Chapter III
Multi–User Virtual Environments for Learning Meet Learning Management

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ABSTRACT

Alongside the growth of interest in Games-Based Learning, there has been a notable explosion of interest in the use of 3D graphical multi-user virtual environments (MUVE) for learning. Platforms such as Second Life® or alternatives (There™, Active Worlds, OpenCroquet, and so on) have potential for online tuition in ways quite different from those offered by traditional Web-based Virtual Learning Environments (VLE, a.k.a. Learning Management System or LMS). The Sloodle project is working to integrate Second Life with the Moodle VLE – and to investigate how this might support learning and teaching with the Second Life platform. Second Life can be considered as a 3D client for Moodle learning activities, while a complimentary view is to consider Moodle as a back-end for Second Life learning activities – enabling virtual world learning activities integrated with Web-based class lists and grade books. The authors close by considering future directions and applications.
INTRODUCTION

The educational application of multi-user virtual environments (MUVE) is emerging as a distinct area of research, with considerable cross-over and also some notable distance from the game-based learning mainstream. Within that mainstream, the educational potential of games is often seen primarily through the ability to create simulations or scenarios for role-playing (c.f. Aldrich, 2005 or Gee, 2005).

While commonly built on the same basic technologies as multi-player online games, MUVE are not necessarily games as such – often lacking in the types of rules and systems governing progress and success that are a defining feature of most digital games (Björk & Holopainen, 2004). Platforms such as There, Active Worlds or Second Life are all primarily social worlds, virtual places for people to meet and interact. Interactions may be playful, but the virtual worlds themselves are not games per se, although they may contain any number of games. Two people meeting in Second Life may simply chat, race vehicles, engage in some combat or role-playing oriented game – but without progress in ‘Second Life’ being linked to success in these endeavours in any meaningful way.

In providing the means for user-generated content while removing the pre-determined game elements from virtual worlds it becomes possible to use the environments in a wide range of different ways to support different pedagogical approaches and different curricula (c.f. Livingstone & Kemp, 2007). It is possible to develop detailed simulations or role-play scenarios (similar perhaps to those found in traditional games-based learning), to simply use the 3D world as a space for online discussions within an immersive setting or to use the virtual worlds as constructionist (Papert & Harel, 1991) virtual learning environments – where the students are tasked with creating the content, possibly to teach others about their chosen subject.

Challenges for future educators as these technologies become more commonplace in the classroom (or in some cases, instead of the classroom) will include how to support learners in general purpose 3D learning environments and how to integrate class management and assessments from 3D spaces with other web and intranet based systems for learning support and management. Experience has shown that learning can be hindered in exploratory learning environments, including the likes of Second Life, which do not provide effective guidance to students (Nelson, 2007). Reuse of existing educational materials will also be important, as not all educators can be expected to be skilled developers of 3D educational content.

In the following section we present a brief review of teaching and learning with learning management systems (LMS) and in online multi-user virtual environments (MUVE). From this we look in more detail at the requirements for enhanced support for teaching and learning in MUVEs. We will then introduce Sloodle – a system that seeks to provide this support for Second Life through the integration of Moodle, an open source LMS. A detailed case-study is then presented before we close with a discussion on how the ideas presented here may apply to other projects using game-technologies to facilitate learning and to outline future plans for Sloodle.

BACKGROUND

Learning and Teaching with Learning Management Systems

Learning management systems (LMS), also known as Virtual Learning Environments (VLE) are now commonplace across the education sector from Universities down to secondary schools (12-16) and even in the primary sector (5-12). LMS, whether proprietary (Blackboard, WebCT, Desire2Learn, AngelLMS, etc.), open-source
(Moodle, Sakai, Claroline) or developed ‘in-house’
tend to include a number of common features for
facilitating and supporting e-learning – although
the precise feature set can and does vary (Cook,
1999, Dougiamas & Taylor, 2003, Kemp & Liv-
ingstone, 2006, Yueh & Hsu, 2008):

- Document sharing (e.g. for online distribu-
tion of lecture notes)
- Assignment uploading
- Online assessment (for formative and sum-
mative assessment, multiple choice quizzes,
true/false, and free text)
- Online gradebooks
- Forums for asynchronous discussion
- Chatroom/online classroom for synchronous
web-based text-based discussions (Figure 1)
- Integration with institutional registry infor-
mation systems

Additionally, many LMS also support the de-
velopment of plug-ins and extensions – allowing
additional features to be added by the developers
or by third parties. These can include the likes of
video conferencing, wikis, or modified forums
for audio discussions using MP3 files (see case
study, below).

