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 Contact: Daniel Livingstone
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We would also like to thank Eduserv for their previous funding of SLOODLE, and San Jose State University for the continued hosting of <http://www.sloodle.org>

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Project Summary

One area that has received little attention in the rising focus on virtual worlds in education since 2006 has been the effective use of virtual worlds with existing web-based e-learning systems. The potential pedagogical and other benefits of blending the use of these technologies has also been largely ignored. A second emerging issue is the need to be able to share and reuse virtual world eLearning materials and content. Sharing and reuse of virtual-world content that is linked to web-based materials presents a challenge that has not been explicitly addressed to date.

SLOODLE is an open source software application that explicitly aims to blend eLearning across 3D and web-based platforms, providing a range of tools to promote integration between the open source Moodle VLE and Second Life and OpenSim virtual worlds – making it possible, for example, to build immersive settings around existing VLE content, and to use the VLE to provide greater accessibility to immersive content.

This project brought together investigators and groups at four institutions which each have significant prior experience in teaching and learning in virtual worlds – and with particular experience in developing eLearning simulations and scenarios using web and 3D content in Second Life.

The teams developed and evaluated a number of learning activities blending use of both web and 3D content.

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Main Body of Report

Project Outputs and Outcomes

Output / Outcome Type (e.g. report, publication, software, knowledge built)	Brief Description and URLs (where applicable)
Final Report	This report & Annexes http://virtualworldsandvles.jiscinvolve.org/wp/
Experience, Knowledge & Expertise: VW & VLE Integration	UWS and Ulster shared previous experience integrating Second Life and Moodle with other team members. OU provided the first trial of implementing SLOODLE on a University's main production VLE environment, one with very large numbers of students in individual class cohorts. All teams built experience in teaching and learning with integrated VW & web learning environments.
Experience: Understanding of steps and processes required in developing content for reuse	Previous work by project partners in Second Life has not prioritised reuse. Within this project partners were able to package resources for reuse within Second Life and to recreate some resources for use in Second Life and/or Opensim.
Resources for educators (institutional contributions)	A range of resources for educators, derived from materials created as part of institutional contributions for the various case studies. These resources are taken from the different pilot activities and provide guidance on integrating VW and VLEs. Video Guides: http://www.youtube.com/user/sloodle
VW learning objects (institutional contributions)	Additional institutional contributions from project partners, learning objects for teaching Computer Systems / Computer Engineering. In various formats for use in OpenSim and/or Second Life, plus supporting documentation and video. This contribution consists of (a) making some previously created content in Second Life available to copy and (b) recreating some additional Second Life learning objects for use in Second Life and/or Opensim.
Dissemination	A number of conference and workshop presentations have allowed the project members to discuss their experiences and share the knowledge gained.
SLOODLE 1.2	An update to SLOODLE, merging in previous work from University of Ulster and various minor updates/fixes http://www.sloodle.org/ This builds on substantial institutional contributions.
Moodle Mayfly (OpenSim launcher)	Proof of concept trial for on-the-fly launching of OpenSim virtual worlds from Moodle, from trial work at Ulster. http://sloodle.googlecode.com/svn/branches/opensim_launcher

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How did you go about achieving your outputs / outcomes?

The four partners in this project worked together to share experience and build their expertise and understanding while working on four distinct pilots:

The Open University focused on evaluating, supporting and extending the institutional use of SLOODLE. The evaluation was planned to reflect on the readiness of VW for large scale institutional use and explore challenges and advantages of integrated VW/VLE.

The **University of Ulster** pilot looked at how VLEs can support students using 3D immersive simulations in virtual worlds, supported by VLEs, in particular with the SLOODLE Tracker. Part of this activity involved testing a proof-of-concept OpenSim 'launcher', which creates new instances of a pre-prepared OpenSim VW simulation for students when they start a Tracker activity in Moodle. Technical support for this was provided by the University of the West of Scotland. A series of early evaluations were carried out to assess the needs of educators/practitioners/managers in terms of case studies and evaluation resources. This fed directly into the creation of a range of resources for educators.

Imperial College London piloted the use of Second Life for role-plays in training medical students, exploring how VLEs could improve the student and learning experience. Technical support for this was provided by University of Ulster with some additional input from the University of the West of Scotland.

The University of the West of Scotland continued the pilot activity of the University of Ulster, extending this to look at how virtual world simulations and content may be shared and packaged to enable further sharing and reuse.

