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Introduction to Conference Proceedings

Anna Peachey, Conference Chair

These proceedings contain papers presented at the first international *Researching Learning in Virtual Environments*, ReLIVE08, conference, held at the Open University campus in Milton Keynes in November 2008.

The Open University purchased its first virtual world presence, Cetlment Island in Second Life, in June 2006, and was quick to see the potential of this environment for working with our students. Other universities did likewise, and by 2007 there was a boom in the number of educators investigating the use of multi-user virtual environments for teaching and learning. As virtual worlds started gaining momentum in the public consciousness, early adopters were in demand to run workshops and seminars introducing colleagues to the basics of the medium. However, as more educators moved into the arena of research, there were still very few dedicated platforms for academic discussion and presentation.

Multi user virtual environments (MUVs) offer us something new. We can bring aspects of our understanding of distance learning, of virtual learning environments, of virtual reality and others into play, but there is still so much to learn about how people think, feel and consequently function in a virtual world that, in the spring of this year, we started to explore the possibility of a conference that would not only offer an opportunity for publishing and networking but would bring people together around the central theme of researching learning in MUVs.

From the onset, it was decided that the event should be open to those working in (and across) a range of academic disciplines. Emergent research in MUVs is increasingly the result of collaboration between technologists and discipline specialists, crossing boundaries and producing an evidence base which is at the same time about the experience of the virtual and an extension of pedagogical practice and philosophy. In constructing the call for papers, we sought presenters and participants who have experience of designing and delivering learning in virtual worlds regardless of topic, and who have the ability to reflect on and share that experience within an analytical framework.

The papers that were accepted by the international academic committee cover a wide range of subjects and research methods. They embody a mix of theory and practice, planning and reflection, participation and observation to provide the rich diversity of perspectives represented at the conference.

As is often the case, speakers had limited time in which to present their work at the conference and so the papers contained in these proceedings showcase the detail of their research, approach and outcomes. In some cases, the papers reference “work in progress”, and the speakers represent a continuum from those with a record of research history in MUVs up to those who have only very recently started to explore in this area, each with the benefits of their unique perspective.

Presenters outlined their work under the following main themes:

Crossing boundaries and making connections

Papers submitted to this theme were intended to extend our knowledge of the interdisciplinary nature of research into learning and teaching in virtual worlds. Boundaries crossed included the digital divide between first and second lives, subject areas and/or research disciplines. In particular, papers outlined research processes and outcomes which draw upon or extend conceptual and explanatory frameworks from computing, cognitive science, social sciences and/or education.

Opportunities and challenges of virtual worlds for learning and teaching

Papers submitted to this theme reported on research directly related to issues such as enabling disadvantaged learners. Of additional interest were the papers where opportunities and/or challenges were unforeseen at the beginning of a research programme and had a subsequent impact upon the research outcomes.

Approaches to research

This theme explores the range of qualitative and quantitative research approaches utilised by researchers of learning and teaching in virtual worlds, especially accounts that highlight the efficacy of particular approaches and the pitfalls of others, and/or that illuminate issues concerned with the collection of data in-world versus real-world.

Alongside the exciting range of paper presentations, workshops and symposiums at the conference we were very pleased to welcome Roo Reynolds and Edward Castronova as our keynote speakers, and Bill Thompson, Claudia L'Amoreaux and Sara De Freitas to our Question Time panel. Output from these sessions will be available post-conference at the conference website on www.open.ac.uk/relive08 and I would like to thank all our speakers for their time and input, especially Ted Castronova who had so far to travel.

I would also like to thank Professors Steve Swithenby and Denise Kirkpatrick for supporting the conference and I cannot credit enough the brilliant organisational team who are working so hard to make ReLIVE08 a stimulating, exciting and engaging experience for everyone involved. My very sincere gratitude goes to Liz Thackray, Terry Di Paolo, Catherine Reuben and the secret weapon behind relive08@open.ac.uk, Diane Ford.

All abstracts for ReLIVE08 were reviewed by at least two members of the following academic committee. With many thanks for their input:

Liz Thackray, COLMSCT Teaching Fellow, The Open University.

Dr Daniel Livingstone, University of the West of Scotland (Sloodle).

Dr Julia Gillen, Senior Lecturer in Digital Literacies, Literacy Research Centre, Lancaster University (and Schome).

Dr Peter Twining, Head of the Department of Education, The Open University (and Director of The Schome Park Programme).

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Dr Anne Adams, Lecturer in Practice Centred Research & Development, Institute of Educational Technology, Open University.

I hope that those of you who attended the conference found it exciting and interesting, and that all of you reading these proceedings will find something to stimulate your thinking and, perhaps, inform your own practice in research in virtual worlds. Please IM me as Elsa Dickins in Second Life if you'd like to chat about ReLIVE08, and I very much hope to meet you at ReLIVE09.

With regards

Anna Peachey

ReLIVE08 Conference Chair

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How Can Massive Multi-user Virtual Environments and Virtual Role Play Enhance Traditional Teaching Practice?

Angela Addison and Dr Liam O'Hare

Keywords: Second Life, problem-based learning, immersive, cognitive skills development, co-operative learning

Abstract

There are now many educational sites in Second Life (SL), but they are, in general, more formal and less interactive than the most popular social sites. Many educational sites have been built in the image of existing buildings, but they are often deserted spaces. Some, more adventurous, sites include scripted objects that allow an individual to interact with a simulation, but too often these do not compare favourably with simulations found outside SL. This may indicate that recreating what can be provided in real life, or even in traditional simulations, is not effective. Massive Multi-User Virtual Environment's (MMUVE) provide an opportunity to extend the learning environment to take advantage of social learning opportunities. The social sites show us the immersive potential, and the potential for groups to interact, and this is the key to this project.

We are developing problem-based learning in SL using group work, co-operation, and role-play. The project seeks to utilise these principles to encourage and develop the cognitive transition of professionals from classroom taught theory to application in the work place. This is done with the intention of developing skills, confidence and a professional approach. The first development centres on the use of a food factory to allow regulators to undertake an immersive role play. In this learning opportunity, they are able to take the role of a regulatory officer visiting an unfamiliar factory to question production staff on a working line, company managers and other members of the workforce. These other roles may be taken by scripted robots (who may offer little helpful information), by their fellow students, by staff, or by potential employers. In this application, SL is being used as it offers two significant advantages. Compared with traditional role play, SL offers more immersive sets. Students find it easier to take the role seriously, and to detach themselves from the classroom environment. This is aided by distractions during the role-play, for example moving forklifts and factory noise. At the same time the experience is more engaging and open-ended than watching interviews recorded in real factories.

Education in SL

Most educational institutes are adopting electronic learning spaces as part of a blended learning approach. This demonstrates developing faith and acknowledgment that this additional support is of benefit (Kahiigi, 2008). On the other hand, the use of computers in education (e-learning) has often been seen as merely providing rapid access to content, rather than providing a social context for learning. Mathematical or graphical simulations were sometimes found to be useful in science, and the quality and speed of communication were improved by the use of e-mail and discussion boards, but the incorporation of these tools into Virtual Learning Environments (VLEs) such as Blackboard was not seen to deliver significant additional opportunities for knowledge construction. VLEs has been seen as transmissive,

focusing on “*the accumulation, organization, and delivery of content.*” (Gilroy, 2001, quoted in Linser and Ip, 2002). Too often, control over the content has been held tightly by the academic, and the model of communication has been just as didactic and one-to-many as was previously the case with lectures and textbooks. Thus, for many years, the use of computers in education has remained a constructivist’s nightmare. From the constructivist perspective, the value of computers in learning is not that they provide faster access to more information, but that they allow more opportunities for social interaction, communication and thinking, and so promote the construction of meaning and knowledge (see, for example, Garrison and Anderson, 2003).

Even before the advent of VLEs, some of the foundations of the use of computers to promote social construction of learning had already been laid with the text based MultiUser Dungeons (MUDs) which were popular on university mainframes from around 1979. These MUDs included an element of game playing, and gradually developed small in-world economies, trading in their own goods and currencies. Richard Bartle, one of the developers of the original MUD, has been quoted as saying, “*The game was initially populated primarily by students at Essex, but as time wore on and we got more external lines to the DEC-10, outsiders joined in.*” (Armitage, 2006). This was one of the first steps towards the web2 era and the growth of social networking tools. Prominent amongst these has been Second Life (SL). SL is an example of a Massive Multi-user Virtual Environment (MMUVE) or metaverse. There has been enormous interest amongst the HE community in exploring the potential of these metaverses to create learning opportunities. “*Now for the first time we are starting to see serious interest in what we do from the academic side..... the recognition that video games probably represent an emerging new medium, a new design field and possibly a new art form..... there are an increasing number of motivated students that grew up playing these games and now find themselves inspired*” (Wright, quoted in Koster, 2005)

Because of the age limit imposed by Linden Labs, the adult version of SL cannot be exploited in secondary education, but most universities and tertiary education establishments, and some professional bodies, are now establishing a presence.

However, just as the use of VLEs has sometimes been disappointingly transmissive due to the way academics have used them to mimic what they have always done in lectures, so it seems that some of the early uses of SL mimic what has already been done in VLEs. Time spent in SL has suggested a simple classification of the early educational spaces. Although four categories are proposed below, it is acknowledged that most educational spaces in SL fit into more than one category at the same time.

The Replica Campus

Replica campus spaces are those spaces that are intended to be faithful replicas of existing educational buildings, or whole campuses. Many students will attend university campuses away from their hometown, taking them out of their familiar surroundings. It is acknowledged that this causes difficulties and that individuals will take varying periods to adjust, “*One of the most stressful parts of moving to a new place is trying to become orientated with your new surroundings. This can take time and be intimidating, but until you get a feel for the local geography you can never truly feel settled*” (www.studentastic.co.uk, accessed 8/9/08). These replica spaces may be of use in helping the students to acclimatise to the real building or

campus, and so may help in social integration, and this possibly promotes better on-campus learning by reducing one of the barriers to learning faced by new students. It is not clear if they have any other significant role, apart from as serving to make a clear institutional statement of a presence in SL.

The Virtual Workplace

Many spaces contain representations of work-places or of some other environment of significance in vocational education. The most common spaces in this group feature hospitals or health care establishments. Some include objects which include scripting to allow simple interaction (for example a coffee dispenser which provides the avatar with a cup of coffee, a receptionist who welcomes the avatar to the building, or a teleport point that allows the avatars to teleport elsewhere). They sometimes include notecard givers, or other scripted objects, which outline activities, but too often these activities are to be undertaken by avatars as individuals. Few of these spaces seem to be designed to promote interaction between avatars within the activity.

The Poster Display

Some spaces are set up to organise content by providing a building or campus metaphor. The most common style in this group is the poster display, but there are also notecard givers and HTML displays. In many cases, the content is not in any way interactive, and would have been delivered just as well, if not better, by traditional website or VLE. Some sites also offer virtual lectures, but, as Hobbs *et al.* (2006) suggest, “*While these activities provide advantages for distance learning this does not fully exploit the intrinsic properties of the virtual world.*”

Simulations

A number of spaces present avatars with physical simulations, often of molecular or biological structures. Objects in SL are made from primitives (prims) and the number of prims is limited, preventing the representation of complex structures. This is not true in other graphical environments, such as JMOL, where a much more detailed, responsive and versatile exploration of molecules such as DNA can be undertaken (see, for example, <http://www.umass.edu/molvis/tutorials/dna/dnapairs.htm>).

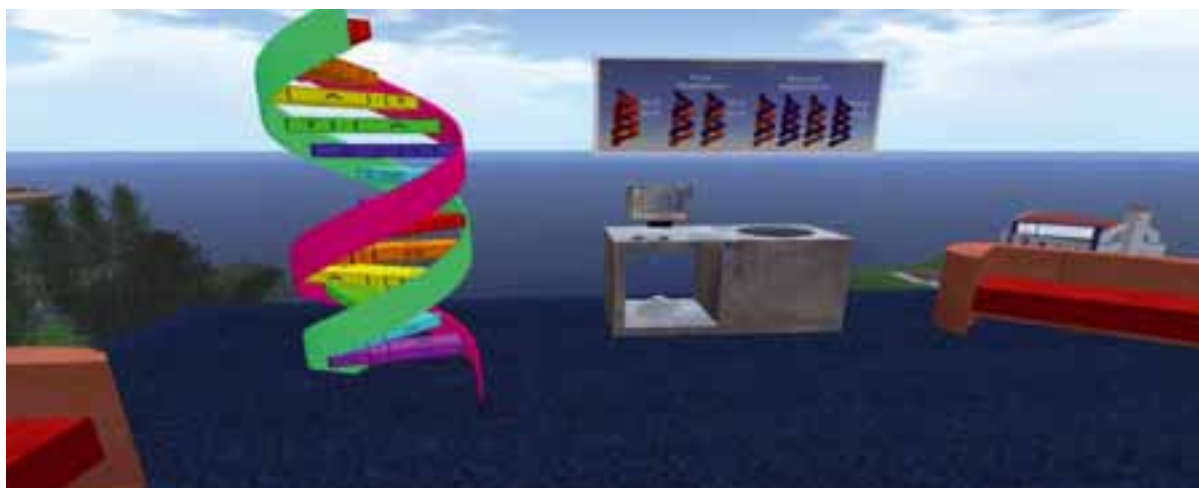


Figure 1 Double Helix demonstration at Genome Island.

The most significant feature of most of these educational spaces, and the noticeable distinction between them and the social spaces, is that the educational spaces are often found to be uninhabited. Perhaps this is because, unlike the educational spaces, the social spaces make use of the unique benefit offered by MMUVES; the wealth of social interaction that is vital to encourage a fully immersive experience. It has often been suggested that the real advantage offered by SL is the scope it offers for social interaction. Oshi (2007) suggests that SL *“adds a rich visual aspect to Internet activities such as socializing, fact finding, and doing business”* while Childress (2006) suggests that *“The highly social attributes of [Massively Multiuser On-line Role Playing Games] make them rich environments for cooperative learning-based activities.”* Surely it is these rich social activities that make SL so popular. If a space does not offer social interaction, then the interest in wandering around a deserted campus, even when there are butterflies or jumping fish, soon wains. Indeed, for students involved in distance learning, possibly already feeling a sense of isolation due to their mode of study, the experience might be quite negative. If virtual worlds are to help distance learners, they must promote social interactions.

Davis and Lucking (2006) have reiterated the importance of student-to-student interaction in the learning environment. They consider that *“generating interaction in the virtual classroom is critical to success”*. In their study of group work in a virtual world environment, Hobbs *et al.* concluded that *“research and preliminary findings all point to the need to devise carefully planned learning activities to produce the desired learning outcomes. The sophistication of the environment makes this a more, rather than less, challenging task”*. This follows previous experience in e-learning, specifically with asynchronous discussion boards, which has suggested that students learn effectively, and become autonomous learners in online environments, when they are guided through a logical progression (online socialisation, exchanging information, conferencing to construct knowledge and finally critical thinking) by means of what Salmon (2000) has described as “e-tivities”. It is likely that the same progression, and the same requirement for structured e-tivities, may also apply to effective learning in SL.

Motivation for the Food Factory SL Project

Early in 2007, the course team responsible for delivering education to future trading standards professionals at Teesside undertook to develop a Virtual Food Factory. in SL. There were a number of motivations behind this development.

One motivation that must be acknowledged is a desire to find applications for a new resource; *“everyone is interested in SL, there must be something WE can use it for too!”*. This desire needs to be treated with caution, as there is a danger that variety and novelty become ends in themselves. It is more important that educational resources are effective than it is that they are fashionable. As Winne (1998) pointed out *“Without careful attention to how students and their teachers are prepared to use systems, and to fundamental principles of learning that must underlie educationally effective systems, the results of adventures in technology-led reform are unpredictable. Some turn out quite badly”*. Perhaps a more reliable motivation is the hopefully well founded notion that SL represents a real opportunity to improve student-to-student interactions.

Another motivation comes from one author’s personal experiences. *“Having watched a dyslexic child struggle with traditional teaching methods, and having encountered the same child’s ability, not only to master activities in a gaming environment, but to recognise and*

replay errors, producing improved performance and successes, it is apparent that recreating a reality in which learning can take place through direct immersive experience can be beneficial.” Linked to the same author’s professional experience “As a former professional and as a Lead Officer for Education and Training for my professional body, I had identified difficulties for training new officers in the field. I determinedthat if these difficulties could be role played in a safe environment there could be some significant improvement in performance and understanding of the issues for new and retraining professionals.”

A final motivation arises from experiences of face-to-face role-plays. The use of role-plays in classrooms has long been a feature of professional and vocational courses at Teesside. The potential advantages are clear. In their classic analysis, Chickering and Gamson (1987) suggested that learners must engage in higher-order tasks, and that strategies promoting active learning could be defined as those involving students in doing and in thinking about what they are doing. Thus the constructivist educator has traditionally used a range of tools, for example investigation (problem based learning, practicals, project work), interaction (group work, cooperative learning, debate and discussion, peer learning) or simulation (including drama and role-playing) to help learners to work together in the construction of knowledge. Of these strategies, role-play has been one of the most powerful is a well established part of many higher education courses, with many attractive features (DeNeve and Heppner, 1997, Bolton and Heathcote, 1999; Bell, 2001). Advantages are also seen by employers, who value the way role play is designed to develop communication skills and practical “people skills”. When used early in a course, it can be useful in building social networks within a class. It is well suited to game-based learning, including competitive games. In the present context, a key benefit is the opportunities it offers for students to work through scenarios and critical incidents as preparation for the workplace (Dracup, 2008). However, despite our enthusiasm for role-play, our experience of the actual sessions has been mixed. We often find that learners fail to fully immerse themselves in the experience. Engaging in role play within a classroom setting fails to give a fully immersive experience. This may result in the responses and reactions of the participants being significantly altered. They seem to be inhibited by the realisation other parts are being played by class-mates, or by staff, and that they are being watched and possibly assessed. Most significantly in the current context, the atmosphere of a classroom can never match that of a food factory. The examples of role-play that we find work best are those set up, often for health, forensic or police courses, using elaborate and expensive sets (Virtual Radiography Suite, Crime Scene House, Vehicle Examination suite, Mock Police Station, Mock Court Room). This would not be possible on all courses. Indeed, on courses aimed at Trading Standards and Environmental Health professionals, the cost as a result of the variety and complexity of the required sets would be immense. Moreover, traditional role-play activities within a classroom setting have required the participants to be in the same room at the same time. This may be difficult with large class sizes, and almost impossible for distance learners. On-line role play may provide the solution to these restrictions (Koskela, 2005; Gao et al., 2008). For example, Lebaron and Miller (2008) found that “*students enjoyed online role play and valued it as a learning experience*”, while Gao et al. (2008) found that students felt that role-play within the virtual setting was more likely to interest them and hold their attention, as compared to face-to-face role-play. In addition they found the virtual environment in Second Life to provide a less restrictive learning opportunity than the face-to-face equivalent.

Implementation of SL Project

The food factory was identified as the focus of the planned development as this has been the area of professional activity that has been most difficult to deal with in a traditional classroom. Factory inspections, in particular inspections of food manufacturers, are difficult because an unfamiliar factory environment presents many challenges. They require regulators to work with colleagues and with factory employees. They must work in a noisy, rapidly changing, and potentially dangerous processing area, and must also tackle lengthy and complex documentation. MMUVEs may enable realistic representation of these problems. The representations are flexible, allowing sets and scenarios to be changed to present learners with a planned sequence of challenges. This should allow a well designed course to lead learners through the stages described by Salmon (2006). Moreover, the potential for complexity in the representation of the physical environment, and for interaction with other avatars, should allow students to adopt an exploratory approach to learning characteristic of the final, autonomous learner, stage. Thus students develop skills at a staged pace, building knowledge and experience as they work their way through the sequence. It is the sense of “really being there” which may produce the most powerful learning responses in the students.

The first phase of the project involved reviewing available virtual worlds. SL seemed to provide the most likely development opportunity, if only because it was the most popular at the time the decision was taken, but initially the level of detail necessary was a concern. To ensure a fully immersive experience, the team felt that there had to be sufficient detail to reflect accurately the complexity of the real life situations, and it was feared that the prim count limitations encountered in SL would prevent this. However, it soon became apparent that even simple representations could provide a very immersive experience when supplemented by photographic textures, appropriate noises and simple movement. Textures can have the added advantage of providing depth to a wall, as shown in Figure 2 and Figure 4.



Figure 2 Prototype factory, showing backdrop and conveyor belts in SL

Having decided to continue with SL, two complementary approaches to building sets for role-plays were adopted.

The first approach was based upon Holodecks equipped with textures and a few simple objects. This can provide a way of using limited space and limited prims to represent many different locations or environments. The textures can be rapidly changed to completely alter the appearance of the space, allowing the same holodeck to be used as a set for many different role-plays. An extreme example is illustrated in figure 3 and 4. Switching from one role-play to the next can be facilitated, as the appearance of a particular space can be altered around the group rather than the group being moved to another location. There is a concern that this may break the sense of immersion as rooms do not change in this way in real life, but this may or may not be a problem, depending on whether the role-plays are intended to deal with a linked sequence of events.

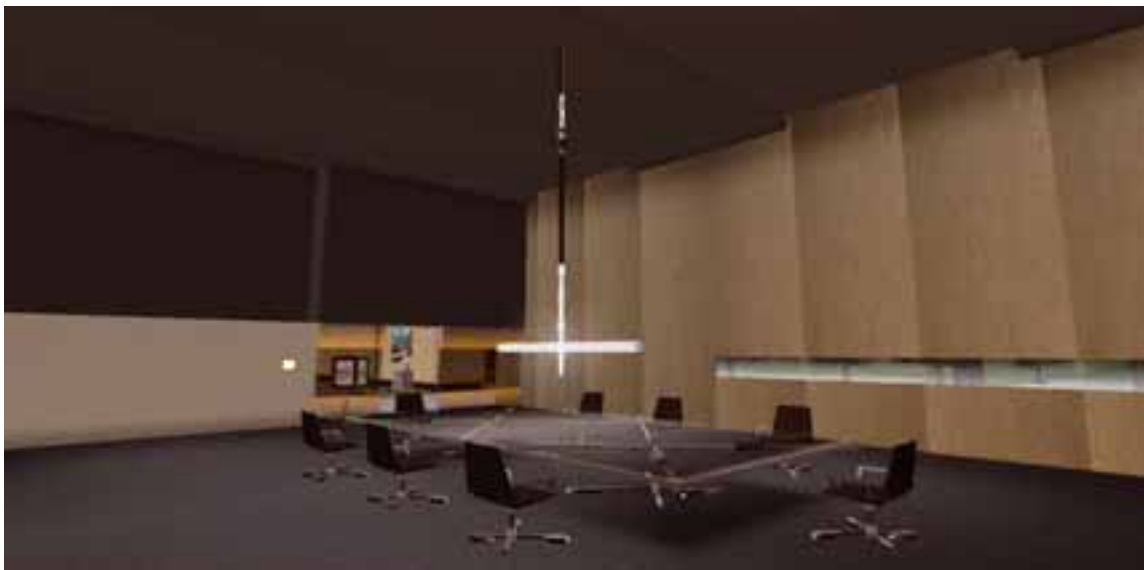


Figure 3 Holodeck set out for Business Meeting in SL

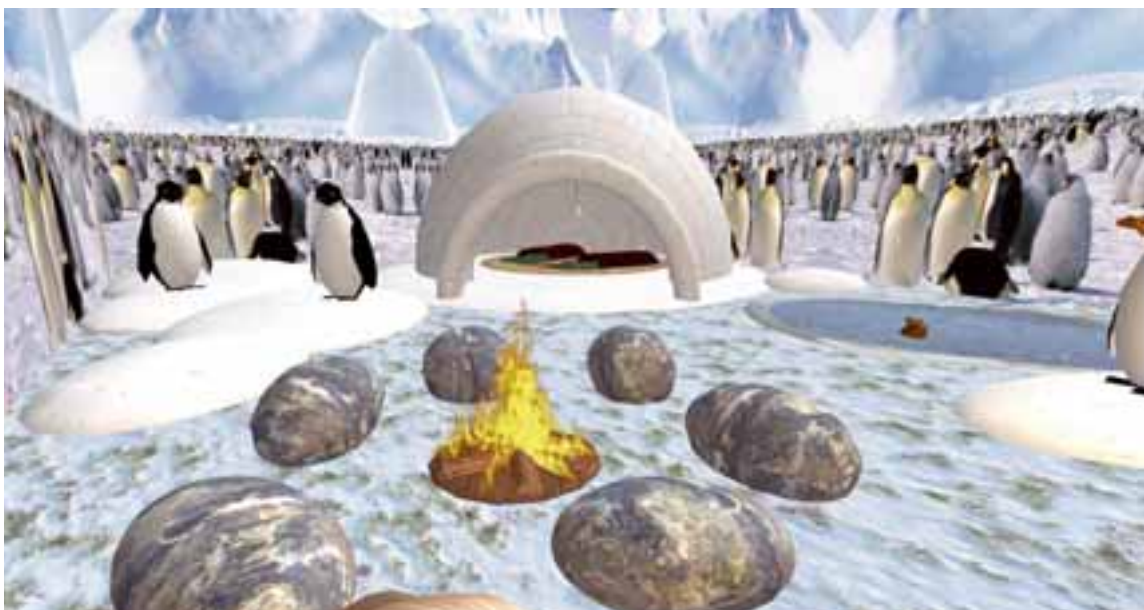


Figure 4 Same Holodeck set out as Penguin Sanctuary

The other approach to building sets for the project includes a full representation a food factory. This is intended to allow learners to move and explore in a more open ended way than the closed holodeck sets. This has been designed to cover the key inspection points and common regulatory compliance failures encountered by officers during their work. The design includes information and guidance for learners provided via scripted objects within the factory.

Establishing suitable assessment mechanisms within the development was recognised as vital at the outset of the project. The philosophy of the project, that the real benefit of MMUVEs lies in their ability to facilitate education through social interaction among learners, requires that much of the assessment will be done by the tutor or by peers in the way that assessment of role-play has always been done. However, as a supplement to this, another possible mechanism was suggested by the role play Sims found in the social areas of SL. Here participants undertake quests. They begin by collecting an information sheet in the form of a notecard from a dispenser and must decipher the clues it provides. The clues lead to treasures which must be collected from scripted objects to complete the chosen quest. This method could be adapted to demonstrate a student's competence. For example a clipboard (the scripted object) could be carried by the student, and when they believe that they have found one of the key inspection points then they could be required to click on the point which would provide a tick on their board. This information can be transferred directly to tutors by the participants putting their completed boards into a collection point which notifies the tutor by e-mail. A further feature of SL is the ability to utilise dummy avatars to take on roles. The current level of sophistication of the interactions possible with these dummy avatars is limited, but never-the-less avatars which automatically provide different pre-programmed responses to participants depending on which questions they are asked could provide a useful part of the exploratory role-plays envisaged in the full food factory.

Conclusion

We feel that many of the early educational developments in SL have focused on structures and information, and that few have made the best use of the potential that the environment offers for student-to-student interaction. At the same time, we feel that traditional role-play has been one of the most powerful tools in the constructivist educator's toolbox. It is clearly an example of active learning, it provides multiple perspectives, and promotes collaboration between learners. However, except in the most expensive and elaborate implementations, traditional role-play may not offer authentic learning, which, according to Cey (2001), occurs when the learning activity is designed to simulate and recreate the complexities of real-life occurrences encountered by professionals. We have therefore used holodecks to provide virtual sets in which to stage a progressive series of role-play exercises in SL. The final set, a full food factory including scripted objects and dummy avatars, is intended to be extensive and complex, and hopefully authentic in important details. This should allow students to explore and investigate, interacting not just with the set, the objects and the dummy avatars, but with staff and other learners. Thus, it is hoped that these role-plays will lead groups of students through a sequence of activities, analogous to Salmon's e-tivities, towards the goal of independent learner.

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Learning scenarios and workspaces with Virtual Worlds: inclusion benefits and barriers of 'once-removed' participation

Simon Ball and Rob Pearce

Keywords: Liberation, disability, autism, simulation, roleplay

Abstract:

"As with any other technology applied in the support of education we need to be careful to make use of the opportunities that virtual worlds afford in ways that align with our, and our students', learning objectives, rather than deploying the technologies for their own sakes. But along with the inevitable mistakes there would seem to be considerable potential." (Macleod, 2007) Many higher education educators are embracing Virtual or Immersive Worlds such as Second Life® (SL), keen to explore and harness the potential for teaching and learning (Kirriemuir, 2008). Despite some obvious access requirements (a powerful computer, institutional access permission and a certain degree of visual acuity, for instance) there are emerging a range of potential benefits associated with adding this tool to the teacher's palette.

Virtual worlds may provide the opportunity to deliver to students scenarios which would be impossible or extremely costly to simulate in real life. For example, the testing of trauma nurses' decision-making processes cannot be effectively simulated in the real world other than by text-based 'role-play-scenarios'. (Dev et al., 2007). The Ann Myers Medical Centre in SL is one of many examples where a hospital accident and emergency department is represented, and the nurses respond to a mass casualty incident (Mesko, 2007). Virtual Worlds are also being used to help students with autism, who can find change highly stressful, by using virtual simulations that will then prepare them for changes they will find in the real world (Saidi, 2008). Further research undertaken with young people with autism suggests more benefits with theory-of-mind impairments (Moore et al., 2005). Conversely, Virtual Worlds may offer a more manageable route into experiences for particular individuals. One simulation in SL demonstrates the sometimes harrowing world of a schizophrenic (Yellowlees and Burrage, 2005). The army is using scenarios constructed in Virtual Worlds to assist personnel with managing post-traumatic stress (Rizzo, 2006). The 'persona-once-removed' that individuals use as their avatar may be sufficiently distant from a user's own personality as to provide a buffer as they begin to deal with traumatic and distressing issues. Potentially the greatest benefit of employing virtual world scenarios in higher education teaching and learning is that for most users it provides a degree of levelling. Although users who do not have vision or quick typing skills will be excluded (Carter and Corona, 2008), control over attributes such as skin colour, gender, disability and so on provides an opportunity to interact without prejudice, and hence may have knock-on liberating effects on the user in their real life, although there are many issues regarding adopting particular real life traits in Second Life (Stevens, 2007). On a more cautious note, it would be easy to overlook, for instance, Ethics Committee approval when employing 'non-real' scenarios. How will you ensure that students with mental health or other difficulties are supported (and appropriately counselled if appropriate)? This paper draws together some of the potential opportunities and challenges of using virtual worlds in teaching and learning, in particular the use of virtual worlds to replicate scenarios which some or all users could not access in an equal manner in real life.

Introduction

Computer generated virtual worlds in various forms have existed since the mid 1970's with the first educational applications appearing in the late 1980's (Slator *et al.*, 2006). The phenomenally successful computer games industry and the development of the internet into the world's first practical and powerful world-wide public computer network have brought about yet more opportunities for educational applications. This socio-technical revolution has created a new generation of 3D savvy students who arrive at university with an easy familiarity, refined skills and a permanent change in expectations. This has not gone completely unnoticed within the academic community and pioneering work has begun. A great example and a popular choice for academics is Second Life (SL), which is, for now, the most common choice for development. Since its release in 2003 the number of UK academics who are developing or operating teaching and learning resources in SL has grown rapidly, particularly in the past 2 years. "While an accurate figure is difficult to determine (partially due to the non-public nature of some developments), as a rough estimate some three-quarters of UK universities are actively developing or using SL, at the institutional, departmental and/or individual academic level. Of these, many institutions support several ongoing SL developments, often involving groups of people rather than individuals" (Kirriemuir, 2008).

Despite some obvious access requirements (a powerful computer, institutional access permission and a certain degree of visual acuity, for instance) there are emerging a range of potential benefits associated with adding this tool to the teacher's palette. Naturally, issues regarding inclusion of visually impaired users should be explored when considering the implementation of virtual world learning and teaching elements. Those issues have been, and continue to be, very effectively discussed in a number of fora (Abrahams, 2007; Hanson, 2008; Kelly, 2008) and effective solutions to aspects of those issues are regularly proposed (Adams-Spink, 2007; Jaime, 2007; Milena *et al.*, 2007; White, 2007).

Much less well discussed are the issues, many of them benefits rather than barriers, that virtual worlds raise with regard to the continuum of needs pertaining to social interaction, ranging from shyness and reluctance to engage in face-to-face discussion through to autistic spectrum characteristics. Together with the potential for virtual worlds to enable individuals to engage with scenarios they would not be able to experience in real life, the stripping away of a lot of the established methods, protocols and habits of communication and learning is not always a win-win. It is possible that there are as many accessibility barriers as benefits, and if this is the case then these should be explored fully.

Social issues both on and off the autistic spectrum

Although it might seem an unusual approach to group together autism and Asperger's syndrome with shyness and social interaction issues, for the purposes of this discussion the effects are quite similar. Whatever the cause, be it an impairment, condition, learning style, preference, personality trait or simply a particular preference at a particular moment in time, there are potentially many learners for whom interaction via a virtual world can provide experiences that would be difficult, traumatic, less pleasant and sometimes impossible experienced in a face-to-face scenario.

At the simplest level, those for whom social interaction itself is a difficult act to perform can practice interaction, never needing to know (or care) who the people that they are interacting with really are. They can practice making small talk, or discussing specific topics, from not only their “own computer, own room, own space” (David Savill, quoted in Saidi, 2008) but also without even having to reveal their identity or their impairment. There is even evidence that using and interacting with others within virtual worlds improves real-life social skills (ScienceDaily, 2008).

For those with more severe social isolation or awkwardness, eccentric behaviour or obsessions, inability to ‘read’ body language or facial expression, all traits experienced by many people with Asperger’s syndrome or autistic spectrum conditions, there is a particular location within Second Life that has been set up to allow them to experience their new mode of interaction with others who understand their position before moving out into the ‘wider world’. Brigadoon is a private island constructed by John Lester, one of the Directors of Linden Labs who created and operate the Second Life program. “The group wanted to socialise and meet people but found it frightening and communicating difficult. [Brigadoon] built up everyone’s confidence. After a while they felt comfortable enough in their social abilities to leave the island and explore the rest of Second Life.” (Deeley, 2007). Tartaro and Cassell (2007) describe a series of experiments in using virtual peer technology with children with autism, enabling children to take ‘buddies’ to develop social skills, and there is no reason why this principle should not extend to adults with similar difficulties (Biever, 2007).

Users with mental health issues or autistic spectrum disorders which cause any introduction to new situations to become extremely stressful can get a ‘taster’ of the new situation in the virtual world, from within their ‘comfort zone’ of home or another familiar environment. Simon Bignell of the University of Derby (Milton Broome in Second Life) says his research in Second Life stems from being “particularly interested in the use of Second Life to reach out to groups of people who show communication and social impairments. The unique virtual world of Second Life could provide an environment where interventions and experiments that may be considered unethical or impossible in real life can be easily conducted whilst assuring the safety of the participants” (Bignell, 2008).

Identity optional? ‘Once-removed’ vs. true representation

The real power of virtual worlds to act as an accessibility benefit in teaching and learning is the very nature of once-removed participation. Everyone who enters a virtual world does so by creating a character, or avatar, that can look and act like whoever their creator chooses. This acts as a ‘leveller’ as those who, rightly or wrongly, face issues relating to the way they look in real life (people with self-confidence issues, people who use wheelchairs, people with facial disfigurements, people of different racial groups etc. may all experience prejudices and assumptions about themselves in real life), should they choose it to be so, can eliminate those issues in a virtual world. The ability, to an extent, for any user to ‘stand in another’s shoes’ in this way is an insight hard to create in the real world. Indeed, many users of Second Life operate several avatars, though the reasons for this (albeit clearly related to identity) and the statistics to measure this trend are nearly impossible to accurately establish.

There is a recognised effect of the use of avatars in virtual worlds on the displayed personality traits of the participants, the “Proteus effect” (Yee and Bailenson, 2007). The Proteus effect suggests that participants develop or emphasise certain characteristics dependent upon the appearance of their avatar (tall avatars behave more confidently in negotiation than smaller avatars, for example, regardless of the physical characteristics of the user controlling the avatar). This effect could potentially help to develop skills that may be difficult for individuals to otherwise acquire – for instance, could a wheelchair user, always used to participating in real life debates from a seated perspective, use some of the skills acquired from operating a tall, standing avatar, to enhance their seated participation in future real life debates?

Certainly in terms of disability, virtual worlds such as Second Life offer the opportunity to not only contribute on an equal basis with everyone else, but to have experiences, albeit vicariously through the avatar, that would not be possible in real life (Crichton, 2007). A Youtube video highlighted on RNIB (2007) shows a person with cerebral palsy operating Second Life using a headwand and extolling the virtues of being able to use or not use her wheelchair at will. She also enjoys being able to fly, in her on-screen persona. However, the realities of the comparison are brought home through an incident in an online nightclub where she was dancing, chatting and generally being included in the social discourse when appearing without her wheelchair. Upon returning with the chair she was ignored. This anecdotal evidence must be balanced with the observation that in an environment where disability is ‘optional’ along with the inherent anonymity buffer between virtual and real identity, this use of the wheelchair could have been misinterpreted by her fellow clubbers as an affectation merely for effect.

Peter Abrahams makes the point of Second Life being a great leveller. “Second Life is a place where everyone is as able as each other. This may well be one of its major shortfalls as it removes some of the diversity of Real Life that makes it such an interesting place. On the other hand it does give people the opportunity to experience, even somewhat vicariously, being one of a bigger crowd” (Abrahams, 2006).

On the other hand Simon Stevens, the creator of Wheelies Club in Second Life, refuses to appear online without his wheelchair, for the very reason that people should be accepting of impairments and learn to deal with whatever disabilities a given situation produces, and to ‘deny’ one’s disability online just makes it easier for people to ignore that responsibility. Not that he denies other people’s right to choose a non-disabled persona if they so wish: “The avatar is a powerful device in ensuring an inner self-identity... So for some disabled people, Second Life is an opportunity to escape from their impairment... There is, however, a group of disabled people, including myself, who wish to appear disabled within Second Life... Within an environment which is perceived to be barrier free, it challenges the very nature of impairment and disability when someone chooses to appear disabled” (Stevens, 2007).

It may even be deeply insulting to those who feel they are partly or wholly defined by aspects of their physical appearance or disability to suggest that they might wish to appear without those characteristics online. There is a distinct community of Deaf people who view Deafness as their culture as well as being a disability in a largely hearing society (a lack of hearing is rarely a disability when interacting with other Deaf people) (Baker and Padden, 1978); and of course there are those whose religious beliefs extend to the way they dress – both groups may wish to represent those defining characteristics in an online persona.

Harmless deception or deceptions that harm?

The usage of avatars, whilst providing the opportunity for liberation and a levelling of interactions, may also produce third party confusion. It was described above how individuals with Asperger's syndrome or autistic spectrum disorders may experience difficulty in interpreting body language or facial expression. The use of Virtual Worlds allows them freedom from having to face this complication, but adds another in its place. If students work together in a group and they know the white female Catholic wheelchair user in class is represented online by a black male Rastafarian sprinter, whose mannerisms and even opinions change accordingly, what issues does that raise in terms of group dynamic? We advise students to respect each other's beliefs and opinions, but this becomes increasingly difficult when someone might be making statements that we know are at odds with their true beliefs. Of course, this brings enormous opportunities for sociological, ethical and anthropological subject areas, but the potential for psychological harm also needs to be considered.

One widely used exemplar of this potential for third party image confusion is that of Wilde Cunningham (New World Notes, 2004) an orange-skinned avatar created and operated simultaneously by a team of severely disabled individuals from a residential care centre in the US. The team individually would have difficulty creating and controlling an avatar, but together they have the skills necessary. This is a wonderfully empowering example of the possibilities of technology, but it also raises the issue of confusion – if the avatar is controlled by smaller subgroups of different team members on different days (rarely are all nine participants available and willing to join in on every occasion) it will display different characteristics on different occasions. If the avatar then participates in any group activities, the other group members will experience a different 'personality' coming through each time they meet.

The once-removed manner of participation also allows others a range of freedoms they may not otherwise have. Whilst it is possible to set up access-controlled rooms and buildings in virtual worlds like Second Life, much of the benefit of using these media is that students can move around the worlds and learn from their experiences. This is potentially hugely beneficial for all students, and especially those whose real world situation means they are unlikely to encounter certain particularly valuable scenarios (for example for a variety of reasons certain students may find it difficult to travel to the country whose language they are learning, but could interact with students from that country readily via a virtual world). But it should also be borne in mind that this also raises the possibility of highly unusual experiences occurring that would not be likely in real life, and so may be beyond the capability of some students to deal with. For example it is highly unlikely - although not unheard of - that a person will undress themselves in a real lecture, but quite possible to achieve instantaneously in a Second Life classroom – see Ellis (2007) for a frightening example of what vulnerable students may encounter.

"Griefers", trouble-makers in Second Life, who can orchestrate anything from harmless pranks to sustained assaults, are numerous. Deliberate acts aside, there is also much discussion in academic circles of the importance of dress (and anatomy?) codes for students attending activities. What might the effect be upon students who find themselves in such an unpleasant situation? How do we create support systems that deal with this? The solution of course lies in the efficacy of the support systems, rather than in avoiding the technology altogether for fear of what might happen.

The once-removed manner of participation in virtual worlds may also lend itself to support of students with particular difficulties. It may be much easier, for example, for a student to make virtual rather than face-to-face enquiries regarding matters relating to sexual health or mental health (for example, one assumes it would be much easier for an anonymous avatar to walk into a virtual world clinic and ask “what should someone do if they got drunk last night and slept with someone without protection?” than for the student concerned to seek advice in real life). Indeed areas in Second Life such as the Sexual Health SIM (Bouloth and Toth-Cohen, 2008) enjoy success as an information outreach.

The final issue to be addressed regarding once-removed participation is the role of the tutor. What might be the issues associated with discovering that the purple biker gorilla lurking in the corner is, in fact, your teacher?

Failing without consequences – the academic benefits

In addition to the accessibility benefits and barriers of using virtual worlds to enable those with particular impairments to interact with others and the world around them in a different way, virtual worlds can provide students with opportunities that simply would not be achievable in real life. In virtual worlds students can begin to learn ‘on’ and ‘in’ a safe environment, so they can practice scenarios and examine their behaviour during their intervention, in addition to reflecting on their practice after the event.

The E-Doctoring virtual world constructed by the Universities of Newcastle (UK), Davis (California, US), Los Angeles (California, US) and Seattle (Washington, US) allows medical students to examine patients, make clinical decisions (if necessary within a given time frame), perform surgical procedures and so on, all within the safety of a virtual world. If a message flashes up during a complex procedure that they just killed their patient, it’s perhaps preferable that this is a virtual world scenario, where they can have another go. E-Doctoring (2008) provides 10 scenarios which cover the full range of ethical and social issues relating to genetics, including aspects of law, communication and culture as well as the medical side. There can be no doubt that these scenarios provide a case-study style of education but with an added element of ‘reality’ that can only assist the students in translating their learned knowledge and skills into practical scenarios. The Ann Myers Medical Center (2008) provides a host of in-world scenarios for nursing and medical students that greatly increases the number of different case experiences they can have during their course. Similarly the SEERS project (Synthetic Environments for Emergency Response Simulation) is funded by the US Department of Homeland Security to provide cost effective mission rehearsal tools for emergency response personnel (SEERS, 2008).

This kind of virtual world scenario has even made its way into game format, with the Nintendo Wii now supporting ‘Trauma-center-second-opinion’ which works in a similar manner to E-Doctoring but is aimed not at medical students but at the general game-playing generation, like an updated version of the family board game ‘Operation’ (Nintendo, 2008).

And then there are more complex representations – how many students can in real life experience nuclear fission (a nuclear reactor is currently under construction (Guess, 2007)), an ocean trench, controlling a chemical plant or investigating a delicate archaeological dig?

How in real life could we give students an insight into what life is like with various mental or psychological conditions? The Virtual Hallucinations tour (secondlife://sedig/26/45/) offers users a small insight into what life is like with auditory hallucinations. Of course there are well trodden arguments about the value of simulations and that they can never provide users with an experience that approaches equity with 'the real thing' but they certainly can offer some valuable insight, and this is an excellent example of that. "Using traditional educational methods, instructors have difficulty teaching about the internal phenomena of mental illnesses, such as hallucinations," (Peter Yellowlees, quoted in UCDavis Health System, 2007). Yellowlees and his team created the virtual environment to replicate the experiences and world of a schizophrenia patient to provide medical students with a better understanding of this mental illness. When comparing virtual world technology with other possibilities for achieving this aim, Yellowlees explained "Compared with custom software development, using an existing software system cut development time for our psychosis environment by a factor of 10."

Virtual environments also enable tutors to monitor students' readiness to go on practice placements. Virtual worlds can be used as measures to prepare students for real life practice by making them aware of their strengths and areas that they need to develop before working with, or on, real people.

Virtual worlds can enable opportunities for tutors to provide interdisciplinary learning opportunities in a way that 'real world' limitations cannot. For example, you may be able to synchronously provide learning opportunities through virtual scenarios for large numbers of students who you could not cater for in a physical setting such as a lecture theatre. This way the students can engage with and learn about each others' professions. This may potentially have useful implications for the increasingly intertwined health and social care fields.

Conclusion

It is evident that the use of virtual worlds in general creates a range of benefits for a variety of different types of users in addition to creating barriers for those who cannot access the interfaces used. It is even more imperative that ways and means are found of enabling those who are currently excluded from engaging in these activities, as more benefits of their use become evident. Applying the principle of once-removed participation to virtual workspaces and learning scenarios may elicit a whole series of resultant effects, many of which will be positive, and some may be negative, for which tutors should not only be prepared, but should welcome. We hope to have established in this paper that the use of virtual worlds for some learners is much more than a fad or gimmick, it is a way of interacting, developing skills and having experiences that they simply could not do in real life. It is not a panacea to all pedagogic or access issues, but as an addition to the suite of tools available to educators, it undoubtedly is in the process of justifying its place.

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Factors that hinder and assist learning in virtual environments: An empirical study

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Keywords Second Life, Non-Immersive Virtual Environments, quantitative analysis

Abstract:

Working, playing and learning in virtual environments will become increasingly important in the future. Such spaces, it is claimed, allow for realistic social interaction and present opportunities for providing motivational learning environments. For example the School of Computer Science at the University of Hertfordshire have recently established an online campus within Second Life. In this paper we present part of a four year research programme into some of the problems and issues inherent in studying and working in non-immersive virtual environments such as Second Life. We found that many learners experience difficulty with navigation in such spaces and that this may significantly affect task performance and attitude. In the first of a series of studies, important variables that affect navigation in such spaces were identified and their effects on task performance, ability to recall information and attitude to the environments were measured and are presented. In the final part of the paper we discuss how our findings are applicable to learning in virtual spaces such as Second Life.

Introduction

In recent years, advances in technology and lower hardware prices have made it possible for three-dimensional (3D) virtual environments (VEs) and particularly computer desktop VEs to become popular (Li & Ting 2000, Mills & Noyes 1999), and be used for commercial, social and educational applications. These technologies and their applications are used in a variety of areas such as entertainment, engineering, architecture, medicine and science. A fairly recent development has been the use of the Second Life virtual environment (<http://secondlife.com/>) in education and training. Since its establishment in 2003, many hundreds of organisations have become involved in setting up educational and training applications using this system. For example, the University of Hertfordshire has recently established an online campus within the department of Computer Science which is currently being used in order to support the learning of campus based students. In consideration of the investment necessary in terms of development cost and staff time to set up and manage these systems, it will be important to provide pedagogical justification for the use of such systems. It will also be important to consider the potential risks inherent in such initiatives. These considerations are discussed more fully in the concluding section of this paper.

