Combining Immersive Virtual Worlds and Virtual Learning Environments into an Integrated System for Hosting and Supporting Virtual Conferences

Nikolaos Polychronis, Charalampos Patrikakis, and Athanasios Voulodimos

National Technical University of Athens
`nikos.polychronis@gmail.com,`
`bpatr@telecom.ntua.gr,`
`thanos@telecom.ntua.gr`

Abstract. In this paper, a proposal for hosting and supporting virtual conferences based on the use of state of the art web technologies and computer mediated education software is presented. The proposed system consists of a virtual conference venue hosted in Second Life platform, targeted at hosting synchronous conference sessions, and of a web space created with the use of the e-learning platform Moodle, targeted at serving the needs of asynchronous communication, as well as user and content management. The use of Sloodle (the next generation of Moodle software incorporating virtual world supporting capabilities), which up to now has been used only in traditional education, enables the combination of the virtual conference venue and the conference supporting site into an integrated system that allows for the conduction of successful and cost-effective virtual conferences.

Keywords: Virtual conference, on-line conference, sloodle, moodle, Second Life, immersive virtual world, multi user virtual environment, virtual learning environment, content management system.

1 Introduction

Virtual or on-line conferences are professional educational events that, compared to their face to face counterparts, are considered to be cost-effective, for both organizers and participants, time and space independent, thus convenient to attend and widely accessible. Furthermore, virtual conferences, being completely reliant on technology, usually keep up with most recent technological advancements, taking full advantage of the new possibilities for interaction and knowledge building that open up, when effectively applying up-to-date technology to conference procedures. During the last few years, a wide range of powerful communication tools and applications have emerged, alongside with the rapid increase in broadband connections, the prevalence of Internet and the emergence of Web 2.0. However, these advances have not yet been fully integrated into conference planning and conduction. Careful choice of technology and exploitation of the nowadays available infrastructures and web tools for use with the

virtual conference may result in planning and conducting on-line conferences that are more effective in terms of creative interaction and social networking among the participants and yet quite inexpensive and less time consuming to organize and attend.

2   The Virtual Conference

2.1   Definitions and Features

Conferences, in general, are considered to be spaces of academic dialogue alongside journals and books, designed to meet the ongoing educational and training needs of professionals [1]. Either in person or virtual, conferences have to accomplish some major goals. The first goal is to create knowledge through personal, organizational and community learning. The second goal is to develop social networks that can be later used to extend learning beyond the conference and to create valued collegial friendships and relationships [2]. According to Anderson, organizer of the first international online conference to be held, the virtual conference is a professional development activity, modeled upon the face to face professional conference that uses telecommunication technologies to reduce the access barriers to participation posed by time and distance [3]. Like its face to face counterpart, the virtual conference runs on a real-time schedule, with a starting date and a closing time. However, unlike the traditional conference the online event is not tied to a specific geographical location, does not require the participants' physical presence, includes numerous opportunities for interaction with fellow participants, presenters, keynoters and conference hosts and staff, is archivable (discussions in various media can be recorded for future review), and isn't - for the most part - time bound (presentations and forums are available at any time, virtually, whenever the participant logs on) [4].

The format of the virtual conference consists of planned learning activities which may take place synchronously, with all participants interacting at the same time, asynchronously, with interaction supported 24 hours a day, or through some combination of asynchronous and synchronous activities [3]. Asynchronous interaction provides freedom of time (learners are able to participate when, and if, they choose to do so), time for reflection, opportunities for research and opportunities for global communication (no concern for time zones). Synchronous communication provides immediate feedback, as well as rapid problem solving and decision making [5].