While there was significant crossover and support amongst these pilots, each will be considered briefly in turn below. Additional information on the pilots can be found in annexes to the report, and online on the project website. In a number of places, a range of issues caused delays due to which some evaluation tasks are as yet incomplete – these will be completed with institutional contributions beyond the end of the main project period and reported over the following 12 months. As we are considering four quite different pilots, only an overview is provided here. Refer to the annexes for more information.

The Open University

OU participation in this project was intended to help evaluate, support and extend institutional use of the SLOODLE Second Life/Moodle 'mashup'. The proposed pilot provided the first opportunity to study the use of SLOODLE in an active course, with tutors directly involved in the pilot and evaluation activities. This pilot also saw the first installation of SLOODLE onto a university's main production VLE. With one of the largest Moodle installations in the world, the OU was a demanding test bed for the software, which was subject to an detailed code review before installation.

SLOODLE was installed onto the OU VLE for use in two tutor groups on the level 1 course T175: Living in a Networked World.

Students in one group had opted in to Second Life tutorials replacing the standard 6 hours of face-to-face tuition on the course, and the other group was offered supplementary tuition time in Second Life. A third group, with no Second Life activity (ie the standard T175 experience) was engaged as a control group for evaluation studies.

Tutors on the two in-world groups were asked to familiarise themselves with the relevant tools and plan their support programme with specific reference to exploiting SLOODLE. The evaluation was planned to reflect on the readiness of VW for mainstream use, explore the pedagogical advantages of integrated VW/VLE and develop improved support for the reuse of learning activities in virtual worlds.

In reality the implementation of SLOODLE to integrate Second Life tutorials with VLE activity was delayed until a point that was almost prohibitively late in the course. This was caused primarily by a

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number of institutional barriers intended, very appropriately (however frustratingly), to protect students.

Fuller details are provided in Annex A, but the key issues can be summarised here:

1. Course Team (CT) Approval:

The T175 CT Chair that approved the proposed SLOODLE project changed post before the start of the October 2011 cohort, and the replacement Chair was unfamiliar with the project. The new Chair had concerns about implementing the research project without disadvantaging students. Considerable discussion was required before the pilot could continue, with a number of amendments to the original plan.

2. Student Research Projects Panel (SRPP) Approval:

Any research that involves OU students must be approved by the SRPP. Internal regulations require a high level of detail can only be compiled with complete support from all stakeholders in the research, so the delay in course team approval had a knock on effect to delay SRPP approval. The original plan to include tutors in developing the evaluation study had to be abandoned as the SRPP submission had to be assembled in parallel with ongoing CT discussions about tutor groups to prevent further delay to the SRPP submission.

Further delays were caused when the member of staff responsible for preparing the SRPP submission was victim to a burglary, losing her laptop that contained the only copies of the work in progress.

3. Learning and Teaching Systems (LTS) Support:

LTS are responsible for managing the VLE and no-one can modify any aspect of the system without a process of authority and approval that leads to them establishing appropriate technical permissions for dedicated users (in this case project officer Greg Withnail). Some delays were caused by this authority, or by LTS prioritising other activity over project requests for action that only an LTS team member could take.

The positive outcomes of these issues were that:

1. The pilot was conducted using a sound experimental design.
2. The SLOODLE software was subject to a thorough code review, and passed a rigorous approval process.

Evaluation tasks are not yet complete due to a range of delays with the project. Tutors have been interviewed and transcripts are being reviewed. The completed evaluation will include a case study resource for practitioners on the effective and practical use of virtual worlds (Second Life or similar), SLOODLE and other web-based tools for small scale tutorial groups.

Despite activity not going to plan in this stream of the project, the outcome remains positive as the OU has made considerable advance in the core focus on understanding the issues involved with evaluating, supporting and extending institutional use of the SLOODLE Second Life/Moodle 'mashup'.

The additional 12 months agreed for project dissemination activities will be used by the OU to present the final outputs of the evaluation and analysis.

Annex A contains more detail of the work conducted by The Open University.

University of Ulster

The University of Ulster Serious Games & Virtual Worlds team had prior experience in using SLOODLE to bring together Moodle and Second Life. In this project, Ulster were able to extend and develop this work, in supporting other project partners (see Imperial College London, below) in

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developing guidance materials, and in conducting additional pilot activities for further evaluation of integrated learning support across VLE and VW platforms.

Ulster had previously developed the SLOODLE Tracker – an extension to SLOODLE which allows the automatic tracking of users progression through virtual world learning scenarios in Second Life, with tracking information visible in Moodle. This allows students to monitor their own progress, and allows tutors to see the overall progress of a class. Ulster had also created a number of learning activities for use in Second Life, including a model of a computer CPU which allows simulation of the CPU instruction cycle.