It seems clear to us that there is a strong rationale for the increased use of virtual systems in education and training. We live and use our senses in a 3D real world environment and are adjusted to interact effectively in one. It has therefore been claimed that, 3D interfaces and VEs which enable 3D interaction provide a more natural manner of interaction with computer applications (Crossley et al., 1997). Whilst VEs, non-immersive virtual environments (NIVEs) and 3D graphical users interfaces (3D GUIs) such as Second Life are becoming more

widespread and have many application areas, they contain problematic design and human factor issues that have to be addressed (e.g. Mills & Noyes ,1999; Stanney et al., 1998). In particular, navigation in 3D GUIs and NIVEs is one of the most important factors directly affecting task performance in these environments.

We present here the findings from part of a four year investigation into the factors that affect task performance in virtual worlds (Haik, 2005). We argue that in order to justify the widespread use of such systems in education and training, we need to understand at the very least, task performance and learner attitude to working in such spaces. In the concluding section we discuss our future plans to extend this work.

Methodology

Initially it was necessary to identify those factors likely to be important in working and learning in virtual spaces. This was accomplished by means of a literature survey (Haik, 2005).

Based on the review of the literature several factors were selected as being potentially important in the context of this study. These included navigation, mouse-usage, orientation and freedom. Additionally, it was necessary to examine other factors that were important in using computer applications in general for real tasks. These include task completion time, the ability to find and remember location of information, and user attitude to the environment. The following describes in more detail each one of the investigated factors:

- **Navigation** – The ability to move efficiently in the environment is an important factor for 3D GUIs and NIVEs. However, navigation in these environments is often difficult.
- **Mouse** – The use of the mouse, a 2D device, to navigate in the 3D space is known to be problematic, where users often experience difficulties. The user's concentration could be distracted by problems experienced with the mouse.
- **Task** – This refers to the overall difficulty in performing the tasks. This could be related to different factors such as difficulties with orientation and use of the mouse.
- **Orientation** – The users' ability to know their location with regard to the environment is an important issue that can affect various factors. Users often experience problems with orientation. This could clearly affect the ability to find information and perform tasks effectively.
- **Finding** – The ability to find information in the environment is crucial to successfully completing tasks. How efficiently one can find information could be affected by the efficiency of other properties such as orientation, navigation and use of the mouse.
- **Freedom** – The degree of sensation of freedom or constraint that the users experience is part of the 3D navigation experience that could affect performance. Sensation of freedom could be affected by other factors such as the orientation and navigation. For example, when users experience frustration with navigation they might feel more constrained.
- **Preference** – This is concerned with the overall users' subjective preference and attitude regarding the ease of the different conditions.
- **Time** – The time taken for users to complete the tasks directly reflects general effectiveness of navigation. When users experience problems, efficiency in performing the tasks is reduced and task performance time is increased.

- **Remembering** – This refers to the users' ability to remember the location of the information after finishing the tasks in each condition. This provides some information about the users' cognitive load.

The factors identified from the literature likely to be important in task completion in NIVEs are presented in Fig. 1 below.

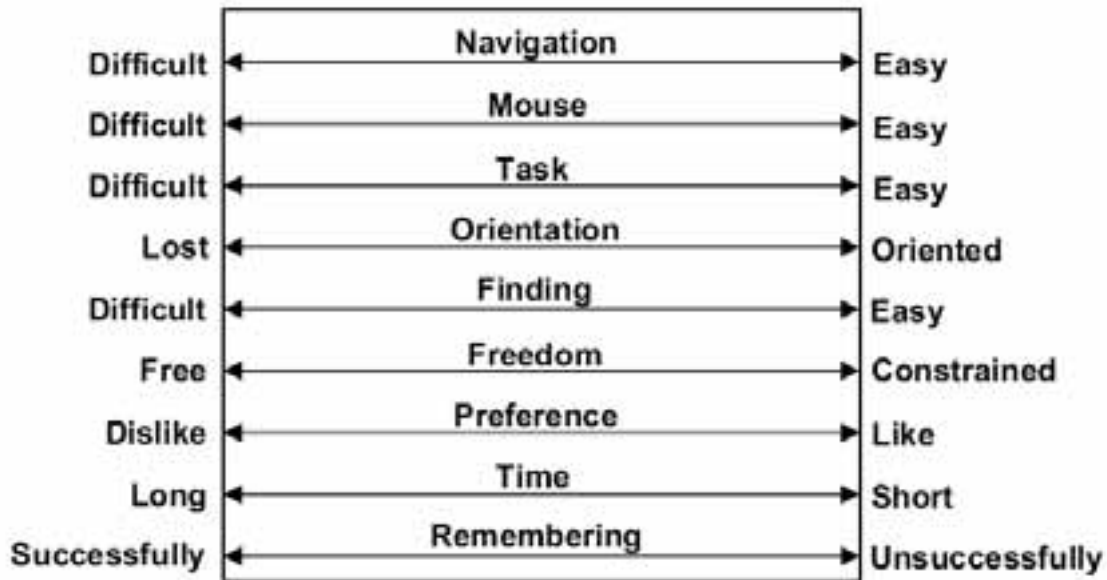


Figure 1 Factors in NIVE task completion.

In order to test the importance of the factors shown in Fig.1, a prototype NIVE was developed in order to carry out a series of experiments. Several experiments were performed over a considerable period using this system (Haik, 2005), though it is not possible to present them all in this paper due to space considerations. In the first series of trials, effective navigation was tested based on widely accepted metaphors, such as maps which are commonly used for navigation, and arrows, which are commonly used to direct users to a destination. Some ideas from several previous works (Darken & Silbert 1993, Li et al 1999, Stoakley et al 1995), along with new ideas such as use of different metaphors, were employed and investigated. It was suggested that the main problems caused with navigation are due to difficulties with movement, orientation and use of the mouse in the environment. The general concept behind the methods was to provide users with guided or targeted navigation that would direct or restrict them to relevant areas and result in easier navigation. This would be achieved by preventing them from coming across problematic navigational areas (such as corners of rooms), by directing them so they would not, or assisting them if they did. Providing these methods of navigation by simple mouse-usage aimed to prevent the users from experiencing problems with using the mouse for navigation. The investigation included three navigational methods. The first method is a simple map that provides a view in the form of a fixed 3D miniature of the environment, intended for intuitive use and suitability for the environment (Fig. 2). The map is visible to the user along with the VE itself and includes an avatar representation of the user that moves according to his / her movements. The aim was to assist the users with orientation by providing them with indication of their location and direction of movement in the environment.

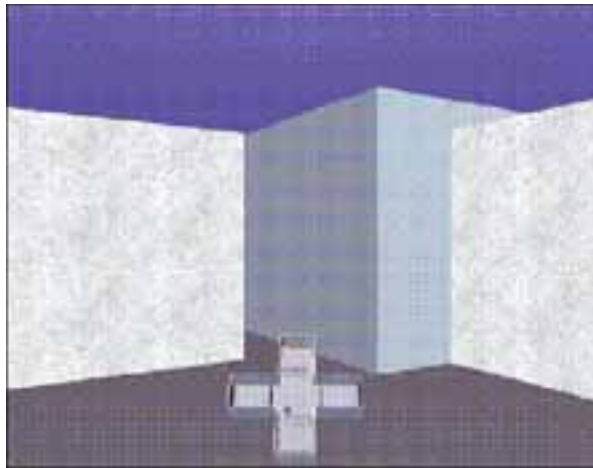


Figure 2 Method 1 (simple map) Screenshot from the central space of the environment.

The second method was based on the use of navigation arrows and zones positioned in the environment, in predicted problematic areas. Whenever a user enters a targeted zone, navigation aids in form of arrows appear in the VE (Fig.3). Clicking on an arrow animates the viewpoint to an area of interest associated with that arrow. Choosing not to click enables the user to continue with free navigation. This method provides the user with general / exploratory navigation as described by Mackinlay and colleagues (1990), along with support for guided navigation, an idea that was supported for example by Galyean (1995). The guided navigation feature was included to provide the user with simpler navigation that is enabled by simple mouse clicks on the arrows.

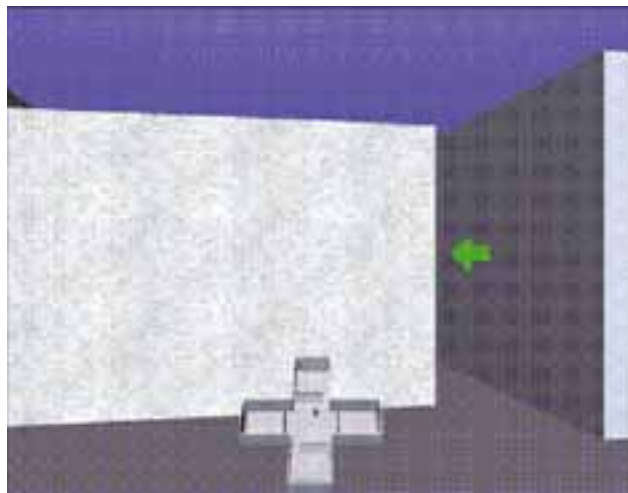


Figure 3 Method 2 (simple map and arrows)

The third method provides the user with targeted navigation (Mackinlay et al 1990) to areas of interest in the virtual interface (Fig. 4). In order to simplify the use of the mouse, the navigation was enabled by simple mouse clicks on the map rather than by pressing the mouse button and moving the mouse. Upon clicking, the viewpoint is animated to the related area and the avatar representation moves accordingly.



Figure 4 Method 3 (navigation map)

The following is a summary of the methods:

- **Method 1** (simple map) – A fixed 3D miniature that provides a view of the environment (Fig.2).
- **Method 2** (simple map and arrows) – a simple map (method 1) accompanied by navigation aids in the form of arrows that upon clicking provide guided navigation to associated areas (Fig. 3).
- **Method 3** (navigation map) - A fixed 3D miniature model of the environment that provides targeted navigation, which is enabled by clicking on the map (Fig. 4).

Aims and Objectives

The aim of the first experiment was to investigate factors that affect navigation and their relationship to task completion within and attitude to the NIVEs. The following objectives were generated:

- Investigate any relationship between navigation, task performance and features of the VEs.
- Investigate any relationship between user attitude and features of the VEs.

Hypotheses

It was hypothesised that guided and targeted navigation would result in faster performance. It is possible to summarise the hypotheses as follows:

- Any difference in task performance and user attitude would be related to the navigational method used.
- Environments with navigational assistance would result in quicker task performance and more positive user attitude compared with the control condition.
- The navigation map would result in the fastest task performance and most positive user attitude.

The experimental environment

It was intended that the environment should provide challenges for navigation and orientation as most NIVEs do. Several authors have employed the 'room(s)' metaphor in their 3D GUI or VE research. The early 3D interface - the Information Visualizer (Mackinlay et al 1992) used virtual 'rooms' for the user to retrieve information in 3D. Li et al (1999) tested their techniques for navigation in VEs, using a room(s)-like environment. Additional examples are Drucker and Zeltzer's (1994) work, and the Task Gallery (Robertson et al 2000), which also employed a rooms / gallery shaped environment in their research. It was therefore decided in this study to base the 3D environment on a 'rooms' metaphor, as shown in Fig. 5 below.

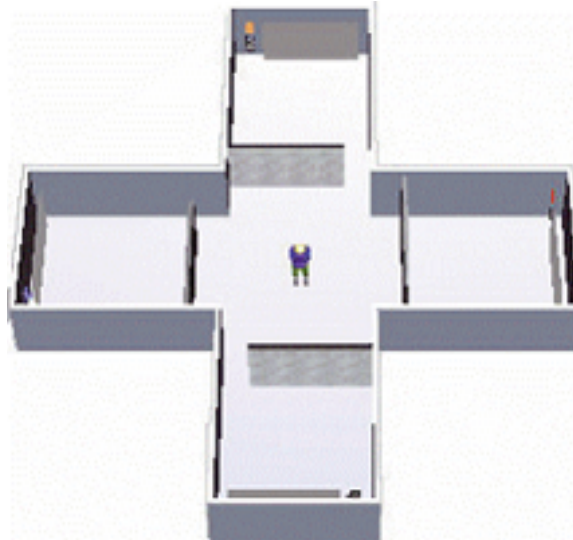


Figure 5 Layout of the environment: consisting of four rooms and a central space.

Method

In the following section the stages of the experiment are presented.

- Practice stage - the user is introduced to navigation in a desktop VE and practices navigation.
- Subjects were then presented with the following conditions:
 1. Environment-only, navigation is enabled by mouse movements (control).
 2. Environment with a 3D view map, navigation is enabled by mouse movements.
 3. Environment with a 3D view map and with the navigation arrows. Navigation is enabled by mouse movements and by clicking on the arrows that animates the viewpoint accordingly.
 4. Environment with the 3D navigation map. Navigation is enabled by clicking on the map that animates the viewpoint accordingly.

In addition to randomising the order of the conditions in the experiment, the location of the rooms was presented randomly, the starting viewpoint for each test was randomised and the task order in each condition was also randomised. Pilot studies were undertaken prior to the first run of the experiment proper in order to test the experimental methods and evaluation tools such as questionnaires. It was then possible to make adjustments to the methods in the

light of the experimental work. The results from the pilot studies suggested that the proposed methods and tools were satisfactory.

The tasks

In each condition, the users (university students and staff) had to navigate to four rooms of the virtual interface and click on a menu item in each one of these rooms in a pre-defined order. They were required to remember features of the rooms and the menu items. The task order was randomised among the different conditions. This kind of task involves navigation-only operations with simple mouse clicks on menu items and did not include any additional complex or time-consuming operations.

Data collection

Each section of a task was timed along with the overall time spent to complete the tasks successfully. All participants were observed and notes were taken regarding their performance and actions they made while accomplishing the tasks. Prior to starting the experiment the participants were asked to complete a questionnaire regarding personal details and relevant computer and virtual world experience. At the end of each test users were required to answer questions about the environment and tasks. This also provided information as to their ability to remember location of information in the environment. Finally at the end of the experiment they answered a short questionnaire intended to measure their attitude to the experience.

Results

The following tables (1,2 and 3) present the results for the four conditions tested. The parametric variables ‘time’ - that it took the user to perform the tasks, and the user’s ability to ‘remember the location of the rooms’ were analysed using an Analysis of Variance (ANOVA) (Tables 1 & 2).

Table 1 Means of ‘time’ and ‘remembering rooms’ location’ variables in the four conditions

Means				
Variable	Env. Only	Env. & 3D view map	Env., 3D view map & arrows	Env. & 3D navigation map
Time	273.08 (SD 87.85)	248.16 (SD 168.27)	208.33 (SD 93.09)	101.41 (SD 27.41)
Remembering	2.16 (SD 0.71)	2.33 (SD 0.49)	2.16 (SD 0.57)	2.41 (SD 0.51)

Table 2 ANOVA of the time and remembering variables

Analysis of Variance			
Variable	F	df	Sig.
Time	7.87	3	.00
Remembering	0.76	3	.53

Non-parametric variables consisted of subjective users' feedback, attitude and preferences and were analysed using a Friedman test / mean ranking presented in Table 3 below.

Table 3 Attitude to environment and Friedman Test results from users' feedback (1-5 Likert scale) in the four conditions

Variable	Mean Rank				Chi-Sqr.	Df	Sig.
	Condition I (Control - env.- only)	Condition II (method 1 - simple map)	Condition III (method 2 - simple map & arrows)	Condition IV (method 3 – navigation map)			
Navigation	3.46	3.04	2.42	1.08	24.88	3	0.00
Mouse	3.33	3.29	2.13	1.25	25.87	3	0.00
Task	3.25	2.83	2.75	1.17	23.11	3	0.00
Orientation	3.33	2.67	2.83	1.17	21.28	3	0.00
Freedom	3.00	2.50	2.29	2.21	3.18	3	0.37 ^{nt}
Finding	3.04	2.67	2.71	1.58	10.62	3	0.01
Preference	3.54	2.88	2.17	1.42	20.27	3	0.00
Overall easiest	3.75	2.92	2.25	1.08	27.40	3	0.00
Overall preference	3.75	2.83	2.17	1.25	24.10	3	0.00

(Env.=Environment, Likert 1-5 rating 1 = good; 5=poor)

Fig. 6 shows below how the time variable was related to each of the four experimental variations in the environment.

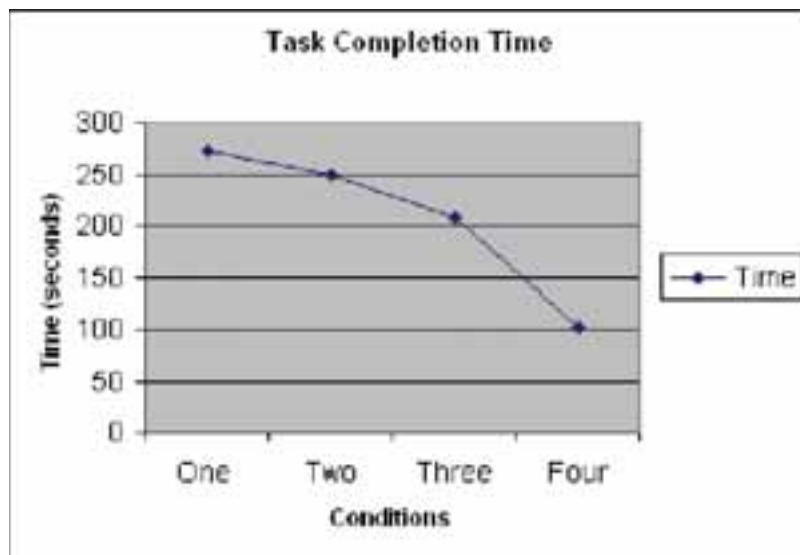


Figure 6 Task completion time and experimental condition.

Table 2 shows that there was a significant difference ($p < 0.01$) found for task completion time between the environments tested. Fig. 7 summarises the effect of environment on the non-parametric variables tested in the study.

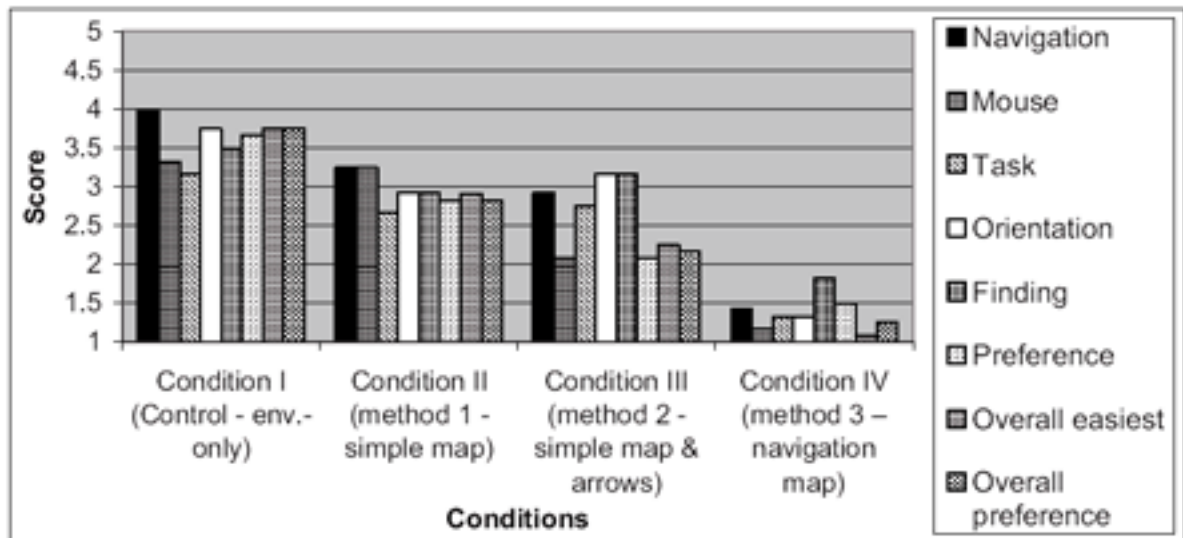


Figure 7 Non-parametric variables and experimental condition

Discussion

Tables 1 and 2 show that there were significant differences in task completion times that could be attributed to the effect of the environment ($p < 0.01$). Table 3 shows that there were significant differences in attitude to the task performance also due to the effect of the experimental condition. It is interesting to note that, despite significant differences in task completion time and attitude to the navigation method employed, there was no significant difference in the ability to remember information related to locations. This is despite tasks performed under the control condition (i.e. no assistive features) taking almost three times as long to complete as the fastest task completion (navigation map). This is interpreted as being related to the additional cognitive load placed on learners due to the difficulty of navigation in the control condition compared to other conditions. Increased time was spent dealing with the difficulties involved in navigation, rather than performing tasks and remembering. It is also likely that in the conditions with less cognitive load, features of the environment were not better remembered because learners experienced less of the environment, due to the assistive measures removing them from it, leading to decreased task completion times. This finding has interesting implications for learning in such environments. Although assistive measures decreased task completion times and improved attitude to the environment, they did not assist in learning about the environment ($p = 0.53$). We argue that there is a trade off between how much assistance learners are provided with in difficult environments and their ability to engage with and learn about the environment. This was supported by our findings. Environments such as Second Life provide several assistive methods intended to decrease task completion times and improve attitude, such as 'flying' and 'teleporting'. Although these may improve attitude to the environment by speeding up interaction and navigation, they are not likely to help in remembering the environment. Needless to say, the actual *environment* itself is central to what takes place in virtual *environments* otherwise we may ask, why have them? The benefits claimed for such spaces relate in part to the motivational aspects of such worlds. It is indeed paradoxical that in order to overcome the cognitive overhead placed on learners by the complex virtual environment, assistive measures to help navigation remove learners from a large part of the environment itself. Even with such assistive measures, there

is a considerable learning curve for even experienced computer users before navigation and task completion become easy in virtual worlds. This is also true for teaching staff who may lack confidence when interacting with student experts in such spaces. Navigation in *fully* immersive worlds is simplified to some extent by our worldly experience. In NIVEs, mouse navigation requires that we keep still and the world moves as we move around in such spaces. This is not natural to us and it is difficult if not impossible for us to obtain the benefits claimed by Crossley and colleagues (1997) related to the naturalness of virtual spaces. We are not able to benefit from a more natural environment, indeed we are hampered by it. Table 3 shows that learners, despite the assistive measures, faster task completion and improved navigation did not feel less constrained because of this ($p=0.37$). This shows that the feeling of constraint and freedom users experience relates more to the frustration of poor navigation than to the ability to roam unhindered. The control environment allowed users to wander freely, yet there was no difference in this dimension from the most physically constrained environment with guided navigation.

It is reasonable then to ask what exactly the pedagogical benefits of learning in NIVEs are. The ability to provide realistic simulation is an important feature of 3D worlds. However, the amount of realism provided by Second Life is quite minimal. In almost all respects it is an artificial world with mouse and keyboard navigation, low resolution graphics, anonymous users with strange names, poor physics, users flying and teleporting and rather strange abilities such as walking through walls and typing as they talk. The possible benefits related to motivation and the feeling of presence in such space however is of interest to us. We intend to investigate these potential benefits in detail with groups of learners at the University of Hertfordshire in the near future.

We have also found in our other studies that individual differences such as gender ($p<0.05$) and approaches to learning ($p<0.05$) have significant effects on attitude and task completion (Haik, 2005). It will be important to continue to understand how such factors affect learning performance in such worlds. Should learners be disadvantaged by such environments, it will be important to understand and to allow for it in some way, possibly by induction measures or the provision of greater assistance.

Given that we find good pedagogical reasons for using NIVEs such as Second Life in learning, there may still be problems of undertaking formal learning in such spaces. The use of web 2.0 technology in learning is a fairly recent innovation that seeks to capitalise on the rapid growth of the social aspects of the internet and apply them to learning. Second Life may be grouped under the web 2.0 banner. Often such services are provided 'free' to learners, and teachers are keen to integrate them into formal programmes. The true cost of this to institutions may be high, including training and support, as well as materials development. Such third party providers are liable to disappear, to commercialise their service, or throw off users, or, as in the case of Woodbury University in the USA, the whole campus. Second Life removed Woodbury's campus for terms of service violations by students.

"..in violation of the terms of service. These problems include incidents of grid attacks, racism and intolerance, persistent harassment of other residents, and crashing the Woodbury University region itself while testing their abusive scripts. Due to the ongoing problems, Linden Lab has no option but to immediately close the Woodbury University region"
(<http://www.secondlifeherald.com/slh/2007/07/woodbury-univer.html>)

The high development cost of creating your own virtual world and the loss of true 'social networking' in university developed systems may be too high for many organisations. Despite much research over the last couple of years, there are few good examples of the pedagogical benefits of web 2.0 in education. Most examples stress the motivational benefits of such systems with little regard to the true cost, the risks, or the actual benefits to learners. It is also important to understand the part that context plays in learning. Distance learners, for example already have significant overhead on their learning. It will be important to ensure that learning in a wide range of contexts and personal situations is not made more difficult by the use of difficult environments with little pedagogical benefit. Our research will centre on finding the pedagogical benefits of such systems and also on the best sorts of assistive measures to provide for learners to ensure a successful and motivational learning experience.

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Second Life as a holistic learning environment for problem-based learning and transferable skills

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Keywords Second Life, holistic learning, transferable skills

Abstract:

This paper seeks to demonstrate the affordances of Second Life for a multifaceted approach to learning. Our experience is that it supports the development of wider transferable skills while delivering subject specific content.

Our most recent experience of using Second Life in teaching has been to embed a problem based element of learning within a conventionally taught module. We used a machinima based assessment where students worked in groups to create short video clips from their activities in Second Life. The conventional elements of the module introduce students to a range of media creation and manipulation tools that they can use to develop their final assessment. Although the assessment has some core criteria, the content, style, narrative and working pattern are all decided by the student groups.

We believe that this approach provides a useful stepping stone between content driven and problem based teaching techniques.

Initial results (from questionnaires, interviews and student reporting) seem to indicate that students have brought in learning from other areas that enhance their transferable skills in group work, project management and problem based learning.

Second Life and Education

Research into the educational benefits of virtual worlds has been documented since the 1990s (Hughes & Moshell, 1997), but is only relatively recently that technology has made such environments available to the mass market (Brown, et al., 2008).

Second Life (SL) is one of these online, 3-D virtual worlds. Developed by Linden Labs, and opened to the public in 2003 (Linden Research, 2006) it has been the focus of a variety of educational activity (Simteach, n.d.). The nature of the world is likely to be the reason for this. Users (called residents) are able to interact with each other, but are also provided with tools and tutorials to create and manipulate aspects of their own environment (and retain ownership) (Linden Research, 2006).

Numerous higher education and university establishments (including Harvard and many in the UK) have their own virtual campus within Second Life (Kirriemuir, 2007). Anglia Ruskin's virtual campus is located on Anglia Ruskin Island (a virtual representation of land 65,500 square metres) where user access and activities can be better controlled.

Much of the initial educational activity in Second Life tended to follow a traditional class-based approach of virtual lectures and demonstrations. Whilst such activities provide additional support for distance learning, we proposed that envisioning learning in SL as a field trip, better exploits the intrinsic properties of the environment (Brown, et al., 2008). The perceived

freedom of the socially-constructed environment is important to practice skills and engage in 'meaningful practice' (Jonassen, 1997). Authors agree that online collaboration can develop skills such as reflection, interpersonal interaction and help motivate learning (Slavin, 1992; Johnson & Johnson, 1992; Thorley & Gregory, 1994).

Problem-Based Learning

In a similar way, the traditional practice in Higher Education of didactic content delivery is moving toward student-centred models, with techniques that support independent, self-motivated learning. A technique used to encourage a self-directed approach is that to engage student groups in the exploration of problem situations (Savin-Baden & Major, 2004). This is known as Problem-Based Learning (PBL). Instead of providing students with information, who then demonstrate their understanding through assessment, students work in groups to explore a problem, identify the information lacking, and develop appropriate skills as required; a task-based, constructivist approach (Merrill, 2007). In this way students are guided to discover their own understanding for themselves (Jonassen, 2000; Sims, 1997).

Undergraduate Module

Our most recent experience of using Second Life in teaching has been to embed a problem-based element of learning within a conventionally taught module. The undergraduate module, at Level 1, aims to provide an introduction to (a basic grounding in) a variety of techniques for the creation and manipulation of image, sound, and video. Within this context, the aim was to use freely available software and teach enough about the underlying theory and techniques for students to make a start, and direct them to resources that would enable them to develop further skills if required.

Machinima

We did this by using a machinima based assessment where students worked in groups to create short video clips from their activities in Second Life. Machinima is a word linking those of 'machine' and 'cinema', to describe an activity of capturing real-time, interactive, virtual world environments, in order to create video footage. The video output appears as a computer-generated animation. The production of machinima can be likened to that of cinema, with virtual actors (residents of the virtual environment), stages, rehearsals, direction, camera angles, lighting, costume, and props.

Second Life Induction

As part of the introductory scaffolding, students were encouraged to undertake the standard 'induction' activities provided by Second Life for new users. In addition they had to confirm that they had read the terms and conditions for using Second Life and the requirements on behaviour for the Anglia Ruskin Island. As well as technical elements, students were set exercises that included socialisation activities. The main taught content focused on showing students where to find tutorials and examples for building artefacts in Second Life. Additionally, basic techniques of machinima and in-world resources for setting camera positions and lighting conditions were demonstrated.

Assessment

Students, in groups of 2 or 3, had to create a scene and provide the action for a short video clip, filmed using machinima techniques in Second Life. Student groups were asked to include a narrative to demonstrate artefacts they had created, textured and used as props in the scene. The problem-scenario was not without scaffolding (tutor support) for both technical and social issues. For example, it has been demonstrated that self-directed 'help-seeking' behaviour in interactive learning environments is related to better learning outcomes, but students are not always effective in this (Aleven, et al., 2003). Social interaction was encouraged as interaction between students may not happen in the natural course of events (Hallett & Cummings, 1997). Indeed, scaffolding has been described as a critical element of successful PBL design (Stewart et al., 2007), and has been shown to reduce cognitive load (Hmleo-Silver et al., 2006) and enhance inquiry and performance (Simons & Klein, 2007) in problem-based learning environments. Problem-based learning activities were therefore mapped to the anticipated motivational aspects of the environment (Laurillard, et al., 2000; Brown, et al., 2008).

Each group compiled a joint report containing individual reflections on how they approached the following assessment instructions:

Common Elements 40%

(one copy, worked on by all in the group), comprising:

Narrative	the concept & content of what is being shown (image, sound, models)
Story board	with asset list indicating who each asset author.
Production	and editing of video

Individual artefacts 40%

(contribution to the group)

Account of the how the Machinima video was made. Description of artefacts made –at least one each of: Bitmap image or texture, vector graphic, 3D Second Life artefact.

Presentation – structure and coherence of document in report format.

Group Presentation - 20%

Demonstrate machinima video, supported by a brief explanation of what you have done and be prepared to answer questions on your work.

From this marking scheme it can be seen that the focus of the assessment was on the process - allowing considerable flexibility on how, or even what, was produced as a final deliverable product. Each of the exercises and assessments reinforced a problem-decomposition approach, where sub-elements of the problem required the student to extend their learning beyond the initial introductory material. Although the assessment has some core criteria the content, style, narrative and working pattern are all decided by the student groups. By specifying the task, and scaffolding basic technical skills, decisions regarding task implementation are down to the student, co-students, and the resources with which they interact.

Evaluation

During our educational activities in Second Life we have observed and attempted to measure the degree that this environment encourages exploratory, problem based approaches to learning. We suggest that Second Life supports social constructivist learning and that it

provides an all inclusive holistic environment. To support this we map criteria from papers on problem based learning (Hmleo-Silver, 2004) and holistic (Chin & Williams, 2006) learning literature.

Mapping onto a Problem-Based Framework

Jonassen et al. (2000) state that “*Constructivist learning environments are [...] problem-based environments that engage learners in articulating, solving, and reflecting on their solutions of a problem or project space, including a representation of the problem, descriptions of the context in which the problem occurs, and the ability to manipulate and test various solutions to the problem*”. Whilst it would seem that the Second Life virtual environment is aligned with this description (learners are engaged, provided with visual representations of the problem, creating their own context, and able to manipulate various solutions), we further attempt to map evidence to a PBL framework.

There are a number of frameworks that identify the key goals of PBL. Here we use the framework proposed by Hmleo-Silver (2004).

Mapping PBL Framework (Hmleo-Silver, 2004)

PBL Goal	Evidence
Flexible Knowledge	Each of the student groups had to consider how the limitations of environment and resources affected their creative ideas. Without a single ‘correct’ way to approach the implementation we found a variety of different approaches that suited the group skills.
Effective problem-solving skills (planning, design and problem decomposition)	The story line, the action and the supporting props were created by the group so these have to be designed and integrated. The scene has to provide three minutes of coordinated action so every aspect has to be planned and choreographed.
Self-Directed Learning Skills	Basic exploration of Second Life provides the context for developing simple research skills and sifting through the various resources, tutorials and knowledge base web pages to find what you need provides a good way of testing these abilities.
Effective Collaboration	When shooting video clips from Second Life you need at least one, and preferably two other people to provide the action while someone give directions and works the camera. The group has to work well together with attention to timing and direction. Peer group learning was also apparent as locations for free resources and various techniques were shared throughout the cohort
Intrinsic Motivation Groups	were not in competition but the ability to see what others were building and in some instances join in, provided motivation to create something that appealed to peers as well as assessors.

An important feature for a problem-based or scaffolded inquiry environment is that it gives students the opportunity to engage in complex tasks beyond their current abilities (Hmleo-Silver, et al., 2006). This was evidenced by a student creating an entire chess set rather than the single piece required for the exercise. Other students extended the assessment

by learning about scripting actions for objects, using the Second Life programming language, LSL.

Another key aspect of PBL is the 'real world' nature of the task. A well-selected task, or trigger, should encourage students to develop knowledge and skills that direct the abstract skills of graduate learning to solve a problem of a type that they may encounter in a professional capacity. In this respect although the environment is virtual, the machinima video represents an artefact created through a real design process with the kinds of limitations imposed by a real world – not unlike a brief from a media design company.

Mapping onto an Holistic Framework

The phrase 'holistic learning environment' has become more popular as the facilitation of learning seeks to evolve from information transfer to a more student-centric approach.

Chin & Williams (2006) describe a 'holistic learning environment' theoretical framework (model for eLearning) which has been operationalised by U21G (Universitas 21 Global, an online institution comprising 16 highly-reputable, member universities, and Thomson Learning publishers.) comprising a number of overlapping 'sub-environments'. Chin & Williams (2006) describe the following scaffolding as essential for a holistic environment:

- the instructive environment
- the situating environment
- the constructive environment
- the supportive environment
- the communicative environment
- the collaborative environment
- the evaluative environment (Teo, 2003, cited Chin & Williams, 2006)

and whilst the authors' study is in relation to distance learning of some 1200 postgraduate students in more than 50 countries, many of the challenges are relevant to our discussion here.

Mapping Holistic Learning Environment Framework (Chin & Williams, 2006)

Sub-environment	Description	Mapping
(Chin & Williams, 2006)		
Instructive environment	The content, the provision of subject domain information.	Subject domain knowledge is provided by subject experts through tutorials and notecards in the Second Life (SL) environment.
Situating environment	Learning is best facilitated when situated within authentic activity rather than abstract concepts.	Assessment tasks are 'authentic activities' situated within (Seeley-Brown, et al., 1989) the SL environment.
Constructive environment	Knowledge is not transmitted but constructed through activity.	Task requires that students actively construct knowledge through discovery of information and situated practice.

Supportive environment	Tools for executing tasks (performance support) and mentoring support for the learner (cognitive support).	SL provides tools for editing and manipulation of author creations. Chin & Williams (2006) describe how learners can provide cognitive support for each other, and this was demonstrated as members of each group help other members. Tutors would be available in-world to provide support at a distance if required.
Communicative environment	Interaction with other learners to provide a sense of belonging and reduce isolation.	Group members are able to support each other within the environment and because of the visual nature are able to see other groups and through speech, chat, instant message, or gesture.
Collaborative environment	Ability to work in teams.	SL facilitates groupwork as described above. Members were able to aggregate knowledge.
Evaluative environment	Formal & informal formative evaluation to provide information on progress.	Tutorials provided informal formative feedback, with tutors inworld to provide additional feedback & guidance for reflection. Overlapping with the communicative and collaborative environment, students were able to participate in informal peer assessment for progress.

Student Response

Students were asked to respond to a questionnaire which asked a number of questions about the nature of the assessment. One of the key areas on which we focussed was the level of support to enable each of the two assessments. The first assessment was strongly based on taught material and required students to create and document a bit mapped image, a vector image and a 3D image. Contrastingly the second assessment (machinima) provided scaffolding support, but a requirement for student-directed learning.

Results from the questionnaire showed that 82% of students had communicated in some form over the internet, and 35% had used virtual environments. 47% of students felt prepared for the first assessment compared to 24% for the machinima assessment. For the first assessment, 29% of students reported they had found their own material, with 65% finding their own material for the machinima assessment. Of the 65% finding their own material, significantly these were students who had not used virtual environments before (44%), or students who reported they had used virtual environments 'a lot' (31%).

In terms of the development of skills, students reported the following skill development:

Planning	25%
Project Management	13%
Groupwork	31%
Remote Working	56%
Research Skills	38%
Self-directed Learning	63%

Of interest is the fact that students report Remote Working skills have developed, yet 65% were at the same location during work on the project.

Of the 63% reporting developed Self-directed learning skills, students reporting higher scores were more likely to feel better prepared for the machinima assessment. There was no correlation between the reported development of this skill and previous familiarity with online communication or virtual environments. So students, to whom this environment was new, were not at a disadvantage for the development of this skill.

Some students reported they found the machinima assessment took a lot of time (38%), and the same number found the assessment difficult (with some correlation). In terms of the machinima assessment, 38% enjoyed working in a group, but 44% disliked the concept of the assessment, with 58% reporting a dislike of machinima. Despite this, 64% were motivated by the thought of producing a good end result, with 57% being motivated by their group, or the thought of the final mark, and 50% being motivated by the 'interesting environment'. Asked what they would change about the assessment, a third of students requested more staff contact / feedback / support.

In terms of Hmleo-Silver's (2004) key goals for PBL, students' self-perceptions map as follows:

Mapping PBL key goals to student self-perceptions

PBL Goal	Evidence
Flexible Knowledge	65% of students report 'a lot' and 'quite a lot' of their own material was found for the assessment, building their own knowledge to a level required to complete the assessment. A further 24% indicating 'some', or 'average' development (total 89%).
Effective problem-solving skills(planning, design and problem decomposition)	25% of students report 'quite a lot' of planning skill development, with a further 31% indicating 'some', or 'average' development (total 56%).
Self-Directed Learning Skills	63% of students report 'a lot' and 'quite a lot' of Self-Directed Learning Skill development, with a further 31% indicating 'some', or 'average' development (total 94%).
Effective Collaboration	31% of students report 'a lot' and 'quite a lot' of groupwork skill development, with a further 44% indicating 'some', or 'average' development (total 75%).
Intrinsic Motivation	64% of students reported being positively motivated to produce a good end product, with a further 21% indicating 'some' or 'average' intrinsic motivation (total 85%).

The results show that most students were happy with the level of support for both assessments despite the considerable increase in the amount of student-directed learning required to complete the second task. Most of the comments demonstrated a good level of engagement as many related to weaknesses in the tools used and the desire to extend the capabilities of Second Life.

Discussion

Students were asked to participate in two sets of assessment, one strongly directed, the other requiring self-direction; both were scaffolded. The second assessment (machinima) was situated in Second Life, an online 3-D virtual environment. It was envisaged that the nature of the environment, coupled with the structure of the learning activities would encourage the development of transferable skills. We set out to assess the effectiveness of the environment to support learning, the structure of learning activities, and the self-perceived development of transferable skills.

This paper has sought to demonstrate the affordances of Second Life for a multifaceted, holistic environment for learning. In our earlier paper (Brown et al., 2008) we described how modes of delivery (Sharpe et al., 2006) could be mapped to types of learning (Mayes and de Freitas, 2004) with the Groupwork Project grounded in the transformative (constructivist) mode. Here we have attempted to demonstrate the holistic nature of the Second Life environment by mapping onto a Holistic Learning Environment theoretical framework (Chin & Williams, 2006).

Whilst the theoretical framework has been used for distance learning, it is well-tested, and the measures are a useful start in assessing the multifaceted nature of a learning environment. More needs to be done to define what is meant by, and evaluate the nature of, a holistic environment.

We sought to demonstrate the suitability of the virtual environment for problem-based learning through the mapping of learning activities onto PBL key goals (Hmleo-Silver, 2004) and assessed their effectiveness through the self-perceived skill development of students, situated within these problem scenarios. Whilst there appears to be a positive development of self-directed learning skills, this is a snapshot of one cohort, and further work would need to be done to assess consistency. More work needs to be done in the assessing the development of transferable skills.

Future work will be to use an increased level of problem-based learning, utilising the strengths of Second Life. Noting the importance of scaffolding in the development of transferable skills, suitable support will be provided through the strengthening of the instructive, supportive and evaluative sub-environments (Chin & Williams, 2006) through the creation of interactive learning resources. These sub-environments may also be strengthened via links to virtual learning environments such as SLOODLE. Furthermore, whilst the tasks are authentically-situated within the virtual world, the real world element of the task could be improved by using a real brief from a local business or competition.

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Creating and Assessing a Virtual Patient Player in Second Life

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and Sheetal Kavia

Keywords: Second Life, virtual patient, interoperability, standards, medbiquitous

Abstract:

The JISC-funded PREVIEW project aims to develop problem-based learning (PBL) scenarios in Second Life (SL) for distance-learning healthcare students. One of the target courses - a Paramedic course run by the joint faculty of St George's University of London and Kingston University – uses PBL that is based upon a 'virtual patient' model.

In order to keep scenarios as sustainable and portable as possible we adopted the MedBiquitous VP Standard – or MVP – designed for any virtual patient player or authoring system. For this project an MVP player capable of operating within Second Life was created. This allows the same case to be played both within Second Life and on the web.

The PBL scenarios were tested with small groups of Paramedic students with some limited experimentation with different collaboration models. Feedback from students and tutors was generally positive.

Further adaptation and testing of the scenarios will be carried out over the coming months, before the scenarios are embedded as PBL exercises within the Paramedic curricula in the next Academic year.

Introduction

The JISC-funded PREVIEW project aims to develop problem-based learning ^{1,2} (PBL) scenarios in Second Life (SL) for distance-learning healthcare students. The project started in February 2008 and is due to complete in March 2009, with live students from September 2008.

As part of the research into learning in virtual worlds ³ a model of Avatar and Information driven scenarios has been developed (Savin-Baden, et al, 2008 - forthcoming). In the former the emphasis is on interaction with avatars (either human or computer controlled), and in the latter the focus is on interaction with objects which yield information. The PREVIEW project is exploring both models. The avatar driven scenarios are being run at Coventry University (using a chatbot and AI engine⁴ developed by Daden Limited), and both avatar driven and information driven scenarios by the joint faculty of St George's University of London and Kingston University – using PBL that is based upon a 'virtual patient' model.

A virtual patient (VP) is defined as: “an interactive computer simulation of real-life clinical scenarios for the purpose of medical training, education, or assessment.” ⁵ The majority of Virtual Patients are text driven web applications; PREVIEW is the first project to deliver such resources within a multi-user virtual environment.

MedBiquitous Virtual Patient (MVP)

In researching the best approach to take to creating virtual patients within a virtual world it was decided to use the MedBiquitous Virtual Patient ^{6,7,8} standard. This was since:

- It was an open standard
- It removed the need to develop a new mark-up
- It used XML, so would work well with existing tools
- There was already familiarity with MVP tools such as Vue and Labyrinth

The MVP model (Fig 1.) is one of nodes and links. Each major decision/information point in a scenario is a node, and nodes are linked to other nodes (representing decision groups) by links.

At the top (map) level the nodes are referred to as Activity Nodes, and typically define one activity to whatever level of granularity is required. An activity node refers to one or more Data Availability Nodes (DAM Nodes), which define what information is available at that node at that time, and each DAM Node refers to one or more pieces of Virtual Patient Data (VPD), which may be simple narrative text, images/audio/video/other media, or structured text such as medical specific forms including Diagnostics and Medication (although these are little more than collections of string and integer fields).

The MVP standard also includes counters and rules to allow more sophisticated link and node control. Within these scenarios counters were used to track the quality of student choices, simulated elapsed time, and basic physiological values such as heart rate, breathing rate, pain, CO2 levels etc. These physiological counters were affected by drugs and treatment and read by the relevant devices. For example, giving a patient morphine would reduce their pain value. If the student was to ask the patient their pain value before and after administering morphine, the patient would report different levels of pain.

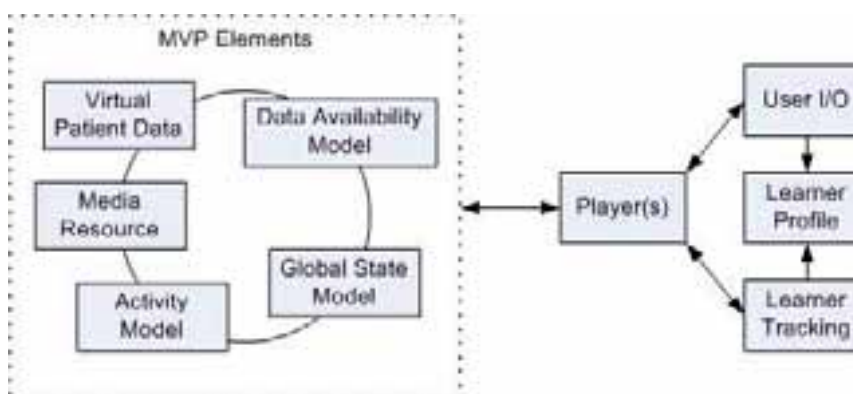


Figure 1 MVP Architecture

Most existing MVP implementations are web based (e.g. Fig 2) – the user follows through the case by clicking on hyperlinks to move from screen to screen as they make their decisions.

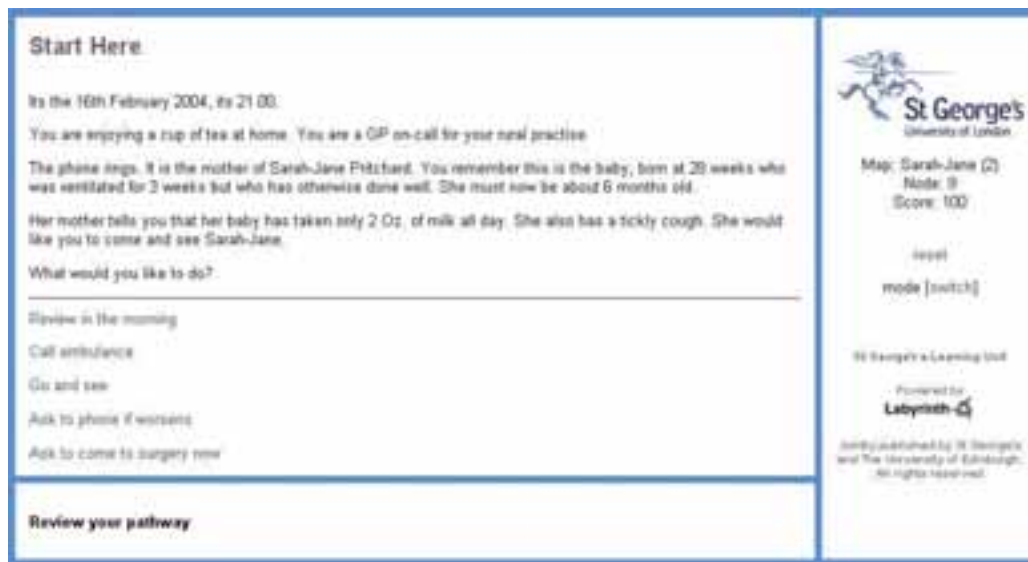


Figure 2 A typical existing MVP web based player

Player Architecture

The basic components of the system (Fig. 3) are:

- The XML files comprising the MVP case stored on a web server
- On the same web server an MVP player which will both play the files directly for web users, and provides a web service to a virtual world controller
- A virtual world (in this case Second Life) controller which acts both as a GUI and as an interface between virtual world objects and the MVP Player
- A Heads Up Display (HUD) in Second Life to allow users to access the system remote from the controller
- Second Life objects which link back to the Controller on chat channels and activate specified nodes. One key object was the sensor framework that sat within the patient mannequin and allowed students to touch particular assessment points and place particular devices. Other objects represented every major piece of medical equipment and every drug in the ambulance.

