshops and to demonstrate some of the core design principles they try to incorporate in their work.

Through the understanding of the affordances of Second Life, we have implemented the LAVDS at the SL environment and have aimed to comply with teaching and learning objectives that are common to architectural design studios, namely to provide an environment for students engagement, interactivity, collaboration, experimentation, and idea generation. According to Eschenbrenner and Siau (2008) these objectives have become more complicated and challenging to comply with in an on-line format. However, we have found out that after our inaugural formal event and the subsequent informal activities that followed during the semester, the LAVDS has provided opportunities for significant learning (Fink, 2003) and have the potential to:

- Promote collaborative and cooperative activities that allow connections between students, mentors and reviewers, even if they are geographically dispersed.
- Provide the students the ability to acquire information when needed and understand concepts related to 3-dimensional building design. We take advantage of the rich communication media available in the VS, such as audio, visual, and textual features of SL.

- Encourage students to engage and become immersed in the design project by providing and receiving reviews generating an increased sense of caring about the design subject. Additionally, the students certainly gain a great experience about architectural discussion and debate within the VS.
- Provide a great sense of self and a sense of community of learners (Las Americas Virtual Design Studio) by allowing formal and informal interactions with peers who are in a distant location that otherwise might not meet in a face-to-face setting. As a social space for learning, students and reviewers meet and make use of interactive whiteboards, chat, audio and video streaming, blog page links, and other tools.
- Promote the performance of meta-cognitive activities. The activity of reviewing and critiquing a design project is an integral part of the process of learn-how-to-learn to design. It provides the student the opportunity to develop design inferences on-demand. The LAVDS in SL promotes this aspect focusing primarily in the exchange of ideas about the project during the virtual review session.

Conclusions

We would like to outline the following conclusions:

1. Multi-user virtual worlds provide a platform on which to construct compelling experiences not possible within the material and temporal constraints of the physical world. In this case, the LAVDS in SL not only brings together students and reviewers who are geographically distributed but encourages them to collaborate and through social interaction contributes to build a sense of community of learners. This is of fundamental importance as we recognize that continuing professional learning takes place in the context of community of learners that blend social and professional agendas, and that on-line social networking is the fastest growing activity in the Internet.

2. The LAVDS in SL offers many tools for the exchanging of information in many media and facilitates the implementation of architectural reviews that may lead to debate and a rich exchange of ideas in real time. In this context, the level of engagement with the design project promotes a level of immersion and motivation that benefits the student's learning.

3. The next step in the improvement of the LAVDS in SL is the simulation of 3-D spaces as designed by students and the visualization/evaluation of the same. In this improvement, we find also opportunities to expand the review activity and provide more avenues for experimentation and innovation. At that point of development we will be further enhancing the spatial simulation capabilities that support review and design activities.

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Figure 2. The Ribbon-cut ceremony in the LAVDS