In October 2010, Ulster conducted a pilot with the Tracker with a small student focus group through two activities in Second Life: the instruction cycle, and a collaborative problem solving task. This had additional support from a visiting researcher, Cathy Tombs from the Learning Innovation Group at Coventry University who assisted in this.

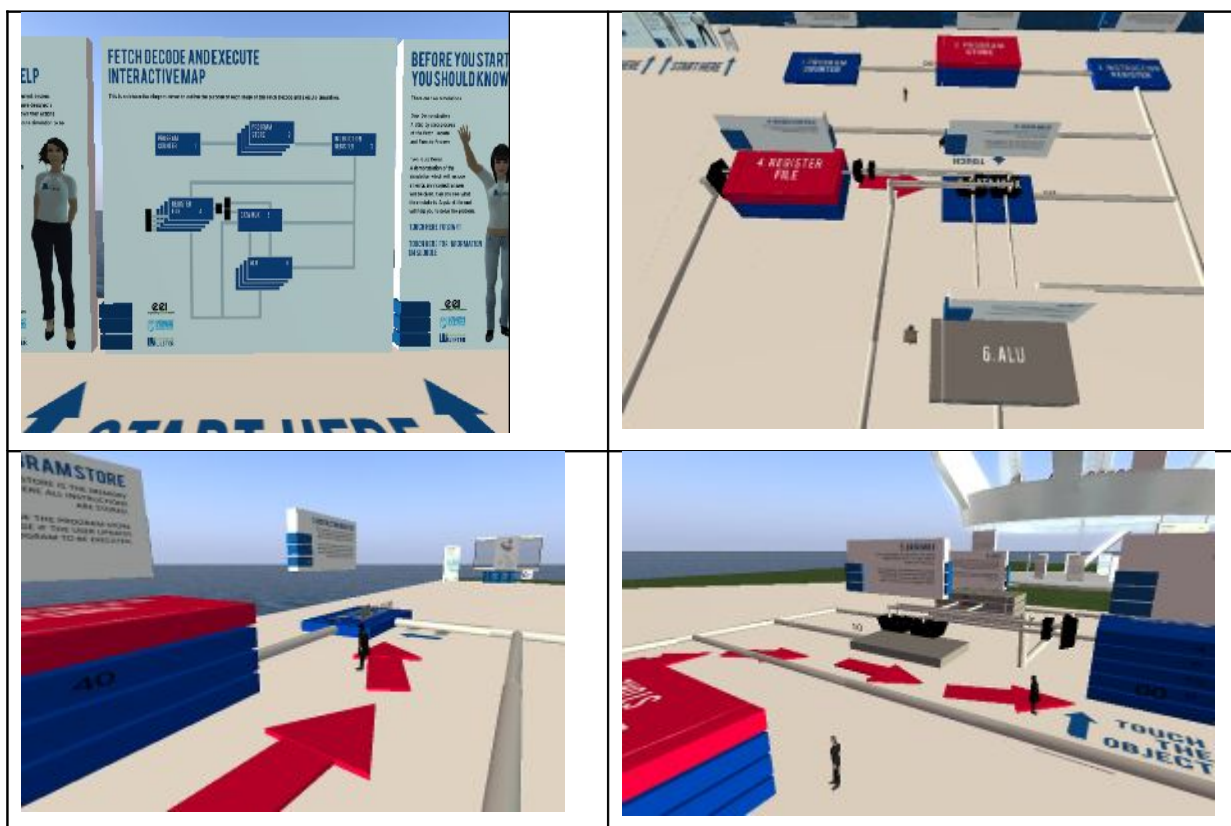


Figure 1: The Instruction Cycle simulation in Second Life. Instructions and overview (top left), View of complete simulation (top right), arrows guide users through the simulation (bottom left and right).

This evaluation process helped Ulster to assess the needs/requirements of practitioners and managers in understanding the opportunities offered by combining these technologies and the barriers to practical usage. The student feedback helped to refine both the simulation and evaluation process. The evaluation materials were shared with UWS for their related pilot activities.

Subsequently, Ulster worked closely with Imperial College London to prepare a Second Life scenario for use in the Imperial pilot. This is detailed more in Annex B and C.

In the second semester, Ulster focussed on documenting their work. A beneficial output from this is a series of case study resources which are detailed in the “Creating interactive simulations in virtual worlds integrated with virtual learning environments, Resources for practitioners and managers” document. This extensive resource will be distributed free as part of the deliverables for this project.