In practice, the actual use of LMS often makes
limited use of the more effective co-operative,
collaborative and learning technologies. Often
LMS are used primarily as simple document
repositories to allow online distributed access
to course notes, coursework submission and as
an electronic gradebook, the findings of Yeuh
& Hsu (2008) being fairly typical in this regard.
Downing et. al. (2007) present a case-study
which demonstrates some of the additional steps
required to foster use of an LMS beyond the rather
minimal norm.

Thus, while the tools are there to support and
promote discussion and collaboration, it seems
that these are generally the least commonly used
tools within a LMS.

Teaching and Learning in Virtual
Worlds

Launched in 1995, and still in use today, Active
Worlds is an extensible virtual world platform that
allows users to create their own worlds (subject to

Figure 1. The Blackboard virtual classroom for synchronous online meetings provides support for text
‘chat’ and an interactive whiteboard drawing area
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purchasing the resources required) and to enable links to other virtual worlds built using the same platform. While the 3D environment is noticeably dated, it is used to underpin two notable pioneering projects using virtual worlds for education – River City (Dede, Nelson, Ketelhut & Bowman, 2004) and Quest Atlantis (Barab, Thomas, Dodge, Carteaux & Tuzun, 2005).

Active Worlds features a fairly traditional looking Windows user-interface, with different elements of content presented in different panes. A central pane shows the 3D world itself, below this is a chat window and to the right a web-browser pane that can be used to view web-pages using the built in web-browser (Figure 2).

Both River City and Quest Atlantis present visitors with custom-built virtual worlds with immersive scenarios where students work to solve a range of problems. The approach used here is to embed elements of curriculum and problem-based learning tasks into an immersive environment. While for many students, the game-like scenarios promote engagement with the material, in some cases it appears that the game-like nature of the environment may distract from the serious learning goals, though this might have much to do with issues relating to the acceptance of games as a suitable medium for instruction (Lim, Nonis & Hedberg, 2006).

While the platform itself is open and modifiable, without learning specific content, both of these projects use this openness to create custom environments. Prepared encounters and carefully written narratives are employed to help students achieve particular learning objectives. More generally, it is possible to consider the learning affordances that a platform such as that which Active Worlds provides without reference to instructor generated content (Dickey 2003, Dickey 2005). 3D worlds provide spaces that more effectively support “situated and embodied” (Dickey 2005) learning, effective in presenting opportunities for experiential learning. Communication features (such as text-based chat and instant messaging) support collaborative and social constructivist learning, although limited asynchronous messaging support is an issue here.

But the affordances of the 3D virtual spaces themselves might not be sufficient to promote and support effective curriculum based learn-

Figure 2. Active Worlds uses a familiar Windows user-interface with separate panels for the 3D world, for typed ‘chat’ and for displaying web-pages using the built in browser.
The web-browser integrated into the Active Worlds client is used to provide additional support and guidance to students in both River City and Quest Atlantis, with customised web-sites tied in closely to the activities to be undertaken in the 3D space. Nelson (2007) provides further detail of the addition of a tool for reflective-guidance in the River City project, and reports that increased use of the individualized and reflective guidance correlated with gains in test scores. Noting the relatively low uptake and use of the guidance system, Nelson includes in his conclusions a note that “future designers may benefit from more closely integrating the guidance system into the 3-D environment” (Nelson 2007, p.95).

Second Life, publicly released in 2003, is an alternative MUVE. Second Life is graphically much more advanced, with correspondingly higher hardware and networking requirements – but extends to all users the ability to create custom content from avatars to furniture, buildings, vehicles and all manner of scripted and interactive elements (Rymaszewski et. al., 2007). A large and active education community has grown around Second Life, and a range of applications and approaches to using the 3D environment to support learning have emerged. Broadly speaking, these tend to fall into the following categories – though individual classes may involve activities from more than one category:

- **Constructionist.** Students may be charged with creating content to educate others about a topic (Papert & Harel, 1991). While identified by the authors as an example of Experiential Learning, the activities described in Mason & Moutahir (2006) clearly has a notable constructionist component.

- **Facilitating synchronous discussion.** A basic use of the platform is for synchronous discussion for distance or blended learning. A 3D world provides a richer degree of presence than a text only web-based chatroom (Becker & Mark 2002), and so may be more engaging a space to conduct chats.