2.2   History and Technology

Early on-line conferences were entirely e-mail based because of bandwidth and software limitations. At that time e-mail was the lowest common denominator among internet tools, offering higher access rates, compared to newer, high bandwidth or increased interactivity tools and reaching many of the most remote regions, including some with very low levels of telecommunications infrastructure [3]. The first international online conference to be reported was organized by the International Council for Distance Education (ICDE) in 1992 [6]. For the needs of this conference a central mail distribution list was established at the University Of Calgary in Canada, receiving all the incoming mail and feeding outgoing mail to approximately twenty-five

different networks or mail discussion lists for further distribution. The rapid development of computer network technology has since offered online conferences a larger pool of delivery tools. For instance the ICDE 95 online conference used MOOs (Multi-User Dimensions/Dungeons Object Oriented) to provide participants real time interaction. Later conferences included real time audio, video broadcasting and made use of the World Wide Web [7].

Nowadays a wide range of software tools is available, suitable to support the virtual conference, not only in terms of communication and delivery of content, but also as far as content management, user management and creation of social networks is concerned. This range of tools involves from complex commercial products, directly developed for web-conferencing, like Elluminate, content -learning management systems (CMS-LMS) like Moodle, originally developed to enhance traditional education, immersive virtual worlds like Second Life or WOW, social networking Software like Facebook or Flickr and social bookmarking tools, like del.icio.us, to nowadays widely spread Internet tools and technologies like blogs, wikis, podcasts etc. that have turned the web into what it is today.

Technological progress and the emergence of new powerful tools has deeply affected the overall conference format and structure over the years, introducing new ways of interaction, enabling the deployment of more complex activities and adding functionality. While early applications of virtual conferences imitated face to face conferences, it was soon realized that this was "horseless carriage" approach that should be replaced by an approach that ensures understanding and application of technology in ways that optimize its unique strengths and virtues [3].

3   Choosing Technology for Hosting and Supporting Virtual Conferences

3.1   Criteria and Modern Aspects about Technology Use for Conference Conduction

When choosing technology for hosting and supporting virtual conferences, cost effectiveness, time flexibility and remote accessibility are three major factors that should be taken into consideration, because, after all, those are the initial reasons, for which virtual conferences where originally developed. Apart from the above mentioned criteria, the great impact technology and modern software tools can have on the educational and communication - socialization processes when wisely utilized, seems to be the key factor when choosing among the plethora of software tools and network infrastructures available today. Siemens, Tittenberger, and Anderson [1] claim that although planning technology use in conferences is currently in a state of a flux, greater utilization of technology in conferences provides value for extending activities and dialogue, capturing content, supporting conversations, encouraging social networking, enable tagging, fostering backchannel communication and aggregating content. Suter, Alexander and Kaplan [8] insist especially on the ability of new social software technologies to provide a "container" for persistent conversation and also support what might be thought of as the social architecture of a community (of professionals). Finally, the adaptability of the

selected software to various needs and specifications, its scalability and its ability to evolve and keep up with emerging technologies and also the ease of use for the end user, seem to be equally critical concepts to be accounted for. Of course previous experience in organizing virtual conferences should be investigated, best practices ought to be taken into account, and any proposed solution should lie close to the mean technical level of its time.

3.2 Technology Review

The combined use of various technologies for supporting different aspects and activities of the same event can be spotted at many contemporary virtual conference events. Usually a software package, or a set of tools, is used for supporting synchronous sessions and live presentations, and a second technology, or a combination of technologies, for supporting the asynchronous activities, registration process etc. Among commercial products, Elluminate[1] (www.elluminate.com) seems to be one of the most common choices, for holding live sessions and presentations, while streaming technologies like podcast are often favored for the delivery of live or recorded audiovisual content. Asynchronous interaction among the participants usually takes place on forum boards, blogs and wikis, while RSS feeds, tagging and bookmarking enhance the participants' experience, enable the aggregation of content and add value to asynchronous conference activities. The use of software packages, like Moodle[2] (www.moodle.com), for supporting a whole range of asynchronous activities, and, at the same time, managing users and safely storing and distributing content (especially documents), through an integrated environment, is also a common practice in contemporary virtual conference conduction.