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Finally, a packaged version of the Instruction Cycle learning activity was prepared, and instructions for educators on how to copy this and recreate in their own areas of Second Life included in the Resources for Educators guide.

Annex B contains more detail of the work conducted by Ulster.

Imperial College London

The Faculty of Medicine at Imperial College has previously pioneered the use of game-based learning with Virtual Patients in Second Life, including the construction of a Respiratory Medicine ward in a Virtual Hospital. This research also explored the role of gender, finding a less significant gender gap than might have been expected.

In this study, Second Life enabled the simulation of a child psychiatric setting and process, for example history-taking and assessment through role-play. The advantage of role-playing in *Second Life* is that the adult clinician (the tutor) could adopt an 'adolescent avatar' and hence optimise the realism of the simulation. Although this pilot was synchronous, and hence time and resource intensive, it was a worthwhile activity as it is challenging to replicate the role playing of adolescent in the child psychiatric settings due to ethical issues.

Students meanwhile adopted the role of 'clinician avatars', whose task was to perform a child psychiatric assessment. Before the role-play, the teacher reviewed the principles of child psychiatric assessment, depression and self-harm, and debriefed and gave feedback after the role-play. Integrated survey tools were used to collect student feedback from within the virtual world, which was then visible to the tutor via the VLE. The University of Ulster supported the preparation and development work required for the role-play activity, developing interview rooms in Second Life, custom avatar development and

A fuller description of the research protocol can be found in Annex C, but is summarised below:



Figure 2: Some students observe an interview. A tutor acts as the patient, being interviewed by another group of students.

Students received 30 minutes of training in the use of Second Life, to familiarise them with the environment and controls, before starting a 90 minute class. An in-world briefing session was followed by a role play activity where adopted a 'patient avatar' and students as 'clinician avatars'. Each student was allocated a different role-play, (eg. assessing presenting complaint, psycho-social history, mental-

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state examination). Within each group, students were able to observe each other during the role-plays (see Figure 2).

Following the role-plays, and while remaining in-world, students confidentially completed reflective notes on the experience. These were visible to the tutor via the VLE, and referred to by the tutor during the subsequent in-world debriefing session.

The Second Life role-play was itself evaluated using pre-session and post-session questionnaires and discussion involving all ten participants as a nominal group. A final interview with the tutors was also conducted to find out their views about teaching and learning in Virtual Worlds.

Annex C includes further detail on the context, protocol and results of the Imperial pilot.

University of the West of Scotland

During the first few months activity at UWS was largely limited to supporting the other institutions and general project management. With some crossover in course content between Ulster & UWS, the UWS pilot focused on attempting to reuse learning materials developed at Ulster to support teaching and learning on the module COMP07024: Computing Systems.

It was decided to focus on two simulations:

- **Computer Instruction Cycle simulation.** A model illustrating the communications that occur inside a computer processor as it executes a single instruction of machine code.
- **Giant PC.** A model computer which students can walk their avatars inside as they explore and learn about the hardware components in a typical modern PC.

The complexity of the first of these meant that we chose to use this resource in-situ in Second Life, on virtual land owned by Ulster. While one mode of sharing and reuse, it is obviously not ideal for all situations. (as noted above, Ulster has since produced a version of the model which can be installed on a user's own area).

The Giant PC had early issues, as there were some areas of the model that needed updating - but the original model had been produced by a student and was composed of a very large number of pieces. Editing, modifying or copying the model would have been prohibitively difficult due to issues with permissions in Second Life. A new Giant PC model was developed by current UWS students (as an institutional contribution), with reuse being addressed from the beginning. This new model is being made available in Second Life and also in a range of archive formats for uploading to Second Life and/or OpenSim - or as part of a complete OpenSim island 'OAR' package.

A questionnaire was developed based on the one used in the Ulster pilot (to allow greater comparison of results), and the two simulations piloted with a number of UWS students (drawing mainly from students studying the module COMP07024: Computing Systems)

Two test conditions were prepared - in both cases a student would be asked to complete the same activities in Second Life. The key difference between the two activities was in the degree of information provided in the VLE as guidance before they entered the virtual world. Ethical approval was awarded for a large study, of which the JISC pilot forms only the preliminary part - which will allow the experiment to be refined and extended.

Due to the nature of the instruction cycle model, only one student is able to complete that experiment at a time. As a result the trial was conducted with pairs of students - one doing each simulation, then swapping over. The post trial questionnaire was supplemented with data collected automatically in Second Life (using the SLOODLE Tracker) and from their responses to formative assessment questions linked to each simulation (using the SLOODLE Quiz tool). Supplementary data was collected through observation of students as they took part in the trial. During the pilot period, a small number of students took part in the trial (n = 10), but approval has been awarded for a larger study which will continue over the following academic year.