- **Role-play.** A number of educational and entertainment based role-play sites exist within Second Life. For example, Renaissance Island in Second Life provides a ‘living museum’ where visitors can learn through play and interaction about life, music and culture in Elizabethan England (Bell et. al., 2008). Role-play can also be combined with facilitated discussion – Robbins (2007) outlines how the freedom to change one’s appearance in a virtual world was used to set-up a number of role-play activities (changing gender, body shape or form, etc.) that then fed productively into facilitated debates in a rhetoric class.

- **Visualisation.** The modelling and scripting capabilities allow the creation of static, interactive and automatically updating three-dimensional models representing a range of scientific data. Notable current examples in Second Life include a range of 3D real-time weather models, molecular structures large enough to hold meetings inside them and a giant fly-through model of the insides of the testes with a running commentary. Such models allow students to experience systems from inside, one of the potential benefits of game-based learning identified by Gee (2006).

- **Simulation.** Interactive activities can be built where individual users or groups of users can complete activities that simulate real world tasks, or offer a chance to experience situations otherwise difficult to simulate in a classroom. For example, Virtual Hallucination offers visitors the rare opportunity to experience schizophrenic episodes as reported by schizophrenic sufferers – a chance to learn more about an oft misunderstood illness (Yellowlees & Cook, 2006).

- **Simulated real-world practice.** Shaffer (2006) describes how game-based learning can provide epistemic frames – allowing real-world practices to be developed inside computer supported games. In the multi-user
environment of Second Life it is possible for this practice to extend from being simulated practice to real practice – albeit within a simulated environment. So, for example, students can learn about conducting field research in an environment with considerably fewer physical risks than those present in the real world (Foster, 2007), practice film-making without the need for cranes to enable difficult shots or time-consuming health & safety assessment processes (Robinson, 2007) or design fashion in an environment where new clothing designs are sought after (Polvinen, 2007).

In contrast to this wide range of examples of the use of Second Life with different subjects and different pedagogical approaches, there is currently a lack of clear empirical evidence regarding the effectiveness of Second Life as a tool for learning. Yellowlees & Cook (2006) surveyed visitors to their virtual installation, finding that over 70% of respondents thought that it improved their understanding of schizophrenic hallucinations. There was, however, no comparative study group with alternative technology to compare against. Weusijana et al. (2007) use a lab based approach to evaluate whether a virtual world, such as Second Life, can be used to teach adaptive expertise – with evidence from lab based trials indicating that this seems to be the case. This work is currently being extended to include comparisons against a traditional classroom control condition.

Twining (2007) reports on a pilot group of school-children using Teen Second Life as part of an out-of-school programme, and while benefits for individual students are reported, the overall conclusions are merely that Teen Second Life has strong educational potential, but that further study is required. Similarly inconclusive, but indicative of strong potential and interest, have been a series of “snapshot” reports on Higher Education activity with Second Life in the UK, the latest published in May 2008 (Kirriemuir, 2008).

While this does not conclude on the effectiveness of Second Life for learning, the responses listed do highlight some of the positive and negative aspects of using Second Life for teaching – and reveal that there is some considerable amount of ongoing evaluation work.

This list provided earlier is not intended to be exhaustive, but gives some idea of the breadth of form that education can take in Second Life. Given such a wide variety of educational approaches, how can effective support for teachers and learners be provided?

**Supporting Learning and Teaching in Second Life**

The web-based guidance and support systems found in River City and Quest Atlantis are highly specialised and are developed to work closely with those specific projects. From the listed examples above, it is clear that web-based learning support for Second Life is unlikely to meet the needs of the varied teaching and learning approaches unless it offers a high degree of flexibility – in providing freedom to instructors in choosing which tools suit their needs from a larger set and in providing freedom to use those tools in a way that works well with the preferred teaching style of instructors and preferred learning styles of the students.

A useful first question might be to ask ‘what are the support needs for students taking, and instructors teaching, classes using Second Life?’.

One challenge facing educators is the open-ended goal-less nature of Second Life itself. While leveraging this provides a long list of ways in which Second Life can be used, it is also a problem for instructors and learners – which can, and does, result in a lot of lost time spent aimlessly wandering around the 3D space unsure of what to do (New Media Consortium, 2007).