What may be worth highlighting, is the use of the Multi User Virtual Environment (MUVE) of Second Life (www.secondlife.com) for hosting standalone immersive context sessions or even conferences. At least two cases are being reported:

a) The NMC Series of Online Symposia, held on the New Media Consortium (NMC) Second Life campus, and

b) the IBM's Academy of Technology (AoT) Virtual World Conference and 2008 Annual Meeting, hosted in a secure Second Life environment, with a conference space specially designed by IBM for keynotes, breakout sessions, a simulated Green Data Center, a library, and various areas for community gathering. The experience of participating in a virtual conference in Second Life was highly acclaimed by the IBM's AoT members, especially because of the intense feeling of telepresence the immersive environment of Second Life imparted to them, while cost was reduced to about one fifth [9].

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[1] Elluminate, for instance, is used by Webheads in Action Online Convergence (http://wiaoc.org/), Online Connectivism Conference (http://umanitoba.ca/learning_technologies/connectivisim) and the Future of Education (http://umanitoba.ca/learning_technologies/conferences/foe/), K-12 Online Conference (http://k12onlineconference.org/)

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3.3   Assessing Previous Experience and Choosing Technology

Computer mediated asynchronous discussion has proven to be a vital element of most virtual conferences, because it is persistent, it allows participation even after the conference event has finished, it is deeper than real-time discussion, allowing participants to reflect and research before they respond, it is archivable and retrievable and thus accessible to a larger audience, and also time-convenient and space – independent. Live discussion is important for a conference as well, because of its spontaneity and immediacy, allowing for group cohesion and synergy and for creating personal bonds between participants. In that context, the use of virtual worlds, and particularly Second Life, for hosting on-line conferences, making on-line interaction feel like real, seems quite promising, especially after IBM AoT's successful experiment.

Any planning for technology use in conference conduction, taking into consideration previous experience and best practices, should therefore definitely account for forums, blogs and wikis to host asynchronous discussion and should seriously consider utilizing the immersive environment of Second Life for hosting live "feeling like real" meetings. Moreover, it would be ideal if those different technologies supporting the various desirable activities and features of the virtual conference could be, not simply combined, but integrated into a unique and cohesive system: the Sloodle project, reviewed on the next paragraphs, is a software package that attempts that kind of an integration.

4   Sloodle

4.1   Overview and Architecture

SLOODLE (Simulation Linked Object Oriented Distance Learning Environment) is a free plug-in for the popular Open Source web-based virtual learning environment "Moodle", which integrates Moodle and Second Life [10]. Sloodle is open source itself and comprises a large collection of php scripts residing on a Web-server with a database backend [11] and a set of Second Life objects-'tools' compiled in LSL (Linden Script Language), Second Life's built in scripting language. Sloodle is not standalone software but is normally mounted as a module on an existing Moodle installation. Sloodle objects in Second Life communicate with Moodle servers bearing the Sloodle module via e-mail, XML remote procedure calls (XML-RPC), and via HTTP-requests.

4.2   The Sloodle Project

Sloodle software, which is undergoing constant revisions and improvements, is part of an ongoing and growing in popularity and support education-oriented project, initiated at about 2006 by Daniel Livingstone and Jeremy Kemp, trying to investigate how current games technology can help build more immersive and engaging learning environments and on the same time trying to avoid packaging learning content into game form [12]. At that time, there was a rapid growth of interest to be observed, in the use of online virtual worlds, and particularly Second Life, for educational purposes, while

powerful features, already existing in learning management systems like Moodle, were not generally used to their fullest. Sloodle creators noticed that each platform (SL and Moodle) offers complementary affordances not available in the other and that connecting the two systems might allow instructional developers and teachers to explore exciting new opportunities for interaction on the web and within the Second Life MUVE [13].