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Based on the experience with the pilot group which reported positive response to the use of the virtual world content, and which allowed us to test the use of the SLOODLE Tracker, the team at UWS have been encouraged to continue this work, to further embed the use of virtual world scenarios in COMP07024. The experience with reusing and porting content to Opensim will prove valuable, as UWS have reduced their presence in Second Life since the end of the pilot, and will be primarily using Opensim or other open platforms in the foreseeable future.

Annex D provides further detail on the UWS pilot.

What did you learn?

With four pilots at different institutions there were a number of lessons learnt. These range from some very positive findings to increased awareness of issues that subsequent work should be aware of.

Key Findings

- SLOODLE is sufficiently robust and reliable to allow for installation on large production Moodle systems. While some of the participants had been using SLOODLE over a period of several years, this had been on small custom installations of Moodle, supporting relatively small numbers of students. For the OU pilot, SLOODLE was installed on the OU Moodle, in a course that had many hundreds of enrolled students. (Annex A)
- Tutor acceptance as a key challenge for embedding novel, innovative and non-standard technologies in educational practice. Environments such as Second Life are often adopted by enthusiasts, but are likely to be dropped when teaching teams change. This was highlighted by the OU pilot, where an incoming course-leader was reluctant to use SLOODLE within the T175 course. (Annex A)
- Institutional barriers for the large scale adoption of virtual worlds remain significant. Additionally, the limited support for large numbers of simultaneous users (in Second Life and Opensim) is problematic for running classes with large student numbers. (Annex A)
- Virtual worlds remain a fringe technology in current educational practice, and continue to face challenges for wider adoption. While virtual worlds have been increasingly used in HE over recent years, the Imperial pilot brought out experiences from tutors who had no previous experience with Second Life. While the results of this pilot were positive, it seems that a number of challenges remain before the technology could be part of everyday practice. As supported in other studies (For example, Dickey, 2005, Childress & Braswell, 2006), potential use for distance learning was identified as a possible particular strength. (Annex A, C)
- VW/VLE integration with SLOODLE enabled prompt feedback during synchronous role-play sessions. (Annex C)
- Focus on technology can detract from learning. Using un-familiar technology can present challenges that take focus away from the subject and may have a negative impact on learning. (Annex C)
- Replicating non-verbal communication is important for some role-play activities (e.g. psychiatric assessment), but is difficult and poorly supported in Second Life (and by extension Opensim). Other graphical virtual worlds most likely perform similarly, but this is an issue that would benefit from further exploration. (Annex C)
- There are a number of areas to look at in terms of future research and funding applications. Having a separate webpage client and virtual world client can confuse some users. A browser based plugin accessing the virtual environment would be worth exploring. In addition the use of dynamically generated regions e.g. Mayfly project would be a possible solution to scalability issues in virtual worlds allowing regions could be generated on demand. (Annex B)
- Current virtual world technologies provide variable support for the sharing and reuse of learning objects or other content created in or for these virtual worlds. Sharing and reuse

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need to be considered when developing new content. When this is not done, reuse may then prove to be impossible or impractical. (Annex B & D)

Minor Issues and Findings

- It is possible to provide strong guidance in a web-page for students about to undertake an activity, but difficult to force them to read it. In-world activities should be designed to be as self-explanatory as possible, and web-based guidance should be carefully structured.
- To be able to share and reuse learning resources in Second Life, reuse should be a key consideration during the initial development of the resource.
- Linden Lab provide *two* SLurl services. The new one of these is at maps.secondlife.com, and generates confusing web-pages that are likely to confuse. The older slurl.com service should be used instead wherever possible.
- Moodle itself includes some features which can be used to support research. The groups feature of Moodle can be used to create multiple versions of resources. Combined with the use of enrolment keys which automatically assign users to specific groups, this makes it easy to place online participants in research into different condition groups. This feature of Moodle had not previously been considered for its value in conducting research evaluations, but clearly has strong potential.

Other Lessons

- For Daniel Livingstone in particular, this project has involved something of a steep learning curve. Early in the project, some specific risks were identified and very successfully addressed – balanced by the discovery that other parts of the project that had not been identified as risks proved to be more challenging than expected.