Second Life is also used to support different modes of instruction – from being a lab based activity in a face-to-face class taught largely in
a traditional setting to use in a purely distance learning based class or in a ‘blended learning’ setting that uses some mix of both of these.

Existing support for a range of teaching and learning activities exists in the form of a wide range of specialised tools and objects, including:

- **‘Whiteboards’**, for displaying images or slideshows to other users inside the environment. Can be used asynchronously for self-directed learning or as a presentation tool. Other presentation tools include RSS displays, which can be used to present feeds of course related information inside Second Life. Video streams and (with limited functionality) web-pages can also be rendered onto surfaces in the 3D environment.

- **Quiz tools**. Several of these are available. An instructor might scatter a number of quiz objects through a 3D space, each of which contains one or more questions. Setting up quizzes and reviewing results (for formative or summative assessment) may need to be done through Second Life itself.

- **Turn-taking tools**. Discussions are normally free-flowing with typed ‘chats’ in particular prone to interruption. In some settings users may wish to be able to support more formal turn-taking, and some tools exist that track turn taking in discussion. While unable to prevent interruptions, these can remind participants to help enforce this.

- **Chat-loggers**. Settings in the Second Life client can enable the saving of chat and users can also cut-and-paste their chat history into text editors. However, the Second Life terms of service prohibit recording chat without permission and chat-loggers that request this permission before recording chat (which can then be emailed to the owner) are available.

- **Blogging and communications support**. A range of communications tools are available that integrate with external web-applications. For the most part these are specific to particular applications and uses. These might enable a user’s online status to be seen on their homepage or allow blog-posts to be authored from within Second Life.

- **3D display management**. One useful category of tool, without an obvious analogue, is a 3D content display management tool – often referred to as a ‘Holodeck’ or similar. Named after the Star Trek device, these tools allow the 3D content of an area to be reconfigured or changed entirely with a single click. An educational use of this might be to allow an area to support a range of different role-play scenarios, changing the content to suit any of a large number of scenarios as and when required.

- **Visitor tracking tools**. A number of companies provide support for user tracking and freeware solutions are also available. These can potentially be used to support attendance registers, although manual transfer of data to the register will be required.

These examples describe just a handful of the various tools available. These have been developed by many different creators, and are rarely integrated with each other to any extent. It is difficult to even provide a single authoritative reference for the range of tools available, but The New Media Consortium organise “Teachers’ Buzz” events that regularly present new tools (http://www.nmc.org/sl) and a range of tools have been collected at Ross Perkin’s virtual ICT Library (http://ictlibrary.googlepages.com/).

**SLOODLE: SECOND LIFE MEETS MOODLE**

Many of the original concepts for Sloodle were focussed on providing a direct analogue of a Moodle course to be realised in 3D inside Sec-
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ond Life (Kemp & Livingstone, 2006). Much as a Moodle course provides a ‘home’ for a course on the web, a Sloodle classroom would provide the same in Second Life – furnished by a suite of 3D tools and features based on the Moodle course page itself.

However, in recognition of the wide range of ways in which Second Life is used in an educational setting, development has focussed instead on providing a suite of tools that can be used singly or together – some ‘owned’ by the instructor of a class, some by the students.

The approach of the Sloodle project is then to provide tools that can be used by instructors and students in a manner that suits their own learning and teaching styles and goals. Deciding which tools to implement was initially driven by expert analysis and by focussing on tools which could be created easily. Since then, development has been community led with two feature request surveys helping to shape the ongoing development of tools and new features (Livingstone & Kemp, in press).

Tools currently available and prototyped include:

- **Web-Intercom.** This tool mirrors typed chat between Second Life and a Moodle chat-room, allowing synchronous text-chat between users logged into Moodle and users logged into Second Life. This can be used to improve accessibility to Second Life discussions and also allows chats in Second Life to be recorded in the Moodle chat-room database. Thus the intercom also acts as a chat-logger (see above), but with the added functionality of providing password protected access to the log to students and staff registered on the appropriate course. Avatar chat is recorded with both the user’s Moodle and Second Life user names where the avatar is linked to a Moodle account.

- **Registration and enrolment tools.** A number of different tools have been developed to allow avatar registration and enrolment. Registration links a Second Life avatar to a Moodle user account (requiring the user to login to authenticate the link). Enrolment tools allow avatar interactions in the 3D world to automatically enrol the associated Moodle account onto a particular Moodle course. Registration and enrolment has also been used to support the development of prototype access control tools – such as a door that only opens for avatars enrolled on the corresponding course.