The most important qualities of Sloodle are its dynamics and its constant evolution. Sloodle developers continuously try to improve its form and attributes by exploiting new affordances by emerging technologies, conducting surveys to find out what educators want [11] and receiving constant feedback from a rapidly growing community of Sloodle testers, users, and developers [14].

4.3   Features

At the prospect of introducing Sloodle to virtual conferences, next paragraphs review some of the in-world educational tools and registration/enrolment objects included in Sloodle, which according to the authors' opinion, may prove useful for supporting and enhancing virtual conferences.

Sloodle WebIntercom mirrors chat between Second Life and Moodle, allowing attendants to participate in chats from either environment, and it also archives Second Life chat on the Moodle server [14]. WebIntercom only applies to Second Life's Local Chat with script messages.

Sloodle Toolbar is a Second Life user-interface enhancement, a toolbar that enables blogging to a user's Moodle profile, adds animated classroom gestures to Second Life, and which allows a user to query Moodle for the Moodle identities (if any) of avatars nearby in the 3D virtual space.

Registration Booth checks if avatars are registered in the corresponding Moodle site, and, if not, it helps them register while the *Access Checker Door* controls access to a certain confined space within Second Life.

Vending Machine allows web-controlled and in-world distribution of objects.

Sloodle Presenter is a tool for creating presentations (for lecture, seminar or self-paced tutorial use) in Second Life. The presenter avoids the requirement to upload images into Second Life and allows presentations to combine images, web-pages and videos by streaming the presentation content into Second Life using the media settings. Thus, each slide can either be a webpage or an image or even a video (in Quicktime compatible format) [15]. On the latest versions of Sloodle YouTube support is also available while pdf support is expected to be included in future releases. The development of the *presenter* was based on the HTML On A Prim technology, which was only recently introduced to Second Life, and has been a real revolution, not only because of saving former costs of uploading images on the Second Life servers, but also because it enables new media format to be fed to Second Life.

Sloodle Choice lets participants respond to a poll set up in Moodle (Moodle's *choice activity*) from in-world.

5 Developing a System for Hosting and Supporting a Virtual Conference Based on Sloodle Technology

5.1 The Core Concept

Both Second Life and Moodle feature compelling functions and attributes for the virtual conference organizer, as indicated in section 3.3, and both platforms have been so far used for supporting virtual conferences, as mentioned in section 3.2, but no report of them being used together for the same event has been tracked yet. Sloodle is a software package that enables the integration of Second Life and Moodle into a cohesive, enhanced Virtual Learning Environment, thus it would only sound reasonable to examine the possibility of using Sloodle to integrate both platforms into a complex system for hosting and supporting virtual conferences.

Sloodle has originally been developed for supporting teaching and learning "in the virtual classroom", aiming at a centralized educational structure, which typically involves a teacher or professor and his or her students, a structure usually met at schools, colleges and universities. Reports from using Sloodle in the virtual classroom have been quite encouraging so far, but no other use of Sloodle outside this context has been reported yet. Conferences constitute educational processes too, but unlike teaching in a classroom, they are based on a decentralized educational structure, where importance lies on collaborative learning and knowledge building and where crucial ideas might be born even during unofficial conversations on the margin of the official event, so conferences may not be what Sloodle creators have originally been aiming at. Nevertheless, conferences do involve activities, a presentation being a typical example, which simulate the teacher–students educational schema; furthermore, the point of teaching inside the virtual classroom, instead of the real one, lies exactly in fostering situated learning, where collaboration, exploration, and construction are important, and transform - decentralize the conventional educational process. Therefore learning in the virtual classroom may not be so different from learning in a conference after all.

Taking into consideration all the aforementioned factors, namely: a) the positive reports about testing Sloodle in the virtual classroom b) the similarities between the virtual classroom and the on-line conference and c) Sloodle's overall compelling features, it is hereby claimed that *transferring Sloodle technology from the virtual classroom to the conference venue would positively affect and enhance conferences as well and would give virtual conferences a qualitative boost*. A way to implement this transfer is described next.