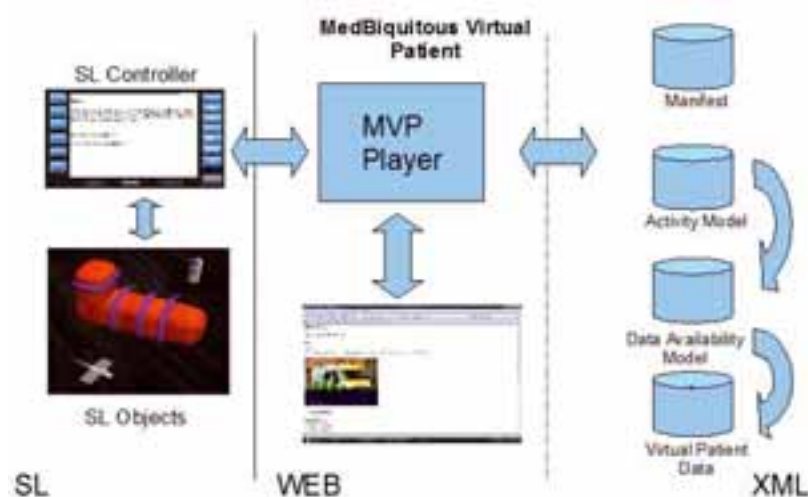


Figure 3 MVP Player Architecture

Adopting this architecture (where most of the code was on the web server rather than in Second Life) offered three principal advantages:

- Deploying the system to another virtual world (e.g. Olive or Twinity) would require only limited recoding
- Cases can be edited on the web using rich web tools rather than within the virtual world
- The Second Life objects need have minimal functionality (effectively just calling a particular node when touched) which again minimised the amount of in-world changes that need to be made for each scenario, and also creating more general purpose objects (e.g. a cannula used in paramedic scenario would not need recoding if used in a ward based scenario).

The operation of the system is then:

- Objects in Second Life respond to being touched (or other interactions) by requesting a particular node by sending an in-world message to the MVP Controller
- The in-world MVP Controller makes a web-services call to the MVP Player to retrieve the relevant data for the selected node
- The MVP player accesses the files are stored on the same server, and also a session file and decides on the response to be sent to the Controller
- The MVP Controller either displays the response, or sends an instruction to an object to display it (which may be graphically, as text, a media file or even an object change)
- The MVP player can also be accessed via a web browser to play the scenarios on the web if desired

During development of the system there was a requirement to cope with changes in the Second Life functionality – for instance the introduction of support for viewing web pages. This significantly improved usability and also made it easier to support a Heads Up Display for the students – which meant that they could see the display wherever they were in the scenario area.

Further work since by Daden has now allowed the web based version of the MVP Player to be viewed and navigated in Second Life allowing yet another model of interaction.

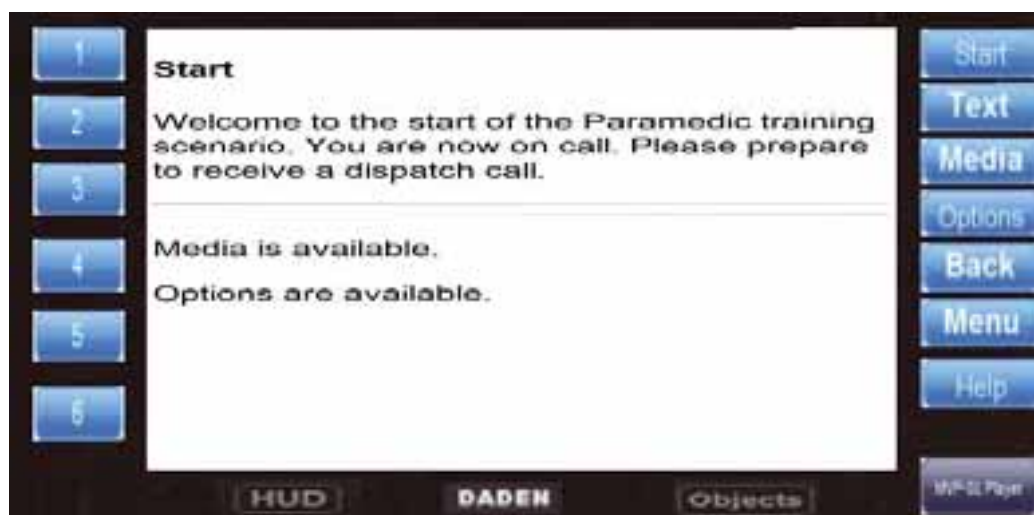


Figure 4 The MVP SL Controller

The Paramedic Scenarios

The initial scenarios were aimed at Year 1 paramedic students. Since these were problem-based learning exercises there was no need to impart information or guidance during the scenarios – the students discussed the scenario and what action to take between them.

Three scenarios were chosen which would test student knowledge:

- A motorcyclist in a road traffic accident with muscular-skeletal (MS) injuries
- A woman in an underground station with cardio-vascular (CV) problems
- A person with mental health problems in a job centre

Paramedic tutors initially created the MVP maps of the MS scenario (Fig. 4) and passed these to the systems partner (Daden) for testing on the system.

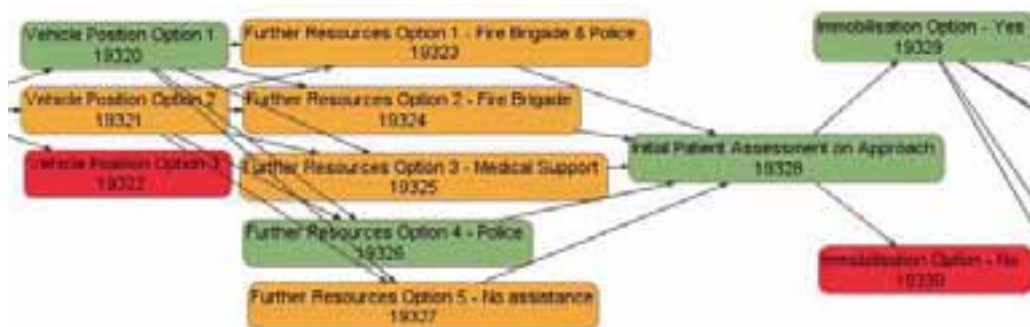


Figure 5 Original Case Map (part)

It soon became apparent that the cases had been designed within the limitations of the web based systems, in that the scenario played out in a step-wise fashion following the correct procedure (e.g. check airway – breathing – circulation). One of the advantages of the virtual environment though was that it could support all the options at all times since each option was represented by a device or touch point. This made the virtual world scenario far more realistic since students would be forced to rely on their own knowledge of procedure and not be prompted by the limited options that fit on a web page. As a result the maps (fig 5) were re-drawn creating a far more open choice scenario.

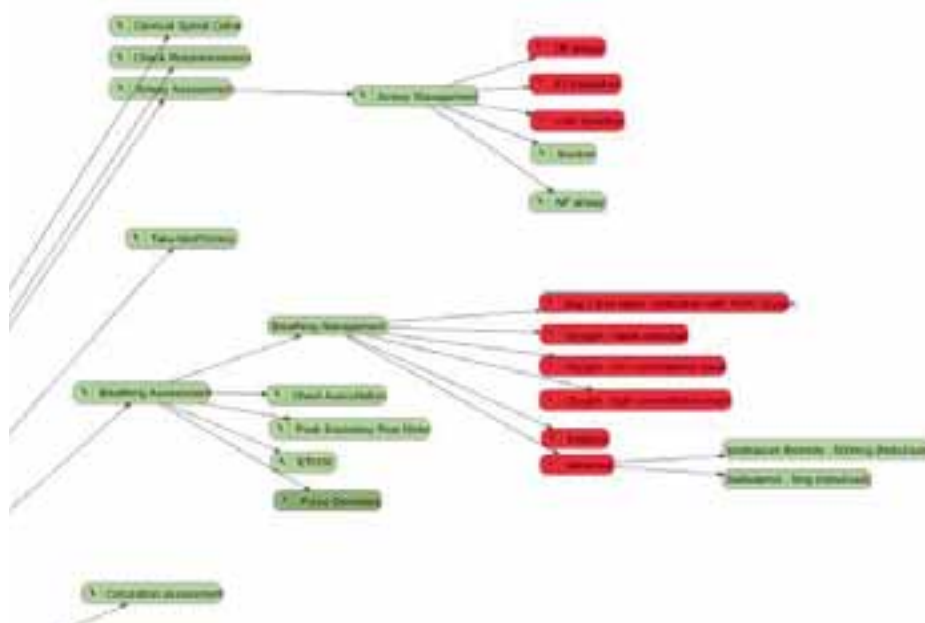


Figure 6 Final Case Map (part)

Given the similarity of the scenarios (a typical paramedic call-out) a single template scenario was developed, and then each of the three operational scenarios became simply a custom instance of the template – requiring usually only changes to descriptive text and the counters that flagged good, poor and bad choices (hidden from users until the end). This meant that a new scenario could be developed for testing in under an hour. The scenario template had around 100 nodes.

A standard scenario run through would then be:

- Student teleport to location
- They click start on the MVP controller
- The MVP controller takes them through the set-up (e.g. receiving the call, driving to the scene) in a linear form
- Once they have been given the “Initial Assessment on Approach” the scenario goes non-linear and students must make their own choices with no prompting
- Once the students think they have done what they need to do they decide on a suitable way of transporting the patient to the hospital, and then use the radio to alert the hospital or trauma centre, and the GPS to select their route
- The scenario then ends with a handover at hospital

Second Life Environment

To provide the immersive environment the ELU at St George’s University of London created a set of streets with photographic facades. The network of streets provided enough space and screening to allow 4 scenarios (including the training scenario) to be run simultaneously without overlap of chat. The environment also included a small underground station (complete with platform and tracks), a crashed motorcycle, and hospital (which also housed the briefing and admin areas for the exercises).

The scenarios focus purely on those aspects of the environment which were relevant to the medical knowledge being tested – so students did not drive an ambulance but teleported between scenarios and devices automatically attached to the correct point on the mannequin once selected.

User Testing

The PBL scenarios were tested with small groups of Paramedic students, all of whom were unfamiliar with the SL environment. There were 12 students in the test group. All students were initially in the same classroom, one student per PC.

For the first 1-2 hours the students were put through an SL orientation exercise which had been developed specifically for the PREVIEW project. This gave them the opportunity to learn how to use the SL environment (they had been recommended to complete the basic SL orientation before the testing day, though few had done so). Students were also given paramedic outfits for their avatars – which were very popular and helped with the sense of immersion.

They were then briefed on the general format of the exercise. Three instances of a demo scenario had been created (based on a drunken student outside a night-club), and students could then learn how to use the SL MVP Controller, HUD and SL objects to assess the patient and complete the scenario. A facilitator shadowed the task in-world and prompted the groups to discuss possible actions and their reasoning behind their decisions. At the end of the scenario the students wrote their handover notes into an SL notecard and then returned to the hospital and dropped the notecard into the relevant scenario box. This notecard was then emailed to their tutor.

The dummy scenario took about 1 hour, twice as long as experienced SL users had done in pre-testing, but was vital to familiarise the students with the system, especially the HUD and equipment box which both proved particularly challenging. The students then rotated around the three scenarios, spending roughly an hour on each.

Whereas, in the MS and CV scenarios, the prime model of interaction was through the SL objects, in the Alzheimer's scenario the students played through the whole scenario on the SL MVP controller. This would enable the evaluation of two different delivery modes. Again each group was shadowed in-world by a facilitator.

For the initial session all communication was through the SL text chat interface – although physical world talking was not explicitly forbidden. The second session used in-world voice communications. Some tests were carried out with putting students in separate rooms, but this had to be curtailed due to bandwidth issues. The third session had to be curtailed since the testing day coincided with a Second Life system maintenance session.

All activity in the main room was both captured on video camera and by in-world screen video capture. Chat logs were also recorded.

At the end of the testing a debriefing session was held and also videoed.



Figure 7 Scenario 1 - Alzheimer's

Assessment

Student

Feedback from students was generally positive.

The orientation was “pretty good”, although some felt they’d have liked it a few days before so they could test it out again out of class, and then have a refresher and a reference guide on the day.

Once basic navigation and action issues were mastered the biggest problem was around co-ordination. Students would often find themselves both talking over each other, getting out of sync in conversations, and taking actions before the group had reached a consensus. The latter was partly resolved by the group nominating a “clicker” who would only touch the mannequin, use a device, or interact with the controller once consensus had been reached. Even then one student said that there was *“Sometimes too much going on if you were the clicker, and sometimes easy to get carried away. Would be something you’d get used to.”*

Students could see how the virtual environment could provide a half-way house between using real actors and paper based exercises. They appreciated that real actor sessions were expensive to set up and timely to co-ordinate, but felt that paper exercises were too theoretical. The virtual world appeared to offer a reasonable compromise, with the immersive and open nature of the exercises mimicking real world experiences.

There was also a feeling that it would be beneficial to be able to go in and use scenarios alone - although can learn from each other, as well as facilitator. The students were keen to be able to use the scenarios for self-directed learning, if the VPs were written to provide more structured feedback on their decisions, to support and reinforce their own learning. This would enable them to use the scenarios in their own time both for additional learning and for revision and self-assessment. The collaborative nature of the virtual world would also have the advantage of supporting students across different residential locations (e.g. halls - although these had IT access restrictions, flats – where open broadband was common etc).

Students were less keen on the Alzheimer’s scenario which was played purely on the MVP Controller screen. They *“found it confusing”* and *“difficult to manage”* and *“could see no benefit to this compared to the others”* – although this may have been different if the students had not been in the same room or building.

Overall there were positive reactions to using this type of activity for learning. They would not like it to replace any face to face time, but would be happy to do say a scenario a month. They felt that this type of simulation bridged the gap between theory and practice. Interestingly they still felt as though they were in a learning session, not playing a game.

Other specific comments by the students included:

- *“Liked extra resources such as ECG. Would be useful to have more external resources e.g. JCAL guidelines to look up drug dosage.”*
- *“Extra screen to write collaboratively on might be good, but then an extra thing to have to interact on and would limit view even more.”*
- *“Making decisions helped learning. Decisions would be better if affected scenario more.”*

- *“Sometimes hard to realise what could and couldn’t do. Quite impressed by functionality.”*
- *“Good learning experience to mix trusts and look at other policies. Has potential to train for major incident.”*
- *“With refinement the scenarios would be really good.”*



Figure 8 Scenario 2 – Muscular-Skeletal

Tutors/Facilitators

Facilitators were impressed that students were engaged and concentrated well on the tasks at hand, and not too distracted by other SL features, despite being new to the environment. The orientation helped to exhaust some of the natural inclination to play, fly, click on everything in sight and continually edit appearance.

Students sometimes seemed a little stuck as to how to proceed – but it wasn’t clear if this was because they didn’t know what to do, or how to do it, or because they didn’t know what they could do. A facilitator was definitely needed initially to help explore the different functionality that was available. But by the last rotation students seemed to have picked it up really well and move much faster – needing less facilitation.

Other points noted by facilitators included:

- There were great differences in student abilities with the software.
- The clicker became the dominant person in the group and they needed to be encouraged to consult
- Screen clutter was also significant and contributing to information overload.
- Dialog boxes were only visible to the “clicker”, but options need to be visible to all
- Scenarios would benefit from communal feedback on what choice has been made so every member of group is aware of what has been selected.

- Voice chat was much faster and allowed more collaboration. Chat seemed quite restrictive.
- The Alzheimer's scenario was clunky and not that quick to use or intuitive. It was a little frustrating and pointless – with no real advantage to doing this in Second Life
- Students didn't mind that their handover notecards could not be shared – and appeared to prefer this, making their own individual assessments
- Having two types of facilitator was useful, at least one per group focussed on the learning aspects, and at least one other focussed on Second Life and system issues.

In summary, one facilitator commented *“The students seem to enjoy the scenarios and engaged in the scenarios well.. I found that students assessed the patient as they should. The students were able to talk about ways to assess the patient and discuss each step in detail before moving on. Everyone had a good attitude throughout the day towards the whole process and there were no major problems and all students stayed throughout the whole day to engage in the scenarios.”*



Figure 9 Scenario 3 – Cardio-Vascular

Technical

The MVP model proved effective for the project and easy to work with. A number of areas were identified where the MVP Specification could be changed in order to better support scenarios both explicitly within virtual worlds and more generally. These areas, which have been raised with the MVP working group, were:

- The use of a “device” parameter with the Data Availability Model to route specific pieces of information to specific devicesThe ability to embed counter values in text, referenced by their XML location
- More consistent handling of images, currently handled both by a Manifest (for SCORM compliance) and different Virtual Patient Data items
- Rules driven by counter values at the node and DAM levels, rather than just globally

Even without these changes MVP provides a powerful authoring language for almost any eLearning exercise, not just those related to medical training – see below.

The Second Life platform has proved reasonably stable. The biggest issues have been around having enough bandwidth from classrooms to support large (10+) numbers of simultaneous users. There have been no major issues with island stability, or availability of the web server or web service. The HTTP Request function in Linden Scripting Language has also been reliable.

Pedagogic

The open, unstructured nature of the virtual environment seemed well suited to PBL exercises. As the student feedback showed though there are also opportunities to provide more structured learning. Given the nature of the MVP specification it would only require a new Activity Node file with greater linkage between nodes to allow the same exercise to be run in a self-directed rather than PBL mode – providing far more guidance and feedback to the students. Again this would significantly improve tutor productivity allowing multiple teaching, assessment and even learning styles to be supported by the same core scenario.

Communications

Whilst timing only allowed an initial testing of different communication modes, it was interesting to see how student used the differing options of:

- Physical world voice (i.e. Face to face)
- SL text chat
- SL voice chat (when available)

Whilst real world voice was used for some social communication (e.g. humorous comments, problem resolution etc), the students naturally used the text chat in world – despite there being no edict to do so. This may be since it seemed a part of the immersive experience. The advantage to tutors of students using text chat is that it is easily captured in a chat log for later analysis and de-brief.

Some problems were encountered with the simple chat engine in the mannequin picking up on user chat (e.g. if a user mentioned “pain” the mannequin would report its pain state even if not being addressed – but this may also happen in the physical world!). For later use the mannequin chat engine has been provided with a prefix filter so students must use this prefix (e.g. “ask”) when addressing the mannequin.

In-world voice communications was more problematic given both laptop and bandwidth issues. Several laptops needed rebooting to clear SLVoice problems. However, when working the benefits could be seen by the users since the keyboard did not get in the way of what they were trying to say. However they did need to be more disciplined in terms of turn-taking, and this itself could have beneficial effects in terms of teaching students to be managed and precise in their on-scene dialogues. Students still needed to use text chat to talk to the mannequin.

Student comments included *“Scenarios much easier to use with voice to collaborate, more natural”* and *“with text that you can go back and see what everyone has said”*.

Further Work

Further adaptation and testing of the scenarios will be carried out over the coming months, including replacement of the screen-based case and the development of a fourth case, before the scenarios are embedded as PBL exercises within the Paramedic curricula in the next Academic year. Specific enhancements which have already been identified are:

- The contents of dialogue boxes and choices selected made visible to all
- A number of paramedic kit objects have been redesigned based on feedback from the paramedics and attachment process improved
- To trigger a conversation node, the question has to be prefixed by the characters “ask:”, and the conversation nodes are being added to, to allow a wider range of questions to be asked by students.
- A “Web” button has been added to the controller to allow pages to be viewed in a normal browser for images that require accurate reading (e.g. an ECG chart).
- A confirmation dialogue has been added to the Start button on the controller to avoid accidental reset of the scenario

In addition a web based editor for MVP is being developed to avoid the need to edit raw XML in a text editor, and to optimise MVP development for the virtual world scenarios.

Beyond Medicine

As mentioned earlier although the MVP specification is aimed at medical implementations there is no reason why it can't be used for any sort of eLearning experience. Daden have already used it to prototype an interactive story book and a more conventional eLearning exercise for KS3 students. The MVP steering group is also looking at an extensibility option which would allow developers to add their own data types to those already supported by the VPD file which would further enhance the potential to use the virtual world MVP system in other fields.

Going Open Source

Under the terms of the JISC contract the system must be made available at no charge to the educational community. In working out the best way to move the system forward the partners are planning to establish an Open Source software around the project. This will allow the partners and others to both continue to develop the system, and to take advantage at no cost of the developments of others. The Second Life objects developed for the system will also be available at no cost, and the partners are looking at related services to help with the wider adoption of the system such as training, sharing of cases and scenarios, and the hosting of the web based MVP Player and web service.

Conclusions

From the testing and assessment of the system it appears that the use of MVP within Second Life has significant potential. The need to thoroughly familiarise students first with Second Life, and then with a Dummy scenario, was an absolute necessity. Once familiar, though, the students can rapidly become productive within the environment. MVP provides the flexibility to create rich and interesting scenarios, and the 3D visualisation in Second Life not only provides an immersive experience but also provides a very open environment ideally suited to PBL approaches. As expected the testing did identify both technical and procedural shortfalls, and these are now being addressed prior to the use of the system on real courses.

Overall it is considered that with this approach to problem-based learning, the MVP standard and the SL player, and the scenarios developed will provide a useful way of conducting PBL, and of providing unique learning opportunities. It is also felt that the system will be suitable for creating a wide range of e-learning applications within virtual environments beyond the medical field.

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The Use of Three Dimensional Interface within a Virtual Learning Environment and the impact on Student Collaboration and Knowledge Creation

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Keywords: collaboration, three dimensional interface, knowledge creation, mix design analysis

Abstract:

The purpose of this study was to determine whether collaboration occurred within 3D virtual learning environments. Furthermore, if collaboration occurred were the elements of Nonaka and Takeuchi's (1995) knowledge spiral present as well? By creating a 3D didactic constructivist virtual environment, conversations were observed for collaborative elements. Data for this mixed-design study were gathered through three sources, the 3D virtual environment, a survey created by the researchers, and follow-up interviews.

Findings revealed that the five (5) forms of collaboration: Elementary Clarification, In-Depth Clarification, Inference, Judgment, and Application, amplified the knowledge creation process and indeed occur with virtual learning environments. It was also determined that all four (4) requirements for a knowledge spiral: socialization, externalization, combination, and internalization, did occur during the period of this research within the 3D environment. Thus the creation of new knowledge as knowledge passed from tacit to explicit and explicit to tacit (Nonaka & Takeuchi, 1995) within this 3D virtual learning environment. Qualitative results further suggested that after a period of adaptation by the user, most participants were less likely to get off-topic and focused more on the project given to them.

Introduction

Distance education is on the brink of several major technological advances (Dede, 2005). These advances make possible many aspects of distance education that heretofore have not been conducive or cost-effective for the average educational institution or educator (Hobbs, 2004). Given renewed interest due to technological advances in research that was largely conducted in the mid to late 1990's, it was decided to conduct research in the area of collaboration using three dimensional virtual learning environments (3D VLE).

These changes in technology have made it so that it is no longer necessary for students and teachers to interact from the same location or even at the same time (Champion & Freeman, 1998). But just because it is no longer necessary, can it be said to be an equivalent education? Two essential components of education are the collaboration that occurs between students and the teachers as well as the collaboration that occurs between students and their peers (Bruffee, 1999). With this in mind, it was decided to examine in this study the use of collaboration in the virtual learning environment for learning and the creation of a knowledge spiral (Nonaka & Takeuchi, 1995).

Collaboration

Bruffee (1999) expanded the accepted concepts of learning as a collaborative process by casting the process of learning as the reacculturation of the learner. Meaning that in order to

fully participate in a community of learners, a student or learner must gain new vocabulary, knowledge and language skills as one continues to participate within the culture of learning. This learning process is, by its very nature, a collaborative process.

Furthermore, in this reacculturation process, Bruffee argued that the learner must gain a new vocabulary to participate within the collaborative community. He noted that most learners have experienced at one time the feeling of not being a member of the learning community in which they find themselves. Without the proper vocabulary to express themselves effectively, he postulated that they are unable to participate, let alone understand the community with which they find themselves “their worlds were closed by walls of words” (Bruffee, 1999, p. 6). The concept of worlds being formed by words seemed very appropriate and essential for virtual worlds. These conceptualizations help to generate the notion of examining collaboration in 3D virtual environments. In this inquiry we examined the creation of vocabulary by the learning community, and thus by distributing the learners’ knowledge of the virtual environment, the group becomes a collaborative community (Bruffee).

Knowledge Spiral

Nonaka and Takeuchi (1995, p. 59) noted that “in a strict sense, knowledge is created only by individuals”. As knowledge is shared between individuals within an organization, it moves from being tacit knowledge to explicit knowledge. Nonaka and Takeuchi (p. 72) further noted that as knowledge moves from tacit to explicit, it passes through “four modes of knowledge conversion”. These modes, socialization, externalization, combination, and internalization, amplify the creation process. This amplification results in this knowledge becoming acculturated and larger in scale as it moves through the organization.

Dede (2005) articulated that “at present, social groupings depend on co-presence in physical space (roommates, classmates). In other words, collaboration depends on shared physical presence or cumbersome virtual mechanisms. However, in the future, students will participate in far-flung, loosely bounded virtual communities (independent of cohabitation, common course schedules, or enrolment at a particular campus)” (Dede, 2005, p. 10) which emphasizes the need to examine closely how collaboration can occur effectively.

3D Virtual Learning Environment

As this case study focuses on collaboration within 3D Virtual Learning Environments (3D VLE), a key portion of this research was the creation of a Virtual Learning Environment. This 3D VLE utilized the Torque Game Engine provided by Garage Games and a content pack created by BraveTree Productions, LLC. The engine was modified to allow for the recording of collaboration between participants and the creation of user accounts.

The target group of participants for this study was students enrolled in computer programming courses. An intended outcome of this project was to improve the programming skills of these students and give them experience in programming and working with a 3D game engine. To that end, the 3D VLE was created and equipped with male and female avatars, several tank designs to which the participants would eventually apply basic artificial intelligence, and a virtual environment in which the participants could interact with one another. Additional, kiosk stations were placed in the environment to provide directions and clues to the participants.

The process of collaboration within the 3D VLE was a three step process (see Fig. 1). Participants created their own account which enabled them to connect to the chat database. After login, the 3D VLE enabled the participant to then connect to a Master Game Server, which provided a link to the hosted game. All chat messages were saved on the Chat Database and forwarded to all active participants through the hosted game.

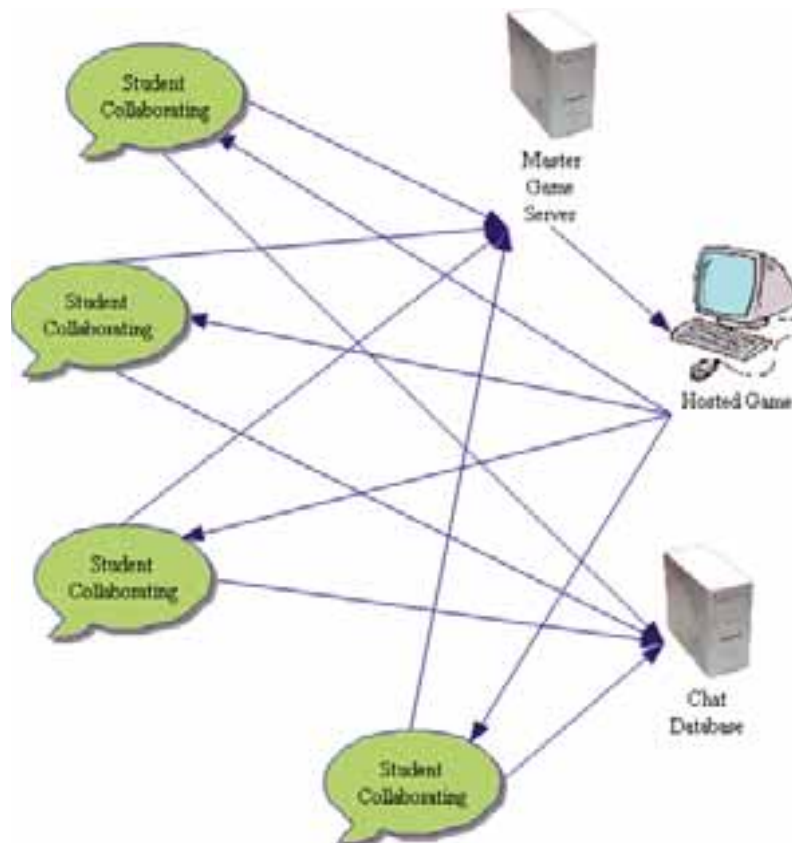


Figure 1 Participant – Server interaction

Experiment

The population for this mixed design study was comprised of students enrolled in computer programming courses attending either a private, religious college or a public, state college. Twenty-eight college students participated in this investigation. Quantitative data were gathered using the 3D VLE that allowed the participants to communicate with one another through a built in chat system. Additional quantitative data were gathered through a follow-up survey that contained open-ended questions and a purposeful sample of interviews. The interviews, survey and communication from the 3D VLE provided triangulation of the quantitative data.

Conversations were evaluated using Hara, Bonk, and Angeli (2000) system of classification to check for collaboration. This system creates five (5) categories of classification for conversation based upon the purpose of the conversation. Elementary clarification is the observation or studying of a problem, usually indicated by identification of relevant elements.

In-depth clarification is the gaining of a deeper understanding of the problem. For inferencing, the participant has made an induction or deduction toward solving the problem. In judgment, the participant has made a decision or evaluation of the problem. Finally, application is the coordinated action or application

Discussion

Participants were informed of seven (7) problems in the 3D VLE and given the challenge to find solutions or resolve the problems. These problems were documented, informing the student where the problem was located, possible solutions, and what needed to be done to resolve the challenge. There were also three (3) undocumented problems within the environment. The three (3) undocumented problems were designed to be very noticeable and to generate conversation and, hopefully, collaboration. The problems were of varying complexity with some of the more complex problems requiring the resolution of simpler problems before they could proceed. As expected, the participants quickly noticed the three (3) undocumented problems. This generated most of the early elementary clarification collaboration. One of the undocumented problems dealing with the User-Interface was resolved within the first 24 hours. Other problems, such as the correct avatar not loading or animations not working correctly had many potential solutions and applications generated, but were not implemented by the end of the project.

Collaboration

To analyze the use of collaboration, the researchers examined qualitative data gathered from the chat records of the 3D VLE, survey responses, and interviews. First, all of the chat records were reviewed, followed by the survey responses, and interviews to gain a holistic view of the data set. Next, the data were classified and axial coded to allow themes and clarify the students' interests and concerns as well as identify the types of collaboration that occurred.

The chats recorded from the 3D VLE provided a rich texture of collaborative data. Of the 682 conversations that occurred during the two weeks of data gathering, a majority (62.6 %) were found to be collaborative in nature (see Table 1).

Table 1 Number of Chat Conversations by Classification.

Classification	Conversations
Elementary Clarification	201
In-Depth Clarification	92
Inferencing	35
Judgment	37
Application	62
Off-topic	174
Salutations	67
Flaming	4

Note: N=682 examined conversations

The majority of conversations were initially off-topic or focused on learning the environment. Participants were able to easily move and communicate within the 3D VLE (see Fig. 2). After approximately two and a half (2.5) hours of working inside the 3D VLE, there was a dramatic

drop in off-topic conversation. At this same point, there was a noticeable change toward conversations that were seeking in-depth clarification and application. From the surveys, several comments were made concerning the initial general collaboration. As one student noted, “Most of it was us helping each other understand the mechanisms of the environment, figuring out what was tied to what.” One student found that the collaboration allowed for the “clarification of goals, discussion of problems, fun banter, answered questions that others raised, and some arguments when misunderstandings arose.”



Figure 2 Communication within the 3D VLE

One participant interviewed stated: “Online, there were many different types of discussions, from productive collaboration to general silliness. Outside of the VLE, more productive communication occurred via text messaging and e-mail chat programs”.

While the amount of flaming (a hostile or demeaning statement directed at another student) was relatively low (14 total occurrences, or 2% of the total conversations), it was mentioned by some respondents on the survey. Some participants considered it “fun banter”, while other students mentioned the flaming stating that “I was flamed. And was given advise on the hot keys and how to crash the game” and “well when I was on with other people there was a lot of joking, some flaming...”.

Based upon the conversations recorded from the 3D VLE, qualitative statements from the survey and follow-up interviews, all five (5) types of Hara, Bonk, and Angeli (2000) student interaction categories were present in varying degrees. It was not surprising to find that there were more collaborative conversations dealing with Elementary Clarification (201 conversations or 29.5% of all conversations) and In-depth Clarification (92 or 13.5% of all conversations).

While the presence of derogatory comments by some participants aimed at other participants was low in quantity (14 or 2% of all conversations), Cook (1996) does argue that the presence of conflict is evidence of successful collaboration. Furthermore it would be hoped that students could be directed to express their conflict in a less derogatory fashion.

Knowledge Spiral

With the success of finding evidence of collaboration within the 3D VLE, the researchers turned their attention to finding evidence of Nonaka and Takeuchi's (1995) knowledge spiral. To find evidence of a Knowledge Spiral the chat logs were examined as well as the follow-up interviews. The beginning of a knowledge spiral must show the transference of tacit knowledge to explicit knowledge, passing through the four modes of knowledge conversion: socialization, externalization, combination, and internalization. This process became evident from the chat records recorded in the 3D VLE. One example of the knowledge spiral is presented:

1. RedShirt_Rich: "The Prof says he switched to code on the CLIENT side only for switching between characters"
2. Furry: "Yeah but it is set up differently than the tank code"
3. Furry: "he is calling to two different cs files instead of one"
4. RedShirt_Rich: "Whatever he switched turned off the animations, and I'm not sure the server would EVER see the Ava model..."
5. RedShirt_Rich: "...if the server side code doesn't have the new selection methods"
6. Furry: "let s throw in blue man to see if the code is defaulting to the player.css"
7. Imber: "hey is the problem of not showing the animations and not loading av in the aisplay.cs?"
8. Imber: "OMG i got the animations to work..."
9. Imber: "all problems are in the aiPlayer.cs"
10. Furry: "That s why the[y] have to be in the same file"
11. RedShirt_Rich: "No[w] what?"
12. Imber : "w[ait] ill change to adam"
13. Imber : "ok thats weird"
14. Furry: "See you broke it :)"
15. Imber: "Whatever the server host chooses gets cast to all other players"
16. RedShirt_Rich: "Ava's animations worked for servers AND clients. Adams s animation ONLY works on the Server."
17. Imber: "the call backs need to be uncommented and the male needs to be taken out of the aisplay.cs file"

In this sample of conversations, the students complete all four (4) of the modes of knowledge conversion: socialization, externalization, combination, and internalization. In the socialization process, tacit knowledge is shared with other students. The students start out by collaboratively sharing what they have learned by experimentation and from others. In Statement 1 and 2 of the conversation, RedShirt_Rich and Furry discuss what they have learned thus far from others and observation inside the 3D VLE. This socialization process ensures that they are both at the same starting point as they prepare to address the avatar and animation problems in the learning environment.

In the externalization conversion of tacit to explicit, a hypothesis is proposed as to where the problem is located. Statements 3 through 7 represent this move from tacit to explicit. Furry notes to RedShirt_Rich that two data files are being accessed in the computer program instead of just one data, which they had seen in another example. RedShirt_Rich makes a hypothesis that this might be the cause of the animation problems. Furry (in statement 6)

proposes a method of checking to see if this might solve the problem. At this point, Imber, in statement 7 notes that the problem being discussed seems to be originating from one data file, beginning the transfer to the combination mode.

As the students move into the combination mode, students create a structure for the problem and attach it to one location with the program files. Statements 8 through 14 show the development of the structure and application of the hypothesis developed in the externalization process. Imber initially believes he has solved the problem by making a change to the data files. As he further applies the hypothesis, it creates other visual problems within the 3D VLE, causing Furry to, in good natured fun, tell him that he just broke the system.

During the final internalization phase of the knowledge spiral, the students take what they have learned thus far and apply it. In statements 15 through 17, the three students discuss what was done to create the differences in the virtual environment and what files were edited. This creates new observations about the problems that they are addressing, which starts a new cycle of the Knowledge Spiral. The 3D VLE shows that it provides an excellent opportunity for the students to practice Nonaka and Takeuchi (1995) knowledge spiral, which they refer to as “learning by doing” (p. 69) (see Fig. 3). While the students do not completely resolve the problem in this conversation, it does form the bases of future conversations of tacit to explicit knowledge creation that eventually leads to a solution being proposed.



Figure 3 Nonaka and Takeuchi's Knowledge Spiral

The data reveals the presence of all four (4) stages of the knowledge spiral: socialization, externalization, combination, and internalization. With the presence of all four (4) stages of the knowledge spiral, it is concluded that Nonaka and Takeuchi's (1995) knowledge spiral does occur within 3D virtual learning environments when they are designed to enhance collaboration.

Conclusions and Further Research

Dalgrano (2002) has proposed that 3D environments have potential to encourage learner to learner collaboration. This research has confirmed that potential. Further, the findings of this research directly impact the educational model of today and help to remove reservations of change for alternative learning structures for the future. Distance learning and traditional

education have new tools in the 3D virtual learning environment that can be used as supplements, and in some cases replacements, for other resources such as expensive equipment or texts. Special needs for learning disabilities and gifted students as well as those who are physically challenged or even those requiring greater attention due to behavioral problems can learn in a more controlled environment and be offered a level playing field without being offered lesser services than their peers. This type of learning environment can be utilized to lessen the cost and provide equality between all school districts whether they are rural, urban, or suburban.

With collaboration now being established within 3D virtual environments, many other topics remain to be researched regarding impact upon student learning outcomes. What impact does being able to select and design the avatar have upon learning outcomes? If a student is given an avatar and told that the avatar is very good in a subject that the student struggles with, is learning impacted? Is cheating more or less prevalent in a virtual learning environment? An additional field of research deals with the development of virtual real estate. With online environments such as Second Life (Linden Research Inc, 2007) available, how will this impact traditional learning?

Of course more research into the area of collaboration and its utilization within 3D VLE is needed. Since this was a case study, the application of this research is limited through transferability to the general population. However, further large scale research is warranted to ensure the validity and application to a broader range of research.

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SLAVE – Second Life Assistant in a Virtual Environment

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Keywords: Second Life, interactive e-learning, assistive intelligence, lifelong learning process, dynamic knowledge management

Abstract:

Virtual worlds, in particular Second Life, have recently been gaining more momentum in emerging trends within the educational research dimension due to their dynamic, flexible and accessible nature. One problem which educators are facing is that of having an aesthetically appealing display which at times learners cannot exploit at will unless a pre-planned event has been scheduled. Residents often complain that educational lands are often void of life, and show a marked lack of presence. SLAVE aims to provide a solution to this problem. The innovation which came along with Second Life denotes an aspect where limitations are only posed by one's creativity offering not only the tools which lead to more flexibility, more activity, and less formality but also those which can exploit the Web 2.0 concept. SLAVE aims to create an environment which is inhabited by intelligent assistants presenting Second Life, not as static entertainment but as an environment which has a scope. This scope will be fulfilled by 'adding life to Second Life' and applying artificial intelligence to resident agents leading to an outcome which is richer, more 'colourful' and has more to offer to the learners experiencing it. Second Life thus becomes a 'learnscape' where residents are guided towards more experimentation and more practice with the aid of artificial avatars, accompanying them across their mission to learn.

Introduction and Concepts

This paper will introduce a pilot case study held by the Department of AI, Faculty of ICT, University of Malta in relation to connecting learners through the use of virtual worlds, and more specifically Second Life (SL). The idea of making use of a virtual world environment for educational purposes stems out from the increasing usage of such environments by teens and adults alike. A report about Teens and Social Media (Lenhart, Madden, Rankin Macgill, & Smith, 2007) reveals that 93% of the teens which were interviewed use the Internet, and 'more of them than ever are treating it as a venue for social interaction – a place where they can share creations, tell stories, and interact with others'. This idea is also indicative that more Internet users, our new generation of learners are constantly on the lookout to be active rather than passive in their own content creation. Such activities have therefore led to an increase in not only website creation, but also blogs, wikis, social networking platforms and any form of Internet-based communication which lets any user stretch his/her creativity in order to give his/her however tiny it may be, contribution to the massive World Wide Web. In addition, the theories that propose that knowledge is indeed not as much constructed as it is 'connected' led us to explore possibilities whereby our students start to get connected with other learners in different fields in order to enhance their learning by association through cross-collaborative activities. Downes (2007) proposes that, 'In connectivism, a phrase like 'constructing meaning' makes no sense. Connections form naturally, through a process of association, and are not 'constructed' through some sort of intentional action'. This in essence has led us to start

thinking along the lines of creating a space, a world where students are allowed to roam, and eventually pair up with students from other academic fields in order to explore, create and give their own contribution to their own and their peers' learning.

This paper is divided into 4 more sections. The 'Background Work', outlines the work which has been done by the department in establishing such a pilot project, and the ideas and concepts which gave rise to such a project, and more importantly why SL was chosen. It will also look at existing educational projects going on in SL and attempt to identify lacunae which will ultimately lead to the department's future work. The third section, gives a brief look at the overall project which was handed out to the students and some of the outcomes which students came up with. 'Future directions' will explore the conclusions from the case studies and will attempt to identify the areas which need to be exploited and the route by which learners need to be guided in order to maximise the potential of this resource. The 'Conclusions' will gather together and discuss the ideas within this paper with relevance to the overall scope of the project.

Background Work

Learning environments, as has been shown by research are more than just tools and frameworks. Dagger et al. (2007) describe the emergence and the need for structures which are more than just monolithic frameworks targeting the e-learning concepts. They describe the technologies, and enhanced use of the Semantic Web services in order to achieve more flexibility and more dynamicity for the learners. On the other hand Attwell (2007) makes use of the term personal learning environments in order to describe more than just a technology. He describes the concept leading to an environment which does more than provide the technology. This environment becomes a 'learnscape' which learners can exploit and use to build their own knowledge constructs. Downes (2008) goes one step further and comes forward with implications that if one wants to discuss connectivism in knowledge, then one cannot discuss it in terms of construction. Therefore learners rather than building their own knowledge objects as if it was something logical or practical, learn by connecting, by associating what they can see, touch or hear to an action or an outcome. Siemens (2008) traces the roots of connectivism to philosophers and theorists such as Vygotsky, Bandura, Salomon, who propose ideas and concepts based upon social learning theories and distributed cognitions. However he then uses such concepts to emerge with his own theories as to the uniqueness of such connectivism blending knowledge, learning and the environment which the learner is exposed to...in today's case the Internet being one of the major key players in the learners environment. That is where Virtual Worlds find their scope. SL is the size of a small city, with thousands of servers and a 'Resident' population of over 13,956,336 (Second Life, 2003). Residents in SL are users whose representation or 'alter-ego' in the virtual world are termed as 'avatars'. Avatars can take forms of augmented reality, where they become an enhanced form of the 'real' person, or immersive, a fantasy representation dependent only on one's imagination.

SL, as a Massively Multiplayer Online Game (MMOG) has found its uses in the educational dimension, as such immersive learning environment is being used to "integrate information to solve a problem. Learning in this manner incorporates discovery, analysis, interpretation, and performance as well as physical and mental activity" (Antonacci & Modares, 2005). Wright (2006) adds:

Even up to present, much of distance learning has been made time convenient but impersonal. Avatar-based virtual world education is highly interactive, providing the same convenience of not having to travel while providing a richer, more effective and more enjoyable experience. For such, many students would most gladly make the scheduled time for the virtual classroom.

SLAVE therefore was born out of the need to integrate such experiences while building a new connective environment for learners. O'Driscoll et al. (2007) believe that,

as with most breakthrough technologies, Virtual Worlds are somewhat a solution looking for a problem. VWs can provide a platform for collaboration, community, and commerce, but so can a sofa. Aside from entertainment appeal, what's new here?

SLAVE wishes to address this challenge and aside from the appeal of including an immersive reality in learning, it also wishes to address a number of elements which will add a new dimension – what O'Driscoll et al. (2007) term as 'Learnsapes' – or rather an ecosystem which is made up of a number of elements such as experimentation, observation, practice, activity, repetition and motivation. SLAVE wishes to build upon these elements, adding also the element of connectivity and knowledge connectivism in order to enhance more cross-collaboration amongst peers. However as statistics show (Second Life, 2003), the residents logged in SL, in April and May, amounted to 1,066,611. However this presence of residents in the virtual world is not really indicative of the challenges encountered by a number of university campuses and other educational virtual worlds. It seems that many suffer from:

1. Lack of resident presence
2. Lack of giving out assistance in using the technology and navigation (Barbieri & Paolini, 2001)

Kay & Fitzgerald (2006) collect a number of resources which make use of SL for educational purposes. Examples of courses and projects being held over SL include "a course on the creation and delivery of persuasive argument in the new integrated media space constituted by the Internet and other new technologies. The course uses Web 2.0 tools such as wikis and blogs and extension students meet in Second Life" (Kay & Fitzgerald, 2006). The New Media Consortium (NMC) hosts a number of real life conference session and associated events in Second Life, using streaming technologies to broadcast real life proceedings in-world. The Infinite Mind is a US-based weekly public radio program which covers a range of topics including the art and science of the human mind and spirit, behaviour and mental health. In October 2006, they produced and broadcast the first ever real life radio shows from a virtual world. Thomson Netg offers training in Cisco and Microsoft Certification, business development, sales and customer service skills. The company uses Second Life to run live classes, to provide mentorship and to offer on-demand training with individualised media and streamed audio and video presentations or podcasts. They use the unique qualities of the shared 3D space to allow students to interact with technology demonstrations and to enact elaborate role plays. Such examples are but a few of the projects which include training, simulation and other course delivery methods. SLAVE also explored the concepts of creating an intelligent assistant in SL. Artificial Intelligent projects have explored a number of domains, amongst which natural evolution of life on the island, and ant colonisation projects. Such intelligence serves to 'add life to Second Life' in an attempt to tackle the challenge of lack of guidance and lack of presence in the virtual worlds.

SLAVE Case Studies



Figure 1 Draughts game, with the assistance of an agent

The scope of slave was to allow learners to build their own 'learnsapes' through practice, experimentation and design. A number of case studies have emerged from SLAVE and a few of them will be discussed in this section. The first project included the creation of a two-player draughts game over SL. An intuitive 3-D interface was constructed, and the avatar player is required to take a seat in the game. All logic is taken care of whilst only the legal moves are allowed. The innovation in this mini-project is the inclusion of the agent who will be identifying the players taking their turns in the game and whose turn is to play. The scope of this project was that of adding some fun and activity for other peers visiting the SLAVE island in SL whilst providing assistance and guidance to the game. This project involved various aspects of the Linden Scripting Language, such as animations, elements and transmitting linked messages between primitives and timers.



Figure 2 Magic Carpet; an agent will transport the avatar to specific locations

The second mini project involved a number of scripts including a search sculpty, a magic carpet and revolving gun and protector. These tackle three different problems and pose three different solutions. The search sculpty, will listen on chat channel 0 for a particular command concatenated with a string and searches the Wikipedia for such a string. The agent involved in the magic carpet, will ensure that the carpet follows the avatar when called with a particular command without bumping into the avatar or lose orientation. The carpet will be able to transport the avatar to specific locations.