  - **Object distribution.** Tools have been created which allow instructors to place collected objects into a distributor inside Second Life. Users can then obtain the items for their own avatars by interacting with the object in Second Life or by choosing objects from a web-based form in Moodle.

  - **Blogging tool.** The Moodle LMS provides all users with a personal blog space accessible through their profile (or from a blogging ‘block’ on a course page). A Second Life ‘HUD’ toolbar allows users to write reflective blogs from within the 3D environment. Posts are automatically tagged with a link to the virtual location from where the entry was submitted.

  - **Avilister.** The Avatar listing tool scans the other avatars near the user and checks whether they are registered on Moodle. The Moodle user names are then listed for the Avilister user to see. This tool is combined with the blogging tool, along with a set of ‘classroom gestures’ animations in a single toolbar.

  - **Choice tool.** The Moodle choice activity provides a single question with a number of answers to choose from – and is often used to support activities such as class votes on a single issue. Sloodle Choice allows users to vote in either Moodle or in Second Life, with a 3D representation of the votes visible in Second Life to complement the graphic viewable on the web.
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- **PrimDrop.** Many classes using Second Life ask for students to create 3D content for assessment. The PrimDrop allows students to submit these inside Second Life, checks that permissions are set to allow the instructor to amend the submission, and records the submission details on the web-site.

Some of these tools replicate some features available in other tools that can be found in Second Life. These other third party tools are generally not integrated with each other (or necessarily with anything else) and can thus leave instructors with the challenge of collecting a range of tools from different producers with no clear central repository. Tools are also commonly not free – while costs are generally very low, the total cost may rise if copies are required for students. More significantly, tools are generally not provided with access to the source-code, limiting the ability of future users to customise or adapt the tools.

Future tools will continue to be developed with openness and flexibility as a key feature. We believe that educators working in Second Life have, and will continue to have, different approaches to teaching and learning. Supporting these creates a challenge – one size does not fit all. Thus tools need to be flexible, giving freedom to instructors and students to choose which tools to deploy and how to deploy them. As instructors work more regularly with virtual worlds, and work with larger classes, we believe that there will be an increased need for integration with web-based and other online applications for a range of class management activities – attendance monitoring, assessment collection, gradebook updating, and so on. But for student acceptance, vital to the success of Sloodle, tools also need to provide tangible benefits to students themselves.

In a later section we present a case-study highlighting just some of these benefits – before which we have a more detailed look into the architecture of Sloodle.

## Sloodle Architecture

From a high-level perspective, a large part of what Sloodle does is to simply act as a means of data exchange between two otherwise independent systems, as illustrated in Figure 3.

The way in which this exchange occurs is entirely dependent on the capabilities of the systems involved. In this case, Moodle operates as several PHP scripts residing on a webserver, with a supporting database. Access to a Moodle website by a user is usually accomplished via an HTTP connection, using a web-browser. On the server, the database is queried, the given web-page is structured by the PHP pre-processor, and it is formatted using HTML. Subsequently, on the client, the pages are rendered for human reading. The transmission of data to Moodle is typically achieved using web-forms – the user enters data into fields, and their web-browser transmits it back to Moodle via HTTP parameters (Cole & Foster, 2005).

The Linden Scripting Language (LSL) allows objects in Second Life to communicate with external systems in several ways. Sloodle primarily uses raw HTTP, although XML-RPC (XML Remote Procedure Calling, which occurs as a formatted layer above HTTP) provides additional elements.

*Figure 3. Sloodle as a data-exchange between Moodle and Second Life*
of security and flexibility for certain tasks, such as negotiating secure sessions.

In Second Life, scripts can be added to any object – and individual objects can contain multiple scripts. In practice, a single Second Life server may be supporting several thousand scripts as well as processing user data and physics data for moving objects. With these constraints, LSL presents very limited processing time and memory availability, and consequently imposes limits on the quantity of information that may be handled using its communications functionality. With these limitations, the HTML formatting in Moodle pages that might be received by an LSL script would not only be surplus to requirements – typically the script might require only a small amount of data, not a complete HTML page – but might be more than the script can actually process or filter. The data exchanges must therefore be focussed and structured.