5.2 Implementation

Sloodle is not a standalone application; it presupposes the use of Second Life and Moodle. Using Sloodle to conduct and support on-line conferences means setting up a system comprising two parts: a web site created with Moodle and some kind of virtual facilities hosted in Second Life, allocating conference activities and supportive functions among the two parts, and finally setting up and configuring Sloodle to interconnect the two parts. An optimal way to do this is hereby suggested, that consists of creating a virtual conference venue in Second Life to host all synchronous activities

and a Moodle site to host asynchronous activities, manage registrations and store conference content. Further functionality is achieved by setting up and using the We-bIntercom, the Presenter, the Access Checker Door, the Registration Booth, the Sloodle Toolbar and, finally, the Sloodle Choice features described in section 4.3. The following detailed description of the end-system is partially based on a small scale prototype [16] formerly developed for testing purposes. Some screenshots of the pro-totype implementation are presented later in the paper.

The Virtual Conference Venue

The Virtual Conference Venue is a properly shaped and designed - according to given requirements and specifications- virtual building intended to host live events. A Sloodle Access Checker Door controls the access into the building: only users, who have signed up at the Moodle site and have registered their avatar, are allowed to enter. A Registration Booth outside the building facilitates the registration process for the newcomers. Inside the venue a Vending Machine hands out the Sloodle Toolbar to all users. The Sloodle Toolbar allows for reflection during live conference sessions; participants can take notes during a presentation or discussion and send comments to their personal blog, that can be reviewed later for further investigation or discussion. All synchronous discussions and presentations are hosted in the virtual venue using voice or text. Text based sessions are recorded by Sloodle WebIntercom and auto-matically saved on the Moodle site for later review. Sessions using voice are recorded using third-party software and manually saved on the web server. In case some atten-dants cannot log in to Second life due to technical reasons, text is preferred over voice, so that they can join the conversation through the browser based Moodle chat room. Presentations are held on the Sloodle Presenter, allowing both images and vid-eos to be displayed. Sloodle Choice objects, correctly positioned inside or outside the venue, allow organizers/presenters to receive immediate feedback, right after the conference/presentation, on the participants' opinion.
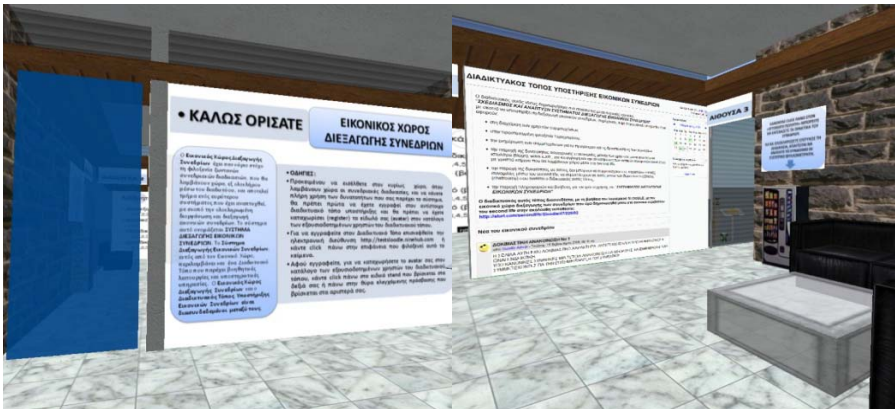

Fig. 1. Outside and inside the virtual conference venue's reception room. Outside: Sloodle Access Checker Door controls access into the venue. Inside : Vending Machine links to conference proceedings on the Moodle site, the wall displays Moodle site's frontpage including calendar. [16]