Immediate Impact

With a project of just 12 months, and with dissemination activity continuing, there is relatively limited immediate impact for the wider academic community, but there is some. SLOODLE 1.2 has been formally released, and is available for download. As with previous versions of SLOODLE, this is likely to be adopted by a number of educators, researchers and research students around the world and used with a range of classes and test groups. The key modification has been to include the Tracker system (previously independently developed by Ulster) into SLOODLE.

UWS has already closed its main island in Second Life. A small presence in Second Life will be maintained, but the University will be moving most virtual world activity to Opensim, and work has started on preparing an Opensim world for the university. The archive of materials for use in OpenSim is significant as that will be the main virtual world platform for UWS for the foreseeable future. The experience of porting simulations to OpenSim will allow continued use of these into subsequent academic years. UWS are planning to continue the use of virtual worlds, and the lessons used in the pilot this year will be made available to all students taking COMP07024 in the next academic year. Ulster will be making a similar transition over the next year or so and will concentrate on Opensim as a future platform for development due to cost, scalability and flexibility issues. The experience of UWS in exporting content to Opensim will prove useful as Ulster embark on their move to the open source platform.

The Open University is scaling back activity in Second Life, which has been primarily exploratory, as shrinking budgets are forcing an institutional focus into established resources for mainstream course support. The proposed inclusion of Second Life activity into a flagship level 1 ICT course (TU100: My Digital Life <http://www3.open.ac.uk/study/undergraduate/course/tu100.htm>) has been halted due to the inability of the platform to support the significant anticipated student numbers over a concentrated period of time. However the project is referenced in a weeks worth of virtual world learning in this course (with projected numbers of 6000 students annually) and there is a video interview with Daniel

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Livingstone describing SLOODLE. Research activity will continue in virtual worlds, particularly exploring Opensim, and if higher concurrent visitor numbers become feasible then learning from the project will be put into direct practice with implement of SLOODLE for TU100.

Within The Open University the experience gained in ratifying and implementing SLOODLE on a pilot project will provide solid evidence for future discussions about implementation of virtual world activity and how this can be made accessible – we have proof that it can be done within the OU system. There is minimum impact beyond the institution at this time due to the timing of the project and evaluation against the OU academic year (which for T175 ended in July) but we certainly anticipate sharing our experience, findings and understanding and hope that this will be of benefit to other institutional Moodle/virtual world users.

The Open University is not yet ready for a mass roll out of virtual world activity, with or without SLOODLE. There are too many institutional road blocks and not enough resources to address them, the immersive environment does not support the numbers of students that the OU deal with, and students and staff are too uncomfortable with the whole concept of virtual worlds to be thrust into mandatory VW activity at this stage. A lot more institutional scaffolding is needed to support a programme of development which should include equal measures of research into both technical and emotional aspects of using virtual worlds. However the lack of resources noted above means that this programme is very unlikely at the current time and instead the enthusiasts will continue to make incremental steps at ground level.

Imperial College identified a number of strengths and possible roles for further use of virtual worlds in teaching – in particular for distance learning of clinical and interview skills. However, due to a number of current technological limitations, there are no immediate plans to extend this work other than to embark upon further trials – perhaps exploring alternative virtual world technologies.

Future Impact

Having identified continuing institutional issues for the large scale adoption of virtual worlds, it is challenging to project the wider future impact of this work. Second Life and Opensim are still primarily used in HE by enthusiast tutors with their own classes. With a new release of SLOODLE and the experience in installing the software on the OU production system, we hope that other institutions will have greater confidence in installing and using the software. The video guides and other materials provided by Ulster should help support this, and prove helpful not just to IT departments but to the enthusiast tutors who are currently driving the use of virtual worlds in HE.

Our experience in sharing and reusing virtual world content will hopefully inform others and lead to greater awareness of the issues involved – it will be increasingly important and valuable for educators to be able to share and reuse virtual world learning objects to avoid redundant efforts. As the sector becomes increasingly cost conscious, this will only become more important. Wider sharing and reuse of virtual world content can potentially have a large impact, benefiting tutors preparing lessons in virtual worlds and reducing costs to institutions.

Our work with the Tracker and Quiz tools in Second Life/Opensim will hopefully support more educators in building in more formative and summative assessment into their virtual world classes. This should reduce the time required by tutors to develop assessments, and benefit students by providing more opportunities for formative assessment.

Dissemination activities for the project are due to continue over the next 12 months, during which time our experiences, evaluations and findings will be presented to education technology, engineering education and medical education audiences, and allow the project to maximise its potential impact.