This necessitates the use of additional PHP scripts that directly access the Moodle functions and database, extracting only that data which is necessary, and returning it in a strict format. The LSL scripts in Second Life interact with these scripts, instead of directly with Moodle and have been termed ‘linker scripts’, as illustrated in Figure 4.

With this structure, Sloodle begins to act as an integral part of Moodle – in this case, as a Moodle plug-in ‘activity module’. A similar architecture could be used with other LMS or content management systems, providing that reasonable access to the underlying data can be achieved – whether through scripts with direct access to a shared database or via an API.

Using the current Sloodle WebIntercom tool as an example, Figure 5 shows the complete data exchange between Second Life and Moodle as it is currently implemented. The exchange occurs in both directions, entirely via Sloodle linker scripts. By establishing portable conventions for the HTTP communication between Second Life and Sloodle, and creating a generic interface for Sloodle communications with the VLE, the same structure can be applied in many platforms.

Case Studies

Two example case studies based at the Korea Advanced Institute of Science and Technology are presented here to illustrate the successful use of Sloodle to support the use of Second Life in English language classes. In contrast, some brief notes from a third class are also presented to illustrate a less successful attempt to integrate Sloodle into a class using Second Life.

Dubai-Korea Virtual Cultural Exchange

Sloodle tools were used to facilitate the Dubai-Korea Virtual Cultural Exchange program in the spring of 2008. Chris Surridge at the Korea Advanced Institute of Science and Technology (KAIST) and Nicole Shammas at Dubai Women’s College (DWC), designed and deployed a seven-week course wherein students from both sides would experience a motivated, meaningful com-

Figure 4. Sloodle scripts residing on a Moodle server act to provide focussed structured data exchanges between Second Life and Moodle
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Figure 5. Data exchange for the Sloodle WebIntercom. Users can participate in text-based ‘chats’ from either Second Life or the web-based Moodle chatroom.

The students involved at both institutions were learning English as a second language – and English was to be the language used in all exchange activities.

Students were taking the class to improve their English skills and the cultural exchange (including meeting in Second Life) provided a high-level of engagement and motivation. Aware of the challenges facing new users in Second Life, a key goal from the outset was to prepare students for communicative interaction in the Second Life environment. Specifically, the program was designed to equip the participating students with the skills required to communicate at a distance with their partner school. The technological tools being used included a Moodle VLE, an audio recording web application, a video conferencing client, video recording and editing tools, as well as Second Life and Sloodle. All of these mechanisms were presented and interacted with under supervision in an internet-ready PC lab. Ultimately, it was hoped that the students would begin making spontaneous contact with their partner school using any or all of the available tools.

Prior to being introduced via Second Life, the students were first prepared for contact through a Moodle audio-forum exercise. The students on each side were divided into teams, with each team composing, recording and posting relevant questions for their partner team to answer. The result was a rapid, asynchronous voice conversation that stretched over several weeks.

This laid the groundwork for meaningful, personalized interactions, as the students were tasked to not only ask relevant questions, but to respond with answers that were personal and genuine. In addition, the pronunciation differences between the sides also required the development of tools for repairing and maintaining communication. These skills of planned interaction, topic selection, response consideration and communication maintenance were intentionally built into the interaction to prepare for a more fruitful interaction once the students reached Second Life.

The next stage in the interaction involved an exercise whereby students on each side collected small representative objects for ‘culture capsules’. The capsules were then sent to the partner school. A video web conference was used to broadcast the opening of the capsules in a live environment. After several weeks of voice interaction, the students were finally able to see and hear each other. As the objects were taken from the culture capsules, the students asked and answered questions about the contents and their relevance.
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This interaction solidified the personal nature of the program and provided a gift-giving exercise that created trust and friendship between the sides. These elements, in turn, increased the relevance of future interactions and provided common bonds as well as fresh questions between the sides. This would be an enormous benefit once the students connected in Second Life.

A final step was an ongoing video exchange between the teams on each side. Students were tasked to explain some aspect of their campus life via a short video clip. The videos served to provide the students with creative licence to describe their lives on their own terms using the technology of digital video cameras and editing software. In addition, their success with the videos increased their self confidence regarding using this form of technology. The videos were unsupervised and were left completely up to the students. This independence would also be a useful quality once they met in Second Life.