The third program which uses intelligence to assist avatars on the island, sees a cannon which shoots cannon balls towards the avatar. The avatars protector agent will shoot another cannon ball in order to destroy the threat towards the avatar.



Figure 3 Designing 3-D models in SL

The third mini project takes into consideration another aspect of SL, to find a solution to the general lack of socialising abilities between strangers on SL. This project defines the friend finder which explores SL reality in order to find ‘friends’ sharing the same interests. The friend finder comes in the form of an SL ‘wearable’ device, similar to a paging device, and by setting the gadget status, one can decide whether to be found or not. Friends’ List is maintained using SL note cards which are created upon adding persons to the contact list. The disadvantage of this friend finder is that all avatars need to possess one in order to be able to function well and be exploited as is necessary.



Figure 4 Assistive Agent in SL

Another project made use of a PandoraBot as a personal assistant accompanying the avatar through his journey on the island in SL. PandoraBots is an experimental software robot hosting service (PandoraBots, 2008). Chatbots such as ALICE, are based upon AIML (Artificial Intelligence Markup Language) and can be integrated within objects in order to create agents assisting the avatars.

ALICE AIML is a free software which can be made use of to create a customised chatbot. The free A.L.I.C.E. AIML includes a knowledge base of approximately 41,000 categories. An example of one such engine which has been customised includes:

```

default
{
    state_entry()
    {
        cust="";
        botid="b1e9139eee362838";
    } on_rez(integer param)
    {
        llResetScript();
    } link_message(integer sender_num, integer num, string msg, key id)
    {
        requestid = llHTTPRequest("http://www.pandorabots.com/pandora/talk-xml?botid="+botid+"&input="+llEscapeURL(msg)+"&custid="+cust,[HTTP_METHOD,"POST"], "");
    }
    http_response(key request_id, integer status, list metadata, string body)

```

Another SL agent assistant project takes its roots and forms from the Star Wars Movie and the droid R2D2. For this purpose this droid was replicated on SL. In this mini project the droid waits to be called by the avatar, and proceeds to operate the house blinds, door and lights. The droid will also protect the avatar home by closing the door and blinds to prevent other avatars from entering the house or looking at what's inside while the avatar is away. This is done through a series of scripts which induces the transaction of 'sensor' messages between the droid and the objects around the house.

```

listen(integer channel, string name, key id, string message)
{
    if (llGetOwnerKey(id) != llGetOwner())
    {
        return;
    }

    //the door is close
    if (message == "close to door")
    {
        if(VecDist(llGetPos(), <55.543,59.354,22.602>) < 5)
        {
            llShout(50,"open");
            PlaySound("R2D2-B");

```



```

        IISleep(3);
        return;
    }
}

//the door is open
if (message == "door open")
{
    if(VecDist(IIGetPos(), <55.543,59.354,22.602>) > 10)
    {
        IIShout(0,"close");
        IIShout(50,"close");
    }
}
}
}

```

Future Directions

New Media Consortium (NMC), consisting of 200 leading universities and museums has been dedicating research and development effort in a bid to explore uses of new media and technologies for educational purposes. NMC is already in the process of testing out this virtual environment for a range of educational activities, such as art exhibits and in-world sessions exploring the concept of how virtual worlds can enable unique environments for digital storytelling as a means of learning. A SWOT analysis of SLAVE reveals the strengths, weaknesses, opportunities and threats of the learning design model in terms of the seven sensibilities as outlined by O'Driscoll et al.(2007): *"Sense of Self, Death of Distance, Power of Presence, Sense of Space, Capability to co-create, Pervasiveness of Practice, and Enrichment of Experience"*.

Therefore the strengths of SLAVE are portrayed as being in its:

- Repetitive practices which allows for learners to repeat their experimentation until they are satisfied with the outcomes;
- Experimentation methodology encouraging learners to try and learn in the process;
- Experiential environment which is more engaging than other digitally mediated technologies;
- Facilitated learner activity;
- Enhanced motivation stimulated by the people's own active part.

The weaknesses of SLAVE lie in the lack of direction and the complexity involved in using multiple modalities to explain concepts. The lack of pedagogic learning agents on the virtual world doesn't reinforce connectivism in learning and learners on SLAVE didn't have the necessary networking platform to share experiences and resources with peers.

SLAVE opportunities lie in the enhanced Web2.0 concepts which can be exploited in SL. Berners-Lee et al.(2006) emphasise the applied concept that,

Allowing users to personalize their tools and workspace means that the Web remains more than a commoditised one-size-fits-all area and instead becomes a space within which people can carve out their own niches.

SLAVE gives this opportunity to learners thus creating a domain which is not built upon passive reception but motivated interaction.

SLAVE threats lie mostly in a risk assessment impact, which revolves not only around market acceptance by the learning technologists and university institutions, but also around the issue of maintenance, and repudiation. Many SL challenges focus around a central theme which deal with providing enough stimuli to exploit the virtual world platforms as connective environments providing learners with adequate pedagogical structures.

SLAVE's learning design is built around concepts of:

- Learner generation of content;
- Using the "pulling" model versus the "pushing" model which is applied in the traditional teaching; the pulling model refers to methods whereby learners access and make use of content when and how they need it, enhancing the pervasiveness of learning access (Tozman, 2007);
- Use of concepts of PLEs which aim for learners to personalise their own learning activities and contents.

However the weaknesses and threats identified in SLAVE pave the way for additional future improvements.

One such direction for the future improvement lies in the ability to pedagogically design an environment which learners can use as a 'learnscape'. This means to say that sounder pedagogic principles need to be applied to SLAVE in practice and more direction given to the learners. This has to be in line with the faculty and departments mission and programmes of study. In order to achieve more connectivity and connectivism, this has to be developed in collaboration with other departments which ultimately will also be active participants in SLAVE. This will ensure the maintenance of SL which won't run the risk of extinction. Such programmes need to be defined, the main scopes and missions outlined and highlighted and learners briefed well. In addition to this, PALs (pedagogic learning agents) (Wilcoxon, 2008) will need to be designed, and developed in SL accompanying learners throughout their learning mission. Such agents will need to be found in specific parts of the island giving specific assistance to the learners experimenting with the various techniques and technologies which can be implemented in SL. Agents such as bots, exploit the chat tool in SL to communicate via chat.

SLAVE proposes to point future developments in the direction of the application of natural language communication techniques.

Thus to summarise, SLAVE proposes the following developments:

1. Design practices to include pedagogic principles
2. Adding more connectivism in the spirit of Web2.0 technologies
3. Use learning technologies to provide a platform for inter-collaboration between different departments at the University of Malta
4. Develop new techniques for enhancing the intelligent assistance in SL
5. Make use of existent bots techniques to explore the addition of natural language processes to enhance the communicative skills over SL
6. Adding more life to SL; including more agent avatars will provide more motivation and stimulus for the learners to achieve a more active role in the learning process in SL
7. Allow learners to creatively produce and add more structures, objects, and more intelligence to the SL island documenting progress along the way
8. Integrate a blended form of learning with a more formal course management system such as moodle in order to make use of additional course tools which would prove of benefit to the learners. SLOODLE [Second Life Object Oriented Distance Learning Environment] in Second Life (Sloodle Learning System for Virtual Environments, 2008) will be used to merge together the virtual environment and 3D construction using interactive scripts, to the Moodle Learning system containing amongst others structured lessons, threaded discussions, assignment drop boxes and grading.

Conclusion

SLAVE wishes to address the issue of change in the perception and approach to learning. However it also aims to ultimately reach the Web2.0 vision which was first outlined by Tim Berners Lee (2006) as being based upon concepts of sharing of resources and removing the one-size-fits-all Web 'outfit' to introduce more personalisation, more activity and interactivity for individuals.

Anderson (2007) in addition outlines 6 key elements which contribute to the Web2.0 ideas and ideologies. These key elements include:

- Individual production and user generated content;
- Harness on the power of the crowd;
- Data on an epic scale;
- Architecture of participation;
- Network effects;
- Openness.

A project such as SLAVE, which makes use of the virtual worlds needs to move away from the perception which centres around such realities and focus more on the implementation of the technology in order to fulfil the principles upon which it is built and rooted.

The change in times is demanding a change in technology, due to the pervasiveness of the technology itself and the way that society has been ensnared in its mesh. Education, which is at the roots of civilised society, is thus being affected by this change, and this pre-empts for adaptability. Learners, employers, research, and industry have been sustaining this evolutionary change from times when distance education was practiced using media such as TV and radio up to current times, when virtual worlds, immersive and augmented reality coupled with artificial intelligence are becoming the order of the day. Yet the main focus centres around the learner, and learner-centric events promoting and sustaining the Web2.0 legacy built around Tim Berners Lee's concepts which as quoted goes on to say:

*'I have always imagined the information space as something to which everyone has immediate and intuitive access, and not just to browse, but to **create**.'* (Tim Berners-Lee in Anderson, 2007)

SLAVE therefore not only proposes the utilisation of technologies which lie behind virtual worlds, coupled with AI techniques and methods, but it will also propose a fusion between different pedagogies in order to emerge with an outcome which is connective, social, allows for creativity and flexibility, is active and interactive and fulfils the ultimate goal of improving the quality of Education for all.

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Learning, Teaching and Ambiguity in Virtual Worlds

Diane Carr, Martin Oliver and Andrew Burn

Keywords: community, learning, pedagogy, ambiguity, affect

Abstract:

What follows is the description of a research project in which learning practices in online worlds were investigated, and the implications of such practices for online pedagogy were explored through teaching in *Second Life*. Working within an action research framework, the researchers employed a range of methods to investigate how members of online communities define the worlds they encounter, negotiate the terms of participation, and manage the incremental complexity of game worlds. It is argued that the variable nature of online worlds results in ambiguity that impacts on social practices, and has significant implications for online teaching and learning.

Introduction

What might online communities and informal learning practices teach us about virtual world pedagogy? In this paper a project that addressed this question is described. During the project we adopted a range of approaches to data collection and analysis while working within an action research framework. In the process, we developed a theory of virtual world pedagogy that incorporates considerations of ambiguity, learning and affect. What follows is a brief overview of the project, followed by a discussion in which it is argued that the virtual world *Second Life* is actualised (and thus defined) according to the various preferences of its residents. This variability results in an ambiguity that impacts, we propose, on aspects of community in *Second Life* and its associated online forums. This same ambiguity has interesting implications for researchers and educators working in virtual worlds. These issues are explored through various research exercises and then discussed in relation to our experiences of teaching in *Second Life*. The paper concludes by identifying an agenda for further work in these areas.

Background: the ‘learning from online worlds’ project

This paper refers to research undertaken during a small project called ‘Learning from Online Worlds; Teaching in *Second Life*’ which involved the investigation of learning practices in online worlds and the extension of this work through the design and delivery of taught classes in *Second Life*. The project’s aims included theorising the learning that happens in social worlds, exploring how any such learning might inform teaching in virtual worlds, and investigating the various cultural factors (such as subjectivity and identity) that might impact on pedagogy in these contexts.

Given that there was a relative shortage of available research that might provide a theoretical grounding for the project, an action research approach was adopted (Zuber-Skerrit, 1992). This provided a framework in which experience could be gained, theorised and used to plan further investigation in a structured yet emergent manner. The first iteration of the action research process was primarily of value in establishing the issues that the remainder of the project should pursue.

The first phase of the research was thus experiential, and began with exploring *Second Life* as users. We socialised, attended seminars and meetings, experimented with in-world creative practices (from making clothes, to creating machinima), and kept 'game diaries' of our experiences, which allowed us to move into a reflective phase of work. The following is a sample of this early material:

[I've been spending time on the] customising of my avatar. It's easy, quick, and the improvements are obvious. That leads to learning (the acquisition of a basic familiarity with the edit appearance settings, the inventory). And from there to despair ('oh, I look like a duck') and from despair to shopping, and from shopping to freebies [...] In retrospect I think of this as my pre 'pain barrier' phase [...] Because I battered away and persevered [...] I eventually scraped some skills together and stumbled across this pain barrier, at which point SL became funny, enjoyable and potentially interesting. (DC's 'game diary' March-June 07)

The team compared diaries, and as a theorising and planning step, identified a set of issues relevant to the project's central questions. These issues included:

- Expertise (how is it demonstrated, measured or performance?)
- Conventions (socially produced) relating to expertise, identity, etiquette, trust, etc.
- Learning curves and the 'Second Life pain barrier'
- Credibility, 'noobs' (new users) and hostility or 'gatekeeping'
- Self-presentation, representation.
- Drama and performance
- Public spaces, social constructions and ritual spaces (the 'magic circle')
- Voice and access issues
- Creative and collaborative practices (such as machinima).

These issues were then explored in greater depth through particular research activities, each of which built on the previous iterations of the research process. We referred to the emerging research in this area, including educators' blogs, wikis, reports, such as Kirriemuir (2008) and conference proceedings (such as the annual *Second Life* Community Conference Education Track). At this stage much of the reportage is exploratory, and remains difficult to coherently review due to the range of educational contexts (from classroom based building work, to distance learners media production, for example) and the variety of learners (from children to adults), as well as the diversity of disciplinary affiliations and perspectives of those engaged in research (from computer sciences to media practice for instance). Yet these resources are evidence of the amount of interest in this area, and the range of work being undertaken. In addition to reviewing this material we drew on literature from digital game studies, media and cultural studies, Internet studies, drama education theory; ICT and education research, and communities of practice theory (Wenger 1998).

Defining *Second Life*; Defining *Second Life* research

During our individual experiences with *Second Life* we had identified an initial period in which using *Second Life* was frustrating, even annoying; this 'pain barrier' had to be overcome before we felt comfortable as users of the environment. We provisionally defined this pain barrier as the moment when sufficient learning or competence has been accrued to tip the new user from bafflement and annoyance, to pleasure, or even 'flow' (Csikszentmihalyi).

Given that most of our students would be entering *Second Life* for the first time, and would be doing so at our instigation, we had an obligation to understand the difficulties posed by this virtual world for beginners. Such difficulties included issues about the interface, as well as the public and potentially intimidating nature of this virtual world. Additionally, we expected that an understanding of the pleasures and the potential frustrations of *Second Life* should inform the planning of our classes.

First we needed to ascertain if pain barrier experiences were at all commonplace. To find out we proposed to gather short accounts of the journey from newbie to resident, from self-described residents. We wished to be non-intrusive, and thus we posted a message identifying ourselves and making our request at a *Second Life* forum, rather than approaching subjects in-world. Requests from students and researchers are common at the various *Second Life* forums. Here is a sample response in which a pain barrier moment is described, while pleasure and frustration are attributed to particular aspects of *Second Life*. SV wrote that

[at first] I hated it! [...] All I saw was walls! I had no idea what was where, it was totally disorientating! [...] I just couldn't get used to it. It was only when one of the guys I came here to be with from the old chat [room] asked me to come in for another's birthday that I did and it just clicked, it was then, in March, I felt 'right', it all came together. (SV by email)

This response suggests that there is value in the notion of a pain barrier. Meanwhile, however, a dozen contributors at the forum had responded to the eliciting message with scepticism or outright disbelief. Posters suspected, for instance, that our message was from impostors engaged in some form of 'scam'. Furthermore, it was asserted with confidence that we were not conducting *proper* research which -as some of the posters explained -involves clinics, large amounts of data and/or observing people without their knowledge in order to 'get at the truth'. While these forum responses were of limited value in relation to our interest in the idea of a *Second Life* pain barrier, they were intriguing in terms of our interest in hostility, control and credibility in virtual communities. We were particularly interested in the respondents' claims about research.

Prompted by the forum respondents' assertions as to what constitutes 'proper research' we found ourselves reflecting on the manner in which we ourselves had implicitly constructed *Second Life* in this instance. We had focused on the experiences of individuals, and had assumed a 'human subject model' (see Bassett and O'Riordan, 2002). What alternative approaches might there be to the analysis of hostility, territorialism, community or credibility in *Second Life*?

One alternative would be to analyse these issues while conceptualising *Second Life* as a 'collective text'. Within this text, particular discourses emerge and circulate. Within this discourse, certain constructs or agencies might emerge. For example, an agency -invisible,

vague yet omniscient -could manifest in discourse as 'we' or a 'them', as 'the community' or an 'everyone'. Such agencies would function as figures or reference points, and would be used by participants attempting to, for instance, establish the terms of legitimate (and hence illegitimate) participation. The point of these speculations is not just to suggest the value of alternative methodological approaches to virtual worlds. What this is intended to highlight is the potentially circular relationship between a preferred yet perhaps implicit definition of *Second Life*, and research-as-practice.

Second Life can be used in various ways and thus there is scope to define it in various ways (as collective text, programme, social networking platform, tool, public space, etc.). This suggests that definitions will be provisional, and reflect the perspective of the user (or the disciplinary perspective of the researcher). The preferred definition of *Second Life* will inform the research questions that are devised, and the methodologies that are adopted. All of which will impact on analysis and findings. None of this is 'bad' of itself, but failing to recognise this circularity could be detrimental. Furthermore, we found that the difficulties associated with defining *Second Life* can be associated with tensions within what might be described as the *Second Life* community.

Contested definitions and 'community'

Our attempted explorations of the pain barrier had raised the ambiguity of *Second Life* as a concern. This suggested the importance of exploring how residents were constituted in (and in relation to) *Second Life*. Our next phase of research was designed to focus on this process of community constitution and maintenance. Conflict over the definition or 'real meaning' of *Second Life* are present in *Second Life* residents' discussions. We looked for an example of this that would allow us to investigate how users negotiated their community involvement, and what kinds of things counted as legitimate participation for them. Tensions relating to these issues were heightened during 2007 as a result of the proposed introduction of an integrated voice feature by the developers, Linden Labs. In discussions at *Second Life* forums during this period there was anxiety that fundamental aspects of *Second Life* would be altered as a result of the new feature.

We appreciate that forums have their own conventions and that *Second Life* forums should not be conflated with *Second Life* itself. However, what the forum offered was a ready-made display of contested definitions of *Second Life* and references to legitimacy and practices of exclusion, authored by *Second Life* users. We explored this in more detail while drawing on notions of communities of practice and legitimate participation drawn from Wenger (1998).

To do this, we identified a particular 21 page thread on a popular *Second Life* forum. The originating post in this case was from a self-described deaf *Second Life* resident expressing dismay at the imminent arrival of the integrated voice feature. In an iterative process, we analysed 13 posts on this thread to generate a set of identifiable rhetorical and discursive strategies. We then reviewed 100 posts to expand and clarify this set. We looked to the identification of objects and agents, claims about these, the classification of claims, counter-claims, and the construction of self, other and difference through these manoeuvres. This material was then organised according to its including or excluding function. By these means it was possible to map the work undertaken by forum participants as they performed particular identities, set up and attempted to enforce the terms of community and legitimacy, and defined *Second Life* itself.

Across the posts it was possible to identify inclusive rhetoric, where affiliation was claimed. Membership was performed, for instance, through declaration or reference to *Second Life* 'belonging' – in assertions about how long a person has been a resident, through mutual recognition, or by displays of technical vocabulary and in implicit or explicit references to 'us'. Affiliation and inclusion was expressed in terms of affect (expressions of pleasure and contentment relating to *Second Life* use), and in relation to popularity and friends.

Similarly, it was possible to identify attempts to exclude, as when posters made declarations of apartness or distinction, for example, through reference to self 'I'm not...' and through phrases such as 'your kind' or 'them'; in expressions of discomfort, or even in apparently supportive efforts which in actuality emphasized the distance between those identities constructed as normal, whole, or neutral, and those not ('I can't begin to imagine what it is like for people like you'). Posters would situate themselves 'within' the *Second Life* community, positioning themselves and others in certain ways, while harnessing particular strategies. The original post became the ground from which claims and counter claims were made about what is realistic, fair or democratic; what is controversial, acceptable or admirable.

The introduction of the integrated voice feature stirred these debates because it threatened to undermine what were held to be definitive aspects of *Second Life*: its separateness from participants' 'first' lives, and the option of anonymity. If voice became the default mode of communication in social settings, those not using voice (it was proposed) would be compelled to explain their choice. The use of voice was linked to issues of disclosure and trust, and such concerns linked to discussions about what *Second Life* is.

One definition in the thread that surprised us was the description of *Second Life* as a game. We had been certain that *Second Life* was not a game, because we share a background in game studies and we are accustomed to defining games according to criteria drawn from game studies literature (see, for example, Salen and Zimmerman, 2004). Games are played, and incorporate various modes of play. Games have goals, chance, rules, and discernable outcomes – which are absent in *Second Life*. So we were struck when posters to the forum referred to *Second Life* as a game or even a 'videogame' (and these claims remained uncontested). For these posters, it was the separateness of *Second Life* from real life, the value of this separation, and the play in fantasy and identity that the distinction affords, that meant that *Second Life* could be categorised in this way. As an aside we would note that this raises interesting questions about our reliance on structure-orientated definitions within game studies, and the 'grey area' where games and play combine.

These issues emerged in the context of a discussion about the introduction of the integrated voice feature, because posters considered that voice was being introduced to service those sectors, such as business, that were being courted by the developers at the expense of 'real residents'. Across this thread, then, it was possible to identify tensions relating to identity and ambiguity, the defining of *Second Life*, and references to its 'proper use' being aired by participants in the context of a discussion where legitimacy and inclusion were at stake.

In this instance we looked at the 'work' at the forum, rather than the issues referred to in the original post such as deafness and access. However, it is clear that such sites offer researchers a location to examine socio-cultural aspects of disability. It was, for example,

frequently (even casually) acknowledged in press releases and on the forum that voice would not be good for deaf users, but that it would be beneficial to educators and business people in *Second Life*. In these statements deaf people were consistently positioned as essentially distinct from the business and education sectors.

Investigating these aspects of *Second Life* was useful in terms of our understanding of participation and community within this virtual world. The variability in modes of participation, however, can complicate attempts to document specific instances of learning (outside of educational settings). To investigate learning practices within virtual worlds, yet outside of educational contexts, we turned to the Massively Multiplayer Online Role-Playing Game, *World of Warcraft*.

Learning in online game-worlds

World of Warcraft offers multiple modes of participation, yet play involves interacting consciously with particular structures and constraints. While the game incorporates variability and different modes of play, play styles and preferences, particular constraints or structures will -in part at least – define the experience and the ‘text’. It has a generically definitive rule set, for example, that marks it as a role-playing game. This means that characters ‘level up’ in experience points by performing particular tasks, and while specialising in particular traits (physical power, particular forms of magic, etc.). Play is dramatic, variable and expressive, but the context of this play is more defined than that on offer in *Second Life*. The game world has a geographic cohesion, with roads and transport hubs, major cities and public spaces as well as wild habitats and borderlands. Avatars or characters in the game do reflect player preference yet (visually at least) they conform to particular if customizable templates. The game is ‘owned’ by its developers, even if it only ‘lives’ because of the input of its subscription-paying users. (For MMORPG analysis, see Taylor 2006, or Ducheneaut *et al*, 2006)

While learning obviously happens in this game world (otherwise players would not progress), studying learning practices is not straightforward. We did not want to divorce players from the real-world contexts of play, yet we wanted to focus on learning that emerges through players’ participation with a game world and other players. Our solution was to focus on couples who play the game together, while sharing a real space.

We recruited through online guilds and real-world social networks, and interviewed ten people (four heterosexual couples and one mother-son pairing). In doing this, our previous experience in research and playing online games – we had been casual players of *World of Warcraft* for around 18 months when this project began, and we still play – proved extremely valuable in making initial connections to willing participants.

We interviewed our couples in game at a location of their choosing, and chat-logged the text-based semi-structured interviews, each of which lasted between 60 and 90 minutes. The resulting transcripts were split between the authors, and the contents categorised. These separate categories were then jointly reviewed and reconciled to produce our initial categories, which included references to:

- Who got who started and how
- Assessments of increasing competence (and incompetence)

- Help – from mentoring to ‘backseat driving’
- Guilds
- Affect
- Domestic space and assets (‘best’ chair or computer, for example)
- Alts (second or alternative characters)
- Gender
- Time constraints
- Relationships (in game, in guilds, being a couple, etc.)

By reviewing the data, and reflecting on and refining these categories, we arrived at the notion of the ‘management of resources’ as a framework or key, through which it was possible to identify learning. As players moved towards greater competence, they identified and leveraged an increasingly complex array of in-game resources, while negotiating real-world resources and demands. To consider this framework in greater detail, we subdivided the management of resources into 3 categories: ludic, social and actual (for an account of this research see Carr and Oliver, 2008).

Second Life users might manage different resource sets, or in different proportions, but we would expect that learning practices in relation to the management of resources could be documented in *Second Life*. For the sake of coherence it may be necessary to narrow the inquiry to identifiable communities of practice (see, for example, Burn, forthcoming). In such a case, the terms of legitimate participation might function as the implicit curriculum, for instance. To return to the example of *World of Warcraft*, it is interesting to consider this game as a combination of structures that support social and experiential learning and to ask – then -what games might teach us about curricula and pedagogic design. Questions of design are returned to in the discussion that follows, where learning and teaching are considered in relation to *Second Life*’s amorphous tendencies.

Teaching in *Second Life*

What follows is an account of our teaching in *Second Life*, with an emphasis on the issues of definition and ambiguity discussed thus far. The ambiguity referred to should not be assumed to be a problem in a teaching context, or a failing of these classes. On the contrary, as we have argued elsewhere (Carr, 2009), ambiguity has the potential to unsettle or de-naturalise aspects of our roles (as teacher, learner or researcher) -which could be considered one of the most interesting aspects of a virtual world for educators.

We taught four sessions in *Second Life* over two terms (see Table 1). These taught sessions were designed to fit into specific MA (postgraduate) modules rather than to fully exploit or test the various aspects of SL.

Table 1 The four classes in Second Life

Class no.	Course module	Class format
1	Computer Games, Gaming Culture and Education (from the MA in Media, Culture and Communications)	Topic: Machinima Guest presenter and studio tour 4 students plus a guest, 2 facilitators, 1 guest presenter, 1 host (during tour)
2	Computer Games, Gaming Culture and Education (from the MA in Media, Culture and Communications)	Topic: Fan practices and role-play Guest presenter 3 students plus 1 guest/informant, 2 facilitators, 1 guest presenter.
3	Computer Mediated Communications (from the MA in ICT and Education)	Topic: Virtual world research i. Ethics 3 facilitators, approximately 15 students
4	Computer Mediated Communications (from the MA in ICT and Education)	Topic: Virtual world research ii. Discussion 3 facilitators, approximately 15 students

Methodologically, this phase of work echoed the reflective, experiential model of the first phase; however, we also drew on students' evaluation of the session within the course (e.g. in a feedback forum within Blackboard – the more conventional Virtual Learning Environment that was used) and conducted interviews with students. Data was also gathered during the sessions themselves (in the form of chat logs). For a more detailed account of this process and excerpts from the interviews and commentaries, see Carr's report 'Learning to Teach in *Second Life*' (online at the project blog). Students were informed that we were conducting research and had access to the project blog. Attendance at the SL sessions was not compulsory.

The majority of participating students – especially the distance learners -believed that the *Second Life* sessions were a useful addition to a course. The students compared *Second Life* to Blackboard, finding that while the VLE offered structure, it was socially 'dry', whereas *Second Life* was highly motivating if occasionally anarchic or chaotic, and offered very welcome real-time and virtual-space contact with peers and tutors. Most did not value *Second Life* over the VLE. They appreciated the offers of both and described the identified differences as complementary. While the majority of the feedback was positive, the students were not uncritical. The few students who had real-space access to peers and tutors were unimpressed by the *Second Life* sessions. Some of the students struggled with following text discussions, and it became clear that participating in discussions in *Second Life* with confidence is an acquired skill. While we had calculated on students having to familiarize themselves with the interface and the basics of avatar movement, we had not fully appreciated the problems associated with text-chat for beginners. While inexperience with virtual worlds was an issue, there were also indications that experienced gamers were more likely to be annoyed by *Second Life*, at least at first, because their expectations about the usability, graphics and coherence of virtual worlds are not met.

It also became apparent that *Second Life* sessions require significant amounts of preparation (emailing reminders, posting material to the VLE, distributing notecards at the beginning of the session), and they are quite labour intensive to run. We preferred to divide roles across 2 or 3 tutors for instance (leaving one free to 'direct' the session, greet stragglers or manage technical problems using instant messenger; one to lead the discussion or present and, if

possible, another tutor who is then free to be immersed in the discussion itself, responding to the multiple input from students with counterpoints or questions).

As this suggests, classroom conventions do not translate in a predictable fashion. In terms of duration, *Second Life* is time consuming but also potentially intense and draining. While 4 students might constitute a very small group in a real classroom, it can feel like a sizable group in *Second Life* -and the larger the group, the more necessary some kind of formalized structure becomes. Over our four classes we moved from less structured, small groups, to more structured larger groups, and from a more exploratory format (tours, guests) to a more conventional format. These are not evaluative descriptions – we do not propose that one of these approaches is ‘better’ than the other -or more innovative, or less creative. What is important, rather, is the manner in which a set of factors (see Table 2) combined in virtual worlds during a session.

Table 2 The factors in the sessions that contributed to or countered ambiguity

Classes 1 and 2	Classes 3 and 4
Elective activity	Core activity (but still voluntary)
Smaller group	Larger group
Guest presenters (with tutors present)	2 of the 3 tutors were known to the class
Course taught in mixed mode of delivery: via conventional VLE (First Class), 2 days face-to-face residential teaching, 2 elective sessions in <i>Second Life</i> .	All distance learning (on Blackboard) with 2 <i>Second Life</i> sessions.
Mix of full time/on campus students, with part-time distance learners	All distance learners
Less straightforward relationship between course content (computer games, gaming and education), and <i>Second Life</i> as a whole, or as a phenomena	Obvious links between course content (computer mediated communications and education) and <i>Second Life</i> as phenomena
Some of the course literature (on simulations and role-playing for example) does apply to <i>Second Life</i> .	Clear relevance of much of the course literature and set reading.
Session format: Tours, guest presenters, projected images, various locations.	Familiar discussion and presentation format, in one location.
(greater ambiguity) ←←	→→(reduced ambiguity)

We reviewed students’ comments and identified instances where affect (confusion, anxiety) could be linked to specific aspects of a session, and considered such elements across all four of the sessions. Session 1 and 2 were less formally and less familiarly structured than session 3 and 4. Additionally, the relationship between *Second Life* as phenomenon and the content of the meeting itself were less obvious in sessions 1 and 2 than they were in sessions 3 and 4.

Depending on the degree to which a session is structured, and depending on the management of elements such as those mentioned in the above table (and this is not an exhaustive list)

we would propose that ambiguity (of place or role, for instance) might be either amplified or suppressed according to the teacher's needs. A degree of disorientation or ambiguity might be productive in one learning context yet completely counter-productive in another. When planning teaching in virtual worlds, pedagogic and curricula structures could be imagined as constituting an aperture through which ambiguity can be incorporated and managed. 'Managed confusion' can be pedagogically useful if, for instance, it confounds expectations, exposes assumptions and promotes reflection. The difficulty, however, is that effectively managing these affective aspects of learning can be a problem in a virtual world where the teacher might have surprisingly little access to real-time feedback.

The 'anything goes' nature of SL meant that our students took little for granted. For example, they questioned the various pedagogic decisions that had been made. The unfamiliar format rendered pedagogic design 'visible' to participants. We feel that this is potentially significant in relation to education studies and an issue deserving further research.

Conclusion

The pedagogy that is emerging from this work may best be understood in terms of managing the ambiguity that virtual worlds bring, rather than necessarily removing it. As the research described in this paper make clear, the object of study (a virtual world) is constructed and enacted in different ways according to the setting in which it is encountered, and the interests of the user. This cannot be avoided; however, it can be worked with pedagogically. This variability or ambiguity renders roles, teaching designs and practices unfamiliar or visible, and thus it be used to draw attention to issues of pedagogic importance.

This was most evident when the educational process itself was the focus for teaching. In such a case, the various design decisions and the perceived potentials of virtual worlds were questioned and challenged by participants, thus heightening their awareness of the issues involved in 'education and computer mediated communications' debates, for example. However the same ambiguity can be seen in relation to other topics, and in other contexts. The forum responses to the issue of deafness provide a case in point. In the discussions that we reviewed, deafness was constructed as a disability, and a tangled relationship between actual hearing loss, online identity (both 'normal' and 'other'), technology, social inclusion and virtual community was evident -all of which calls for further investigation.

While there is much here that might be regarded as critical, we would repeat that the overall response from students was very positive, to the extent that *Second Life* sessions in one form or another will be integrated into at least two of the Institute of Education's MA programmes (in 3 different modules) during the coming academic year. This presents us with an opportunity and we hope to extend this action research into a next iteration, continuing in our role as educators while further refining and extending our research into virtual worlds, learning, ambiguity and affect.

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The impact of the characteristics of a virtual environment on performance: concepts, constraints and complications

Joff Chafer and Mark Childs

Keywords: e.g. Second Life, performance, Shakespeare, practitioner research, mediated environments

Abstract:

In April and May, 2008, two scenes from Hamlet were performed live in a recreation of the Globe Theatre in SecondLife (R) to an inworld audience, by a troupe of performers known as the SL Shakespeare Company.

The performance was mediated through voice, through the representation of the avatars, through gestures and through the positioning of the avatars within the stage space. All of these have links to other forms of performance, particularly masked performances and puppetry.

Barriers to performance included the lag between lines being delivered and being heard. This was compensated for by the performers and the support mechanisms that were put in place.

The role of technology in telematic and virtual performances is similar, in that performances that explore the nature of the technological platform are more successful than when technology is intended to be an imperceptible mediator of performance.

One of the elements that was lacking to convey a sense of realism in the performance was individuation and subtlety in gestures. Part of the elements that convey realism within an environment is imperfection and small variation. Further work will explore the creation of choral gestures inworld with small differentiation between each performer.

Introduction

The paper presented here represents a collaboration between two researchers in the field of immersive virtual worlds; these are Joff Chafer, a performer and lecturer in contemporary performance with experience in puppetry, mask-making and acting and one of the actors in the virtual performance recounted here, and Mark Childs, a Teaching Development Fellow and doctoral student, who, as part of his thesis, has developed a conceptual framework that draws together many of the factors that influence learners' experiences in mediated environments.

This conceptual framework was employed as a structure with which to evaluate the experience of performance in a virtual world. The aim of this analysis was therefore two-fold. Firstly it was to attempt to capture the experience of virtual performance and identify good practice that could be passed on to performers at future events. In parallel with this evaluation, the analysis was also to test the conceptual framework as an evaluative tool, and to further develop it. The evaluation was conducted as a semi-structured interview of Joff by Mark, combined with personal accounts by Joff.

The paper begins by describing performances of Hamlet in Second Life, in which Joff participated, and the conceptual framework used by Mark as a basis for their evaluation. The paper then reviews the characteristics of the environment that have an impact on the

experience of participants. The paper concludes with a) a reflection on virtual performance and possible further areas in which performance may be developed and b) observations regarding the usefulness of the conceptual framework as an evaluation tool.

Virtual Hamlet and the SLShakespeare Company

The SLShakespeare Company is a group of performers most of whom are in the USA, Canada and the UK, although a few others are elsewhere. None have actually met face to face.

The performances of Hamlet were held in a reconstruction of the Globe Theatre in Second Life. The original Globe in real life was an Elizabethan circular theatre located in London, built in 1599 at Bankside, burnt down in 1613 and rebuilt in 1614 with a tiled roof and finally demolished in 1644. Second Life contains many reconstructions of the Globe, the one used by the SLShakespeare Company was constructed by Ina Centaur. The SL Globe Theatre was built to be a historically accurate replica of the original Globe Theatre that stood in Shakespearean days (figures 1 and 2). Changes, however, had to be made due to certain Second Life quirks.

Size perception is actually larger than life on Second Life due to (standard humanoid) avatar height distortions. Using a 1:1 RL to SL ratio would yield a petite theatre, roughly, the size of the Old SL Globe Theatre. However, the new SL Globe Theatre was built for voice acting, and requires movement on a stage. Thus, dimensions were multiplied by a SL Size Distortion factor of 1.5 based on sketches taken from historical excavations. (Centaur, 2008).



Figure 1 An external view of the SL Globe theatre



Figure 2 An audience member's view of the stage

For the performances, two scenes were chosen from Hamlet. These were Act One Scene One (with the first appearance of the ghost of Hamlet's father) and Act Three Scene Two (the "mousetrap" scene in which Hamlet organises a play to try to catch Claudius out.). These were selected because they were pivotal scenes within the play and to create a taster for the full work. Also by working on these scenes the performers learnt a lot about performing in this environment. Each scene was of 10 minutes duration, the first having five actors in it, the second had 12 performers. Also designers were involved to develop costumes and scenery.

Auditions were held initially in August 2007 and rehearsing took place over several weeks in early 2008. The performances were held over two weeks for each scene. The first taking place in April 2008, the second in May 2008.

The plays were very well attended. Total attendance for the first series of performances was approximately 180 per performance, for the second this was around 170. There were over 10 000 visits in the period between February 28th and mid-March.

The Mediated Environments Reference Model (MERM)

The term "mediated environment" refers to a technology that enables two or more distanced participants to interact synchronously by the creation of a shared digital space. This space can be created through videoconferencing, through text (such as in the case of a MUD¹), or through a computer-generated 3D environment, such as an immersive virtual world (Zhao, 2003; 445). Since the concept of a mediated environment unifies these different technologies, this has been used as a basis for drawing together literature from a range of different fields, and synthesising and organising this into a single reference model (Childs, 2008a; 38). The reference model is still a work in progress, and is intended as a means to facilitate dialogue

¹ A MUD or Multi-User Dungeon creates a spatial metaphor using text by describing rooms that users can enter and leave.

about the various influences on experience of mediated environment. This dialogue facilitation role is a function of reference models described by Smyth (2004) as “to scaffold research and, therefore, to assist a researcher to make meaning of subsequent findings”.

The model describes the factors affecting the experience within mediated environment in terms of the various forms of presence and the formation of the participant’s identity within the environment. These factors are taken from activity theory (Engeström, 1999; 31) and are:

- The subject (i.e. the performers)
- The rules and conventions
- The community
- The division of effort and labour
- Tools and artefacts
- The object (in this case *Hamlet*)

For reasons of space, this paper focuses solely on the role that the tools and artefacts, that is the Second Life environment itself, had on the experience of performance. The role of the environment on experience is subdivided into several categories (figure 3.) These categories were then used to structure the interview and to structure then analysis of the transcript.

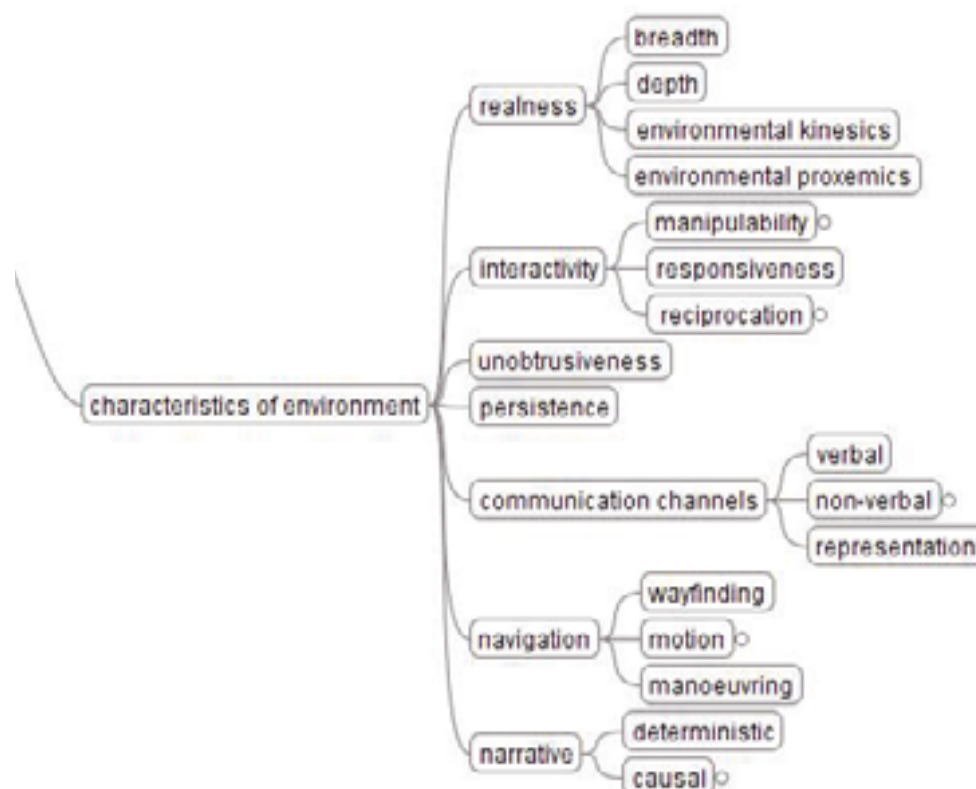


Figure 3 The characteristics of the environment that influence experience of mediated environments (a section of the Mediated Environments Reference Model)

The sections that emerged from the interview as directly bearing on the experience of performance are listed below. The remainder of the terms are described in Childs (2008b).

Interactivity

Interactivity can be subdivided into three elements; manipulability, reciprocation and responsiveness.

Manipulability is the extent to which a participant can change the environment, both in terms of the fineness of the changes and the range of elements that can be changed. Dreyfus (2000, p. 57) states that “What gives us our sense of being in direct touch with reality is that we bring about changes in the world and get perceptual feedback concerning what we have done.” Manipulability adds to our sense of being within the environment and also supports the extent to which the environment can seem real. The more things we can manipulate and the degree to which we can alter them add to this sense of realism.

Reciprocation is the degree of feedback on our activity. When this reciprocation is from other users, it can support the sense of social cohesion. Short et al., (1976) identify “evidence that the other is attending” as a critical feature in the promotion of socially meaningful interaction (Rourke et al, 1999, 56). Responsiveness is distinct from reciprocation, in that it refers to the speed of the feedback, rather than the degree to which it takes place. Within immersive virtual worlds where the technology will introduce delays in responses (called lag) this will act against sense of copresence with other participants. The importance of responsiveness and reciprocation in enhancing copresence is an effect noted by Wheeler (2007; 111), where he lists elements such as access to others and the speed of response by them, as well as “paraverbal utterances such as backchannelling and other confirmatory utterances” as contributing to copresence.

In combination, these three elements all contribute to the perception of connection with the environment and other people mediated by that environment. This sense of connection supports our feeling of copresence with the others, and our presence within the virtual world.

In performing, manipulability was felt to be key element to the experience of being a performer particularly the movement of their avatars.

M: Is it important to have control over those animations yourself (or the animations be) controlled by something else moving your avatar in a pre-set sequence?

J: For me I'd much rather have the animations there and have to remember where they are and work out where they are. As a performer there's that sense of being in control.

Enhancing the manipulability by extending the fineness with which one could manipulate the movement of the avatars was felt to be an important development to the system.

M: Is there a need to develop gestures that would co-ordinate with each other?

J: I would like some more subtle gestures that I could hotkey or whatever. At the moment the gestures are all quite definite.

Although the platform supported many channels of communication, providing opportunities for reciprocation, there were many issues with slow responsiveness due to lag (delays in hearing a voice due to time taken to process and transmit the audio). This was made more complicated by the lag changing as the system was required to do more processing.

M: Does (lag) vary very much within a performance?

J: Generally not, although we did find that we'd be on this raft[backstage away from the venue] and then we'd turn up backstage and suddenly everything would slow down because we were set to 64m draw distance and we were far enough away not to have to rezz² any of the audience but as soon as you get there ...

M: ... you'd have to rezz everything.

J: Yeah.

In order to compensate for the lag, the performers found that they had to begin their line before the end of the previous one to account for this lag, otherwise there would have been gaps, slowing down the performance. This is a technique called 'dovetailing' (Kronos Kirkorian, personal communication).

J: The very first show we did of the second run, we had all sorts of problems with lag, so we decided to work out how on Earth we would sort this out. What we did was just have someone backstage with their mic on playing through speakers because that way as you talk you get your echo and you can hear how long the lag is and you can hear other people's lag as well.

One means by which this could have been overcome would be to have synchronised all of the participants through the use of an external cueing system, indicating when they should deliver their lines, however this was not chosen as an option.

J: One of the things, though, with using the voice is that you want to allow for people to take longer or slower or wait for a cue because someone hasn't actually arrived.

M: It's getting that balance between automation and control.

J: Because if you wanted it to work perfectly just record everybody's voices and then stream it in.

Despite the slow responsiveness of the system, having to dovetail and overlap lines in order to compensate for the lag is still preferential to automating or cueing the speaking of the lines, since the latter reduces the amount by which performers can manipulate the environment, and removes the element of responding to the other performers. Not only does this reduce the sense of copresence within the environment, from a performance point of view it undermines the *raison d'être* for the activity.

A technical solution that may reduce lag in future performances may be to offer audience members a costume to wear. This will then mean fewer textures will need to be processed. Asking audience members to turn off particle effects and animations was already carried out for the two series of performances described here.

Communication channels

The greater the range of communication channels used, the greater the sense of copresence (Becker and Mark, 2002, p.29). Within the performances the actors used voice, considered to be essential for performance (Gwen Williams, personal communication), since voice contains

² To rezz (a term coined by Lisberger and MacBird [1981]) means the resolving of an object in a virtual world, either its formation inworld, or its appearance to the viewer.

not only language but paralinguistic elements such as tone, emphasis and pacing (Farnell, 1999; 351). Other aspects of communication are non-verbal aspects, i.e. kinesics, proxemics and representation.

Kinesics is the study of the “conventionalized vocabularies of gestures/postures” (Farnell, 1999; 351) and analyses how information is conveyed through visible bodily motion. Within immersive virtual worlds, kinesics are conveyed through the employment of animations and gestures that can be used to control the movement of the avatars. The prominent role that kinesics play in communication is indicated by the importance placed on having control over the gestures of the avatars and the requirement to be able to improve this control with greater finesse, both mentioned above. When communication through kinesics is successfully enacted, then that is particularly satisfying for an actor:

M: When you're clicking on an animation do you feel like you're performing?

J: Yes. Particularly when you've got a nice gesture. There's that sense of satisfaction when you time it just right.

M: You were talking about the parallels with puppetry. Does that feel like the same thing?

J: Very much so. Very much so. Trying to get that fluidity that looks natural.

However, appropriate employment of kinesics does not entail using as much movement as possible.

J: If you try and do too much it just confuses the issue. I think you have to look at that sense of movement and gestures in terms of a language, and if you're moving and gesturing all the time, it's just a babble. It's like sometime with the automatic voice gestures, sometimes there's too much going on.

M: In a real life performance people aren't moving constantly.

J: It's very much in that bad puppetry mould where "I've got to keep it moving constantly otherwise no-one will believe it's alive."

Similarly with the use of animations that move the lips of the avatar as the performer speaks. Adding extra elements to the movement of the avatar does not necessarily add to the strength of the performance, and these are elements that can be omitted from real life performances without detracting from the understanding of the performance.

J: We've also got the lipsynch HUDs³ to animate the mouths, which I personally don't like because it's never actually going to lipsynch properly and, having worked in puppetry and masks before, it's something that you don't really need. When I used to do stuff with masks, the mouth and head never moved as such but people would come up afterwards and had understood exactly what was going on.

Communication through proxemics also plays a part in communication; proxemics being the way in which position of people in relation to each other enables sense to be made of relationships between people. The relative positions are a semiotic system that can be read by participants, although this reading differs across cultures and contexts (Farnell, 1999; 351). The positioning of the performers on the Globe's stage was an aspect that was developed and

³ A HUD is a “heads-up display” a control panel that appears on the screen when attached to ones avatar.

improved across the two sequences of performances. Interpretations differ, however, as to why audiences would have felt this to have been important:

M: Were there issues with the movement through the space (for the first performance)?