The Moodle Site

The Moodle Site handles registration to the conference through its built-in login interface. Conference events are registered in the built-in calendar and announced on the central page forum board. Various other forum boards may be created for hosting scientific discussion on different conference topics. Content like conference proceedings, individual presentations and live session recordings are stored on the server and distributed to registered users. Through the built-in chat rooms users can join text-based conversation taking place in the Virtual Venue or selectively retrieve past, automatically archived, text-based sessions. Additional web pages inside the site may provide user with useful information and instructions, about how to use the system etc. If desired, content and activities appearing on the Moodle site may be organized into different *Courses* for increasing functionality, though this is up to the organizers' discretion.
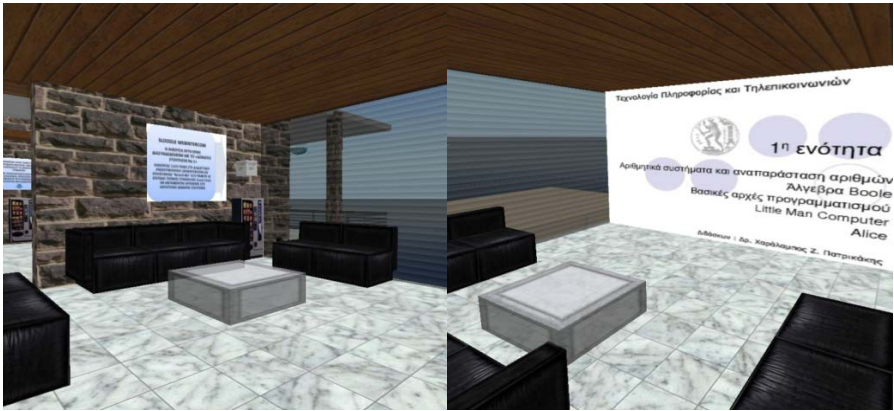

Fig. 2. Double aspect of a conferencing room inside the virtual conference venue, featuring seats, a presentation screen, Sloodle Webintercom, and a Vending Machine for linking to document repositories [16]

6   Conclusions

Combining two technologies, Moodle and Second Life, formerly only separately used for supporting virtual conferences, and integrating them with the use of Sloodle, so far used for supporting only traditional teaching, into a complex, standalone system, is expected to take on-line conference conduction to a next level.

The proposed system features Second Life's immersive environment, making remote participants feel as if they are really there, and Moodle's wide range of asynchronous communication tools, allowing for a deep, long-lasting and persistent conversation among the experts, plus Moodle's powerful user and content management functions, needed for registering participants, distributing the proceedings, controlling access to resources and activities. Utilization of Sloodle offers additional possibilities for reflection during the live sessions, facilitates direct assessment by the participants, makes recording and archiving live sessions easier, extends access control to the virtual level and allows for richer, cost-effective presentations.

Furthermore, the whole system can be easily built up to meet individual needs and specifications, as both Second Life and Moodle offer great flexibility and adaptivity. Second Life content is exclusively user created, while Moodle, apart from being fully customizable, is open source, which allows for even deeper changes to be implemented.

The overall suggested solution is cost-effective. Sloodle and Moodle software is free, web hosting for small scale deployments is free, while, for any potential large scale virtual conference organizer, saving some space and bandwidth on the corporate or institutional servers shouldn't do any difference. The only costs associated with undertaking such a project, lie in buying land on Second Life, costs which are still far lower than the costs of organizing the real event, while temporary free hosting of small scale creations is also possible.

The most intriguing and compelling part about the technologies chosen is their dynamics. Both Moodle and Sloodle, being open source, are actively supported by a large community of users and developers and therefore are constantly evolving and improving. Permanent feedback from software users helps tracking defects and adjusting software more and more to end users' needs, while emerging technologies are quickly embraced by developers and, when possible, integrated into the software, making the best out of it. Especially, as far as Sloodle is concerned, its constantly growing community of supporters and the fact that the release of new versions bearing brand new features increases in frequency, indicates that there is still a lot to expect and that only difficultly will this piece of software be outdated.

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