The first in-world meeting in Second Life employed several of the core Sloodle tools: the Access Checker, the Object Distributor, and the Web Intercom. The Access Checker was set up on the DWC virtual campus in Second Life, and students were instructed to register their avatars to connect their Second Life accounts with their Moodle accounts. Given the simplicity of this task – one merely guides the avatar through a semi-transparent ring while logged in to Moodle – along with the students’ exposure to various forms of technology earlier in the program, the results were predictably positive.

The authorization process also meant that students could access the Sloodle Object Distributor on the VLE. The distributor was stocked with free clothing, appearance modifications and accessories. Through the distributor, participants were able to quickly and efficiently distribute objects to themselves and to others, thus reducing the time usually required for finding such things on their own.

The students were then directed to one of several Web Intercom cubes to log their chat. This process is also very simple – one touches a cube and is asked for permission to log the chat. One accepts and the chat logged to the Moodle database.

The students engaged in topical, if boisterous, interactions in Second Life, and were able to review their chat content subsequently by simply logging into Moodle, visiting the chat and clicking on “View past chat sessions.” This was particularly helpful as many of the students were able to review their chat messages and see where communication succeeded or broke down. It also provided solid review material for further interactions.

Two additional in-world meetings were planned and attended by the schools with positive results. The students were easily able to locate and activate the Web Intercoms as well as the Object Distributor.

Through this staged program, the students were gradually prepared to use the Sloodle tools to engage in meaningful and motivated communication in Second Life. The tools worked as they were designed to, and the students used their communication repair and maintenance tools to ensure that the intended interactions took place. Motivation and meaningfulness played an enormous role in the effectiveness of these tools in the English language exchange.

Learning English While Learning Second Life

In a separate but related program, students at KAIST were introduced to Second Life and Sloodle via rich-media tutorials. Early tutorials guided students via audio, images and captions, through the process of registering for a Second Life account as well as the basics in avatar management. Successive tutorials or ‘Missions’ as they were called in the program, tasked the students
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Figure 6. Virtual exchange students from Dubai and Korea meet for the first time in Second Life (top), their discussions being logged to a Moodle chat-room allowing later review and reflection.

![Image of students meeting in Second Life]

The project required students to perform actions in Second Life that required the use of blogging and photography skills.

For this program, the Sloodle Access Checker, Object Distributor and Toolbar were used to accomplish the missions. Students were required to pass through the Access Checker in order to authenticate their avatars. This authentication was required to access the Object Distributor, through which they would send themselves the Sloodle Toolbar. The toolbar would then enable them to send written data to their blogs in Moodle.

In Mission 1, students were required to teleport to a location and pass through the Access Checker. They were then informed about the process for authenticating their avatars. This first step was basic, but was an English-medium exercise that required listening, reading and reasoning skills to accomplish correctly. The mission status of the task distracted the participants’ attention away from the language-based layer of the program and toward the task.

In Mission 2, students were required to photograph their avatars, edit and post the photographs in a forum, along with brief written descriptions. Students were then tasked to read the forum posts of their classmates and rate them for quality and interest. This step again required listening and instruction-following skills, as well as the skills required to manipulate the Second Life camera, the Second Life viewport image capture, and an online photo editing program. These skills would, in turn, be required for future missions.

In Mission 3, students chose a location of their choice from the Second Life search function, visited a locale, photographed the locale and, using the Toolbar’ Blogging HUD, wrote a
brief blog describing the locale. They were then instructed to edit and add their photo to their blog in Moodle. The entire process allowed them to express some degree of free choice in their mission, while working with the Sloodle tools on a productive and relevant task in English.

The overall results from these early missions was that the students learned progressive and relevant skills in an English medium, while contributing personal information, via Sloodle tools, to the shared community of practice supported by the VLE.

**Collaborative Virtual Environments**

Sloodle was also used to support a class at the University of the West of Scotland studying Collaborative Virtual Environments. Students were primarily drawn from Computer Games Technology (a software engineering based course), multimedia and animation courses. The assessed activities in this class were based round reflective blogs (using any blogging software or service chosen by the student) and a group project that had to combine a web-site and 3D content in Second Life to promote an aspect of regional life.

The Moodle VLE was used throughout the course and the forum in particular was heavily used by the students to support and co-ordinate the group projects and meetings. The majority of students chose to maintain their blogs on Blogger.com, though some used other hosts or used their existing hosted web-server accounts to create a blog as part of their own web domain. The Sloodle tools themselves were introduced about half way through the course – after the students had familiarized themselves with Second Life and had already written a number of reflective blog entries.