J: The direction of the movement wasn't particularly specific enough. There wasn't a real sense of how it's actually going to look and how we're going to use the whole space or not. As it was we ended up clumped over one side a lot of the time and had to push ourselves to move anywhere else. Whereas the second time round there's much more a sense of the whole space and trying to make sure there's a good balance of where action happens and we throw the focus from space to space.

M: Since they are just virtual bodies in a virtual space, why does that matter?

J: I think just a visual aesthetic really from an audience point of view. If it's unbalanced, it's unbalanced.

Irrespective of whether an audience may have found the placement of actors more appealing in the second performance than the first for aesthetic or semiotic reasons, this does indicate the validity of a key factor of immersive environments; that is that “users do not simply roam through the space as ‘mind’, but find themselves grounded in the practice of the body, and thus in the world” (Taylor, 2002; 42). Because our life is normally experienced in the physical world, when we experience things virtually we carry those experiences over into that virtual space, in this case that actors will move around on stage in a particular way. Mimicking the proxemics (or aesthetics) of real world performances will create what is perceived as a better performance by fulfilling those expectations.

Information is not only contained in verbal and non-verbal cues, but also the information conveyed through self-representation, such as avatar design. Users report that the avatar they choose to adopt is intended to communicate to other users “like all objects, the artefact of the avatar is located within a system of meanings and values which will have an impact on how it is experienced and received” (Taylor, 2002; 54).

Between the performances, modifications were made to the appearance of the avatars, the costumes and the scenery. This added to a sense of the theatrical. The faces of the real life actors were scanned and these were used as the faces of the avatars (although not exclusively the avatars of the people who had been scanned). This was to give a greater level of detail to the appearance of the avatars to enhance the realism of the event, i.e. this was to signify to the audiences that this was akin to a real performance. Unfortunately, however, this had a detrimental effect on the responsiveness of the platform.

J: One thing was that the set itself was more elaborate and the costumes were a lot more flexiprims and the lag was ten times worse because of all the extra. It was ridiculous. I found that it was better if I took the wig off because it was all flexiprims and textures in it.

Unobtrusiveness

Bowman (2002; 281 - 282) provides a list of the characteristics of mediated environments which includes obtrusiveness i.e. where the technology “interferes with the user’s ability to focus on the task” (Bowman, 2002; 282). Ensuring that the elements of the technology are not obtrusive have been remarked on elsewhere as being important for maintaining a sense

of presence, for example in a study of students taking part in a telematic learning experience, one student remarked how “Passing a microphone around broke the illusion too.” (Childs, 2007; 24).

The interface proved to be very obtrusive as far as performance was concerned with the need to set up and trigger the required animations.

J: For the dumb show the actors working avatars for that all had a set of animations, that they would have to set in order in the right place. For some of the time ... they had phantom invisible objects that they would line up that they would click on to set off the animations. The other way was to get the animations out on the desktop, HUD, whatever, but then with that you do have that problem that if you're not in a gesture already it means your (avatar's) eyeline follows the cursor to the next gesture. So everyone looks down to click, or wherever you've put them on your screen.

For an actor acting in an immersive environment there is an additional need to be immersed in the role (in order to act) as well as be immersed in the environment. Conducting the mechanics of the interface as well as the process of acting and doing these simultaneously proved to be difficult, at least in these early stages.

J: I think it's very hard to get out of that sense of being a technician and actually go into role because there's all that other stuff that you have to worry about. I think that in time it would become like driving a car where you automatically do them and you know where the things are.

Further work

Many of the issues with the performances reviewed here stem from them being replications of real world performances within a virtual world. Although the rationale for conducting versions of Shakespeare's plays is to test as much as possible the capacities of the system, those plays were designed to work with the affordances of real life and avoid the constraints (Vygotsky, 1925). A performance designed around the strengths of a virtual world and in which the technology was an element to be explored and integrated into the experience would be less problematic. In those circumstances, the intrusions of the technology would be a factor to be experimented with and experienced, rather than distractive interference with the performance. This mirrors the evaluation of performance in telematic environments (Childs and Dempster, 2008) in which it was found that the technology was too limiting for conveying performance techniques that rely on the proximal experience of other performers (such as a Suzuki method workshop) but did provide a worthwhile experience when the telematic environment itself was incorporated into the piece. An example of the type of performance in which the technology is foregrounded is given here:

J: something which is more along the lines of the telematic performances where we have real people in a space and we had virtual people in a virtual space and we find some way of mixing the two together, but without worrying about a particular narrative or whatever, but essentially treating it like a drama game that we play with but is also a technical game at the same time.

Another future plan is to use choral gestures, i.e. to have many avatars performing the same actions at the same time. However, here the fineness of control of the gestures will be an issue.

J: Something else I'd like to do is having a look at choral gestures. What happens when you have twenty people all doing the same gestures? How does that work? Is there a way of getting a subtle difference between them? Because sometimes the fact that people are doing exactly the same is not quite right. It's those ...

M: It's the imperfections that make it real.

J: ... imperfections that make it real.

An aspect of kinesics is that we are used to action in the real world having subtle differences, and unless these differences are carried over into the virtual, this will not correspond to our "practice of the body". Correspondingly, for the performer, without the fineness of manipulability of his/her avatar, the sense of performance will be less.

Conclusions

Appropriate use of kinesics, proxemics and representation all convey aspects of performance that audiences are used to in the real world and therefore their inclusion in virtual performances adds to the connotation of a good performance. These can be overdone however, more movement is not necessarily better performance, instead appropriate use entails examining those aspects of performance in the real world that audiences value (or notice) and mimicking those. These are part of the rules and conventions for performances in which technology is in the background as the medium for performance. Rules for effective performances where the technology is foregrounded may well be different and will be the subject of future work.

Interactivity was constrained by two sets of limitations, those of the responsiveness of the environment, due to the heavy processing required when the performances took place, and the lack of fineness in manipulability in gestures. The use of gestures also limited the sense of performance through being obtrusive. However, lag can be compensated for through the employment of dovetailing and the gestures can be incorporated into performance and these techniques may become automatic with practice.

From the meta-evaluation conducted after the semi-structured interview, it was concluded that having a systematic reference model had helped the evaluation process. Additionally, the framework was comprehensive enough to have elicited responses on all the aspects of the experience that could be recalled. Stimulated recall, through replaying machinima of the performances, may have produced more focused and detailed accounts, and this will be incorporated into future evaluation activities.

The influence of the "attention to technology", i.e. whether the technology is part of the reason for the performance to be, or only a means to convey the performance is an additional factor that was not originally part of the framework. Future versions of the reference model will include these as one of the set of rules and conventions governing interaction. In this capacity, the reference model has fulfilled its role in scaffolding research, through making omissions in the conceptualisation of mediated experience more explicit.

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Get Real - this isn't real, it's Second Life Teaching ESL in a Virtual World

Margaret de Jong Derrington and Bracken Homewood

Keywords Second Life, Skype, Action Research, language teaching online, ESL

Abstract

This paper was written following a year spent in teaching English as a second language through the medium of English to groups of students from all over the world (ESL) on-line in Skype and Second Life (SL). Further investigation of the teaching and learning process in SL included learning Japanese and taking classes and courses in scripting and building and an eight-week instructor program at one of the SL building schools. This hands-on approach offered great opportunities to observe and examine the emerging pedagogy of SL tuition as practised not only in ESL but also in the in-world schools of building and scripting and to see it develop following the introduction of voice and the emergence of innovations which belong not to real life but only to the magical environment of a virtual world. The greatest benefits for ESL learning were observed where creative teachers, unhampered by too close an attachment to reality, were able to harness the full potential of the virtual environment.

1 Two Embryo ESL Learning Groups in Second Life in 2007

1.1 EPOTI

The EPOTI group (English Practice Over the Internet) is a group of individual adults who for various reasons are learning English by different formal and informal methods each in their separate countries all over the world. With the freely-given help of a series of different teachers and native speakers they practise chatting together in text (sometimes accompanied and corrected by a native speaker) and chatting together in their own voice conferences and Skypecasts. They collaborate in various ways, recommending different free programmes, websites, and other facilities available on the internet. Frustrated by the deterioration in quality of Skypecasts and Skype conference calls experienced over a period of some weeks they decided to try using SL for their regular voice chats. Unfortunately, because some members of the geographically widespread group had inadequate internet connections or computers, only about half of the keener students did make it into SL.

Hitherto their learning in EPOTI had been free. This was important because many of the group were learning English as a hobby, or with the idea that improving their English might help in their future careers and although some were using EPOTI as an unofficial adjunct to a course they were engaged on elsewhere, for most of them it was a leisure activity. Many of the students come from countries where the cost of paying US or UK rates for tuition would be prohibitive.

Like Skype, SL is free software, which can be downloaded and used without charge, but SL abounds with glittering opportunities to spend 'Linden Dollars' which have to be bought or earned in some way. Many of the students loved SL, and some became completely immersed in sightseeing and social activities finding not only opportunities to practise their English but

also English schools running classes that they could attend in-world. Indeed, one or two found that they were becoming more and more immersed in SL, spending too much time there to the detriment of either their work or their real social life. Two months later, when Skype's technical problems were resolved and other voice options became available (permanently open voice conference rooms on Skype which could be used in conjunction with a public (text) chat-room for discussions, exercises and general chat,) most of the group went back to using Skype and the EPOTI group once again became centred entirely on Skype text and voice activities.

Fig 1 shows the EPOTI group, who, having migrated from Skype in search of better sound quality, are seen here sitting round a table on a sky platform in SL. They are using voice, augmented as necessary by text to have a discussion --exactly as they did in their Skypecasts. There is a native speaker there helping them with new words and correcting their mistakes. The 'magic' table is scripted and set always to have a couple of free seats, a new empty one appearing when anyone sits down. Sitting at the table fixes their positions and orientation making the sound level of each voice constant and they can see who is talking by the green brackets above the avatars' heads. The text-chat is in a separate window which participants arrange on the screen so that they can see both at the same time.



Figure 1 The EPOTI Group from Skype sitting round a table in SL talking with text and voice.

1.2 Drive-Through

The Drive-Through English School is one of the longest running English schools in SL and with a team of student helpers and class runners has been running English classes in SL since November 2006. Originally, before the introduction of voice, these classes were in text-chat. Now a variety of classes is offered, free to helpers but paid for with 'Linden Dollars' by other residents. Fig 2 shows a text class at the Drive-Through ESL School in July 2007. The teacher standing at the front of the class, and the students sitting in armchairs type to communicate. Whilst the EPOTI group existed outside SL and, as a group, met within SL for English lessons, the Drive-Through ESL school exists only inside SL and advertises its English lessons to existing SL residents. This explains to some extent its emphasis on the school classroom or tutorial scenario. It has a greater need to present itself as a school inside SL since it does not already exist as one outside it.



Figure 2 A text class at Drive-Through ESL school in July 2007.

The classroom is on a platform high in the sky so that passers by are unlikely to drop in. This is the equivalent of closing the door of a classroom in real life. In SL there is no need to have a roof to keep out the weather...and if it gets dark, pupils can reset the apparent time of day to noon to make it light again. There are actually low, transparent classroom walls to prevent the avatars accidentally falling off when they arrive and look for seats in class. Since all the teaching and learning is in fact taking place in the chat window, pupils and teacher would normally try to arrange items on the screen so that they can see both the classroom with the other avatars, and the chat window in which the dialogue appears.

1.3 ESL in SL

In both of these SL classrooms, SL has been used to replicate as far as possible the classroom that it replaces. There has not been a complete rethink of the facilities required to teach language, or any attempt to maximise the possibilities of SL. That said, the SL classroom scenario has given the students a sense of communal presence; although they are all sitting at computers in different parts of the world, they think of themselves as being in the class with the other students and the teacher.

As a language learner, learning Japanese using websites, books, CD.s and tapes of TV programmes, I found that, learning alone at a distance, the vocal medium of Skype and the virtual world of SL were exactly the media required for experiential language learning. In both these places, the learner can find native speakers with whom to practise real, meaningful conversations. Wandering about in a Japanese Sim was, I felt, like being in Japan itself. I could see real Japanese people's avatars walking about and chatting in Japanese. With the prevalence of US and British residents in SL surely it must be even easier for English learners. A visit to SL must be like a holiday in an English speaking country; a great opportunity to try out the language they are learning. I had observed the progress that could be made by immersion in a foreign language both firsthand when I spend three months in France many years ago and later at second hand when I employed au pairs from Europe; they had all quickly become fluent and even one who arrived with no English at all had passed the Cambridge Advanced Certificate after two years in London.

Surely in SL this immersion could be found, experienced and used; a learner could be immersed in the target language and culture. Surely also these media should be examined or compared in some scientific way in order to see what practices could be transferred, and what restrictions relaxed; how the new medium could best be used. Examination of the affordances of the different platforms should enable me to see whether what works in one might be transferred to another. And in particular whether transfer to a new medium would mean new restrictions or open up new possibilities.

2 Back to Basics

2.1 Requirements for the teaching of ESL

ESL teaching is not like other foreign language teaching. Since the students in a class generally have a variety of mother tongues, English itself must be used for teaching. This can be a great obstacle when the students' English is minimal. In real life ESL classrooms, basic vocabulary is elicited and beginners are taught by a variety of methods including pictures, mime and gesture, drawing, producing objects --whatever on the spot, off-the-cuff methods the ingenious teacher lights upon. Whilst on-line teachers (whether in Skype or SL) can have resort at any time to 'google images', translation tools and pre-prepared resources, it can be quite difficult to achieve mutual understanding.

Physical affordances for teaching ESL

	SKYPE	SECOND LIFE	REAL LIFE
prepared text	o	o	o
spontaneous text	o	o	o
automatic logging of text	o	o	o
text editing and correction	o	o	o
prepared images, drawings and diagrams	o	o	o
spontaneous images on line	o	o	o
spontaneous drawings and diagrams	o		o
spontaneous mime/acton	o		o
pre-prepared mime/acton		o	o
prepared speech	o	o	o
spontaneous speech	o	o	o
recording of speech	o	o	o
display of film, music etc	o	o	o
observation of mouth and lips for pronunciation	o		o
role play		o	o
visiting places (class trips and excursions)		o	o
Unbold o indicates the need for additional technology or add-on eg an electronic whiteboard in RL or separate sound recording equipment			

Figure 3

The relative availability of the affordances of Skype, SL and real life classrooms is shown in Fig. 3. As can be seen from this table, Skype has some practical advantages over SL, particularly in the availability of Skype's 'talk and write tutoring tool' which allows spontaneous drawing of images and diagrams and in the facility to correct text that has been 'sent' for up to half an hour afterwards. With a webcam Skype also has the facility of showing the disposition of the tongue and lips for pronunciation and some capacity for spontaneous mime. SL however has a greater capacity for role play and affords opportunities for visiting places and spaces to provide interesting and useful settings for learning.

2.2 Robins' Taxonomy of Digital Spaces

Robins' Taxonomy of Digital Spaces (Robins 2007) is another way of looking at the two platforms. In Fig.4, I have used her Taxonomy to describe Skype and real life too (SL was included in her list of virtual worlds) in terms of the 'Ten Characteristics of Virtual Environments'.

**Robin's Taxonomy for SL
Skype and Real Life**

		Skype	Second Life	Real Life
# of users	single			
	multi	●	○	○
Dominant Form	text	●		○
	image		○	○
Network	LAN			○
	WAN	○	○	
Persistence	Persistent	●	○	○
	Non-persistent			
Synergy	Synergic	●	○	○
	Non-synergic			
Object Ownership	private	●	○	○
	public	●		
Identity Formation	static			
	custom	●	○	○
	conditional			
Access	private			
	public	●	○	○
Relationship with other users	Collaborative	●	○	○
	Antagonistic			
	Conditional		○	
Relationship with Environment	Collaborative	●	○	○
	Antagonistic			
	Conditional			

Figure 4

Apart from the dominant form...which in SL is image, and in Skype is text...there is absolutely no difference between the two. They are both publicly accessible, internet-wide, multi user systems (although it must be said one can generally observe around ten million Skype users on line at any one time to SL's 50,000 or so). They are both persistent and synergic; what you do and say in either place remains for all to see and will still be there when you log back in. In fact the options to log chat on both platforms can be very useful for subsequent study. In SL users cannot log chat that takes place while they are not logged in. In contrast by joining a public chat-room in Skype, access is gained to the chat that happens even while a user is absent offline. When a user who has not left a chat-room but merely logged out of Skype logs back in, up to a month's missed chat comes flooding through either in an avalanche or in drips and drabs according to the state of Skype's servers.

2.3 Comparing Both SL and Skype with Real Life

Although there might be some discussion about whether real life's users have a collaborative or an antagonistic relationship with each other and with the environment, I think it must be agreed that, in terms of Robin's Taxonomy of Digital Spaces, both Skype and SL

bear a remarkable similarity to real life. The main difference being that in real life voice communication is local, within a classroom, not even LAN-wide, whereas Skype and SL are both WAN-wide; they extend face to face education to distance learners.

Robin's view is that that understanding different technologies and charting them according to these ten qualities should inform our decisions regarding a technology's effectiveness in our classrooms.

"Teaching is fundamentally about communicating information and experiences to students. Therefore, a deeper understanding of the communicative qualities of an environment are critical to pedagogy in these digital spaces. If this side-by-side comparison merely makes the new seem more familiar, I believe it has helped us make great strides." (Robins (2007))

Awareness of the similarities should encourage us to consider different environments but pedagogy can never survive a transfer intact, nor should it. Attempted replication on a new platform can only be a pale reflection of the previous one. It is by exploring the differences that new, better pedagogies emerge. New technologies like SL should not be regarded simply as a way of including distance learners in our real life classrooms they must also be considered as a way of releasing learners from local classrooms into the wider world of the WAN, into that unreal world where distance is nothing

2.4 Cognitive presence and Immersion

As long ago as 1990, Bricken defined 'cognitive presence' and it has been said (Winn 1993) that 'desktop VR' with avatars does not meet Bricken's conditions for 'total immersion'; certainly there is no haptic feedback and SL avatars cannot point and touch things without pre-prepared scripted animations and gestures. However, in the sense that language learning is the learning of verbal communication, once VOICE is employed in SL and Skype, it comes pretty close in so far as the user is being required to use voice in the target language to communicate 'for real'.

As a citizen of SL one quickly becomes aware of how much users identify with their avatars, how annoyed they are when their avatar is jostled, how embarrassed when it is clumsy, or when computing glitches make it suddenly appear bald or naked. Awareness of what O'Driscoll (2007) called the 'Seven Sensibilities of Virtual Worlds', those properties of a virtual world which encourage students to identify with their avatars and enable them to move great distances in milliseconds, which give them the ability to feel they are present with and can work together and share knowledge and experience with others is crucial both to understanding what happens and to taking advantage of the educational possibilities of an environment like SL. It is only by taking full advantage of these sensibilities as well as of the more obvious affordances, that a change of platform will become a positive step and an improvement rather than a merely an attempt to give distance learners a watered down version of a real classroom environment.

3 Building and Scripting in SL

Scripting and building classes have been taking place in SL longer than most other education and perhaps provide the first signs of emerging traditions of pedagogy and accumulation of teaching expertise.

3.1 Bringing Classes into SL

There are two quite different types of building class. Walters, the CSIT Program Coordinator at Pellissippi State Technical Community College (as Travis Willesmere) brings a RL class of students (who are already virtual world gaming geeks) into SL where they learn to build and script objects such as vehicles and speedboats. They test them by racing against each other on specially constructed in-world racecourses on Winding River Island as part of a course in Game and Simulation Programming.

First there is a sofa building class with full step-by-step instructions. Then various stages of building a boat are laid out in order. The student works his way through the process identifying the different building blocks from which it is made. (Fig. 5) This scaffolding helps the students through the task with or without a teacher present. A similar process is laid out with a racing car and a tank but with less detailed help.



Figure 5 Building side by side at Winding River.

The communal presence of SL is utilised by setting out small platforms for individuals to build on, which are close enough together for the students to collaborate, discuss in voice what they are doing and help each other whether they are in the computer lab at the college or working after hours at their own computers at home. Even working from their different homes, in SL they are together in class.



Figure 6 Basic Building course at NCI

An object in SL can belong to an individual or to a group, and there is an option to allow another avatar to edit one's objects thus allowing collaborative building projects. Objects can be given to or set to allow copying by another avatar, but the original creator is always listed in the object's properties. This provides an excellent facility for collaboration with some protection against plagiarism.

3.2 Creating classes within SL

There are several in-world building schools which offer mostly free classes to new and aspiring builders and scripters in SL. These find their students by advertising to the avatars already in SL. Teachers are generally SL enthusiasts paid by donations or tips from pupils, or sponsored by in-world businesses. Arrangements vary. NCI (New Citizens Incorporated) pays its teachers a small honorarium, but Tui's teachers (Technical User Interface) receive only students' donations and any sponsorship they arrange themselves. Some of these schools run teacher training courses for residents who aspire to become in-world teachers or instructors. Classes generally last an hour, are attended by avatars from all over the world and take place in classrooms specially designed for in-world teaching. There is no legacy pedagogy to import from another place but already a tradition has been built up of students stationed on a matrix of mats following pre-prepared instructions given automatically in text and supplemented (again in text) with advice and encouragement from the teacher, who generally creates a huge scaled model of the 'build' at the same time and troubleshoots when students have difficulties.



Figure 7 Building scripted apple trees at TUi

There are various problems inherent in this format. When a large number of avatars are close together in one space, this creates 'lag', SL slows down and computers crash.

Avatar Rendering Cost, (ARC) the cost in computer processing of the features of individual avatars can be investigated and shown on screen (Linden 2008). Not only one's own ARC but that of all avatars in sight can be shown on screen, and this can be surprising. For example, the apparently complicated robot avatar shown here (Fig 8) has an ARC of 559, less than half the 1265 ARC of the female avatar with the flexi-prim hair which includes a script to illuminate her face. When knowledge of ARC becomes more widespread perhaps attendees at classes and other events will be limited to 'green' ARCs of less than 1000. It will be almost like having to wear a school uniform!



Figure 8 Avatar Rendering Cost can be shown on screen

3.3 In-World Groups and Communities

Apart from offering classes, SL also provides a facility for creating interest groups. There are interest groups for scripters and builders and also (sometimes several) groups attached to most in-world schools. These are used almost like the newsgroups on the web, but used for synchronous communication by people asking for or giving advice in text-chat and posting details of events like classes. It is quite normal to see a conversation taking place in which one person asks for advice or for a script or object, another replies and a couple of other people chime in either adding their pennyworth or asking to be sent the same item also or to say something along the lines of “Oh, thank you! I never knew that!”

Sometimes if a problem seems intractable, one person will actually teleport to another’s location to give or seek help. These groups are real online communities of people who may never even meet even avatar to avatar in the same region of SL, never mind in the same place in the real world but nonetheless freely give and accept help and tuition from each other. One is reminded of Papert’s

“Settings that are real, socially cohesive, and where experts and novices are all learning.....Learning is not separated from reality....Novice is not separated from expert and the experts are also learning.” (Papert 1980 p 179)

SL is most definitely an environment that supports such settings and so does Skype. To make the best use of SL, an ESL school would have to be such a setting, either physically in that it provided a region where avatars could meet and talk, or within a group like the building and scripting groups with the option of teleporting to meet. The EPOTI group’s Skype chat and voice conference rooms provide such a setting of mutually supportive learners. Their migration into SL did not create another such a community in SL partly because of the small numbers involved; only a dozen or so of the 150 strong Skype community ventured into SL and they were only together there for an hour or two at a time. But the activities in SL did for a while become part of the total EPOTI setting, providing a source for discussion in the Skype text-chat and on their blog (Fallach 2007a, 2007b).

4 Examples of Maturing pedagogies of ESL in SL

4.1 Café

There are several places in SL which have been set up to provide places for non-native speakers to come and practise speaking English, often with scheduled help from native speakers. An example is the English Café (Fig.9) on International Education Island where native speakers are paid a couple of hundred Linden dollars (worth less than one US dollar) to chat to group members, mostly Japanese though all are welcome, who come for an hour every day for this free 'lesson.' This is scheduled at 6AM SL time, which is late in the evening, 10 or 11pm, in Japan and generally draws between 5 and 10 students during these scheduled sessions with native speakers. The group text-chat, which is received by all members during the time they are on line, does not create any sort of community, being used only for class announcements.



Figure 9 Japanese residents chat in English at the English café on International Island in SL

4.2 Language Lab

Language Lab, one of the largest and reputedly one of the most successful SL language schools although it has no existence outside SL, recruits its students on the internet and leads them through acquisition of a SL account and an avatar before bringing them into SL in the school's foyer. On an extensive 18-island site, they have built resources to teach English language (and soon Spanish and other languages) in every way afforded by SL. In 'English City' there are various characters (paid native-speaking actors) who carry on a 'life' there and chat in character to any of the school's students who pass by. There is a strict rule against SL jargon and also against references to the fact that they are in a virtual world. From the arrival lobby students can see who is on-line and 'take a taxi' (they must not say teleport!) to their location in the city to practise English conversation. I saw the resident musician showing students a film about orchestral instruments in the cinema there and later another resident sitting under the trees in the park discussing poetry with group of advanced students.



Figure 10 Language Lab's English City and the native English residents

As shown on the film on the school's website, www.LanguageLab.com, there are classrooms with desks, as in real life and lessons take place both in these and in an extensive range of scenarios around the city. There is an airport (where already it is possible to change the signage from English to Spanish at the touch of a button), and everything from a cinema and a bank, to a cafe and a park so that authentic language can be practised in the right setting. This arrangement seems ideally suited for generating a community of language learners but, possibly because of the large space involved in relation to student numbers, this does not as yet seem to have materialised. Each time I was there, apart from groups assembling for classes and scheduled meetings with the native city residents, the city seemed empty.



Figure 11 Language Lab students sit in the park reading and discussing poetry with one of the residents of English City

4.3 Holodecks

SL scripting provides a way of removing or changing scenes at the touch of a button with a Holodeck. The concept is simply demonstrated in a YouTube film (Desoto 2007). Using a holodeck, different scenes can be 'rezzed' or created temporarily in SL and changed at the

touch of a button. Some language schools have made use of holodecks to provide scenarios for lessons. One of the first places this facility was used for ESL was the English Village where, (as avatar Kip Yellowjacket) Boahm, an American ESL teacher with a real life English school in Germany, has been experimenting with ESL teaching in SL since 2006 (Bluberg 2008). Preibisch, as Fire Centaur still runs the English village and continues this exciting brand of immersive English teaching with role playing activities, treasure hunts and other such fun activities.



Figure 12 Washing up, ironing and eating cake in the kitchen at the specially designed house

4.4 Drive-Through in Danish Visions and Media Learning

The use of building and other in-world skills can be used in a variety of ways to enhance and extend the ESL pedagogy in SL. Knudsen (Inge Qunhua in SL) from the Horsens Business College in Denmark began by using specially built houses and a hospital for teaching conversational English and now constructs her own scenes for the holodecks she uses to teach. On the Danish Island of Media Learning in Region Denmark the use of a holodeck for ESL has progressed to an art form. Students from the ESL SL Drive-Through English School visit the holodecks created there by Inge Qunhua and act out scenes in a hotel reception, hairdressing salon, bank, post office, hospital casualty department, a garage, an airport... The scenes, specially created inside a large box can be changed by clicking a button and students can take the parts of proprietors or customers, tellers, receptionists, doctors, hairdressers, patients, garage mechanics or whatever constructing their own conversations or just asking and answering questions about the fixtures and fittings in each scene. Like the students building racing cars on Winding River Island, they are amazingly immersed in the activities and often find and fill previously unperceived gaps in their vocabulary.



Figure 13 The hairdressing salon in the holodeck

The multilingual community of SL itself provides a larger environment for them to practise their languages. Instead of travelling to a foreign country, sitting at a computer in their own homes, students can immerse themselves in the language and culture of another country by visiting the many communities in SL. If their language is not sufficiently fluent, they can use in-world translators to help them to communicate across language barriers.



Figure 14 At the garage in the holodeck

5 Conclusions

When digital projectors and electronic whiteboards were introduced into classrooms in real life, they added the dimensions of permanence and recall to what had previously been written and wiped off a chalk board. But this simple additional facility was provided by a computer which could be attached to a network, an intranet and even the internet and no one can now deny that this revolutionised the pedagogy of classroom education. Teaching and Learning in SL does not merely extend 'presence' in education to distance learners and enable them to be brought into real life classrooms. Exploration of its almost magical affordances in particular in

the realm of language learning can enable teachers to provide authentic immersive learning experiences in the form of opportunities to use language in apparently real settings. Second Life can enable students to travel instantly to other in-world locations in order to explore interesting places together providing a rich environment for the use of language. It is a multilingual, multicultural environment particularly rich in opportunities to speak English.

The sense that can be created of presence in-world together with other people and the many ways of communicating within groups affords opportunities to create on-line socially cohesive communities of learners as described by Papert, (1980) where authentic immersive language learning also takes place. Communities of online learners already exist in other areas of online learning such as webpage design (Derrington 2000) and, as described above, in the field of ESL in the EPOTI Skype group and in SL in the case of building and scripting forums. These are, it has to be said, rather larger communities than the average ESL school in SL. The forums number thousands in their membership, and EPOTI is a public group, constantly challenged by the limit of 150 imposed on Skype chat-rooms. Furthermore, membership of all these groups is free. Language schools, where students pay to attend classes, may regard free, self-help communities as competition. Exploration of these factors may provide explanations of the slow growth of such groups in ESL in SL. However, wonderful environments for authentic immersive language learning are being created and used by ESL schools in SL; in particular where creators refuse to be hampered by too close an attachment to reality!

Acknowledgements

Fig 1 <http://english-practice-over-the-internet.blogspot.com/search/label/second%20life> a picture of the EPOTI group created in Skype by Jolanta Fallach a Polish Anglophile. SL snapshot taken by Mariola Lane = Jolanta Fallach.

Fig 2 SL Snapshot from Johnius Petrov, one of the students in the Drive-Through class; in RL Ivan Zhmaev from the Ukraine.

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Margaret Derrington spent ten years teaching Mathematics and ICT and now lectures on the ICT PGCE course at King's College London where she is also involved in the PHANTOM project at Guy's Hospital. She has spent eighteen months in SL teaching English and learning Japanese. Her avatar, Bracken Homewood, recently qualified as a building instructor at TUI in SL.

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Immersed in Learning: Developing and Supporting Creative Practice in Virtual Worlds

Denise Doyle

Keywords: Second Life, Creative Practice, Digital Media, Collaboration.

Abstract:

The Immersed in Learning Project began in 2007 to evaluate the use of 3-D virtual worlds as a teaching and learning tool in undergraduate programmes in Digital Media at the University of Wolverhampton. A question that the research set out to explore was what were the benefits of integrating 3D immersive learning with face-to-face learning for students who could be considered to be 'digital natives'?

The purchase and development of Kriti Island on the Second Life grid saw the online virtual space rapidly assumed a sense of real presence, and become a focus for collaboration, nationally and internationally. The successful submission of 'Kritical Works in SL' project to the International Symposium for Electronic Arts in Singapore 2008 means that Kriti Island hosted ten international artists work produced in and for Second Life.

With the ongoing research new questions have emerged. There is now a deeper focus on the use of the Second Life platform for creative practice and the exploration of concepts that are impossible in real life. This paper reflects on the development of an island for research and to support creative practice and creative collaboration and comments on its current and future use in the School of Art and Design.

Research Context

Second Life, the online environment or 'virtual world' created by Linden Lab was launched in 2003 with barely 1,000 users (Rymaszewski 2007: 5). The number of residents is now over 15 million, or at least those who hold a *Second Life* account¹. Following the logic of the 'real' world, it follows (most of) the rules of our Cartesian space, providing earth, sky, water, gravity, day and night, moon and sun on a three-dimensional networked grid. Second Life has its own 'time' – SL time, set to the equivalent of pacific coast 'earth' time. The sun rises at dawn and when it sets the moon rises. If you are a landowner you can set the sun/moon cycle as you choose based on a 24 hour clock cycle. Or you can keep a constant 'nature time' – always midnight, always sunset, always sunrise. The 'Force Sun' command enables you to override an area's settings wherever you are, or rather your avatar. It is possible to have any representation of yourself, your avatar, though many choose to represent themselves in human form.

Jones (2006: 10-11) notes that, whilst *Second Life* could not be described as an immersive virtual world based on Heim's set of characteristics of virtual worlds, it still sits "squarely in the discourse of virtual reality because it provides a high level of interactivity and tele-presence within a parallel world that allows for the construction of place and self". He charts the philosophical developments and concepts of the real and the virtual from pre-modern times to the post-modern era and concludes that now:

¹ Statistics from http://secondlife.com/whatis/economy_stats.php
Accessed 06.09.08

[...] Virtual worlds rest within a discursive space that have been constructed upon the struggle between the strengthening and blurring of boundaries of corporeality and transcendence, the real and the virtual, where and nowhere, and the unitive and multiplicitous self. It is this tension that makes virtual reality and virtual worlds so compelling to the contemporary imagination. (Jones 2006: 15)

The academic and teaching community were early in their recognition that a virtual world such as *Second Life* had many potential applications in teaching and learning. Developing out of the concept of the 'metaverse' described in *Snow Crash*, a novel by Neal Stephenson; the metaverse was meant to be a real place to its users, although it still relied on the real world as a metaphor. The possibility of using this virtual world for simulation or simulation based scenarios is obvious. In fact, Boston, in Aldrich (2005: 334), suggests that simulation based environments are "ideal for developing an understanding of big ideas and concepts – those things that experience alone can deepen understanding". In her review of games based learning, De Freitas (2006) notes that:

[...] learning in the context of immersive worlds is beginning to have more wide ranging uses and applications [...] as Second Life communities demonstrate, *interactions within and between groups are opening up new opportunities for learning beyond the classroom confines (physically and conceptually [my emphasis].*

She goes on to say that this presents "real challenges for learning with games and immersively, and opens up new opportunities for innovating practitioners to create new approaches and spaces for learning"(De Freitas 2006).

Place in Virtual Worlds: Creating Kriti

There is no place in cyberspace – there's no Africa there, no mud, no beads or wells or such humanity in the very air. (Griffiths, 2005)

In July 2007, the University of Wolverhampton purchased an island on the *Second Life* grid to support research in the Digital Media area of the School of Art and Design and to encourage collaboration both within the institution and further afield. A question that the research initially set out to explore was the potential use of a virtual world such as *Second Life* as a learning and teaching tool to develop blended learning approaches in the undergraduate teaching programme, given that the students in this area could be considered to be 'digital natives'.

In Virtually U, Jennings & Collins (2008:184) identify two types of virtual campus; that of the Operative Virtual Campus, as illustrated by an island owned by INSEAD, and the Reflective Virtual Campus as illustrated by the archipelago of islands developed by Ohio University. The Operative Campus functions as a working campus, where learning, research, and communication takes place completely in a virtual environment that could not exist in the real world. In contrast, the Reflective Campus affirms the institutions spirit and reproduces its physical campus in the virtual world.

In its initial development Kriti Island followed the Operative Virtual Campus model. Distinctly different from the University of Wolverhampton campus, Kriti Island is a place that, beyond the initial stage of development of a dramatic central landscape and welcome area, has evolved organically and by adaptation to use.

The welcome area holds information about the island, the projects and the teaching and learning opportunities associated with Kriti. An amphitheatre area was developed close to the welcome area as a central point for presentations and viewing of video streams of student work. Other spaces have evolved over time, such as the social and meeting area, the library, and the seminar space, which will be discussed in later in this paper. Further to this, between May and July 2008 the whole island was used to house the Kritical Works in SL exhibition, which will remain part of the island until the end of 2008.

The 'sense of place' that the island has assumed over the last year has been of particular note, with students and collaborators referring to Kriti as though it were a real place. Jones (2006:12) notes that:

The historical context of the use of imagined and experienced virtual spaces, as well as cyberpunk dream of making the cyberspace/matrix/Metaverse into a reality, frames the imagination of *Second Life*'s creators and users. In fact, *Second Life* takes the production of virtual spaces further by allowing the users to be gardeners themselves, landscaping their world as they wish it to be.

The use of the building, creating and landscaping tools of Second Life, to sculpt, create and experience 3D space to test new concepts has formed the basis of the potential use for students in the area of Digital Media.

Creativity: Concept and Practice

When researching the use of the *Second Life* platform for creative practice, a number of themes emerged, although of particular note was, whatever the mode of creative practice, the artistic focus on exploring what is clearly impossible 'In Real Life' (IRL). In conducting a survey of creative practice in *Second Life*, through work undertaken in the fields of Art, Media Arts, Architecture, Performance, and Machinima, I noted in particular the goals of the Ars Virtua Gallery² to be a laboratory for the formation of new art practices and to:

[...] provide a platform for the intersection of media and the information/knowledge fields
[...] to promote the development of a commons in networked space, a place where ideas can be exchanged across physical borders inside a shared experiential space.

Recent *Second Life* Arts events include the creation of Brian Eno's 77 Million Paintings, mirroring a Real Life exhibition in San Francisco in June 2007 and in September 2007 Ars Electronica held its first Architectural competition specifically for the platform of *Second Life*. The Intimacies Symposium, held in *Second Life* in December 2007 focused on the presentation of the avatar as data, continually reforming in virtual space. The Media Artist Lynn Hershmann Leeson is currently exploring *Second Life* as an archiving space for her extensive projects created over the last four decades in performance, film and interactive installation called "Regenerative Presence", Documenting Life to the Second Power. Real world artist DC Spensley, known as DanCoyote Antonelli in SL, creates his hyperformalist work in SL but also extends his creative practice into 'live' performance with the ZeroG Skydancers programme, which the author attended in January 2008. Robbie Dingo recently re-created the 'space' of the painting 'Starry Night' (1889) by Van Gogh on an entire Island in SL, and Adam Ramona, Adam Nash in Real Life, has developed a substantial body of conceptual work in SL through an exploration of sound and space. Robbie Dingo contributed to the Kritical Works in SL project outlined below.

² Information accessed InWorld and available at <http://arsvirtua.com/about.php>
Accessed 14.04.08

Kriti Island as an Exhibition Space: The Kritical Works in SL project

With a growing number of artists and designers continuing to specifically work with the SL platform itself the project Kritical Works in SL aimed to bring together a range of art works to explore if common themes were emerging. Developed from a submission to ISEA2008 in Singapore this project and subsequent virtual exhibition aimed to investigate if there was a maturing of the languages and spaces within SL. Was there a commonality of approach and emergent experience?

The artists that were invited to contribute to the Kritical Works in SL project were selected because they were already exploring the *Second Life* platform in some way in their creative practice, whether it was in the fields of art, design, media arts, virtual environments or sound technology. The aim was to include a diversity of practice and to encourage responses from a range of backgrounds. Some contributors are very well known within *Second Life*, or rather their virtual personas or counterparts are.

As island owner and curator of the exhibition Wanderingfictions Story, my virtual counterpart, was the link and the collaborator in virtual space. The process of inWorld curation was both interesting and challenging. At least half of the contributors I have never met, or spoken to, in person. The curation occurred essentially through avatar to avatar. The works presented in the exhibition contributed to the exploration of the potentials and limitations of the medium itself. The exhibition was launched at ISEA in July 2008 in Singapore. The exhibition can be visited inWorld until the end of the year.³



Figure 1 Planning the Exhibition on Kriti (2008)

In terms of the exploration of creative practice there is a growing interest amongst the wider international artistic community in the Second Life platform. At the beginning of the academic year 08/09 research will be undertaken with undergraduate students in Digital Media and in Fine Art, to firstly, gather responses to the international work created and presented as part of the Kritical Works exhibition and secondly, to gather student perceptions of Kriti Island as a virtual space to develop creative practice. Interested students will have the opportunity to take part in a virtual exhibition on the island later in the academic year.

³ SLurl for the exhibition is <http://slurl.com/secondlife/Kriti%20Island/205/20/21/>



Figure 2 The Water Gallery on Kriti (2008)

Kriti Island as a Seminar Space

In an educational art and design context, it is the UK based *Second Life* work developed by Leeds College of Art and Design on the HND Design for Multimedia course, and by Leeds Metropolitan University to support a range of Studio Practice based degrees in Fine Art and Graphic Design, that has been used as a model for the integration of the use of the *Second Life* space in the Immersed in Learning project. Angrybeth Shortbread from Leeds College of Art and Design, and Kisa Naumova and Cubist Scarborough from Leeds Metropolitan University, all artists and educators each contributed to the Kritical Works in SL project with respective projects called Ping Space, the Autonomical Grid, and White Cubist Chair. Each institution has at least one island on the *Second Life* grid which supports art and design practice either specific to a single course or to a range of courses.

The Undergraduate Digital Media Programme in the School of Art and Design at the University of Wolverhampton traditionally attracts circa 400 students across the three levels annually. There are five distinct pathways that make up the programme: Animation, Film and Video Production, Computer Games Design, Interactive Media and Digital Arts and Media. Kriti Island was introduced to the students at each level of the programme. However, in 07/08 there has been a particular focus on the introduction of SL into two modules: a contextual module at Level One undertaken by all students in the Division and a specialist Animation module, Character and Environment, at Level Two. I focus here on the use of *Second Life* as a seminar space to support the Level One contextual module.

Rethinking Concepts in Virtual Space

The fifteen week contextual module Understanding New Media was studied by all students registered at Level One. The module registration for 07/08 was 140 students. The module structure relies on a one hour lecture session for the whole group followed or preceded by a two hour seminar session exploring and discussing ideas developed in the lecture. In the seminar the students work with pathway specific staff with a maximum of 30 students per group. In Week One, during the module introduction, the students were introduced to *Second Life*. They were encouraged to create an account and an avatar ready to participate in an online session later in the module. In Week Nine it was possible to have a face-to-face seminar session in a computer room with two of the seminar groups, Interactive Media and Computer Games Design students,

which had *Second Life* installed on all computers. This enabled the whole group to support each other in the creation of their avatar and journey through Orientation Island, which is the first place that avatars find themselves once they have created an account. From student feedback, they were surprised by how much they enjoyed the session, particularly those who had not created a *Second Life* account until that day.

In Week Ten the students had the opportunity to participate in an InWorld seminar which was offered twice during the week, outside of the normal lecture slot. The seminar, 'Representing Reality: Synthetic Realism and the Film Image' was adapted from a lecture given during the 06/07 Lecture series of the same module. The content of the lecture lent itself to the experience of *being* in *Second Life* as questions of how we both represent and experience reality were explored and debated. In March 2008 the author attended a presentation given by Simon Bignell at the MML08: Massively Multi User Workshop at Anglia Ruskin University in Cambridge, England⁴. During the presentation Bignell most notably discussed the benefits of using the 3D nature of the user experience to explore and explain concepts. I wanted to apply some of his ideas to the development of the session.



Figure 3 Preparation for the In-World Seminar (2008)

The 06/07 session was structured around three images, each representing reality in different ways. It was my intention to allow the students at the end of the session to vote for which image represented reality the most in the context of our discussion, by adding note cards to each box with the chosen image on. After the initial introduction to the session we discussed the text written by Manovich (2001) seen in Fig. 3. The Manovich premise is that we have become so accustomed to the photographic image as an accepted representation of reality that what we attempt to do is to recreate something that is actually based on a film image and not on our actual experience of reality.

Following a discussion of the three videos/films that the images were from; a Chris Cunningham music video for Bjork, *All is Full of Love* (1999); *Polar Express* (2004) and *Grasshopper* (2005) by Richard Linklater, we discussed the Japanese Roboticist Mori's diagram of the Uncanny Valley (see Fig. 3 and Fig. 4). None of the students who participated in the seminars had heard of the Uncanny Valley, although all of them seemed to grasp the concept very quickly. A section of the recorded text from one of the sessions is below:

⁴ The presentations were filmed and are available at <http://www.inspire.anglia.ac.uk/mml08>

[11:05] You: The Uncanny Valley is the region of negative emotional response towards robots that seem “almost human”.

[11:05] You: Movement amplifies the emotional response.

[11:05] mrtom100 Dreadlow: u mean like what is put forward in I robot

[11:06] Shinigami Lehane: in that we fear that which we do not understand?

[11:06] You: and it is where 70 – 100% human likeness is where the problem begins.

[11:06] You: its exploring the similar ideas - yes

[11:06] You: but is more focused on our reaction to visual imagery

[11:07] You: this is the classic diagram explaining the Uncanny Valley

[11:07] You: one line is for still objects

[11:07] You: the other is for moving objects

[11:07] You: and it gives examples of where various forms are on the line

[11:08] Shinigami Lehane: amusing diagram

[11:08] mrtom100 Dreadlow: so was this model just placed on robots or generally everything that could represent humans

[11:09] You: if you look at the two lines

[11:09] You: the horizontal is what is associated with the degree of human likeness

[11:09] You: so up in the right hand corner is a 100% human

[11:09] You: on the diagram it says a healthy person

[11:10] You: and on the vertical, it is level of familiarity

[11:10] You: so equally, the familiarity is 100% for a human

[11:11] Shinigami Lehane: so the uncanny valley peaks at zombie as the definitive example of confusion between healthy life and complete death, in other words an absolute logical fallacy

[11:12] You: Cognitive Dissonance – the perception of incompatibility between two cognitions

[11:13] You: cognitive dissonance is where we can believe two things at the same time

[11:13] You: so - according to Mori

[11:13] You: all is well - to around 70% human likeness

[11:13] You: then when things get ‘too’ close to human likeness

[11:13] You: we fall into the uncanny valley



Figure 4 The group discussing Mori's Uncanny Valley (2008)

Responses to the Seminar

Each of the sessions generally lasted one hour. In terms of participation there were proportionately more Computer Games and Interactive Media students who participated in the seminar. This may be accounted for by the fact that the other students studying Animation and Film and Video Production were not given the opportunity of a face-to-face session to set up their account in *Second Life*. Feedback from the students about the seminar session was generally positive and all students felt that the experience had been engaging, although most students tended to anticipate that this would be a one off experience. I am uncertain as to what had created this perception.

This seminar will be developed further for the 08/09 programme. To further extend Bignell's ideas of conceptualising ideas in 3D, I will build a full 3D walk around version of Mori's Uncanny Valley diagram. This will mean that the students will be able to interact with the diagram and place the examples given actually in the 3D space of the diagram, and include examples of their own. The voting system will also be developed further and comments given will form the basis of the second part of the seminar.

Conclusions

The research being undertaken in this study contributes to an emerging area of study in art and design educational research and its use of virtual worlds such as *Second Life*. The decision to buy an island on the *Second Life* grid for a range of research purposes has, in itself, created further research questions and opportunities that could not have been anticipated at the time. As Kriti Island enters its second year of 'presence' on the grid, further research on concepts of space and the notion of virtual 'place' will be possible with students and collaborators, and the potential for students creative practice extended through Jones's (2006:12) gardeners concept, "landscaping the world as they wish it to be". Further to this, being able to create a space for international collaboration promises a future project that will build on the Kritical Works in SL exhibition and could encourage undergraduate students to explore and experiment on the *Second Life* platform further.

Although research into the experience of being an avatar is not a focus of this study and is outside of the direct scope of the projects presented here, consideration of the interactive and immersive experience of the student is crucial to the overall understanding of the potential future integration of the *Second Life* space of Kriti Island into the Digital Media curriculum. As Meadows (2008:16) suggests, "an avatar is a social creature, dancing on the border between fact and fiction". The border he refers to has a rich potential for, in particular, the exploration of character within animation and digital media.

The next stage of the Immersed in Learning project will test student perceptions of Kriti Island as a virtual space to support and develop creative practice. Further work will be undertaken in constructing the Uncanny Valley diagram into a fully interactive immersive seminar space and finally, a blended learning approach will be developed for research being undertaken on a character and its environment within a module in the School of Art and Design.