The impact of this work will be partially tracked by the automatic tracking of video views and resource downloads. Citation counts will provide additional input, as will activity on the user forums at SLOODLE.org

Conclusions

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General Conclusions

Across the range of pilots, students have generally responded enthusiastically to virtual world based learning activities – whether individual or group simulations, tutor groups or role-play. This provides some support to prior claims on the uses of virtual worlds for learning and teaching.

As specifically regards the integration of VW and VLE, integration with VLE does not require the use of specific software, but can be as simple as providing adequate scaffolding and guidance on VLE for VW activities – but students do not always read instructions. Thus it remains important to use signage or other guidance within the virtual world itself: design not just of the learning tasks but of the surroundings can be very important for self-guided use of simulations as it is easy to get lost in a 3D environment such as SL.

Conclusions for Wider Community

SLOODLE has now been tested on one of the very largest production Moodle environments in the world. From this, and the close code review by core Moodle developers that preceded this, we have greatly increased confidence in the reliability, security and performance of the SLOODLE software.

Yet the OU experience offers a conclusion that the institutional reviews necessary in order to implement anything on the VLE should not be underestimated – getting additional software added to an institutional VLE may take many months and require multiple approvals before it can proceed.

Tighter integration between VW and VLE (such as by using SLOODLE) can support enhanced formative and summative assessment, and allow tutors to more easily track student progress. It can also benefit students by allowing them more rapid feedback than might be the cases if VW and VLE activities are separated.

Recommendations

There are a number of specific recommendations that emerge from the work of the pilot:

- When developing new virtual world scenarios or content, consider reuse at the beginning and add this as a requirement: not just of the final scenario, but of the individual assets used in its creation. This will require collection of copies of assets as they are created. Consideration should be given as to how these assets might be reused if the scenario is moved to a different virtual world platform.
- Use of virtual worlds in a class benefits from significant buy in from the tuition team themselves. Virtual worlds are more likely to succeed where an instructor is able to teach the same class over subsequent years, embedding the use of the virtual world into the curriculum.
- There remain challenges in convincing institutional IT departments to install software such as SLOODLE onto production VLEs (although the OU study shows that it can be done). Tutors wishing to use SLOODLE should accordingly still be prepared to use separate Moodle installations for SLOODLE.
- SLurls provide the simplest way of linking from a web-based resource to Second Life. Where used, always use slurl.com instead of maps.secondlife.com.
- Integrating VW and VLE allow for richer interactions between the two environments, supporting tracking of student activity, formative assessment, immediate feedback, etc. But even without the rich integration offered by integrating these environments, tutors should carefully consider how they describe, detail and scaffold VW based tasks with information presented on the VLE – and be aware that students will skip detailed instructions if possible.
- Virtual worlds still suffer from a range of technical limitations. If your use is likely to benefit from rich avatar realism (body language, detailed gestures and/or expressions), then the most popular and common VW used in education (Second Life and Opensim) might not be suitable. This is still a rapidly developing field, and new platforms and technologies regularly

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emerge – as far as is practical, keep up to date with new platforms, and try to understand the key strengths and limitations of each.

Implications for the future

By exploring various routes and approaches to combining virtual world and traditional, 2D web content through the SLOODLE mashup, we have created a group of case studies that reflect on both the positives (possible use for distance learning) and negatives (institutional barriers, focus on technology over learning, limitations of current technology) of such journeys. Documenting such experience should help scaffold subsequent users to build on the positives and avoid the negatives, and to carry forward from the point where this project ends.

This field of study is still so young that the opportunities for further development and research are almost without limit - we are still in the process of laying foundations for what might be achieved through the interface of 2D web and immersive environments. Colleagues who are interested in using these tools might apply them in any discipline, or may develop the technology by venturing across different (related) platforms. New users may explore theoretical perspectives, practical and technical approaches and social issues, and/or determinants of efficacy, usability and acceptability.

There is also a need to develop practical support that combines good instructional design with good game design for creating immersive simulations and environments for educational use. Some of the practical challenges encountered in the 3D learning environments in this project may have been easily solved using ideas developed over the past 20 years of 3D game design - but there remains a rift between these and instructional design.

Creating immersive learning content in 3D settings, and having this content linked to formative and summative assessment in VLEs is still very challenging – despite the support offered by e.g. SLOODLE, there remains much work to be done to make embedding 3D learning as simple as adding a SCORM package to a VLE is currently.

Sustainability

The funded project leaves each institution strongly placed to continue development work and/or research, and to begin embedding this virtual learning platform into more mainstream teaching contexts.