By the end of the class opinions and feelings towards Second Life were mixed – ranging from statements indicating that this had been the favorite class of the year for some students to the opposite extreme. However, one thing all students had in common was very limited use of the Sloodle tools. Only one student made any significant use of the blogging feature, and other tools had much more limited use. In hindsight, some of the causes of this are obvious – in particular, the use of external blogs removes motivation for keeping a second blog on Moodle – with or without Sloodle to allow entries to be drafted in Second Life.

**Summary Evaluation**

For the classes held at KAIST, whether embedded in a larger program as the focus of the project, as in the Dubai Korea Virtual Cultural Exchange, or as tools facilitating the use of a virtual environment for task-based learning, the Sloodle tools proved invaluable. By virtue of their ability to track and log interactions from one community of practice to another, for each class the Sloodle tools created one larger, unified community.

Students were willing to use the different tools provided by Sloodle and to make repeat use of the tools without significant guidance or prompting. Students were introduced to the tools at the same time as they undertook their first practicals in Second Life and did not question their value. In a survey of student satisfaction and of how well the class had supported their learning, the overall assessment for the three classes scored 4.5 out of a possible five (where five is the best possible score). Against averages of 4.1 for the college and 4.0 for the institution as a whole, the classes were clearly well received and appreciated.

While several students at the University of the West of Scotland indicated that more documentation, exercises or demonstration time would have encouraged more use of the Sloodle tools, a small majority indicated that they would only use the tools if assessed on it. The students did see significant benefits of using a VLE alongside Second Life, though the benefits of integration had not been proven for this class.
Together, these different results indicate the importance of building authentic learning activities that genuinely benefit from using the tools – with clear differences between the classes held at the different institutions.

FUTURE RESEARCH DIRECTIONS

Beyond the immediate need to investigate data already gathered (surveys, discussions and individual video interviews with students) to add depth to the evaluation, there are a number of ways in which our research work is to be extended.

Over the coming months we will be supporting educators using Sloodle and collecting data from the educators and (where possible) their students. This is necessary to better understand whether the intended benefits are being realized, as well as to gain feedback to help with the continued development of the tools. This is also an important step forward, as to date most of the evaluation efforts have been focused on determining what features the educators think would be of use in their classes – we recognize that there is a need for feedback from students themselves on what works or does not work. We also hope to be able to collect data from educators comparing their classes in Second Life with Sloodle against other classes – either from previous or concurrent deliveries of the same course.

More innovative are our continuing efforts to prototype novel web-to-Second Life interfaces and features. This work, more exploratory in nature, allows us to consider new metaphors for how students and educators might interact in a blended 3D and web-based communicative environment. For example, we can ask how a discussion forum might be visualized in three dimensions – and how this richer visualization might be exploited to add an additional layer of understanding. The extensive collection of existing activities and modules, means that there remain many web-based activities for which there is no current three dimensional analog.

CONCLUSION

In this chapter we have seen that an open ended and user modifiable virtual world such as Second Life is flexible enough to support a wide range of types of educational activity. We also saw that teaching and learning in virtual worlds can benefit from web-based support, whether for learning support (such as the guidance system in River City) or more administrative in nature.

We then presented an overview of how Sloodle seeks to make the functionality required for support available to teachers and learners. Rather than attempt to provide an authoritative set of prescriptive tools the focus of the Sloodle project has been on providing a flexible set of tools for educators to select from and adapt as they see fit.

We then described some examples from practice which showed how two instructors did just that – selecting a subset of the available tools and prepared them for class use. While the evaluation is currently limited, we believe that the KAIST case-study provides an example of good-practice in the use of virtual worlds for language instruction. Here Second Life helped provide additional engagement and motivation. For the exchange program, Second Life was a key part of the class, but it was only one of a range of activities within the cultural exchange. Students were able to meet, play and chat virtually – Moodle and Sloodle both playing a significant and required part in supporting the interactions and reflections. With careful thought and suitable preparation before classes, Sloodle provided tools that were ready for the students to use as soon as they entered the virtual world.

However, these exemplars of how classes may be prepared and delivered using Second Life do not begin to cover the range of possible approaches to
learning and teaching in Second Life—potentially requiring functionality not currently provided for by Sloodle, or requiring tools be integrated into classes in a different way.

For now work on developing Sloodle continues hand-in-hand with working with the virtual community of educators using and exploring Second Life, who retain a vital role in helping shape Sloodle.

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