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Reflections on the use of Project Wonderland as a mixed-reality environment for teaching and learning

Michael Gardner, John Scott and Bernard Horan

Keywords: Wonderland, collaboration, mixed-reality, virtual environment

Abstract:

This paper reflects on the lessons learnt from MiRTLE—a collaborative research project to create a 'mixed reality teaching and learning environment' that enables teachers and students participating in real-time mixed and online classes to interact with avatar representations of each other. The key hypothesis of the project is that avatar representations of teachers and students can help create a sense of shared presence, engendering a greater sense of community and improving student engagement in online lessons. This paper explores the technology that underpins such environments by presenting work on the use of a massively multi-user game server, based on Sun's Project Darkstar and Project Wonderland tools, to create a shared teaching environment, illustrating the process by describing the creation of a virtual classroom. It is planned that the MiRTLE platform will be used in several trial applications – which are described in the paper.

These example applications are then used to explore some of the research issues arising from the use of virtual environments within an education environment. The research discussion initially focuses on the plans to assess this within the MiRTLE project. This includes some of the issues of designing virtual environments for teaching and learning, and how supporting pedagogical and social theories can inform this process.

Introduction – the rationale for using virtual learning environments

There is a great deal of interest in applying immersive virtual environments to teaching and learning. Much of this has been caused by the success of commercial platforms such as the World of Warcraft¹ for online gaming, and Second Life^{®2} for online social networking and e-commerce. These environments have a high level of realism and associated levels of engagement as well as supporting and encouraging social interaction. A key question is whether these positive outcomes can be generalised and applied to the education community, and whether institutions can adopt these environments and provide them as part of their online ICT infrastructure.

Students at the University of Essex (for example) have the benefit of being able to use a world class ICT infrastructure that supports learning across a wide range of curricula designed for full time and part time, home and international students, engaging in programmes delivered at Foundation Degree through to Doctoral level. The ICT infrastructure at the university provides a wide range of e-learning packages and tools available for use by students and staff. These resources include the facility for submitting digital copies of assignments via the internet, a course materials repository, the use of the Moodle virtual learning environment, online assessment using Questionmark Perception, a locally developed web based facility (Mylife) that supports social networking and the development of digital portfolios, and access to the TurnitinUK plagiarism detection service.

¹ <http://www.worldofwarcraft.com/>

² <http://secondlife.com/>

Although uptake of these services is generally high within the University, there are several challenges with respect to integrating existing learning technologies as learning become less institutionally based. Work based learning, in particular, has a number of challenges. For example, it is often associated with a physical separation of the learners from the teachers, that has traditionally been addressed either by ‘bussing’ students to the teachers, or teachers to the students or some combination of the two. In all cases there is additional expense of travel and often the duplication of equipment, as well as consequences for the environment. However, the traditional approach has the advantage of face-to-face interactions, and generally provides a more socially cohesive learning community. Universities also have the added complexity of delivering teaching and learning at more than one site. This separation has implications for teachers as well as learners. The teachers, for example, run the risk of becoming socially and pedagogically isolated from each other. In terms of learners, many of the students are undertaking courses whilst still at work. For example, Foundation degree students may have a curriculum that is delivered mainly through lectures and reflective activities captured in a portfolio. In contrast Continuous Professional Development courses (CPD) demand work place supervision and reflective activities. Learners also require access to the full range of learning resources available to their campus-based peers. These resources include, for example, courseware (lectures, reading lists etc); learning resources (ICT facilities, reading materials), as well as access to tutors and other learners.

Immersive virtual environments have the potential to seamlessly integrate classroom and online participants in a shared learning experience regardless of their location in the real world. It is also possible to bring together the physical and virtual worlds such that the lecturer in the physical world can deliver the classroom session in the normal way whilst having the ability to communicate verbally, in real time, to remote students who may be represented by avatars on a screen at the back of the room. The remaining part of this paper describes some of the lessons learnt from the development of a virtual learning environment (MiRTLE) based on Sun’s Project Wonderland platform. It also considers some of the issues concerned with the choice of the virtual world platform, the deployment issues within an institutional infrastructure, and the evaluation of these new services.

Project Wonderland

Sun’s Project Darkstar³ is a computational infrastructure to support online gaming [Burns, 2007]. Project Wonderland⁴ is an open-source project offering a client server architecture and set of technologies to support the development of virtual and mixed reality environments. A noteworthy example of this is Sun’s MPK20 application; a virtual building designed for online real-time meetings between geographically distributed Sun employees⁵ which is illustrated in figure 1.



Figure 1 Sun’s MPK20 Environment

³ <http://www.projectdarkstar.com>

⁴ <https://wonderland.dev.java.net>

⁵ <http://research.sun.com/projects/mc/mpk20.html>

In more detail, Project Wonderland is based on several technologies including Project Looking Glass to generate a scene and jVoiceBridge⁶ for adding spatially realistic immersive audio. The graphical content that creates the visible world as well as the screen buffers controlling the scene currently use Java3D. Additional objects/components to Wonderland (such as a camera device to record audio and video seen from a client), make use of other technologies such as the Java Media Framework⁷. Graphical content can be added to a Wonderland world by creating objects using a graphics package such as Blender or Maya. Project Wonderland provides a rich set of objects for creating environments, such as building structures (e.g. walls) and furniture (e.g. desks) as well as supporting shared software applications, such as word processors, web browsers and document presentation tools. Thus, for example, a virtual whiteboard can be drawn on by one or several users, PDF documents can be viewed and presentations can be edited. A user is represented as an avatar augmented with the user's login name (eventually it is intended that avatars would have an appearance similar to that of its user). A user can speak through their avatar to others in the world via the voice-bridge and a microphone and speaker, or use a dedicated chat window for text-based messages. The scene generated by Wonderland can be viewed from first-person or several third-person perspectives.

MiRTLE

The objective of the MiRTLE project (Mixed Reality Teaching & Learning Environment) is to provide a mixed reality environment for a combination of local and remote students in a traditional instructive higher education setting. The environment will augment existing teaching practice with the ability to foster a sense of community amongst remote students, and between remote and co-located locations. The mixed reality environment links the physical and virtual worlds. Our longer term vision is to create an entire mixed-reality campus but so far we have developed the first component in this process: a mixed-reality classroom. In the physical classroom the lecturer will be able to deliver the lecture in their existing manner but they will have the addition of a large display screen mounted at the back of the room that shows avatars of the remote students who are logged into the virtual counterpart of the classroom (see figure 2). Thus the lecturer will be able to see and interact with a mix of students who are present in the real world or the virtual world whilst delivering the lecture. Audio communication between the lecturer and the remote students logged in to the virtual world is made possible via the voice bridge mentioned earlier. An additional item of equipment located in the physical world is a camera placed on the rear wall of the room to provide a live audio and video stream of the lecture to the virtual world.



Figure 2 Lecturer view of remotely located students



Figure 3 Student View of Lecture

⁶ <https://jvoicebridge.dev.java.net>

⁷ <http://java.sun.com/javase/technologies/desktop/media/jmf/index.jsp>

From the remote students' perspective, they log into the MiRTLE virtual world and enter the classroom where the lecture is taking place (see figure 3). Here they see a live video of the lecture as well as any slides that are being presented, or an application that the lecturer is using. Spatial audio is employed to enhance their experience such that it is closer to the real world. They have the opportunity to ask questions just as they would in the physical world via audio communication. Additionally a messaging window is provided that allows written questions or discussion to take place.

A means by which a student can feedback their emotional state to the lecturer is also being investigated [Shen, 2007] [Kalkanis, 2008] [Shen, 2008] together with the use of Sun's Small Programmable Object Technology⁸(SPOT) as a means of interfacing between physical and virtual worlds. The MiRTLE world has been developed using open source tools. Blender has been used to create the objects that populate the world. These objects are then exported to the X3D open standards file format for use in the world. The platform employs a client-server architecture and to aid ease of use and to ensure that users receive the current version of the client Java Web Start Technology⁹ has been employed.

MiRTLE deployment issues

Figure 4 illustrates the deployment of MiRTLE within a basic institutional infrastructure.

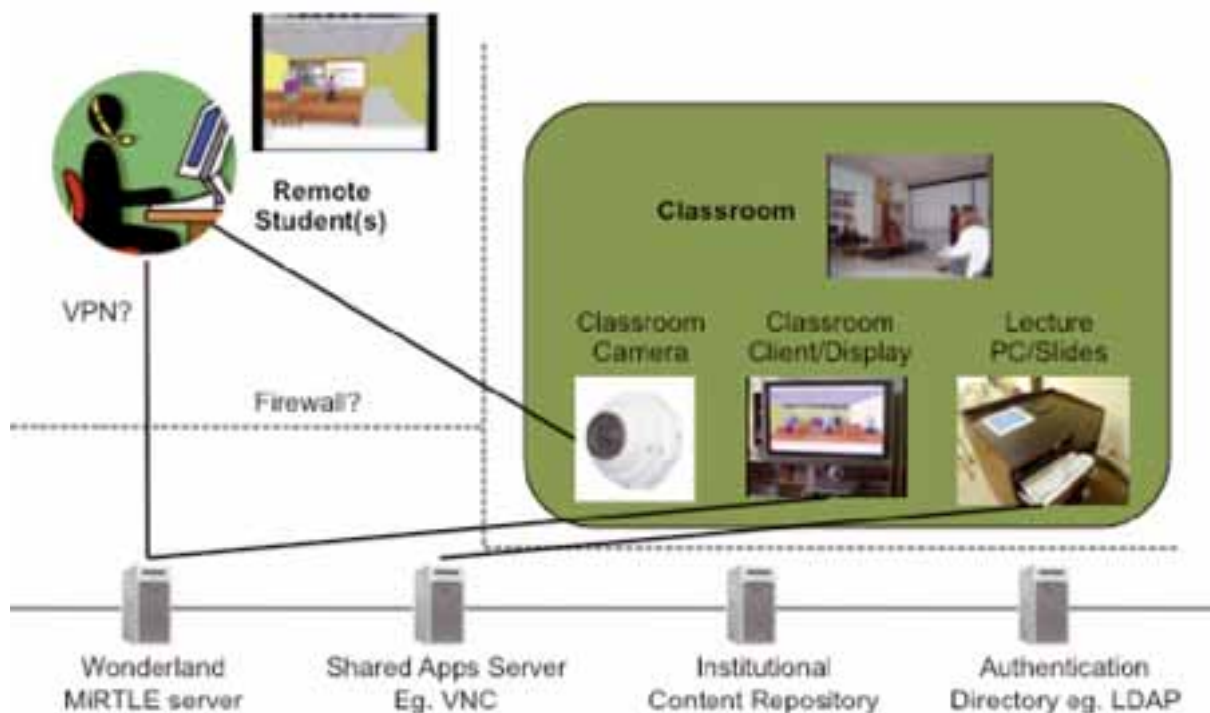


Figure 4 MiRTLE installation

The key component of MiRTLE is the Wonderland server itself which together with the Voice bridge hosts the virtual world, provides the spatial audio and manages the interaction with client machines. A special version of the client called the *Server Master Client* is used to launch shared applications in-world so that all clients may interact with them. This is used to share Open Office applications such as a spreadsheet and also Firefox. Additionally the use

⁸ <http://www.sunspotworld.com>

⁹ <http://java.sun.com/products/javawebstart>

of VNC (Virtual Network Computing) server allows the sharing of any application running on it (such as a Microsoft Windows desktop) from within the MiRTLE world. This VNC server is particularly important, as it is used by the real-time class, to host the display of the lecturer's presentation, which is then synchronised with the main display in the real lecture room and the in-world display to the online students. This will ensure that the students in the real classroom see the same slides as the students in the virtual classroom. From the lecturer's point of view this should be no different to their normal routine of using the class audio/visual podium to control their slides.

This is however, just the minimal set of components required to host MiRTLE. Most institutions will also make use of content repositories and learning management systems (such as Moodle) to manage their content and lecture materials. Also they will have an authentication system to control access to university resources, which will often make use of a user directory (such as LDAP) and an authentication system. Therefore a complete system implementation requires several key components to be integrated.

Further complications may arise depending on the intended use of MiRTLE. For example, if MiRTLE is only intended for internal use within a university, it is likely that most of the system components will reside behind the university's firewall. However, given that the goal of MiRTLE is to support remote students, a VPN (Virtual Private Network) may be necessary to allow remote users (e.g. students at home) to log into MiRTLE and make use of these university resources. Alternatively it is possible to consider a hybrid solution where certain components (such as the main MiRTLE server, classroom camera, etc.) are publicly accessible, and other components (such as the institutional content repository) remain behind the university's firewall. This is further complicated when more advanced scenarios are considered, such as having multiple MiRTLE teaching rooms located in different institutions, and with remote students also participating from different locations. This will then require the use of a federated access management system (such as Shibboleth) to control and manage access to all of the shared system resources within a given federation.

Virtual world platforms – key factors in choosing your platform

The development of the Wonderland platform by Sun Microsystems was originally conceived as a tool to support collaborative working by Sun employees. As such it had a number of clear design goals, which were:

- Focus on social interaction, formal and informal
- Emotionally salient
- Strong sense of social presence, allowing for discussion of sensitive topics
- Spontaneous, unplanned interactions, particularly socializing before and after planned events to build trust
- Enhance communication during formal interactions
- Design for collaboration
- Seamless document sharing with no need to switch contexts
- Extreme extensibility
- Allow developers to add any sort of new behaviour

As such the key strengths of Wonderland can be characterised as:

- Live application sharing
- Integration with business data
- Internal or external deployment
- Darkstar scalability
- Very large to very small
- Open and extensible
- 100% Java
- Open source, open art path
- Audio (spatial) as a core feature
- Extensive telephony integration

Wonderland is therefore a very different beast to the commonly used Second Life platform. The Wonderland platform is primarily intended to be tailored and integrated by organisations within their own infrastructures. Whereas Second Life is a publicly accessible online service with very large numbers of users who can make use of a virtual economy to organise their lives. However, Second Life has already been used extensively by teaching institutions to carry out online teaching (for example see [Robbins, 2007]). There is no doubt that Second Life has been used very successfully to support online teaching and learning. However, it does have several issues around its use, particularly concerned with the privacy and security for participants taking part in online sessions, and whether there are sufficient controls in place for organisations to use it as part of their formal teaching infrastructure.

At its core, Second Life is a commercial operation which has its own set of imperatives. However, it does service a very large community¹⁰, and particularly has key strengths in a number of areas, such as the ability to add behaviours to worlds using a rich scripting language (Linden Scripting Language) and the relative ease of creating 3D objects and adding them to the world.

As an alternative to Second Life, there is the open source OpenSimulator¹¹ platform which can be used to “create a Second Life like environment, able to run in a standalone mode or connected to other OpenSimulator instances through built in grid technology”. The providers also claim that “it can also easily be extended to produce more specialized 3D interactive applications”.

This is in effect a Second Life compatible server (Second Life has already open sourced their client), which can be installed and modified as needed by organisations. The OpenSimulator Grid capability is particularly interesting as it allows different worlds to be linked and promises to provide an easy mechanism for users to move between different worlds. However, it is not as platform-agnostic as Wonderland as it relies on the Mono and .Net software frameworks.

¹⁰ comScore reported nearly 1.3 million people logged in during March 2007

¹¹ <http://opensimulator.org>

Privacy issues and control of virtual environments

A key concern for the use of online services like Second Life is the potential lack of control of the online space, and the privacy of participants taking part. As after all this is an open access commercial platform. This issue is particularly addressed by the Wonderland platform, which aims to solve the problem through the use of its open client-server architecture, which can be fully integrated with whatever access and control mechanisms are required.

This increasing need to protect data and resources available within virtual worlds is considered by Timothy Wright from the University of Notre Dame in the WonderDAC project [Wright, 2008]. In this project, access in virtual worlds is broadly classified into the following 3 types:

- spatial access (i.e., who can move their avatar where)
- media access (who can view which images or hear what sounds)
- object use/mutability (who can use and change which VR objects)

Most commercial online systems only consider rudimentary spatial access control and ignore more detailed control requirements. WonderDAC (Wonderland with discretionary access control) has developed a simple prototype, to add basic discretionary access controls to the Project Wonderland platform. Further plans are in place to evolve WonderDAC along several lines: spatial object access, non-spatial object access, audio chat access, avatar cloaking, and access to WonderDAC information through a user interface. This is illustrated in figure 5, where the avatar *twright* is able to see more content than the avatar *bench-40* based on the access control settings.

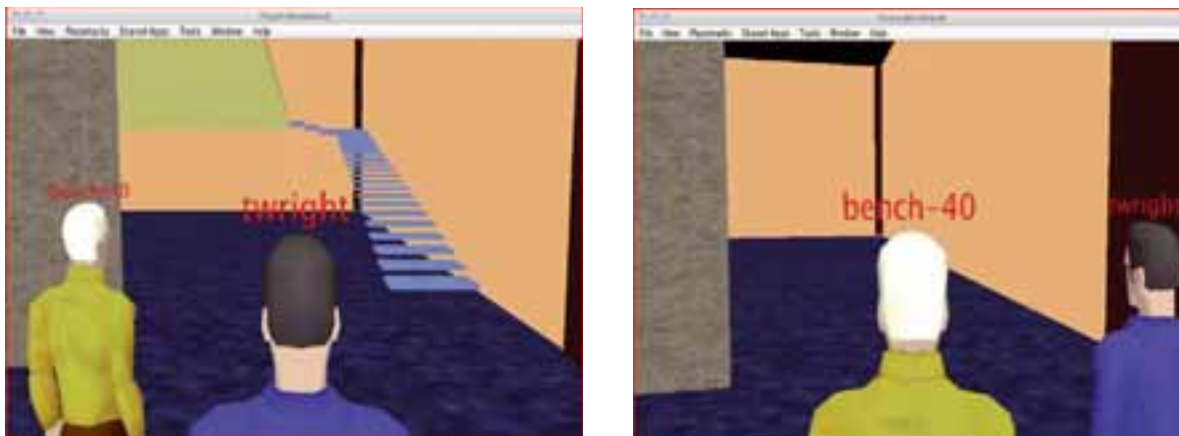


Figure 5 Discretionary access control in WonderDAC

Evaluation of MiRTLE

We are currently planning to deploy and test MiRTLE in several settings. The main evaluation of MiRTLE will in conjunction with the Network Education College of Shanghai Jiao Tong University (SJTU), which currently delivers fully interactive lectures to PCs, laptops, PDAs, IPTV and mobile phones. The core of the platform includes a number of “smart classrooms” distributed around Shanghai, the Yangtze River delta, and even in remote western regions of China such as Tibet, Yan’an, Xing Jiang and Nin Xia.

The MiRTLE simulation will be developed to closely model the SJTU smart classroom. Sun Microsystems are providing a Darkstar server for the project, which is located at the University

of Essex and will host a MiRTLE server. A server will offer a forward-looking camera view of the smart-classroom (i.e. from the students' position, towards the teacher), together with a number of simulated instances of the smart-classroom (each instance being a particular student's environment and view). The Darkstar server will be interfaced to the existing smart classroom servers and processors, enabling Darkstar-based students to access the full range of educational media available in the smart-classroom. To access the system, students will need to use the Internet (broadband or GPRS) to log into the Sun Darkstar server in Shanghai which will create an avatar representation of them (which they will have previously selected as part of customising their account). We are planning to use this customisation as one of the vehicles to explore the effects of cultural diversity by providing a rich set of operational modes, which will reflect social preferences. For example, students will be able to create environments in which they are isolated or highly social avatars. Likewise the amount of personalised information available to other online students will be under their control, as will some of the options for interaction with lecturers and other students.

We are also planning a number of other evaluation trials, including using MiRTLE to link the various campuses of the University of Essex, and also to provide English as a Foreign Language courses from Essex to Shanghai. MiRTLE is also part of the Education Grid, which is provided free of charge to the general public and members of the Sun Immersion Special Interest Group (ISIG)¹². The plan is that members of ISIG can conduct classes and meetings within Wonderland virtual worlds on the Education Grid. ISIG members can also use the Education Grid to build custom Wonderland virtual learning worlds, simulations, and learning games.

With the increasing global outreach of online education, designing online learning that can be engaging to a global audience is critical to its success. Recent studies have found that students learn better when they are socially, cognitively, and emotively immersed in the learning process [Wang, 2006]. Social presence is about presenting oneself as a "real person" in a virtual learning environment. Cognitive presence is about sharing information and resources, and constructing new knowledge. Emotive presence is about learners' expressions about their feelings of self, the community, the learning atmosphere, and the learning process. Learners' cultural attributes can affect how they perceive an online learning setting and how they present themselves online, cognitively, socially, and emotively [also see Wang 2004 and 2007]. A key objective of our approach is to counter the isolation of remote network-based learners, engendering a sense of community and social presence which can improve student engagement and the overall learning experience. At the heart of our vision is the hypothesis that a mixed reality version of the smart-classroom, with avatar representations of teachers and students, will help the social environment that has been shown by Wang can help to improve student engagement in online lessons.

The wider pedagogical implications for the use of virtual environments

We have reported before (see [Gardner, 2003] and [Mayes, 1995]) on the need to consider pedagogical principles in the design of new e-learning services. Much of our previous work has been based on adapting the Mayes conceptual framework as a tool to aid in the design and

¹² <http://sun-isig.org/>

evaluation of e-learning services. We particularly needed conceptual frameworks that bridged the theory and design. Mayes offered such a framework. This framework described three broad modes of learning and then mapped these onto appropriate design principles. The modes or stages of learning were:

Conceptualisation	The coming into contact with other people's concepts
Construction	The building and testing of one's knowledge through the performance of meaningful tasks.
Dialogue	The debate and discussion that results in the creation of new concepts.

It is important to note that 'conceptualisation' is about other people's concepts, 'construction' is about building knowledge from combining your own and other people's concepts into something meaningful. 'Dialogue' refers back to creation of new concepts (rather than knowledge) that then triggers another cycle of the re-conceptualisation process.

Much of this previous work was based on the use of so-called Web 1.0 technologies, and mapping these to appropriate stages of the Mayes conceptual framework. We now need to consider how this can be extended for the new generation of Web 2.0 and particularly immersive virtual environments. [Fowler, 1999] considered this in terms of social networking theories and particularly explored the notion of different types of learning relationships. However, in terms of virtual environments we now need to consider how guidance can be provided to fully exploit the characteristics of these environments. We need to go beyond just purely emulating current practise (which in effect is what MiRTLE is doing in terms of using a virtual environment to support online lectures), to exploring new innovative ways of exploiting this technology, which exploit the key affordances of VR.

Once characteristic of virtual environments which seems to offer the most opportunity for innovation is that of '*immersion*'. In that it is possible to immerse students in different ways according to their educational need. This can then be mapped back to the Mayes framework and is illustrated in figure 6.

In this figure, we have identified characteristics of immersion which are relevant to each of the three stages of the Mayes framework. So for the conceptualization stage, the main emphasis should be on the psychological immersion of the student in the abstract space of the learning domain. This could be achieved by graphically representing the key concepts and relationships of the subject matter, and allowing the student to explore these concepts within the 3D space. For the construction stage, the main emphasis should be on the physical immersion of the student within the context of the learning domain. Here we might consider simulating a particular problem-based learning scenario, and allowing the student to experiment with the course of their actions, through this scenario. Finally for the dialogue stage, the main emphasis should be on the social immersion of the student with a given social network. Here we might consider how the virtual world could facilitate social interaction and collaboration around different domains.

The Concept of Immersion

Conceptualisation	Psychological Immersion (abstract space): Deliberately abstract; explorative; self-directed; experimental; multiple representations/ visualisations;
Construction	Physical Immersion (physical space): Deliberately concrete; realistic behaviours; manipulative; role playing; multiple viewpoints tutor-directed; expected outcomes;
Dialogue	Social Immersion (social space): Deliberately situated; localised conversations; identity; reactive avatars; meeting rooms;

Figure 6 Mayes and virtual reality

There is still some way to go in fully developing these ideas. However, if we are to truly offer new and innovative teaching and learning within virtual reality then it is vital that the development of these systems is grounded within an appreciation of the pedagogy and proper design guidelines.

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¹³ <http://www.essex.ac.uk/chimera/projects/JISC/index.html>

¹⁴ <http://www.essex.ac.uk/chimera/projects/DELTA2/index.html>

¹⁵ <http://www.essex.ac.uk/chimera/projects/EERN-DELTApilot.html>

¹⁶ <http://www.essex.ac.uk/chimera/projects/eProfile.html>

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Literacy practices in Schome Park: a virtual literacy ethnography

Julia Gillen

Keywords: literacy, ethnography, Second Life, corpus linguistics

Abstract

In this paper I deploy a synthesis of methods I term virtual literacy ethnography to investigate the diverse literacy practices of the project Schome Park. This project, directed by Peter Twining of the Open University, involving other Open University colleagues, has worked with teenagers on the first European 'closed' (ie. protected) island in the 3D virtual world Teen Second Life. I analyse evidence from the three main communicative domains of the project: 'in-world' chat logs and instant messaging; project wiki and the asynchronous forum. I demonstrate how I bring a perspective of studying situated literacy practices into virtual ethnography. In his discussion paper for the rethinking of the English curriculum for the QCA Kress (2005) draws attention to 'radically changing forms and functions of texts, which go beyond traditional conceptions of what literacy is and has been'. Contemporary digital technologies are associated with new blends of semiotic resources, especially presented online. But what is crucial about the so-called 'post-typographic' era is not only affordances of digital technologies, but associated new opportunities for collaborative meaning-making, rapid dialogues in diverse formats and potentialities for communicating across what previously might have acted as obstacles to access,.

I show how the diverse multimodal affordances of the communicative domains are imaginatively exploited by the students. Using methods of corpus linguistics I am able to provide evidence of the students' learning orientations during the early phase of the project. Later, I turn to an analysis of a student-initiated 'dictionary' activity on the wiki to demonstrate aspects of the community's collaborative literacy practices. The traditional distinction between 'reading' and 'writing' becomes permeable in interesting ways as new discourses, some specific to the community, emerged.

I conclude that virtual literacy ethnography, as I have proposed it here, is fruitful in exploring the complexity and creativity of the students' literacy practices. I offer support for Kress's (2005) claim that changes in writing practices amount to a 'revolution in the world of communication.'

Introduction: The Schome Project and Schome Park

In this paper I aim to explore the range of literacy practices taking place in Schome Park, a 3D virtual island, during a thirteen month period (February 2007 – March 2008). I do this from a perspective I term virtual literacy ethnography. My second aim, very much entwined with the first, is to develop in practice an appropriate methodology to enable the analysis of the phenomena I am exploring. I shall endeavour to demonstrate that new literacy practices are best approached by a new synthesis of methodologies, recognising distinctions between new literacy practices as understood mostly, but not wholly, in connection with the opportunities offered by digital technologies and the methodological paradigms with which their study is associated. I will outline features of the project to enable situated understanding of its literacy practices, paying some attention to ethical issues in virtual research with children. Having offered some initial descriptions I will trace parts of the route that I take in forming a methodology for investigation. Third I will seek to present some analyses of literacy practices.

In February 2007 I joined the Schome project shortly after it opened its first island for teenagers on the Teen Second Life sector of the 3D virtual world Second Life. The Schome community, led by Peter Twining of the Open University was already active as an essentially voluntary organisation, albeit under university auspices of a wide range of people interested in what might loosely be termed alternative models of education. A group of people that includes academics, parents, young people, policy makers, educators, and other interested parties, the Schome Community was established with the aim of creating “a new form of educational system designed to overcome the problems associated with current education systems in order to meet the needs of society and individuals in the 21st century”, (Sheehy, Ferguson & Clough, 2007). See the schome community website <http://www.schome.ac.uk/> for further information. This virtual community has consistently enacted a view that genuine participation by learners must be instantiated at all stages of planning and operationalizing education. Technology is seen not only as a tool to support and extend existing practices but also as having the potential to transform ways of representing the world and of supporting learning. Sharing this perspective, with particular interest in new literacies (Tusting, 2008), I was attracted by the Schome Community’s decision to explore the potential of virtual worlds, considering their capacity to act as spaces in which visions of future practices and pedagogies can be built and experienced, making it “possible to construct, investigate and interrogate hypothetical worlds” (Squire, 2006, p. 19).

Teen Second Life is restricted to young people aged between 13 and 17 and credentialized adults. The first phase of the virtual worlds project, the Schome-NAGTY Teen Second Life Pilot, was the first European enclosed island. In October 2006, supported with funding from National Endowment for Science Technology and the Arts the Schome Community purchased an island in Teen Second Life called Schome Park. Use of Schome Park is restricted to children invited to join the project, usually via their schools, with the written informed consent of their parents and schools as well as themselves, plus adult staff members of the project who are individually recruited and have had their credentials checked through the Criminal Records Bureau (enhanced disclosure) or equivalent for foreign nationals. Avatars once joined cannot leave the island and visit other areas of Teen Second Life nor of course Second Life. The Schome Community is rightly vigilant to ensure that participation in the project is restricted to credentialized individuals, both students and staff, and that conduct is appropriately overseen. Anonymity of the students is preserved within the project although a securely held database with real contact details is held by a few members of core staff in the event that any concern should be raised online as to a ‘real world’ emergency necessitating contact with an actual individual and his/her parents/guardians.

Describing and analysing activities of the project

Sources of data

The sources of project data available to me and the Schome Community are many and varied: including the following:

- postings on the wiki – including images captured in-world to record events
- postings on the forum – many threads of discussion encompassing plans and decisions regarding the project, also more broadly including the schome community and encompassing forum games;

- sensor analysis – of how many people are in-world and where every minute
- qualitative study – students and staff participated in research meetings, drawing up surveys and interview schedules
- chat logs – if a member of staff is present, then the ‘chat’ ie written synchronous communications, plus any instant messaging they participate in, are automatically gathered. Members of staff then deposited many of these logs into a shared database.
- my own brief fieldnotes, recording some of my sensations and feelings while in-world or otherwise involved with the project.

Schome Park in Teen Second Life has been open in three phases: February – May 2007: the pilot phase, May – December 2007: Schome Park II and then from January-May 2008 the third phase of two islands (Alpha and Beta) operated, one of which was given completely over to students to build. Over 15 months, members of the Schome Park community have interacted in three main communicative domains as even when the island/s are closed for respite/redevelopment, then the Schome community communicates via two associated domains, a wiki and a forum. (The other project communication tools such as blogs, dynamic profiles etc are not discussed here). At this point it will be useful to explain with illustrations in terms of literacy affordances these three main communicative domains

Schome Park island/s

Figure 1 is a screenshot ie. copy of my pc screen taken to show some features of a typical view such as I see when ‘inworld’ to use the prevailing word describing immersion into the environment. It is immediately important to note that this image is already very falsified, being black and white rather than full colour; many of the tones have been flattened, and the sounds have been removed.



Figure 1 Engaging through Rowan the avatar

I am not going to describe all the functionality hidden behind the tabs that surround the scene; these can best be encountered through learning to use Second Life and/or reading a popular guide. But it should be noted that these have menus and submenus and thus entail considerable reading work, not least in deciding what is relevant or might be helpful at any given time. Engaging with (Teen) Second Life is a literacy activity, as are massively multiplayer online games (Steinkuehler, 2007). At the centre of the image is the avatar through which I was represented inworld at the end of the project, Rowan. Rowan is standing in a corner of the steam museum which has been built very recently by an avatar called Steam. It is about to be the site of a 'murder mystery' event. Posters on the wall made and imported by Steam show photographic images of the 'real' steam engines and given historical information about them. Steam has made the two artificial steam engines visible as 3-D objects inworld, one emits authentic steaming sounds.

At the top right of the image I have opened a map that indicates where 'I' am on the island and where other people are. At the bottom right I have opened my inventory which includes notecards – written texts that I have been given and decided to keep about events, instructions and so forth. Most of these have been written by students. At the bottom left is an open white box with text inside, this is the main 'chat' window through which I can communicate synchronously with anybody close enough to see. I can also open up a further box for private conversations and for leaving messages for those not inworld at present. There are many links inworld to webpages and the other communication tools of the project.

This image has been kept simple in that Rowan is alone; if there were another avatar present and visible, the whole scene would appear to the second person from their avatar's/camera's perspective and their screen would also differ according to which tools and functionalities they were dealing with at that particular moment. Here we see "radically changing forms and functions of texts, which go beyond traditional conceptions of what literacy is and has been" (Kress, 2005, p. 1). 'New literacies' are increasingly multimodal: "meaning and knowledge are build up through various modalities (images, texts, symbols, interactions, abstract design, sound etc) not just words" (Gee, 2003, p. 210).

As a researcher, Rowan displays a message saying 'logging chat' above her head, combating "the illusion of privacy in cyberspace" (Frankel and Siang, 1999). I intend to remind Rowan's interactants that at all times she is preserving written records of any interactions she is involved with, or reads in her immediate vicinity. Avatars present in her environment may have private conversations through the messaging system she is not privy to, and all communications made when staff are not present, ie the majority, are not recorded.

Asynchronous forum

The Schome Park forum is the most constantly used means of communication in the project. Access to it is simpler and quicker than going inworld since it can be accessed through any internet browser. Areas of the site are accessible to the public (for general discussions about education, introductions to schome etc.) but most of the site is accessed by members through logging on. Postings are persistent, although some threads are archived periodically, and the forum is monitored by staff.

Frequently, the forum is used to collaboratively plan events, discuss happenings within the project, its interactions with the wider world and so on. There are also self-contained forum games and discussions on diverse topics such as archaeology, video production, consciousness, school dinners and so on, to mention just a few of the topics I have been involved with). Some topics are related to the community life of Schemo Park, yet without any intention to directly link to inworld events. I have chosen to select such an activity for description and later analysis, as opposed to the kind of activity that in format and content more obviously relates to taking advantage of the extremely new, only might almost say unique, affordances of Second Life such as machinima, the crafting of videos recorded inworld and edited outside. This selection is to expose clear products of literacy-related activities that might be more readily comprehensible according to persistent values of our education culture.

Figure 2 below shows such a posting by a student, Trixie, initiating a new ‘thread’ (topic; subset of the forum). It was responded to by a staff member (and forum moderator) four minutes later and then about half an hour later by another student.



Figure 2 page from the forum

Wiki

Almost exactly twenty-four hours after the first posting, both Trixie the originator and another student, Marsbar9, started simultaneously creating and authoring a new page on the wiki where the dictionary could reside. Figure 3 shows an initial wiki page as it stood, after considerable collaborative activity, as captured several months later. I will return to some analysis of the central content of this page below but at this point remark on two aspects of functionality.

Wiki pages vary in format a great deal although the menu to the left and the tags at the top remain essentially consistent throughout. It is beyond the scope of this paper to explain all the menu features and tags but it will be useful to mention two of the tags. If you click ‘edit’ at the

top, and you are a member of the project, you will have the opportunity to edit any part of this page, preview your amendment and then save it so that anyone visiting the webpage will see the new version. The 'history' tag would lead you to an automatically recorded account of who has made changes to which section and when. If you have moderating responsibilities and are concerned about any particular new element of text, then you can find out who was responsible.



Figure 3 wiki page

Towards virtual literacy ethnography

Following from this descriptive introduction to some of the media for literacy practices in Schome I intend to sketch out why 'virtual literacy ethnography' may be an appropriate term to delineate the mixed methods I employ to study these and related phenomena.

As briefly mentioned in the introduction, it is probably useful to characterise a notion of 'new literacy practices' or 'new literacies' as a concept mostly but not entirely mappable onto contemporary digital technologies and the methodologies with which these are studied. As Lankshear and Knobel (2006) discuss, contemporary digital technologies are associated with new blends of semiotic resources, especially presented online. But what is crucial about the so-called 'post-typographic' era is not only affordances of digital technologies, but associated new opportunities for collaborative meaning-making, rapid dialogues in diverse formats and potentialities for communicating across what would previously might have acted as obstacles to access, such as those related to time, space and aspects of embodiment including dis/abilities in the real world. Concepts such as Web 2.0 and digital literacy capture aspects of these relationships between social practices and involved technologies (see Anderson, 2007 and Merchant, 2007 for pertinent overviews.) Lankshear and Knobel (2006) put their theoretical emphasis above all on the practices involved; this sensitivity dovetails well with the perspective known as New Literacy Studies (NLS) or Literacy Studies that has developed since the 1980s (e.g. Heath, 1983; Street, 1984; Barton and Hamilton, 1998; etc). NLS remains relevant as

a springboard to understandings of literacy in its focus on the situated character of functions of literacy, recognising the diverse purposes and understandings with which people deploy their own blends of skills in the production and uses of texts. Literacy skills then are not best understood as an abstract concept but always as related to how situations are inhabited by people who act in way shaped by a myriad constellation of factors including their previous experiences, access to social and cultural resources etc.

Analysing diverse literacy practices of the Schome Park project

Chatlogs

In order to investigate the students' use of written language while inworld I conducted a corpus linguistic analysis of a large, randomized sample of the students' turns in chat logs (with a few Instant Messages) collected by staff during a 4 week period (of phase 1). These included dyadic chat, tutorials, workshops, meetings, more social encounters and so on. The students' turns only were extracted and analysed using WordSmith 4 (Scott, 2004). A frequency list of words was created. This was then compared with a 4 million reference corpus, the BNC Baby (a cut down version of the British National Corpus). The aim of this was to find out what lexical items featured particularly strongly in-world, in comparison to a large sample of language across a wide variety of genres – ie. including newspaper articles, correspondence, everyday conversation etc. by adults. Significant findings were as follows:

- Students' turns were characterised by considerable interrogation and enquiry, with a preponderance of question words such as *how* and *what* in comparison with their occurrence in language overall.
- The students are spending considerable energies in dealing with positioning in space and time with words such as *time*, *here*, *there*, *now*, etc. Functioning in a virtual world entails dynamic processes of orientation which involve cognitive processes and imagination required to function effectively in a virtual environment. *Think* and *because* appear far more frequently than in the reference corpus.
- Even a simple lexical analysis at this level is indicative of positive relationship building and collaborative activities – it is perhaps astonishing that in the frequency list *yes* is high but not *no* does not *no*. *Haha* and *LOL* indicate shared humour. *Help* and *thanks* are indicative of a situation where assistance can be asked for and given and appear significantly often. Indeed politeness is prevalent with *thanks* and *please* appearing more often than in the reference corpus.
- A few genre specific terms – such as *schomer RL* and *IM* feature very highly, indicating a shared level of familiarity with these as basic terms in a social group sharing a Discourse. However there do not appear so many of them as to suggest a level of intimidating impenetrability for newcomers.
- *Thing things make* and *stuff* indicative activities around the construction of 'objects' and 'scripts' These words appear often in the frequency list and in comparison with language overall. The use of simple terms in complex and abstract domains of communication has been noted elsewhere (Swales, 2001). *Meeting* and *library* feature more often than they do in the overall language corpus, which is not unremarkable given that the reference corpus is adult and contains a considerable amount of text in formal genres.

Forum

Returning to fig. 2, it can be seen that, as part of the everyday and generally unremarked activity in Scheme Park (and thus very appropriate to selection of ethnographic data) Trixie has proposed the idea of a Scheme Park dictionary, a kind of glossary. From the outset this is designed to be both the source of genuinely useful information (to newcomers for example) and also function as a space for in-group humour. Trixie has worked carefully on the format of her dictionary, reflecting knowledge of appropriate generic conventions. Every headword is distinguished by emphasis, followed by an indication of its grammatical status and then a definition. One entry has related words, almost as the lemmas of a lexicographer, in brackets; another, also in similar style, gently caricatured perhaps, has a cross reference. Trixie's work here is on the boundary of Scheme Park activity, not directly related to inworld activity. It is, to me, a fascinating, yet not untypical, instance of a new playful genre taking advantage of the affordances and constraints of Scheme Park. She is here, a 'cognitive bricoleur ...[one of] the opportunistic assemblers of functional systems composed of internal and external structures' (Hutchins (1995, p. 172). The external structure she uses so effectively here is the forum, in part through her internalised sense of the structure of a dictionary.

Wiki

Fig. 3 as already mentioned shows the dynamically produced wiki that Trixie and Marsbar9 began. This page is publicly available for viewing, one of over such 800 content pages. Undoubtedly it could bear the weight of considerable analysis, including attention to its multimodality (including colour, not visible here) and through bringing in background knowledge about the content that has been gained through participant observation in the community (I was not involved with the construction of this dictionary and found out it existed relatively late.) However, it is worth making a few points about this collaborative authoring activity:

The page has a clear header, an initial description that would be accessible to all (ie whether seeing this page for the first time, or more familiar with it) and a brief sentence proclaiming its collaborative authorship through the means of welcoming more contributions. The second paragraph relates to the constantly developing convergence of technologies in the project and requires some knowledge of (Teen) Second Life to understand. The references to *in-world* and *scripts* indicate that there is an endeavour to make this into an accessible resource that one can view through one's avatar (ie rather than also having to open a webpage); apparently this (ambitious) endeavour has met with partial success. However, again, this is clearly part of a collaborative activity with an implied invitation to join in if your motivation and skills are appropriate.

The contents box makes use of the hypermedia functionality or multiple routes of navigation possible on the world wide web; one can use this 'window' to quickly find the word you seek, or alternatively close it if you wish to browse down the whole list. The dictionary entries would probably rarely actually be helpful to new entrants to the project and I would suggest that the evidence of the forum thread initiation suggests that they were not designed with this as a true priority. *AUP* is the 'acceptable use policy' which is drawn to the attention of all newcomers so actually the entry is more a comment on its status (somewhat tongue in cheek) rather than a 'definition.' Similarly the other entries feature in-group humour, with only *chatbot* beginning with an actual definition. The dictionary then is part of the Scheme Community's discourse; as Lankshear and Knobel (2006, pp. 71-72) write, drawing on work by Gee:

...literacies are always about much more, and involve much more, than just the production of texts. They are (also) contexts or pretexts for enacting and refining memberships of Discourses that include such dimensions as feeding back, providing support, sharing knowledge and expertise, explaining rules, sharing jokes...enacting an affinity..

'Feeding back' was also to my own considerable surprise, evident to a strong degree when I made the investigation of the history of the wiki page (figure 3). Figure 4 shows an extract relating to the construction of the 'Schome Park dictionary' from the period 23-24 June (captured 17 April 2008). Unlike the 800+ content pages of the wiki, the history page from which this extract comes is one of over 3,500 other pages which will mostly have been automatically generated. I would expect it to be relatively rare that anyone would click onto the 'history' tab of any page. In fact from my experience of the project and knowledge of its now vast resources, I would not expect it to happen unless someone had a very strong proprietorial sense or, in their role of moderator, had something brought to their attention perhaps by someone else, as a matter of concern.

I was astonished to find that several participants have annotated the automatic record in order to enhance the quality of information available to anyone who does wish to trace the changes. The entries relating to the activities for 'Numerius schomer' for example have been recorded wholly automatically. However it is clear that many other entries have had comments appended (see italicised words in brackets). These are wholly 'backstage' to the public face of the project.

* (cur) (last) ○ ○ 21:26, 23 June 2007	Decimus Schomer (Added a couple of entries)
* (cur) (last) ○ ○ 21:11, 23 June 2007	Decimus Schomer <i>as</i> (Rearranged a small amount of formatting so that dictionary compiler can understand it better)
* (cur) (last) ○ ○ 21:08, 23 June 2007	Trixiee Schomer <i>as</i> (→S.T.U. - added SPD and Schome Park Dictionary)
* (cur) (last) ○ ○ 20:58, 23 June 2007	Decimus Schomer <i>as</i> (Updated Numerius' entry)
* (cur) (last) ○ ○ 20:55, 23 June 2007	Numerius Schomer <i>as</i> (→J.F.I.)
* (cur) (last) ○ ○ 20:54, 23 June 2007	Numerius Schomer <i>as</i> (→M.H.C.)
* (cur) (last) ○ ○ 20:54, 23 June 2007	Numerius Schomer <i>as</i> (→M.H.C.)
* (cur) (last) ○ ○ 20:53, 23 June 2007	Numerius Schomer <i>as</i> (→M.H.C.)
* (cur) (last) ○ ○ 17:45, 23 June 2007	Trixiee Schomer <i>as</i> (→A.B.C - addition: chatBot)
* (cur) (last) ○ ○ 17:14, 23 June 2007	Trixiee Schomer <i>as</i> (→V.W.X)
* (cur) (last) ○ ○ 17:13, 23 June 2007	Trixiee Schomer (and some more)
* (cur) (last) ○ ○ 17:03, 23 June 2007	Trixiee Schomer (more entries)
* (cur) (last) ○ ○ 14:30, 23 June 2007	Professor Schomer <i>as</i> (→A.B.C)
* (cur) (last) ○ ○ 14:09, 23 June 2007	TibbyFairy Schomer <i>as</i> (→A.B.C)
* (cur) (last) ○ ○ 14:01, 23 June 2007	Trixiee Schomer <i>as</i> (→S.T.U.)
* (cur) (last) ○ ○ 14:01, 23 June 2007	Trixiee Schomer <i>as</i> (→S.T.U.)
* (cur) (last) ○ ○ 14:00, 23 June 2007	Professor Schomer (added defs for 'SPV', 'sumo', 'volcano sumo' and 'Xhapolapocell')

Decimus, Trixiee and Professor have annotated the record to explain their actions. If they have improved formatting or in some small way improved others' entries, they have chosen to record this or indicated in some other way their own initiation. Such a practice may possibly be drawn from the collaborative editing of Wikipedia that enables conflicts and consensuses alike to be traceable. Myers (2007) has argued that the mass media diatribes against Wikipedia as not necessary 'accurate' are missing the point of its usefulness; that its particular innovatory value as a reference work lies in its preservation of the traces of its dialogic disputation of contested realities. What I find surprising here is the attention some of the Schomers are paying to the system's backroom that such conscientiousness is being applied in a context that will almost certainly attract few or even no readers. It will however be informative beyond what the automatic system provides, courteous to anyone who wonders why something they did has been subsequently changed and of interest to anyone who does want to follow the evolution of the page in detail, whatever their reason.

Conclusions

Glimpsing the work of Trixie on the forum or Steam's artefacts in his museum is a brief introduction to the rich diversity of the activities and experiences of the students in Shome Park. This diversity mirrors the results of the investigations by Green and Hannon (2007) who urge that a common understanding presented in the media of young people as uniformly competent in new technologies be made more complex. They identified different 'user types' as: digital pioneers, creative producers, everyday communicators and information gatherers. This project echoes that finding in its identification of a variety of activities and skill sets developed that are less usefully occluded in any singular term.

Evidence presented and discussed in this paper combats the "consistently negative representation of young people's new-media language" (Thurlow, 2007, p. 214). Participating in Shome Park is a hugely literate activity. New literacy practices demand attention to all features of a text, moving beyond the linguistic to a semiotic disposition (Kress, 2005). People involved operate often simultaneously with a multiplicity of semiotic resources that have to be deployed in combinations that are patterned in ways to make sense to fellow interactants.

In the complexity of the communicative tools and the relations between them, literacy practices involve cultural knowledge, the employment of artifacts and representations of the world. They are thus precisely in Hutchins' (1995, p. 168) terms part of a 'cognitive ecology in which the various representational technologies constitute one another's functional environments.'

Furthermore, it is not (only!) that there is a new complexity of channels and resources, but it is also evident that there is a new intricacy to the choreography of collaborative authoring and feedback in the cycles of text production and reception that come together so rapidly as to be near-simultaneous: "the roles of readers and writers overlap." (Merchant, 2007, p. 122).