- The Open University is running the final presentation of T175 and will be replacing this course with TU100: My Digital Life, which the online prospectus (<http://www3.open.ac.uk/study/undergraduate/course/tu100.htm>) describes as “your introduction to the next twenty years of computers and the internet”. SLOODLE is described within the unit on Virtual Worlds in TU100, and the Course Team are working towards a point where virtual world activity, using SLOODLE for its accessibility affordances, can be offered to all TU100 students (currently hampered by volume of students and technical restrictions on concurrency of users).
- UWS & Ulster are moving to Opensim to reduce recurring external costs, and have created resources to allow them to continue their virtual worlds work using this open source platform. Much smaller presences will be maintained in Second Life, as part of shared spaces with other educational institutions.
- Ulster continue to have all resources used available in Second Life, and some resources are now copyable. The experience from this project will help Ulster in future development work and evaluations. Ulster will complete the move to Opensim over the next academic year but will continue research in this area. The team at Ulster are currently starting a new project with colleagues from Biomedical sciences using the Opensim platform.
- While they are not ready to adopt Second Life or Opensim more widely, the team at Imperial have identified the possible role of virtual worlds for distance learning role-plays as a particular strength, and have identified specific strengths and weaknesses to focus on in future evaluations.

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Long Term Contacts and Community

SLOODLE is already established as an open source project with a user community focused around the website (www.sloodle.org) and its forums, which can be used to host and manage project output in the long term. Punctuation points for further dissemination and networking with the wider community are being identified, including a proposed sessions at Researching Learning in Immersive Virtual Environments in September 2011 (www.open.ac.uk/relive11).

A number of repositories exist for Opensim content, and resources generated as part of this project will be made available on some of these as appropriate (e.g. <http://opensimworlds.com/>)

The project site is itself hosted by JISC and will continue to host information about the project and provide links to the SLOODLE community and to locations where relevant resources may be obtained.

References

Childress, M. D., & Braswell, R. (2006). Using Massively Multiplayer Online Role-Playing Games for Online Learning. *Distance Education*, 27(2), 187-196.

Dickey, M. D. (2005). Three-dimensional virtual worlds and distance learning: two case studies of Active Worlds as a medium for distance education. *British Journal of Educational Technology*, 36(3), 439-451.

Kemp, J., & Livingstone, D. (2006). Putting A Second Life "Metaverse" Skin On Learning Management Systems. In D. Livingstone & J. Kemp (Eds.), *Proceedings of the Second Life Education Workshop at SLCC* (pp. 13-18). San Francisco.

Kemp, J. W., Livingstone, D., & Bloomfield, P. R. (2009). SLOODLE: Connecting VLE tools with emergent teaching practice in Second Life. *British Journal of Educational Technology*, 40(3), 551-555. doi:10.1111/j.1467-8535.2009.00938.x

Livingstone, D., & Kemp, J. (2008). Integrating Web-Based and 3D Learning Environments: Second Life Meets Moodle. *Upgrade: The European Journal for the Informatics Professional*, IX(3), 8-14.

Livingstone, D., Kemp, J., Edgar, E., Surrige, C., & Bloomfield, P. (2009). Multi-User Virtual Environments for Learning meet Learning Management. In T. Connolly, M. Stansfield, & L. Boyle (Eds.), *Games-Based Learning Advancements for Multi-Sensory Human Computer Interfaces: Techniques and effective practices* (pp. 34-50). Hershey, PA: Information Science Reference (IGI Global).

Rogers E.M. 'Diffusion of Innovations' The Free Press, New York, originally published in 1962, 3rd Edition 1983

Websites

<http://virtualworldsandvles.jiscinvolve.org/wp/> - Project blog

<http://www.sloodle.org/> - Homepage of the SLOODLE project

<http://www.youtube.com/user/sloodle/> - SLOODLE videos, including several produced by Ulster demonstrating how to install and use the SLOODLE tools.

<http://blog.kokuaviewer.org/> - Homepage of the Kokua/Imprudence project. Alternative client software for Second Life/Opensim that allows content creators to export models from virtual world to disk, and to import models to any compatible Second Life or Opensim world.

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Appendix A: List of Annexes

The following files are supplied as annexes to the final report:

Annex A: The Open University Case Study Report: [Annex A OU Report.doc](#)

Annex B: The University of Ulster Case Study Report: [Annex B Ulster Report.doc](#)

Annex C: Imperial College London Case Study Report: [Annex C Imperial Report.doc](#)

Annex D: University of the West of Scotland Case Study Report: [Annex D UWS Report.doc](#)

Annex E: [Resources for Educators Readme.doc](#)