This paper offered a brief sketch of some of the ways in which this project, so exciting to be involved in, might be considered to encapsulate some of the potentials of the impact of new global technologies. My experience of the project suggests that we can claim this experience of a well-designed and responsibly managed educational project in a 3D world to be part of a "new communications landscape" (Kress, 1998). It is therefore all the more important that we engage responsibly in the mass media debates that seek to estrange particularly young peoples' engagements with new technology as simultaneously somehow distant and future-oriented yet also as presenting immediate, intimate danger and therefore to be curtailed.

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Exploring community safety in a virtual community: Using Second Life to enhance structured creative learning

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Key words: Student-centred learning, structure, virtual learning environments, Second Life.

Abstract:

This paper introduces an online virtual community that represents an interactive model of a typical dysfunctional neighbourhood. This model has been developed for use by second year Criminology students on a module called Community Safety and the Environment. The virtual community in Second Life integrates both social and physical environments and allows students to map in social and physical problems, which they analyse, try out and evaluate in terms of practical and theoretical applications of existing and new knowledge with regard to community safety, crime prevention and community policing. The critical engagement with key concepts of 'community' and 'citizenship' and theoretical issues, such as individualisation and moral minimalism for example, enable students to interrogate the general assumptions that underpin much social policy on crime management and control in community settings. Whilst developing students' awareness of the powers and responsibilities of the various agencies (police, local authorities, social services, health and mental health professionals, youth offending teams, drugs projects), the virtual community also highlights the challenges of inter-professional collaboration as seen from the different viewpoints. The development of purpose based theory, social climate learning (SCL) and use of the 5 stage model ensures that students remain on track to meet the module learning outcomes without sacrificing their ability to play, explore, generate and test out ideas.

Introduction

A virtual learning model is defined by Boulos et al (2007),

A computer-based, simulated multi-media environment, usually running over the web, and designed so that users can inhabit and interact via their own graphical self representations know as avatars[.] (233).

Laurent (2008) suggests that virtual worlds will be the future to learning on the web; the Web3.0 movements that Second Life will contribute to will play an important part in its future developments and use. These virtual worlds that we describe today, Second Life in particular, combine many learning theories through collaboration on user-created content objects / services, instant chat and voice messaging and live social interaction with user profiles. It is these collaborative tools that aide the learning processes but can also serve as a distraction for users if not embedded within a followed structure.

As Childress and Braswell (2006) maintain, Second Life and other Massively Multiplayer Online Role-Playing Games (MMORPG) help educational professionals to create real-life activities that have only recently been achieved through face to face discussions. Combining such real-life collaborative experiences within the virtual world give students the further edge on engaging within a meaningful learning experience.

Purpose and audience

Social interaction within the learning environment will benefit each individual, a point emphasized by Pritchard (2005) who argue that provision needs to be allowed for social interaction, discussion and collaboration work in teaching. The virtual community island integrates both social and physical environments and allows students to map in social and physical problems. They are able to analyse, try out and evaluate solutions in terms of practical and theoretical applications for existing and new knowledge with regard to community safety, crime prevention and community policing. Critical engagement with key concepts of 'community' and 'citizenship' and theoretical issues, such as individualisation and moral minimalism, enable students to interrogate the general assumptions that underpin much social policy on crime management and control in community settings, particularly the often conflictual nature of communities which presents barriers to successful implementation of crime prevention strategies.

While developing students' awareness of the powers and responsibilities of the various agencies (police, local authorities, social services, health and mental health professionals, youth offending teams and drug projects) and the requirement for inter-agency co-operation brought by community safety legislation, the virtual community will also highlight the challenges of inter-professional collaboration as seen from the different viewpoints.

The Second Life virtual community, developed for the second year undergraduate module 204CRM Community Safety and the Environment is designed and influenced by reflections on workshop teaching and four face-to-face phases with practical activities.

1. Mapping the social and physical environment
2. Understanding community safety
3. Community safety interventions
4. Community penalties

For the purpose of this paper the focus will be on phase two, Understanding Community Safety; defining and theorizing community safety. Each student is given the role of a character in the virtual community and act out a specific role understanding the law and society and how it influences their ability to deal with issues facing themselves and the community they are in.

At present, students complete this in paper format and assign themselves roles in which they create their own characters. See figure 3 for an example of a virtual community developed by students. Finally, students are asked to carry out a serial vision analysis of an area of their neighbourhood looking at crime prone and fear features and the effect this has on the physical and social aspects of the environment from the perspective of their assumed character.

The learning outcomes of phase 2 of the virtual community are:

1. Critically define and outline the meaning and scope of community safety from the viewpoint of the different actors involved in the delivery and receipt of community safety services within communities
2. Demonstrate a critical awareness of the legislative framework that underpins community safety and environmental crime and prevention strategies and how this underpins inter-professional collaboration.

Pedagogic Rationales

The nature of (MMORPG) has endless possibilities for immersive experiences within user constructed environments. As Nicosia (2008) describes, the use of Second Life and other virtual environments lead to learner-led and learner-created activities. This hands-on learning, *virtual hands*, follow the facilitator-supported learning that is initiated and directed by the learner from the extreme engagement of immersive cognitive reactions from user-participants.

In a specific idea to learning with virtual worlds like Second Life you could describe it as a two tier learning process. Firstly the user has the intuition knowledge of identifying that Second Life is a completely new way of learning and engaging in the social climate of discoverable content. Secondly, users are unaware of what to expect but your curiosity and human presence in Second Life encourage you to explore and communicate in a social setting that you are comfortable with. Boulos et al (2007) discuss that the reflective processes are supported through the usage of asynchronous and synchronous discussion boards in Second Life, thus giving the sense of closeness and commitment, a virtual presence.

As Kearsley (2008) explains there are two types of learning taking place, cognitive and experiential, both are equivalent to personal change and growth. We, as human beings have a usual tendency to want to learn, but it is also the role of the facilitator to apply the following settings when learning in a virtual learning scenario:

- Positive climate setting for learning
- Simplify the purpose of the learner(s)
- Organise learning resources
- Maintain intellectual and emotional elements of learning
- Share thoughts and feelings without controlling

The aspect of generating this social virtual community scenario is also beneficial to the involvement of learning in a social context. Kearsley (2008) suggests further, learning is carried forward when it is *'primarily based upon on direct confrontation with practical, social, personal or research problems'*, the key ingredients for a Second Life scenario.

By use of movement and touch students are able to explore and feel free, allowing their minds to explore openly. Boulos et al (2007) describes the navigation of learning space as learners moving around, flying, driving, walking or travelling (teleporting) to different locations. These virtual spaces provide students with a *'psychologically safe environment within which they can participate in experiential learning, practice skills, try out 'what if' hypothetical scenarios and make mistakes without serious repercussion.'*

Specifically with Second Life users can identify that the face-to-face activities and discussions are an open-based learning experience, where the student needs to be an attentive leader asking questions to discover the answer. The learning scenario is guided inquiry, giving an initial question (such as a presentation or outline), and learning outcomes for the student, presenting them the environment for experimentation with a guided learning pathway. LaChapelle (2007) points out that Second Life in the absence of any individual construction is *'non-sequential, random access and exploratory'*.

As Smith (1996) discussed, according to Kolb's model on experiential learning, students are able to acquire and apply knowledge, skills and feelings in an immediate and relevant setting, '*direct encounter with the phenomena being studied rather than merely thinking about the encounter.*' (Borzak 1981).

It is also worth noting that the other (second) type of experiential learning is through '*direct participation in the events of life*' (Houle 1980: 221). It is learning through everyday occurrences and problematic situations.

Kolb and Fry developed their model of experiential from four elements:

- i. Concrete
- ii. Experience
- iii. Observation
- iv. Reflection

These are represented in figure 1, the experimental learning circle:

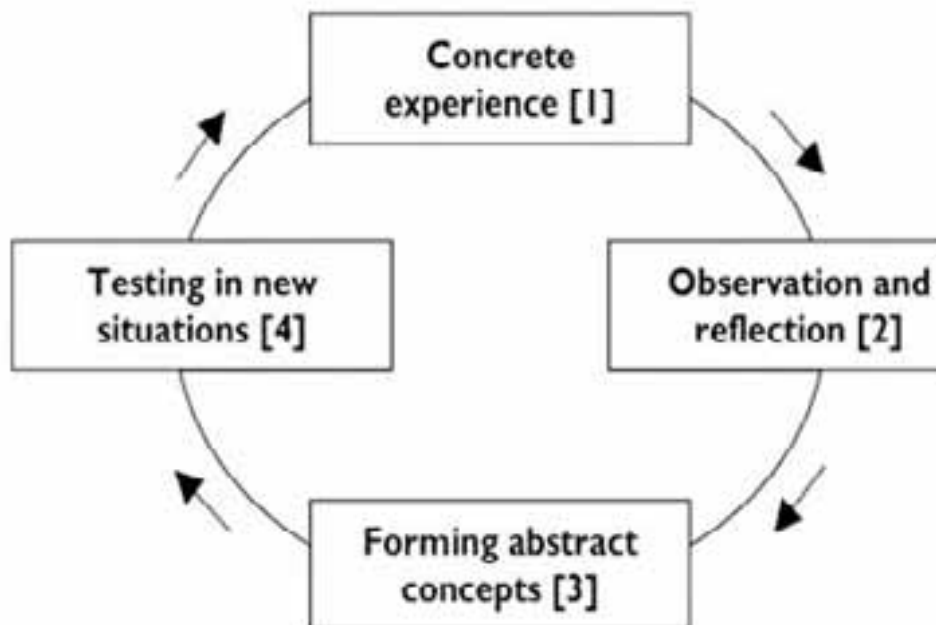


Figure 1 Smith (1996).

The relationship of this model to the four phases of the criminology module can be identified to the following:

- Learning process is started by carrying out an action and then seeing the effect of this action on the situation, i.e. Phase 1 & 2
- Understand these effects and action(s), i.e. Phase 3
- Understand the overall principle of your action(s), i.e. Phase 4

It is therefore necessary that all learning scenarios implemented within the virtual community have learning theory and style. The online activities demonstrate this inquiry process and allow the student to have independent inquiry experiences. However, the need for a structured environment with a clear and appealing goal is essential for student participation. The development of a virtual world's model, social climate for learning (SCL) forms the main component for developing all the learning scenarios in Second Life on the virtual community island.

This model is designed to develop the learners' social interaction, primarily through experiential personal change and development, as illustrated in figure 2:

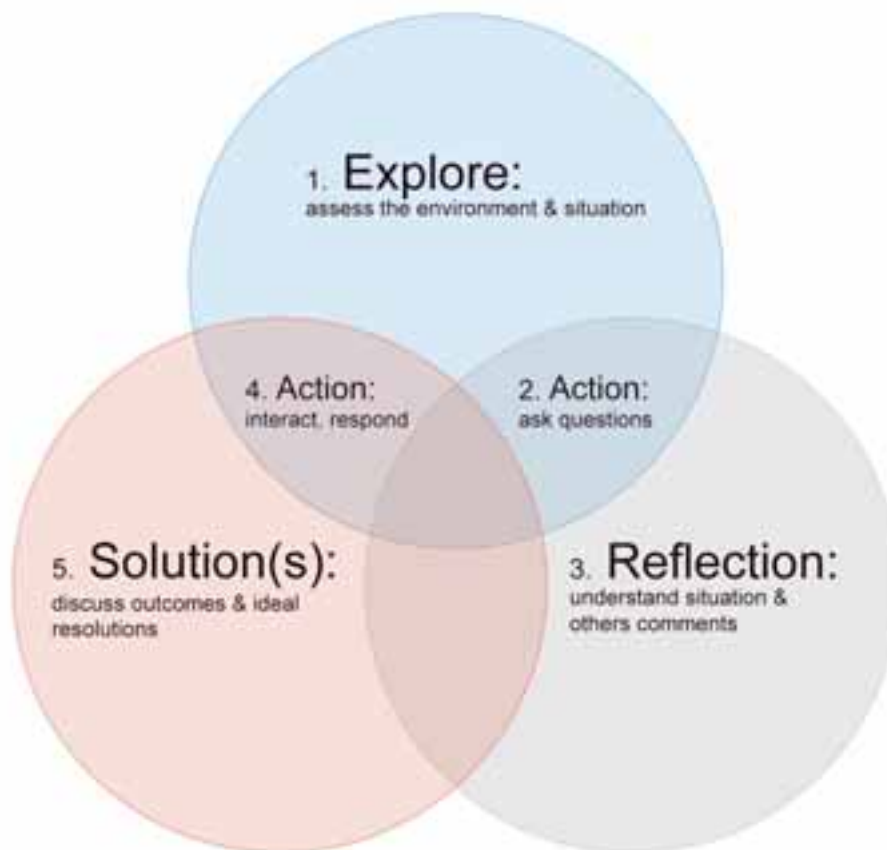


Figure 2 Constructing Social Climate Learning (SCL).

- 1. Explore:** *assess the environment and situation.*
Learners become familiar with environment, technology and each other. The problem / learning outcomes are presented to them.
- 2. Action:** *ask questions through synchronous chat. (ROLE)*
Learners examine problem(s) and communicate questions, responses and thoughts. Some learners may begin to interact with the learning objects placed within Second Life.
- 3. Reflection:** *understand situation and others comments.*
Learners have time to think about each other's responses and the next direction of the role-play.
- 4. Action:** *interact, communicate and respond with ideas. (ROLE)*
Learners respond to each other, interacting individually or collectively and respond with their own experiences.
- 5. Solution(s):** *discuss outcomes and ideal resolutions.*
Learners respond to events and experiences that have taken place during the scenario and evaluate.

The models' main relevance in relation to the learning scenario is central to the students' learning and implementation within Second Life.

Design rationales

The process of how the learner interacts with a typical scenario created in Second Life has the benefit of outlining the design rationale and interface requirements. The scenario demonstrates the user experience of interacting in Second Life and the scenario subject content.

Scenario Story Board:

William is a student at Coventry University studying module 204CRM, Community Safety and the Environment and he is beginning week 6 of the module.

William opens his email and clicks on the Second Life uniform resource locator (SLurl) to launch Second Life. After entering his unique avatar name (first name and surname) and password. Second Life starts and he is prompted to be teleported to the SLurl address once he has pressed the teleport button.

When William has arrived at Second Life, Grahamsville, he is presented with a derelict area, a typical deprived area and a wealthy suburban area. Whilst waiting for the other group members to arrive he starts to explore the wealthy suburban area and interact with the welcome board and information points, receiving information about the Spatial Analysis Scenario (SAS) through the interactive presentation board.

Recognising that the information sign is an obvious start and help point, William is able to understand (again) the purpose for being in Second Life and now has a clear advantage over his other group members.

Whilst still waiting for his group, William decides to chat to another group member who is also waiting for his group members to arrive. By pressing the Enter key on his keyboard the local chat icon window appears, William explains to his other colleague, Adam, that if he clicks on the information sign he will receive guidance (loaded into the SL web browser) and the objectives for being in Second Life. Adam replies that he has already received the information from the taught session last week.

Williams' group members arrive and straight away start sending him instant messages through the group contacts list, William and his group members are in group 3. Within Second Life all members refer to the aims of the scenario from the information sign and take the 'role' of the characters they are to act chosen from the previous week.

The group members and their characters are:

- William
Mr. Edwards, aged 73 (Male). Widower
Elderly man suffers from asthma and lives alone.
- George
Viki Poole, aged 17 (Female). Has an ASBO.
Left school with no qualifications and wants a boyfriend.
- Finlay
Jim Evans, aged 26 (Male). Banned from keeping cats for 2 years.
Qualified Mechanic, married with one child.
- Kathy:
Ashok Singh, aged 37 (Male). Suffered racial attack last month.
Medical Doctor, married with 3 sons.

As the team start to walk towards the street setting they begin to start commenting on the visual presence of police, the placement of public seating, litter bins and street lighting and the layout of buildings over looking public walk ways.

William and Kathy follow the red arrows through the wealthy suburbs and explore the many streets and shopping areas. William interacts with the 'further reading' notice boards, when he clicks on it he is prompted to open an internet web page of further reading on the Home office:

1. Home Office: Protecting the public, securing our future

www.homeoffice.gov.uk

As they follow the red arrows they discuss the virtual presence of police and the overall design of the street scene in relation to their character. When they reach the discussion board they post ideas and thoughts on how their character may be feeling, William also communicates through the group instant message facility.

After further debate and discussion William discovers the interactive TV that is next to the discussion board. This has preloaded YouTube videos and he can control them with the built-in Second Life media interface.

Moving on, following the red arrowed route William, Kathy and Finlay all interact with the 'further reading' notice boards, they discuss the subject of:

2. Home Office Community Safety

www.homeoffice.gov.uk/crime-victims/reducing-crime/community-safety/

How it could impact their character, or their character's neighbourhood.

After discussing, William walks down a small, well lighted side street, he has now entered the deprived area, he discusses with his group colleagues on the contrast of the previous street scene, poor/broken lighting, graffiti, litter, basically social deprivation. Prompted by the notices he sits down on a bench and watches past examples of students assignments on a screen. William decides to take a snap shot of the environment for his assignment!

Walking through the small dark alley William notices a sign prompting him to download all the scenario course notes, URLs and further reading, he does this and saves it to his computer.

Following on, William moves onto answer questions in the Question Analysis System (a Second Life questionnaire). He answers the following questions:

- What do we mean by a community safety team?
- What is the legislative framework in which you will operate?
- Explain how the various pieces of legislation will empower you to tackle the issues and problems identified?
- Explain what obligations, duties and responsibilities the legislation also places on you?
- What are the main elements for a safe community?
- Do you like the Second Life experience?

He answers these questions and is then prompted to speak with a Second Life chat bot. William tells Kathy on the instant message chat to ask the chat bot a question. Kathy asks, 'What is it like to live here?' Other questions relate to crime, social environment, quality of life, policing, law and order etc. Kathy is able to keep a log of the questions in Second Life and use them for the group evaluation. The chat bot explains that there is little crime in this area (wealthy suburbia).

To develop the scenario in Second Life it has been linked to the SCL model into specific elements, figure 3 illustrates this below:

1. *Explore*: Second Life features; media, movement, visual elements
2. *Action*: asynchronous chat, discussions
3. *Reflection*: character profile within environment
4. *Action*: presentations, questionnaires, chat bots
5. *Solutions*: experiences and conclusions

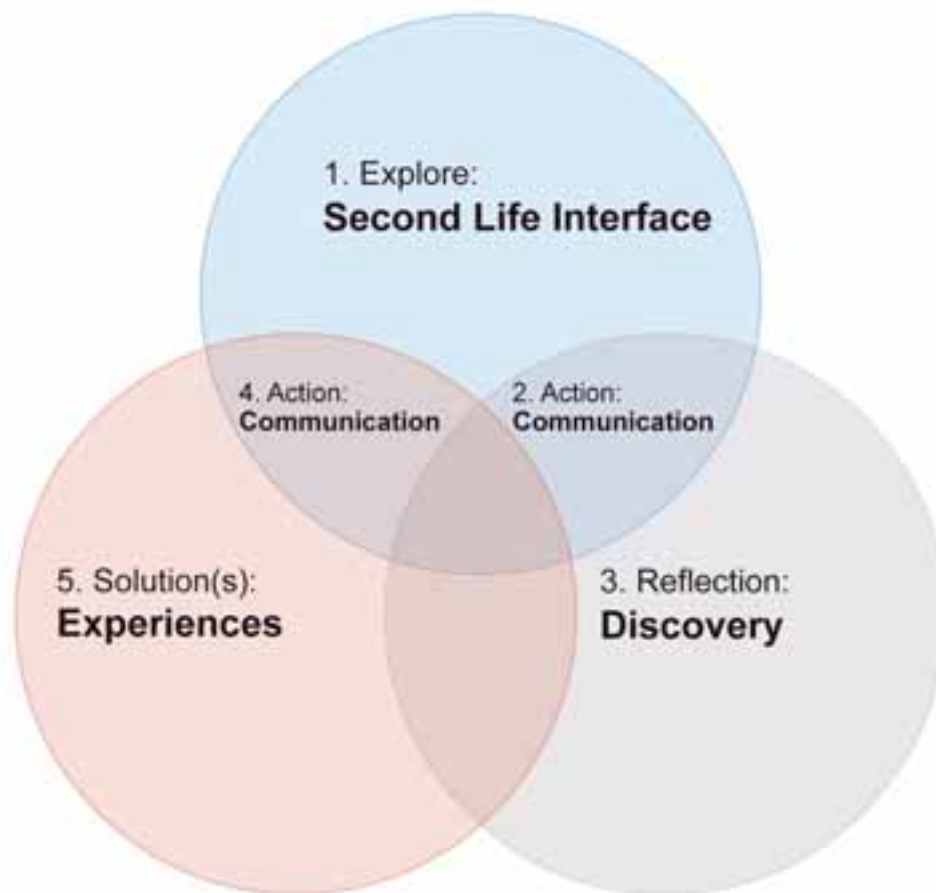


Figure 3 SCL model with scenario implementation.

Prior to starting the scenario students are given a handout explaining the Second Life scenario background and what to expect, this would also be placed within the live session for users to refer to in the scenario. The handout reads as follows:

Scenario Handout: Using Second Life for Spatial Analysis

Weeks 6-10: Understanding community safety

Background

This area of the module introduces the concept of community safety, its development and the legislative framework that underpins it.

Aim

The aim is imagine yourself initially as one of your characters on the Second Life Virtual Community island.

As your character you will need to understand how the law and society influences your ability to deal with issues facing yourself and the community.

Outline

You will be required to work in groups (2-4 ideally) looking specifically at how do governmental definitions of community safety match with the problems that you have identified from previous weeks.

You need to critically engage with what the term 'community' actually means from the different viewpoints of your characters (created in week 2/3) and we will use role play to explore the extent to which 'community' may be problematic for them. You will need to explore the notion of the criminogenic environment, the extent to which environments themselves influence and even precipitate crime, but more importantly how the social/spatial interrelationship of dystopian places gives rise to fearless and using a study of an area within the Second Life Virtual Community island of your choice.

What you need to do

You will take route exploring and identifying the socio-spatial characteristics that give rise to fear and perhaps crime, from this you will be able to take screen-shots and keep a digital log of your chat discussion and findings.

You will be able to apply this to your own virtual neighbourhood. We will discuss your thoughts and findings in a class seminar and assignment workshop session where you will present a short presentation on your findings in your group.

At week 10 you will have the opportunity to reflect on your learning.

Important Notes

The very nature of Second Life is to explore, you can leave your group and explore alone, but stay in touch with them through the group instant chat. Feel free to interact with other avatars that are exploring the scenario even though they may not be in your group.

Please do not leave the Second Life Virtual Community Island whilst exploring the scenario. You are very welcome to leave the island to teleport elsewhere when you have completed the scenario.

Implementation

As Tapley (2008) discusses, designing an entire island *'the right way'*, is a time consuming detailed process. Every island within Second Life is totally unique as it will serve its own particular purpose. However, basic understandings that take visitors and customers into account are urban planning and usability design. Tapley (2008) outlines it is the real-life features of planning and design that are carried over into Second Life, the basis for the implementation of the scenario into Second Life:

Structure: The idea behind the design of the scenario was taken from students' creation of a paper-based scenario, see figure 4.

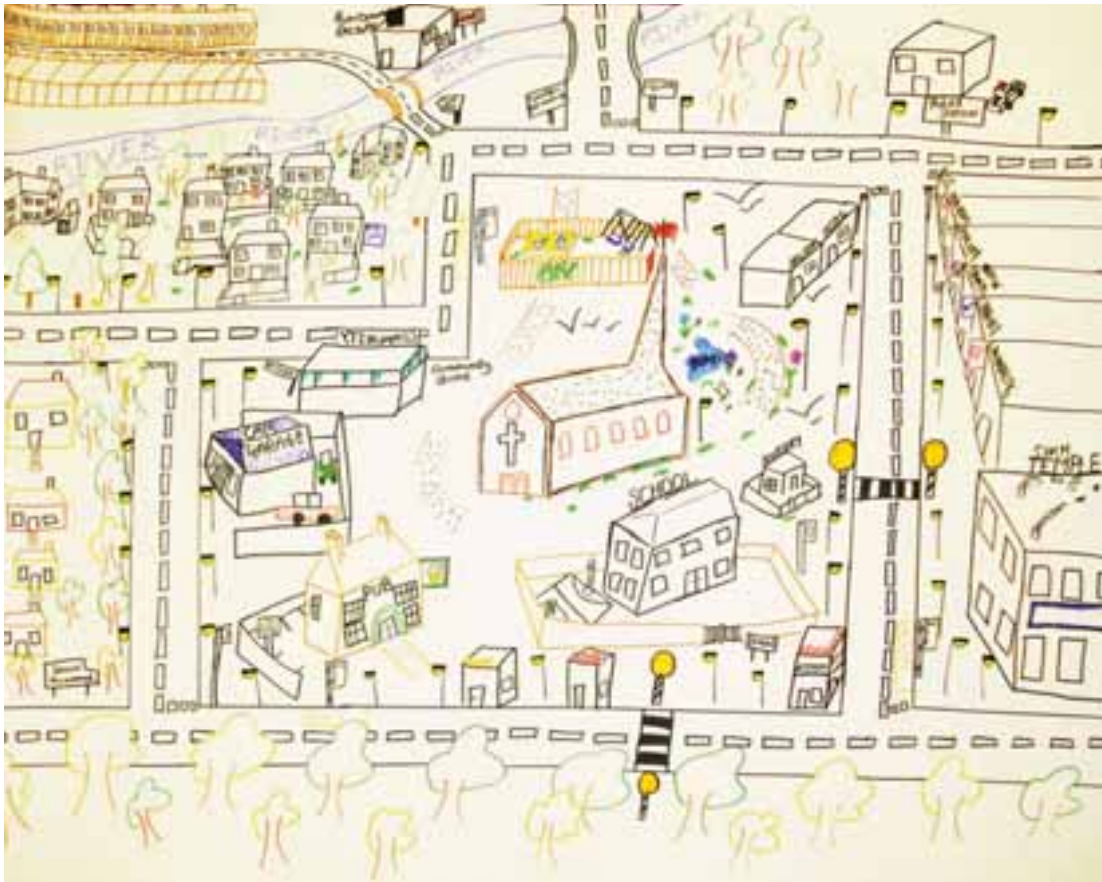


Figure 4 Scenario design plan developed by students.

Once planned, the grid system was used within Second Life to lay the roads and pavements, from this I was then able to map in the 'social community buildings', such as houses, apartments and shops. Figure 5 illustrates the final plan of the community island implemented within Second Life.



Figure 5 Virtual Community Second Life Island.

Each object is created using shapes that are then merged together, edit, apply different textures to and set certain restrictions. For example, making objects physical, meaning avatars cannot walk through your objects, i.e. signs, benches, buildings. The build concept within Second Life is relatively straight forward to use, however you do need to understand basic concepts of 3D design to produce attractive objects. When placing objects into the wealthy suburbia and the deprived neighbourhood we needed to be aware of the kind of reaction(s) and response(s) the students would generate, figure 6 illustrates this. In Second Life it is important to remember that because of its strong visual interaction you are designing for impact and responses.



Figure 6 Building in Second Life

Accessibility: The aspect of making sure that users can easily move from one place to another was also considered when building. The transition of moving from one street scene to another needed to be visually identifiable so the use of placing red arrows on the floor for the learner to follow, thus identifying the overall route of the scenario when avatars/learners fly over the street scene, see figure 7. The very nature of Second Life allows for freedom, so it's important to consider this when placing objects on route through the scenario by not presenting the user with too much distraction. The key to designing and developing in Second Life is thinking how your user is going to interpret each object in a different environment setting (day, night) and group discussion environment.



Figure 7 Identifying the overall route to follow within the Second Life scenario

Wayfinding: The interface of Second Life does allow you to be a little more creative as it is pre-designed and so you can spend time developing the content on your island. By placing pavements, pedestrian crossings and side streets, this indicated to the learner that is an area for them to follow, also the design of sign posts and there positioning help the learner find their way around, both with and without assistance. At the beginning of the scenario I created a virtual PowerPoint presentation that the learner could interact with, this gave an overview of the scenario and brief pointers in what they can expect in Second Life. The placing of public seating and litter bins indicated to the learner that this was an area they could stop at and watch, interact with presentations', communicate and observe the environment.

Animation: Throughout the scenario '*learning objects*' and '*actions*' were implemented along the route the learner follows (the red arrow route). These are designed to encourage the learner to participate and understand the overall learning outcomes behind the session/module and to keep the learner focused on the scenario. Figure 8 illustrates the learning scenario within Second Life and the guided pathway the learner follows, indicated by red arrows with number one = start point, number two = end.

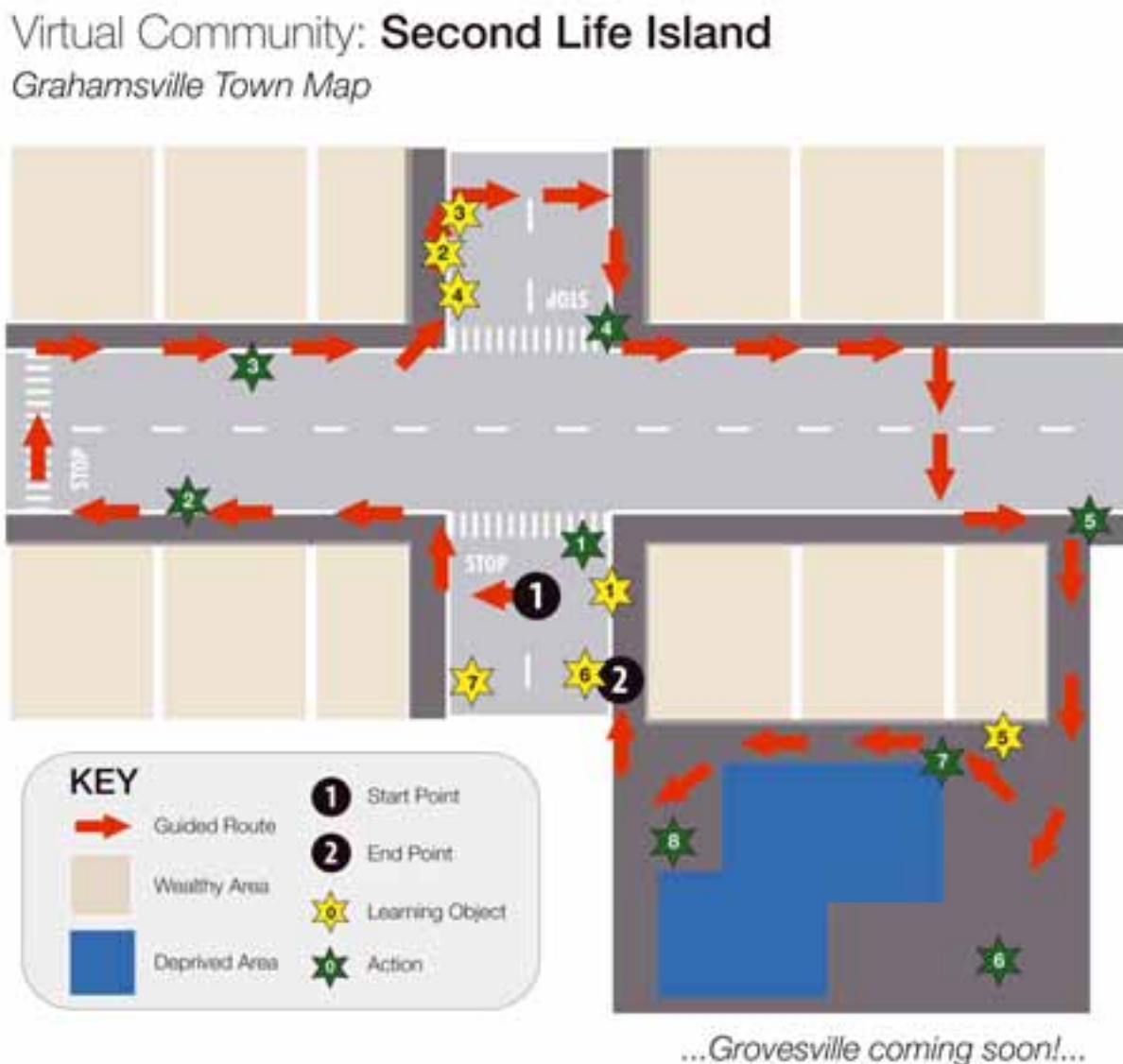


Figure 8 The Second Life scenario illustrating the learning pathway and interactive elements.

The learning objects defined as instructional content were implemented in chronological order on the guided route. These consisted of:

1. Presentation PowerPoint slide show
2. Interactive notice board
3. TV player, linked with YouTube
4. Question Analysis System (QAS)
5. Show and tell presentation screen of past examples of student's assignments
6. Scenario Evaluator System (SES)
7. Chat bot called 'Sparky'

These are indicated on the map by the yellow stars.

The '*actions*' are best described as opening further reading content from a Uniform Resource Locator (URL) from the internet or a learning repository. This content consisted of:

1. Scenario: Using Second Life for Spatial Analysis, placed within Coventry University's repository virtual environment (CURVE)
2. Home Office: Protecting the public, securing our future
3. Home Office Crime Reduction: The National Community Safety
4. Home Office: Community Safety
5. Birmingham Community Safety Partnership
6. Bournbrook Community Safety Project Forward Strategy
7. Community Safety in Selly Oak Birmingham
8. Scenario content download link

These are indicated on the map by the green stars.

Function and fit: This relates to the overall layout of the buildings on the island and how this will affect and influence other areas. I believe the key to designing and developing in Second Life is remembering who your audience is, it is very easy to get distracted by the rich graphical three-dimensional environment.

Order and incident: Perhaps not relevant to the implementation of the scenario but for further work it is worth allowing for unpredicted or predicted scenario building or maybe both.

Consistency and Variety: Reflecting a community into virtual reality certainly allows for this to happen. The scenario has a two community sides built within, the wealthy and deprived area. Each allows the scenario to reach out and actively engage the student with visual contrasts.

Initial evaluation of the scenario

Upon completion of the scenario it was then necessary to evaluate using two students, Craig and Michelle.

Prior to testing the scenario in Second Life I explained to Craig and Michelle the background to the project and guided them through the 'Scenario Handout: 'Using Second Life for Spatial Analysis'. I started the evaluation session with Michelle in Second Life, to assist Michelle and act out the scenario. This exercise was recorded using screen capturing software called Camtasia Studio.

In brief the evaluation with Michelle and Craig was overall successful, taking into account they have no prior knowledge of criminology. The following list outlines some intriguing results, problems and observations from the evaluation:

- Michelle and Craig used the synchronous chat facility easily, ideally the scenario would be followed through in groups of 2-4, making the first 5-10 minutes of landing within the scenario lively and entertaining, certainly through the use of the chat window, instant group messenger.
- The presentation slides need to be made visible, students need to be aware that they can interact with them. Only one person at a time can interact with the slides, a problem if you happen to arrive late in scenario and your group is viewing a different slide. Resolution is to develop individually operated and run learning objects, especially presentation slides.
- Presentation slides take a while to load and cache in the learning environment.
- Good use of linking from external web sites and learning repositories.
- Michelle explains that there is a tendency within the scenario to explore other areas. Setting goals and more interaction with learning objects would keep learners on track.
- Interactive notice board instructions and YouTube television are quite confusing, this needs to be simplified if students are to interact.
- Animation (e.g. movement of balloons) makes the student investigate where they are coming from, therefore discovering a questionnaire(s) to complete.
- Adding links for the download of course notes is a good way of enforcing and encouraging teaching.
- The use of chat bots can be entertaining and Michelle liked the idea of interacting, it would be more effective if I had the time to program the chat bot to discuss community safety issues.

Craig, a component IT user had no experience of using Second Life before the evaluation, although he had seen and read about it in computer magazines. As with all first time users, Second Life can easily be perceived as a game and no real benefit for learning education, initially Craig's opinion.

Evaluation of the Social Climate for Learning Model

From combining theory into the learning content followed by the implementation into the scenario using Second Life. It is the learning theory with the learning experiences taken place so far within the WBLE that has made it unique.

The evaluation helped give an insight into the fundamental structure for the effectiveness of the SCL model in Second Life. The overall findings were:

- **Explore:** *assess the environment and situation.*
 - Scenario introductions and background introductions were clearly presented through URL's.
 - Presentation slides take time to preload and cost L\$10 to upload into Second Life (developmental side).
 - Learners need to be entertained throughout the guided scenario, there is a tendency to wonder off.
 - Develop a 'dummy' scenario to introduce new users into Second Life and communicating in groups, essential if students are given avatars avoiding the orientation introduction to Second Life.
- **Action:** *ask questions through synchronous chat.*
 - Learning objects engage the learner and bring meaning to the scenario, keeping the learner on the guided route.
 - Further development of more learning objects, i.e. notice boards, machinima (animations created with Second Life for role play).
 - Actions are useful and bring other Web2.0 technologies into Second Life, i.e. YouTube.
- **Reflection:** *understand situation and others comments.*
 - Further development of user interfaces and help menus, the creation of a Heads-Up Displays (HUD) for role-play. This can be attached to the main screen giving better guidance and ease of use.
- **Action:** *interact, communicate and respond with ideas.*
 - Development of computer controlled avatars (chat bots).
 - Chat history recorded and used for assignments.
 - Screenshots captured for involvement in face-to-face seminars.
- **Solution(s):** *discuss outcomes and ideal resolutions.*
 - Recording of ideas and scenario play-out within Second Life.
 - A more interactive environment to sustain the interest of the learner.

The systems hierarchy is very straight forward and identifiable, the student follows the guided red arrowed route, clearly visible even when landing within Second Life. Whilst still maintaining the learners' freedom the route offers some form of control reminding them they are in a purpose setting for educational development.

Conclusions

Zielinska & Chambers (1995) discovered that the use of media within teaching environments promotes social interaction that has the potential to enhance the educational success of programs. This paper, from research, exploration and testing, has explored the possibilities of implementing a Second Life scenario. It has provided a valuable resource for creative exploration, responsibility for thinking and learning with the implementation of social climate for learning from the 5 stage model.

However, Second Life is all about people, social networking and communities. It has been stimulating to associate the developed SCL theory associated with learning in a virtual world but we need to consider the implications for practice. As Boulos et al (2007) discusses, it is important for educators to 'think out of the box'. We need to develop new successful methods of teaching not reproducing real-life 'class rooms' in Second Life and focus on the blended learning approach with 2D and 3D media. Lamont (2006) also talks about his frustrations with Second Life, the learning curve involved '*If you are not net savvy or game savvy, be prepared for a very frustrating experience*'.

By visualising Second Life as an empty open space but with an advanced user interface, then the possibilities are endless, as Boulos et al (2007) argues that there is the potential for students and tutors to improve their professional identities with the reflective use of virtual and online learning environments.

It is from the development of the SCL model that it is important to understand the learners own activities are central to the learning process. The process of learning within a virtual world can be very demanding upon the student with many distractions of enquiring new knowledge of discovery.

The benefits to SCL are to present the model for implementation by the tutor, developer and most importantly the student for a **clearer, self disciplined, staged** learning process. By presenting the learning material following a 5 stage model, learners are able to follow a linear path, understand and process information at one point in time. There is also the flexibility that learners have complete control over how they move through the learning material.

The overall advantages to the implementation of the model are:

- *User Support*, the learning objects offer instructions and help messages throughout the scenario.
- *Navigation*, learners follow a linear path, but have the flexibility to control their learning.
- *Collaboration* with fellow learners encourages communication.
- *Authenticity*, learning object content can vividly portray authentic experiences.
- *Communication skills*, users have time to reflect and understand situations before responding with their own opinions.
- *Leadership skills*, users can engage actively to lead.

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The Educational affordances of Multi User Virtual Environments (MUVE)

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Keywords: Second Life, pedagogy, education, affordances, qualitative analysis

Abstract:

The emergence of the synthetic world or Multi User Virtual Environment (MUVE) offers educators not only an exciting new tool with which to interact with their students but moreover; a tool which could be part of a much wider challenge to the established pedagogic practice existing in formal education. In order to understand the potential of these tools the authors have developed a conceptual model identifying educational affordances.

The author's observations of the application of MUVE in educational settings indicate that they could support, effectively, a full and diverse variety range of pedagogic approaches. Undertaking qualitative research, grounded in their empirical experience, as tutors, researchers, long term residents of Second Life and players of other massive multiplayer online role playing games (MMPORPG); the authors present a coherent view of identified educational affordances. The affordances of identity, space, activity, tools and community are presented in the context of examples of current educational activities being undertaken in MUVE.

The authors argue that the pedagogic affordances of MUVE provide educators with an opportunity to challenge existing pedagogic practice and through exploiting these affordances the opportunity to develop new pedagogies aligned to the preferences of students who may be accustomed to using these kinds of digital technologies.

Introduction

The paradox of technology in education is that it whilst it undoubtedly has the potential to fundamentally transform pedagogic practice it can equally serve to endorse the existing established pedagogic practice as Reeves (2002) argues

“In the main, technology is not being used innovatively in education. It is both strength and a weakness that technology can sit quite comfortably within current approaches to education; it is a strength that we can stay with those educational practices we are most used to, but this is also its weakness.”

The author's early observations of Multi User Virtual Environments (MUVE) indicate that they can indeed support a full and diverse variety and range of educational pedagogies. These range from: the highly structured approach, as advocated by behaviourists and empiricists, the rationalist and social constructivist perspectives.

The authors argue that the affordances of MUVE provide educators with a real opportunity to both challenge existing and indeed develop new pedagogies aligned to the preferences of their students who may be accustomed to using these kind digital technologies.

In this paper the authors focus on rationalist and constructivist approaches to education in presenting a view of student driven learning facilitated through MUVE and in doing so endeavouring to unearth why MUVE could be important in encouraging transformational change in pedagogic approaches.

The paper is focussed on Second Life as currently most adopted MUVE tool, amongst educators and on formal education settings and application. Whilst outside the scope of this paper they also recognise the unstructured informal learning that occurs in this environment as a matter of course, every day living for "residents", those that inhabit these virtual spaces, of virtual worlds.

Whilst MUVE and MMPORPG are recent phenomenon the authors have addressed themes around the educational use of digital games in learning and whilst MUVE could not be described as "games" these environments do afford playful behaviour and discovery.

Prensky (2001) suggests, controversially that a new generation of "digital natives" has emerged; students who are comfortable with digital technologies, especially digital games, students who have the ability to think and act at, what he terms, as twitch speed, students for whom the existing paradigms of the delivery and passive absorption of information are not engaging. Beck and Wade (2006) go further in arguing that this "new generation" is dramatically different in terms of their attitude, expectations, and abilities and that this will have a profound impact on the future of business.

Undoubtedly, young people have very personal and individual relationships with technology and the issue of a "new generation" of learners is subject to vigorous academic debate it is broadly recognised that students expectations of the use ICT, at least in higher education are markedly different to current provision. (JISC 2008) The issue of digital skills and literacy is now placed firmly on the educational agenda.

MUVE such as Second Life and Habo Hotel claim residency levels, internationally, into the millions appealing to very broad demographic and MMPORPG such as World of Warcraft, boasts an even greater number of players.

Broader society is engaging with synthetic environments in ever-increasing numbers. Steinkuhler (2004) asserts that the sophistication of interaction, collaboration, and organisation of lineage in World of Warcraft players demonstrates clear evidence of the informal learning that is occurring in these game playing experiences. This notion of higher order skill development is further highlighted by Gee (2003) where he suggests a series of thirty-six learning complex process are embedded within digital games or the associated activities and experience of digital gameplay.

Although his work was done largely in the context of single player games, and before interconnectivity was such that MMPORPG had emerged as a significant genre of gaming, he clearly identified the potential of digital games as educational tools. MUVE have the potential to offer more than the highly structured narrative and experience of digital games. Whilst MUVE should not be categorised as games there are clear parallels and the immersive experience can be considered playful in nature.

So how, pragmatically can MUVE help us face the challenges of educating students. Or are they merely another example of a technical solution seeking a problem? The challenges facing the embedding of technology in formal education are well documented. The wide scale adoption and significant investment by schools and universities in the UK learning content management

systems (LCMS) or virtual learning environments (VLE) such as Blackboard and Web CT is a good example. This investment has clearly not resulted in the kind of transformation desired. Britain and Liber (1999) conclude that the systems currently employed by educational institutions are mainly geared toward content structuring and presentation, conforming to a transmission model of education. The flexibility of MUVE affords educators the opportunity to challenge the conventions of the classroom and engage students in doing the same.

The authors have observed and identified five distinct affordances in these environments that may be conducive to student-centered learning these are Identity, Space, Activity, Tools, and Community. The categories should not be considered in isolation or as being somehow mutually exclusive or indeed as a crude attempt to codify knowledge but more as a framework to consider future pedagogic development.

The Educational Affordances

Identity

It is argued that Learning fundamentally changes us, that when we learn our experiences and knowledge become newly filtered by the experience. Certainly, inspirationally, a large part of the higher education experience is focussed on maturation and personal growth. When this learning occurs within the context of a learning community it can take on a deep social relevance. Allowing students to experiment with their identity as they learn affords an opportunity to see new learning from new perspectives. MUVE allow learners to experiment with Identity in safer ways, Gee (2003) refers to this in games as the psychosocial moratorium, than they might be able to on campus.

An example could be in sociological experimentation, assigning students to change their skin colour, gender, or even species and take on those social and communicative roles as they interact can be enlightening if they're also allowed to reflect on how their new identity influenced their perception of events, concepts, and explorations. Recent research (Fetscherin & Latteman, 2007) suggests that;

“people are using Second Life not to change their identity, but rather to explore and visit new places and people;”

The environments do afford the potential to examine issues of, fluid, identity and persona and the “slippage” between persona and self affords a reflective process that encourages self-awareness, examination, and growth (Turkle, 1995, p. 185). In addition; we know that the ability to experiment with one's own identity can increase tolerance for the identity of others who might be different (Turkle, p. 261).

Learning may involve students developing and playing with identity affording real choice in creating a virtual identity and the opportunity to mediate multiple identities. These identities can, but not necessarily, be independent or extensions of real world persona. The more we interact with others, the greater our reach in a community, the more identities we develop (Wolf & Perron, 2003, p. 93) and these instances of identity become “drafts” of ourselves with which we are able to develop a greater understanding of the effects of learning and thereby a great appreciation for how learning enhances us. We also begin to see ourselves, not as our institutions label us, but as independent beings (Wolf & Perron, p. 100).

MUVEs also afford learners the relative protection of Pseudonymity as the learner's physical real-world appearance need not be exposed although the recent introduction of audio in Second Life has resulted in unintended consequences in this respect. Avatars evolve levels of trust from their peer residents in world they develop value sets and personal cultural models. Krotoski (2005) argues that residents learn from trust and the reputation, described as social capital and that virtual communities operate in very similar ways to other communities both on and offline. The psychosocial moratorium (Gee, 2007) where virtual world actions are free of real-world consequences, described in relation to digital games, can apply to a lesser extent in virtual communities; actions can and do have consequences both virtual and real. However, given the immersive qualities of MUVEs, it's possible to create simulations in which learners can convincingly become, even if they are the only ones who are convinced, different people or different iterations of themselves. Learners are free to explore issues relating to gender, race, creed, and culture as teachers, guru, artisan testing hypothesis by assuming identity and positions with great transience. Challenging the boundaries between student and teacher is invaluable toward creating a real sense of community and imbuing trust between student and instructor.

Communities of learners can greatly benefit from flexible identities as well. Gee's (2007) theory of affinity groups (pp. 27, 59) reminds us that when users are in a shared space they also begin to develop and share a set of values that measure success in the space. Though this may represent a carry-over from the bricks and mortar world of "fitting in" it also allows learners to redefine what success is rather than adhering to the standards set by institutions.

Space

The space in virtual environment affords the potential to explore and create a variety of spaces including recreations, fluid space, student-created and as metaphors for interaction thought made (virtually) real. There examples "in-world" of virtual recreations of traditionally "inaccessible" spaces such as the court of Henry VIII, where residents can interact within the Tudor court; Paris 1900, a simulation of turn-of-the-century Paris, 1900 including the Paris metro, in all its art nouveau glory and the decadent space of the Moulin rouge; one can visit Ancient Egypt in immersive archaeology, view the finery of Da Vinci's work in the Sistine chapel or replicas of Saturn rockets at the NASA Space Flight Centre. Whilst the spaces highlighted could be described as inauthentic they do offer an immersive experiences.

Conventional educational space is well represented in world with countless campus buildings, classrooms, and facilities; there is, however, a trend the authors have observed amongst educators, or rather educational institutions understandably, to merely replicate their "bricks and mortar" real-world presence in virtual worlds, an example of this being Harvard's Berkman Centre's faithful recreation of Austin Hall, and whilst this may have some use for virtual conferences, hosting video and podcasting and undoubtedly for marketing purposes, it is an example of the replication of existing institutional policy and practice in a new medium.

But MUVEs offer more than simulating real-world space without the restrictions of the boundaries of real-world limitation. MUVEs offer much more; think about the potential to interoperate, visualize, model, and create "thought space." Hitherto impossible to represent in real-world scenarios.

“Enter hell this way” is the sign that greets the casual visitor to the virtual, albeit a subjective, representation of the text of Dante’s *Inferno* in Second Life. The visitor can walk through, or better still fly, over this impressive creation of “thought space” including blazing torrents, sculptures, and mud in all its glory before “abandoning all hope” at the gates of hell. Yes, the interpretation is entirely subjective, but literature students could be encouraged to create their own infernos, their own representations, and digital literacy to a new level?

Another example of effective creation in Second Life is the virtual representation of the hallucinatory experiences of schizophrenia; created in order to educate and raise awareness of the disease amongst those who wish to visit.

Undoubtedly more of this kind of innovative creation and use of virtual space will emerge as educators become comfortable with modelling the environment and reach the plateau of productivity.

Activity

Consistent with all forms of educational technology the effectiveness and context of the resulting educational experience, or pedagogy, will ultimately determine the usefulness of MUVE. Suffice to say MUVEs seem to support a wide variety of pedagogic approaches. Examples of activities include the SCHOME (not school not home) project in the teen grid of Second Life. TheTeen grid is a restricted area within Second Life with access restricted to under eighteens and “vetted” individuals. Developed by the United Kingdom’s Open University . The current SCHOME demographic at present consists of identified “gifted and talented” students with an intention to broaden this community in time. Described as the “education system for the information age” SCHOME has a significant presence and has created and established an active virtual presence within SCHOME Park.

One of the key ambitions of the Park is to encourage young people to take ownership, control, and responsibility for the development of the island and more importantly the activities undertaken on it. The Open University has provided only a basic infrastructure. Students encouraged and supported by the SCHOME team have built and developed a sky lounge, physics simulations and areas for business studies, largely self-directed but supported by the OU staff. There have been governance issues, mainly concerned with students being too creative and attempting to build too much and nearly exceeding prim counts (The number of prims on space is restricted prims meaning the primitive objects used for construction); but current diverse activities undertaken include archaeology, artificial intelligence, ethics and philosophy, physics, language lovers, readers and writers, and research.

One of the participating students suggested looking at the potential for game making in Second Life. A meeting was arranged between five students virtually at “SCHOMEHenge” in Second Life, moderated virtually, where a free-ranging discussion of students’ favourite games occurred, and high level “essential” qualities of games were identified; these included action, unpredictability, strong characters, good narrative, multiple paths, progressive difficulty, and immersive environment. They then considered if Second Life would be a suitable environment for game development identifying potential limitation of the technology and environment.

Design proposals were then discussed to construct a skill-based assault course, which is now under construction. The pedagogic approach is consistent with educational theory; in this

case Laurillard's (1993) conversational model, detailed in rethinking university teaching. In this particular instance, the teacher or facilitator set a very broad task, came up with a good idea about something you need or like to learn. Learners are then empowered to achieve the task, in this example through community consultation and negotiation of the learning tasks. The facilitator then provided intrinsic feedback on the actions and in discussions through forums. The students then modified their actions given the feedback and the limitations, both technological and pedagogical, of the environment. The students then modified their actions given the teachers input feedback and the learners description. The students then reflected on their new redefined (re)description of the activity, and subsequently the facilitator can reflect on the students' re-described model.

In summary; the students are engaged in the goal-oriented behaviour of trying to master a self-chosen educational activity; the facilitator has provided the experiential environment to allow this to occur without formal constraints, supporting the interaction with resources embracing social, cultural, and the learning perspectives and preferences of the students. While this interaction is occurring facilitator and students are engaged in a deep level conversation, reflecting and adapting to the others' perspective. In this instance the technology has supported constructivist learning. The established roles and boundaries between tutor and student are blurred.

Building on our understanding of how hypertexts (nonlinear, branching, ergodic texts) can be useful teaching tools, and accepting that MOOs and MUDs are surely a form of collaborative hypertext, then MUVE may not be far behind. By applying what we've learned about using hypertext for education we can begin to view how MUVE are a merely a more graphically intense extension. Manovich points out, in a snarky and yet absolutely correct way, that calling digital text spaces "interactive" is redundant. After all, *all* computer use is interactive. This is important because as educators it's often easy for us to confuse digital learning with truly interactive learning. Education on screen, even in a space as stimulating as Second Life, can still be made sadly passive.

Educational activities should be interactive meaning that they engage learners in active ways that facilitate critical thinking, interrogation, and reflection—interactive in a meaningful way that implies collaboration, community, and choice. The construction of spaces in Second Life is very much like the construction of a shared text and is surely tightly related to the shared narratives created by communities in both the real world and virtual world. We know that effective learners create their own narratives (Atkinson, 1990, p.148; Landow, 2001, p. 225) and MUVE give us concrete spaces in which to visualize and interact with those narratives. The question becomes how do we, as educators, initiate and nurture those narratives? By becoming travel guides of sorts instead of lecturers we can instigate situations in which intellectual curiosity can be fostered. In MUVE spaces, as in other hypertextual spaces, the instructor becomes more of a coach than a lecturer (Landow, p. 222). If the instructor is a coach, then the learners become a team, a learning community with a shared, constructed space.

The affordances of MUVE give instructors tools with which these kinds of interrogative activities can be easily undertaken. For example, in a recent semester students revealed to us that they had blatant gender stereotypes, which were inhibiting their ethnographic studies of communities. Assumptions about how men and women translate events and identities were acting as a lens through which the students looked at things, and the outcomes were almost offensive. So how to break these students out of the Midwestern American stereotypes and give them the tools they needed to become more objective in their observations? MUVE provided a solution.

Without advising the students why we were doing it, we asked them to switch genders for a night in Second Life. Meeting at the normal class time and location on our Second Life island and each student was given a box of mixed gender clothes, asked to go to their virtual dorm rooms, change gender, and come back to the common area. After a few minutes the students started to emerge from their rooms. The transformations were discussion provoking. Male students took on stereotypical, over-feminized bikini-clad avatars with exaggerated female bodies complete with small waists, large breasts, and flowing long hair. Female students emerged dressed as firemen, policemen, and other muscle-bound male stereotypes.

As we observed the students they spontaneously engaged in a discussion about the fallacies of their assumptions. The female students were aghast at the male's assumptions about female beauty and frailty. The men were insulted that the women thought only of men by their profession or role in a male-based society. The discussion progressed for an hour with little intervention. The students were in control of the activity.

This is one example of an activity that was directly facilitated by the flexibility of the MUVE space as well as its collaborative and community-based spaces.

Tools

Second Life affords a variety of tools for use by educators not least the scripting language itself. The Linden Scripting Language (LSL) is a relatively straight forward tool to learn and use for the manipulation of primitive objects (prims) to construct complex 3-D structures. This affords the building of objects at a reasonable resource cost, fast prototyping with effective modeling and programming tools; it is problematically not, however, a full programming language. The simplicity of LSL is both beneficial and problematic in equal measures if used to support the teaching of programming skills. The provision of chat and audio facilities provide students with an authentic experience of digital communication and the search facilities of accessing information. Other tools include the economic and fiscal structure of the MUVE itself and the virtual currency Linden Dollars (with a real-world exchange rate!), "in-world;" this could be applied in the testing of economic and financial models and hypothesis. Castronova (2006) provides an in-depth discussion of the economies of Second Life and other MUVE.

Community

The use of MUVE for collaborative and community development activities is probably the affordance that has been thus far most researched and exploited.

In a recent survey (Fetscherin & Latteman, 2007) learning was cited by 86 percent of those interviewed as motivation to use Second Life.

There is a vast social network of communities reflecting the diversity of interest in the real world; a quick “search” type edit in the toolbar will reveal that any number of residents may join communities of practice, of location, or of interest. To those interested in education and research The Second Life educators community (SLED) is a particularly active group both in world and the affinity group fora and mailing lists, and certainly worth monitoring.

The SLED community is a good example of how organized “communities of practice” (Wenger, 1999) can play a crucial part in the professional development of educators active in this space. Others suggest a more formal approach to professional development advocating continuous professional development courses.

Virtual spaces can facilitate community formation among students as well. Environments that engender a sense of experiment and play allow students to bond without the barriers that face-to-face interactions often introduce. The screen can reduce the feeling of risk or vulnerability that may prevent students from trusting each other and relying on each other in collaborative exercises. Classes in Second Life developed similar traits of community: traditions, meaningful shared spaces, artefacts, lingo, and shared jokes. However, it’s also important to note that as education researchers, the opportunity to observe relationships formed around class exercises and materials are critical to our understanding of community in education whether the course is taught on or off line.

Conclusion

The application of MUVE in education divides opinion there are those who question the escapism and anonymity supported by the environment, those who are concerned regarding the “seedy” side of second lives, the specification of computer required to run the software or in education the network bandwidth and security issues. There are also concerns regarding the level of immersion and if this is conducive to educational activities.

It is hoped that the framework of educational affordances will form the basis of future study and evaluation of MUVE as educational tools. This is essential if MUVE are to contribute to a transformational change in the use of educational technology.

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Using Non-Player Characters as Tutors in Virtual Environments

Clinton Jeffery

Keywords: Second Life, World of Warcraft, non-player characters

Abstract:

Massively multiuser online games such as World of Warcraft employ computer controlled non-player characters and quest activities extensively in training/tutoring capacities. This approach is very effective and popular, incorporating active learning, incremental progress, and creative repetition. This paper explores ways to exploit this model in educational virtual environments. Non-player characters in such environments require a knowledge model, a dialogue model, and a user performance model, in addition to any physical and behavioral traits necessary to make them interesting and credible members of the environment.

A first experiment with these ideas is an explicit attempt to embed a World of Warcraft-like tutoring non-player character in Second Life. Second Life supports virtual objects with scripting, but this facility is not particularly tailored to non-player characters or to education. With care, compatibly formatted web-based content, exercises, and quizzes are imported into Second Life, reducing the effort needed to create content.

A second experiment with these ideas is to ask: What should non-player character construction by end user educators look like? A set of tools and libraries designed to reduce the effort required to construct educational non-player characters within a custom educational virtual environment is described. The same educational content format is used in the first and second experiments. The tools or underlying ideas may be profitably adapted by other educational virtual environment construction systems.

Introduction

The spectacular success of Massively Multi-user Online (MMO) games has led to a large amount of interest in educational multi-user virtual environments. World of Warcraft (WoW) and similar games have demonstrated both the mass appeal and the potential of this genre. From Chinese Coca Cola to North American Toyota commercials, WoW has penetrated beyond the normal sphere of influence of computer games into popular culture. Organizations such as the U.S. Army are using custom games for recruiting and training purposes, and NASA has proposed an educational MMO to use a space theme to promote interest in science and engineering education and careers.

As yet, no one has produced an educational MMO with a significant following. It was speculated at the NASA MMO workshop in April 2008 that the education software industry was not economically able to attempt a large-scale educational MMO. Academia itself has many groups eager to work on the problem, but lacking the resources to realize their ideas. MMO's take years and millions of dollars to develop. A few organizations such as Harvard have developed small-scale educational virtual environments by hiring game companies to write them atop proprietary game engines, but most educators that wish to work with MMOs find their way to a general-purpose MMO such as Second Life.

The focus of Second Life is user-created content. The landscape, buildings, virtual objects, and the appearance of the avatars are largely the result of end-user actions. Educational institutions have presences there for marketing purposes and on-line lectures and discussions. They are in the process of exploring the educational potential of Second Life, but the cost of building educational content (beyond virtual buildings and meeting places) is high. Importantly, Second Life does not directly support the quests and activities that are one of the main reasons to play MMO's, and are similar to the activities that are the mainstay of conventional education software. Similarly, Second Life has no model of experience or skills development which are a major motivator for users to play MMO games.

Second Life provides a scripting language by which virtual objects can incorporate behaviour, and access to external content via protocols such as HTTP. One can build anything with this framework. However, without support for modelling activities and user experience, the cost of developing substantial educational applications in Second Life is prohibitively high for most educators.

The project described in this design paper began not within Second Life but rather with a custom educational virtual environment for computer science distance education, called CVE. With the goal of enabling distant students to attend lectures and office hours, and do homework assignments and labs within the virtual environment, initial efforts focused on reproducing a local CS education environment, including 3D representations of two physical CS departments, avatars, text and voice chat, and interactive collaboration on common CS tasks of editing, compilation, execution and debugging. The initial project was placed on Source Forge for public access at cve.sourceforge.net, but its authors had to face the question: who cares? Perhaps some developers of Second Life projects have faced a similar dilemma: the virtual environment lacked the compelling aspects of discovery, quest activities, and experience levels and advancement which make MMO's special. It was decided to solve this problem for both the CVE and Second Life virtual environments, in order to learn from the comparison. The central building blocks for the experiment are the computer-controlled non-player characters (NPCs), who serve as tutors and record keepers for users' accomplishments.

Non Player Character Tutors

In Role Playing Games and MMO's, computer-controlled NPCs play a vital role as quest givers or assistants to the user who goes on an adventure. Fig. 1 illustrates the very recognizable exclamations over NPC quest givers' heads in WoW. This marks NPCs with available quests as persons in the environment with whom the user has special reason to interact. The dialog on the left side of Fig. 1 shows quest information; the dialog opens in response to a right-click on NPC if that character has one or more available quests.

Quest activities are used to teach the game itself as well as to entertain. WoW quests do not resemble interaction with other player characters, which is through text and voice chat. WoW features about 10 types of quests, requiring the user to perform various tasks, such as combat, exploration, delivery, and gathering or manufacture of virtual items. Other MMO's provide additional kinds of quests. By analogy to Second Life's user-defined virtual objects, future educational MMO's will need end user teacher-defined quest activities. This paper describes an approach to providing that capability in a multi-platform manner, proposing the development

of a Multi-Platform NPC (MPNPC) standard, focusing on user created quest activities. Although MPNPC claims platform portability, this paper focuses on providing activities usable on Second Life and CVE, not proprietary game systems such as WoW.

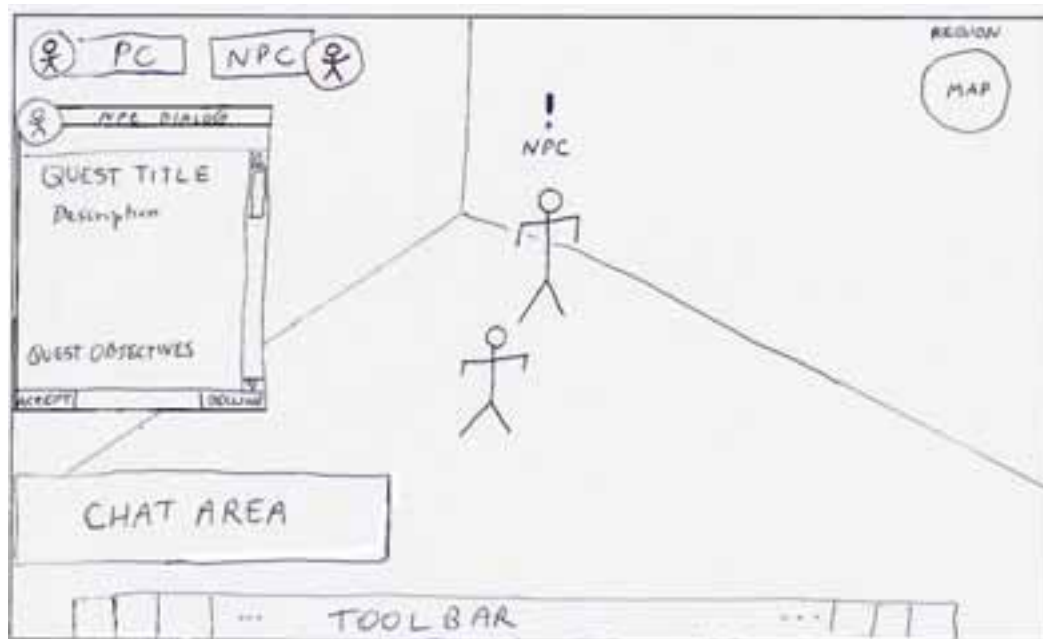


Figure 1 A non-player character and quest activity in World of Warcraft

A MPNPC tutor is created much as is a regular (human-controlled) character. End users can utilize their regular account or an auxiliary account to create an NPC character, adding quests and activities available to other users. When the user is logged off, their avatar is still present on the system, controlled from a remote NPC server machine and functioning as a quest-giving NPC and a virtual secretary, interacting with other users as instructed by the player. Many educators will choose to create multiple “characters” playing specific educational roles, giving them an artificial personality and a set of activities for other users, and leaving them under the control of the computer full-time. There is a reasonable question of whether these characters should be replicated simultaneously in each virtual world, or whether they should exist in one world at a time and move explicitly from world to world. While MPNPC supports both models, it is desirable in most cases to instantiate NPC’s in each virtual world in order to share educational content across platforms.

NPC Profiles

NPC’s 3D appearance is supplied via an avatar creation tool, a task that is not considered in this paper. The more important task of specifying the interactive and tutoring behaviour of an MPNPC consists of defining the knowledge model, dialogue model, and behaviour model for that NPC. These are specified in a *profile* file which is pulled in via HTTP at NPC login time. The profile is used by an *NPC agent*, which is a thread or process that plays the role of a client on the virtual world server.

An NPC profile is a file containing NPC details in simple HTML (for handwritten profiles) or XML (for machine generated profiles) format. The intent is that an NPC Profile can be created and maintained as a webpage. An NPC profile contains the following sections. In HTML

they would each be given in a named anchor tag. Although a friendly graphical wizard for creating profiles is available, many NPC's can be created manually by copying a template and changing the content details.

id

An "ID card" presentation of the NPC, suitable for use on an "inspect details" operation in a game. The id provides an image, name, and other basic attributes. Here is an example:



knowledge

The knowledge model is a specification of the knowledge that this NPC has to offer. This is a bulleted list of named links to quests.

behavior

The behavior is model a specification of this NPC's active (e.g. mobile) behavior. Values include stationary, wanderer, and companion.

dialogue

The dialog model is a specification of this NPC's dialogue capability in AIML

avatar

A specification of this NPC's avatar (link to 3d model file, scale, textures)

Knowledge Model

Real Knowledge Representation will be vital in making smart NPC's of the future, but for MPNPC's, there are two types of knowledge that matter: what quests they can offer, and what they remember about other characters' experience from past quests and in-game events. The former is almost static, refined occasionally by the NPC's creator. The latter is dynamic and should occur automatically during game play.

An MPNPC's quest activities are the primary mechanism for tutorial learning. The format of the actual quest activities is intended to resemble UML use case descriptions (Booch, 1998). Since the virtual environment will not help track quest completion, the kinds of steps available are limited to those that can be observed by the NPC(s) interacting with the user

in the supported virtual environments. The following is an example quest from the domain of computing:

```
Name
    ls
Summary
    Learn the basics of the ls(1) command.
Requires
    Files, Directories
Steps
    1. Read the UNIX manual page for ls(1).
    2. Pass a quiz on ls command line options.
    3. Demonstrate "ls" for Tux.
Rewards
    UNIX: 1
Quiz (2/2 to pass)
    How can you get a long listing that shows file permissions
    and size?
    > ls -l
    How can you list all files in all subdirectories?
    > ls -R
Demo (2/2 to pass)
    Show me a simple listing of the root directory.
    > ls /
    Show me a listing of the current directory, sorted by the
    time each file was last accessed?
    > ls -t
```

The main differences between a quest and a use case description are that a quest may contain auxiliary content (such as quizzes and demonstrations) that are used to measure completion of the quest steps, and a quest lists rewards for completion, if any. Quizzes and demonstrations will often need to be external references to pools of questions. The difference between quizzes and demonstrations is that a quiz is delivered and answers interpreted by an NPC agent directly, while a demonstration involves an in-world interaction (in this case, a session with a tutorial UNIX command-line shell) that is monitored by an NPC agent. Evaluation of deeper understanding may require offline human evaluation, or fall outside the realm of what an NPC Tutor can reasonably perform.

Dialogue Model

There is a semantic gap between WoW-style NPC interaction, and the text and voice chat used by human-controlled player characters. Some MMO's such as Everquest reduce the gap by forcing NPC interaction through the chat channel, with greater realism but more user frustration when an NPC refuses to give up a desired response to a player's guesses. Although WoW-style interaction is easy, chat-based interaction is more "portable" across virtual worlds. An MPNPC's dialogue model consists of a chat script written in AIML (Wallace, 2005), embedded with offers to undertake available tutorial quest activities. The AIML chat scripts provide rules which determine how the NPC will reply to questions initiated by a player.

Behaviour Model

The NPC behaviour model provides a set of rules for NPC movements and responses to external stimuli. Since most WoW quest-giving NPC's do no movement, the behaviour model is not considered extensively in this paper and only three values are described: stationary, wanderer, and companion. An NPC whose behaviour model is stationary does not move from a specified home location. A wanderer is an NPC that moves randomly within a prescribed domain. A companion NPC accompanies a player on a destination-based quest.

Experience and Reward via Peer Review

Players need to be motivated to perform quests, and their accomplishments need to be recognized. Each quest completed by each player from any virtual world needs to be rewarded and remembered. Although such "remembrance" could be associated with the specific NPC for whom the quest was completed, the MPNPC system relies on an external SQL database. Rewards in the form of virtual objects or clothing might be duplicated on multiple virtual worlds, while other rewards may be specific to a particular world (such as Linden dollars, or a new character ability).

The main kind of reward that matters to MPNPC's are the experience points in specific skills that enable a character to undertake more advanced quest activities. In the Is activity described above, two specific previous quests (tutorials on Files and on Directories) had to be completed before the NPC would offer the Is quest. Completing the Is quest enables any quests that depend on it specifically, and also awards a point of general UNIX experience.

When teachers create new tutorial quest activities, there are basic questions about them, including how fun they are, and their educational content. The fun is best evaluated by the quest completers, while the educational content is best evaluated by experts and other peer educators. Thus, when an activity is created its author can suggest its category and experience point value, but those entries are honoured only after the activity has been performed by others and rated.

Architecture Issues

The most interesting design consideration for NPC's in educational virtual environments turns out to be how much of the NPC appearance or behaviour is coded inside the virtual environment using its normal programming API's and scripting mechanisms versus how much is coded externally via a separate program that communicates with the virtual environment.

In this project, it was initially anticipated that NPC's would be coded largely inside the virtual environment's normal programming API's, such as Linden's LSL scripting language. Portability needs overrode this intuition. The more MPNPC logic that can be coded outside the virtual world server, in the NPC process, the more of that logic can be shared across virtual worlds.

Second Life NPC's

Several interesting prior, related experiments have been conducted to add non-player characters to Second Life. We are not aware of existing characters that have been used to deliver tutorial quests.

Art Fossett's blog describes a non-player character created as a virtual object (Fossett, 2008). Making an object look humanoid is a challenge in Second Life, but can be accomplished using sculpted primitives, which are a restricted form of 3D model that graphic artists can produce with commercial grade tools at substantial effort. Fossett couples this humanoid-looking virtual object with an external "chat" program called a PandoraBot, which implements AIML chat and plays a role similar to the MPNPC dialogue model.

Doron Friedman et al (Friedman, 2007) built a Second Life NPC by taking an ordinary user avatar and attaching a virtual object (a ring) to it that turns the avatar into a puppet controlled by an external program. This NPC can move around the environment, albeit with very simple rules for essentially random movement.

The MPNPC Second Life implementation borrows ideas from both of these approaches, namely the AIML and the use of a user avatar rather than an attempt to construct a facsimile from virtual objects. As is the likely case for many other Second Life NPC projects, MPNPC is written using libopenmv (www.libsecondlife.org).

NPC's in the CVE Environment

The CVE virtual environment is primitive compared with Second Life, but its simplicity allows easy experimentation. CVE is written in Unicon (www.unicon.org), a very high level language, rather than a systems programming language. CVE avatars can be created from 3D models produced by tools such as 3D Studio Max and exported in Microsoft .x format. Fig. 2 shows some example models in the CVE environment.

Compared with Second Life, CVE features an integrated collaborative IDE that allows tutorial activities for a range of computing topics. Besides shell commands illustrated in the "ls" example earlier, these include editing, compilation, execution, debugging, and testing activities for C, C++, Java, and Unicon. Different NPC's teach different subjects and have different personalities embodied in their AIML scripts. In order to offer these CVE-native tutorial activities in Second Life, the NPC agents in Second Life must provide the required interactive demonstration facilities themselves, or accept file submissions of captured sessions conducted outside the virtual world.

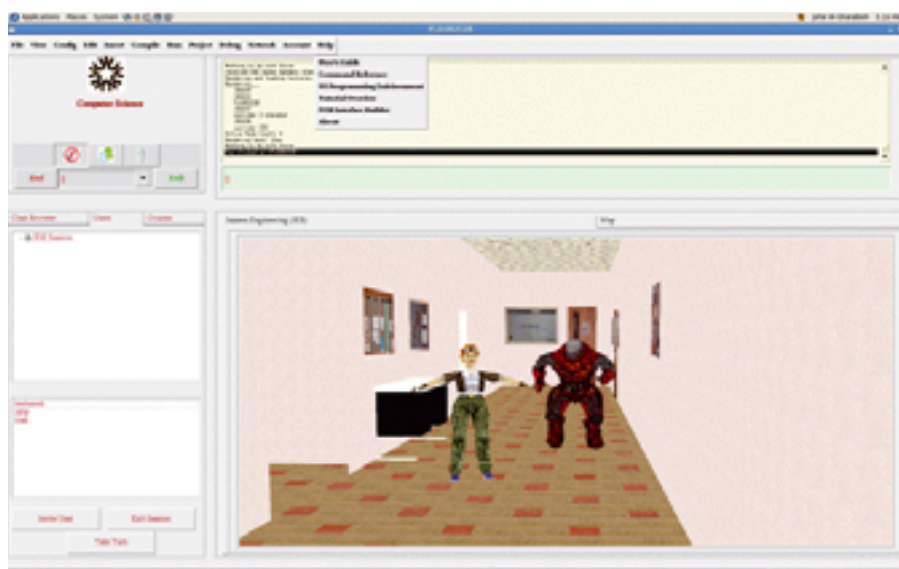


Figure 2 CVE NPC's 3d models are loaded from .x file

Conclusions

This paper introduces MPNPC, an experiment in multi-platform non-player character architecture. The goal of the experiment was to provide World-of-Warcraft style quests for the purpose of encoding educational content. The MPNPC architecture provides rudimentary NPCs that offer educational quest activities to users across virtual worlds. It seems probable that the quests that are the most fun will involve interactions that are specific to a particular virtual environment. However, judging from WoW's quest mix, a large percentage of quests can be world-independent. For tutorial NPC's they will likely be domain-dependent for a learning domain which may or may not have a virtual world embodiment. Without such direct virtual world embodiment of the material being taught, the success of tutoring is defined mainly by the NPC's ability to convey the material via its scripts.

Given the availability of interesting NPC's that live in multiple worlds, significant challenges remain, such as providing rewards that provide increased character capabilities that function across multiple worlds. However, since most users will interact with MPNPC's through a single virtual world interface, the primary function of these tutorial NPC's is to enable content to be used in multiple environments.

Acknowledgements

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Students' procedural and conceptual problem solving using a computer-based 3D models within the field of science education

Ingeborg Krange and Sten Ludvigsen

Keywords: computer-based 3D models, conceptual knowledge construction, socio-cultural theories, design experiment, interaction analysis

Abstract:

This paper discusses the relationship between procedural and conceptual problem solving in computer-based 3D models designed within the field of science education. We discuss institutional aspects linked to the school as a curriculum deliverer, as well as to the presentation of the knowledge domain and the construction of computer-based 3D models. The data is gathered from a design experiment in a science setting in a secondary school, and video data is used to perform an interaction analysis. More specifically, we follow a group of four secondary school students who solve a biological problem in a computer-based 3D model supported by a website. Our findings are clear in the sense that the procedural types of problem solving tend to dominate the students' interactions, while conceptual knowledge construction is only present where it is strictly necessary to carry out the problem solving. Based on our analyses, we conclude that this can be explained partly by how the knowledge domain is presented and how the computer-based 3D model supported by a website is designed, but that the main reason is linked to the institutional aspects related to the school as curriculum deliverer where its target is to secure that the students actually solve problems that are predefined in the syllabus list.

Introduction

The aim of this paper is to contribute to the discussion about students' procedural and conceptual problem solving in science, based on empirical studies of these kinds of settings. Our understanding of procedural and conceptual problem solving is linked to Vygotsky's (1986) idea about scientific concepts; a concept is not scientific before this is considered in relation to, or as part of, a larger conceptual system. Students who are procedurally oriented might deal with different concepts, but they do not consider how these are related to the conceptual system. However, on many occasions they can solve the problem, although they will have a limited conceptual understanding of the process. This means that only those students who, over time, can combine the procedural and conceptual orientation and connect different concepts to systematic relationships, will appropriate the scientific discourse in a knowledge domain.

Several researchers have, in different ways, focused on the distinction between procedural and conceptual problem solving in science and mathematics, from different theoretical positions on knowledge construction (Arnseth, 2004; de Jong & Joolingen, 1998; Krange, forthcoming 2008; Kumpulainen & Wray, 2002; Lemke, 1990; Linn, 2004; Mason, 2007; Moss & Beatty, 2006; Roschelle, 1992; Vosniadou, 1999, 2007). One of the most robust findings across these different perspectives is that students' articulation of conceptual issues is demanding (de Jong, 2006; Anderson, 2007; Jiménez-Aleixandre, Bugallo Rodríguez, & Duschl, 2000; Lehrer & Schauble, 2006). In our study, it became evident that students'

knowledge constructions in science first had the potential to expand the procedurally-oriented knowledge constructions and become conceptually-oriented after the students had worked out the problems they were asked to solve. Students who were procedurally-oriented dealt with different concepts, but they did not consider how these were related to larger conceptual systems. However, on many occasions, they could solve the problem, though they had a limited conceptual understanding of the process. This meant that only those students who, over time, could combine the procedural- and conceptual-orientation and connect different concepts to systematic relationships, would appropriate the scientific discourse in a knowledge domain. This paper follows up this distinction between procedural and conceptual problem solving in science by formulating the following four research questions:

- How do the school as a curriculum deliverer mediate how the students solve a disciplinary problem in a computer-based 3D model?
- How does the particular knowledge domain mediate how the students solve a disciplinary problem in a computer-based 3D model?
- How do the computer-based 3D models, and the website designed to support this, mediate how the students, and their teacher, solve a disciplinary problem?
- How do the school as a curriculum deliverer, the knowledge domain, and the computer tools as a cultural means intersect while the students, and their teacher, solve a disciplinary problem?

To sum these questions up, we will analyze how students' interactions are structured by three main means: the school as a curriculum deliverer, the knowledge domain, and the computer tools as a specific type of social practice. Social practice should here be understood as a general concept that gives us a view of historical and institutional aspects, and the moment-by-moment interactions. The issues at stake are to identify both how the knowledge domain can be productively fostered in an educational setting. So-called disciplinary productive interactions are here understood as interactions that contribute to conceptually oriented problem solving.

Our study has its point of departure in a design experiment (Brown, 1992; Collins et al., 2004; Furberg & Berge, 2003) where collected video recordings of students' interactions were studied according to the premises of interaction analysis (Jordan & Henderson, 1995). The experiment was conducted among a group of Norwegian lower secondary school students in a biology class. They were asked to give an explanation of how to use a *codon table* to read a DNA sequence of a gene (the insulin gene), then to find the corresponding amino acids and combine these into an insulin-protein (this will be explained in detail on pages 4–6). To make them do this we had designed a website to support this kind of knowledge construction. They were also asked to employ this knowledge to build a 3D model of the insulin-protein. The 3D model was organised for distributed settings, with the participants connected in a local area network (LAN) and supplied with a telecommunication system that allowed them to communicate orally during the whole session. In addition, we also had recordings of a face-to-face debriefing session, where the students and their teacher were meant to summarize their experiences and finally recordings of some semi-structured interviews were taken. In this paper it is the data from the debriefing setting that is used as a basis for analysis. However, before going into the data and the analyses of it, we will shortly present the design experiment, the problems the students were asked to solve, and the data presented.

The design experiment

The following empirical illustration is gathered from a four-week gene-technology project at a Norwegian secondary school arranged at the beginning of 2002. Three groups of four ninth grade students (14 years old) were asked to solve several problems. Each group was provided with a number of computer-based 3D models in which they could employ biological knowledge. Moreover, the computer-based 3D models were supported by a knowledge-specific website characterised by *educational inscriptions* aiming to scaffold progress on, and completion of the problem, and with *inscriptions defined by the knowledge domain* that, for example, took care of presenting and explaining the codon table (see Fig. 1, page 5).

We have chosen to focus on the de-briefing session because the interactions that took place obviously made a change in regard to what the students in one of the groups were allowed to talk about during and after their problem solving trajectory. During the problem solving that lasted 53 minutes, one of the students asked twelve times what their activities actually meant conceptually. This question was never really acknowledged or answered, neither by the other students, nor by the teacher. As an implication of this, the importance of including institutional aspects into the analyses of data collected as part of design experiments becomes very explicit, precisely to understand the phenomenon under investigation.

The level of detail in the transcripts aims to suit the depth of the analyses, and to create a high level of transparency so readers can easily follow the talk and the interactions (Mercer, 1991). The students interacted in Norwegian, so these notes have later been translated. All the names are pseudonyms.

The problem area and the computer-based 3D models

To analyse and discuss the relation between the students' and their teacher's procedural and conceptual problem solving we will focus on a problem where the students were asked to build an insulin-protein. The problem area, "building of the insulin protein," consisted of two main phases following up the problem the students had solved the day before of "sequencing the insulin gene". During the first period of "building the insulin protein," the students constructed knowledge about how to use a codon table to read the DNA sequence of a gene (the insulin gene), find the corresponding amino acids, and combine them into an insulin-protein. During the second stage they constructed knowledge about how to use this knowledge to build a computer-based 3D model of the protein. This implies that the students, and their teacher, at least at a theoretical level, should have been capable of considering conceptual elements of sequencing a DNA molecule and building a protein in relation to that concept, and not just separately. To help the reader understand this rather complex subject matter, we need to explain this a little bit further in an effort to make the extract on pages 7–8 meaningful. We will first add some comments in regard to the knowledge domain, and how this is presented on the website. Later, we will describe the computer-based 3D model that the students employed to solve the last part of the problem.

The knowledge domain presented on the website

The students started to solve the problem given on the website. This was to find out whether a particular part of a DNA sequence, arranged in codons (see for example ATG, GTA, CCC) corresponded with a chain of amino acids below it (see for example Met, Val, Pro) (see Fig. 2). These amino acids were parts of a specific protein; the insulin-protein.



Figure 1 The problem the students were asked to solve was to check if the DNA-sequence arranged in codons corresponded to the chain of amino acids that constituted the first part of the insulin-protein. This problem was gathered from the website.

To be able to control this DNA sequence so that it can generate a chain of amino acids, the students needed to find out how to use a codontable (see Fig. 2).

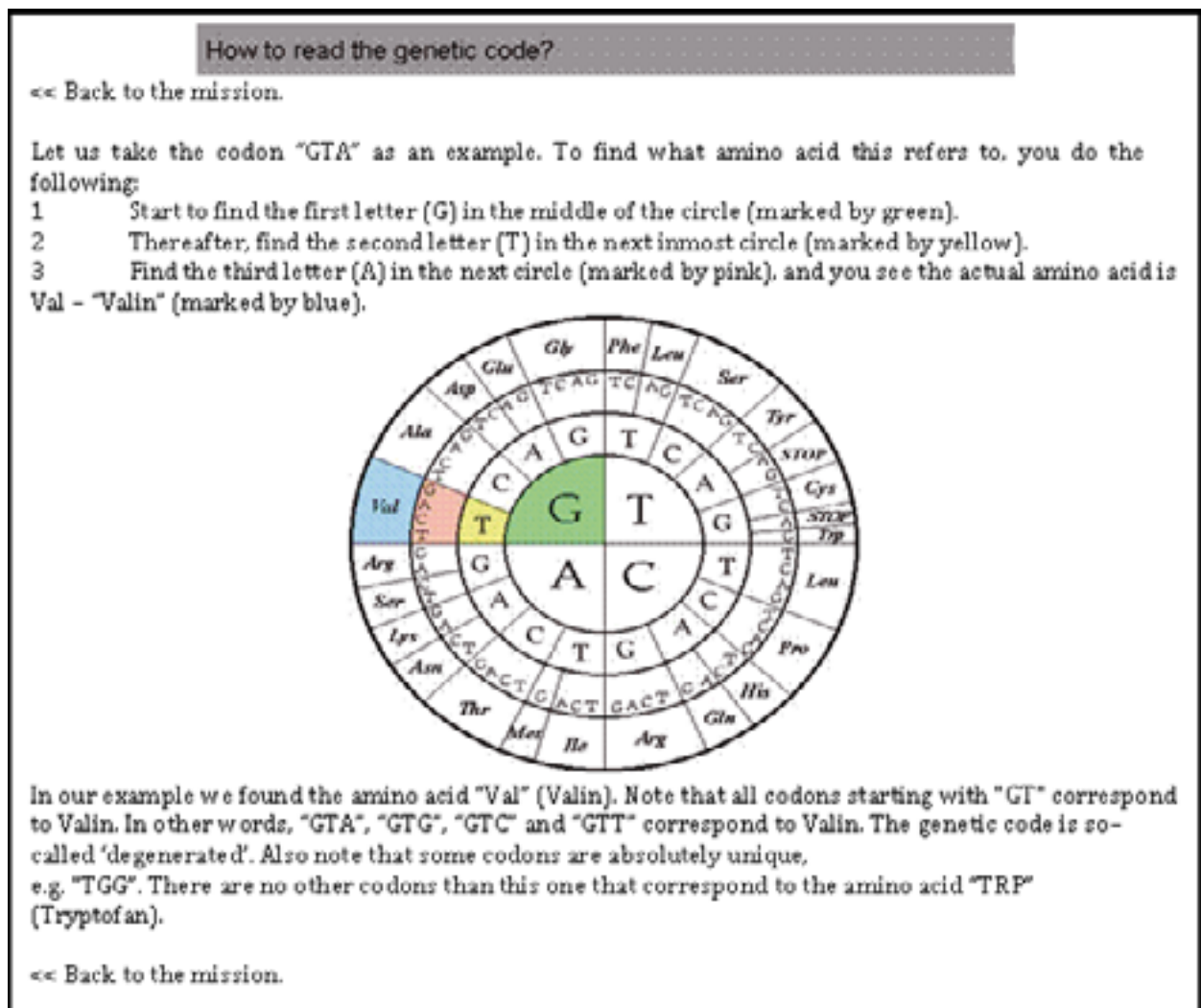


Figure 2 This is a codontable, and it aims to show how to read the genetic code. This entails finding out what codon (GTA) corresponds to a particular amino acid (Val). The figure is gathered from the website.

This knowledge was available on the website, which was particularly designed to support students' disciplinary problem solving. The actual procedure the students were meant to follow was to start by identifying the first letter in the codon GTA. They would have found the letter G, that in the example was marked green in the middle of the circle, and then they could have traced

the next letter T, that in the example was marked yellow in the next inmost circle, and an A, that in the example was marked pink in the third circle. This would imply that they could identify the amino acid Val that in the example was marked blue. The identification of all other amino acids follows the same procedure.

The computer-based 3D models – the storyline and building of a protein

The activities in the computer-based 3D models were linked together by a storyline. The students and their teacher met in a 3D model of a research laboratory (see Fig. 3).



Figure 3 The computer-based 3D model of the research laboratory. The students and the teacher were represented by avatars designed to look like researchers. The man lying on the floor was the professor suffering from hypoglycaemia. In the bottom right corner a hypodermic with insulin was available.



Figure 4 The molecular level of the cells in the computer-based 3D model of what became to be a protein (the chain on the right hand side). The balls that float around were amino acids with different abbreviations (for example 'Gly' and 'Ser'). The students and the teacher were represented by avatars, and here we can see one of these at the bottom of the picture.

Immediately, they found a professor lying on the floor with a condition of hypoglycaemia. A medicine shelf was open, and all the potions of insulin–protein were destroyed. The teacher told the students that they were going to help the professor recover, but before they could do so, they had to solve some problems related to making insulin. Fig. 3 shows the laboratory just after the students had made the insulin. The hypodermic shows that the standing student was ready to give the professor an injection.

When the students made insulin they entered another part of the computer-based 3D model. This was at the molecular level of the cells (see Fig. 4). Here the students picked up fluid amino acids (for example 'Gly', or 'Ser') and placed these as pearls in a chain. Where exactly they were going to put the acids was marked by a flickering ball. A long sequence of codons was presented on the website, and to identify the corresponding amino acids, the students had to use the codontable. Moreover, they had to enter the computer-based 3D model and pick these acids up and place them at the end of the chain. The students were represented onscreen by avatars (e.g. the figure in the middle of the picture).

It is important to note that both these computer-based 3D models were objects that the students, and their teacher, shared. They could see each other while moving their avatars around and while manipulating the amino acids. They could hear each other while talking through a telecommunication system about what they were doing, and partly, what it meant. This was also the case with the website.

The analysis of a de-briefing session – discussing conceptual issues

Language is considered the tool of tools within the socio-cultural approach to learning (Säljö, 2000; Vygotsky, 1978), and will be used as a basis to study how students approach curriculum-based problems as a cultural phenomenon. In addition, different kinds of tools will play a central role in the analysis. These are institutional features, the knowledge domain, and aspects concerning the CSCL environments. The interconnection between these tools can be characterised by tensions or interdependent reinforced tendencies, in the sense that these push the interactions in certain directions. The students will need to perform gap-closing (Lave, 1988), in the sense of carrying out actions that aim to make a minimum of social order. This means that they need to find a shared focus in which the relationship between the tools is characterised as a tensional, or as an interconnected reinforced tendency. Moreover, the different tools have what we could call meaning potential. We could say that the linguistic meaning is an open potential, and there are non-fixed codes of meaning. Words and sentences are essentially characterized by “vagueness, ambiguity and incompleteness” (Rommetveit, 1984, p. 335). The meaning is only half in someone’s head because it is always created in interaction with the cultural and historical settings as backgrounds. The meaning potential must be realized through actions (Linell, 1998; Rommetveit, 1984), and the potential is not necessarily identical to the kind of meaning making which is taking place in situ.

The analysis aims to illustrate how a situated interpretation to design experiments opens up the analysis and explanation of students’ knowledge constructions in science, beyond the computer-based 3D models, the website that is designed to support this, and the knowledge domain. By beyond we think about institutional aspects, and, in particular, what we have called “the school as curriculum deliverer”. As we will see further down, this means that the school seems to have a particular responsibility to ensure that the students actually solve problems that are predefined in the syllabus list, while the quality of their knowledge constructions seems to be of less importance. In this empirical example, gathered from the de-briefing session, we study how the students for the very first time, if not answered, at least acknowledged the repetitive question one of the students raised during the problem solving; namely about what their activities actually meant conceptually. We entered the data at the very beginning of the face-to-face de-briefing session, and the teacher had just asked Cornelia if she understood the use of the “ring” [codon table].

Extract 1: Partly listening to Cornelia’s question

1. Cornelia: I understood that we were going to build bricks and so on or build upwards. *Cornelia is referring to the computer-based 3D model.* I understood that and looking for all of these [amino acids]. I did not understand what insulin is or a protein is ... what a, why should we find these GTA and then it becomes Met and so on? That ... I understood why we did that, but not why or what it means and so on.
2. Pat: No, neither did I.
3. Cornelia: And then I didn’t think that there was any point to build that thing when one doesn’t understand anything. *Cornelia is referring to the computer-based 3D model.*
4. Mark: I don’t understand anything.

5. Fredric: Understand what?
6. Mark: Well, what, what, what is it supposed to be good for?
7. Fredric: What it is good for? You should help that guy! Because he *Fredric is referring to the storyline*.
8. Mark: Why is it like that? Yes, why is it like that so to speak? I will never understand that. Why is it like that?
9. Pat: There should have been some links where it stood, so to speak, what you should do or what the different things meant.
10. Teacher: Mmm
11. Pat: So that you understood it better.
12. Fredric: Isn't it just that way, so to speak...

There is only one main theme in Extract 1. The students have already solved the problem as it was formulated on the website, and the knowledge domain is therefore the only issue to question. Instead, the students enter a more conceptually-oriented focus. We claim that they step out of what they have learned to identify as relevant framing for curriculum-based problem solving in schools (Mäkitalo, Jakobsson, & Säljö, in press). This means that they are not so restricted by the resources (how to handle a curriculum-based disciplinary problem) they have brought from one educational setting over to this situation. Rather, it finally gives them the space to listen to what Cornelia has questioned throughout the whole problem solving process in the computer-based 3D model (utterances 1–8). This means that at least Pat and Mark are willing to follow Cornelia's effort to step out of the situation, by trying to understand what these concepts represent, and what these mean in relation to each other. All three acknowledge that they have not really understood how different knowledge elements are related, and how these are part of a larger whole, while Fredric never admits this lack of insight. The teacher's knowledge at a deeper level looks more uncertain. In sum, this means that the gap-closing concerning what they find relevant to talk about is renegotiated and has *expanded* compared to the interactions the students and their teacher had during problem solving (Lave, 1988).

The knowledge domain is mediating the students' and the teacher's interactions. Different scientific concepts like the protein, GTA, and so on, are used as common reference points, and the students take positions on whether they have understood what Cornelia has questioned or not (utterances 2, 4, 6, 8). Now that the problem has been solved, Pat and Mark seem to recognize and figure out what Cornelia has struggled to get a picture of. However, they do not manage to clarify the relationship between the scientific concepts, and the teacher does not intervene either. What we see though, is a change in their gap-closing concerning what they find relevant according to the knowledge domain (Lave, 1988). They are about to understand Cornelia's curiosity about the relationship between the scientific concepts. Although they finally make a shared understanding of the problem area, they do not formulate an answer to

this. This shows that the students, in some sense, realise that there is more unused meaning potential inscribed both in the computer tools, and in the knowledge domain, than they managed to realize in action (Rommetveit, 1984; Linell, 1998).

Further, the computer tools are mediating the students' interactions even though they have stepped out of the particular CSCL setting and are located face-to-face. This is partly made evident by how Cornelia refers to the "building bricks" and "build upwards" while trying to explicate what she has found confusing (utterance 1), but it is most obvious in the way Fredric refers to the storyline while giving an explanation for why they built the insulin: "You should help the guy!" (utterance 7). Moreover, when Mark follows up his own question, "Why is it like that so to speak?", Fredric does not seem to bother about the underlying scientific issues of what they have done. His actions have been at a procedural and storyline level throughout the whole problem solving process, and he says, "Isn't it just that way so to speak?" (utterance 12). We will claim that this story element, that is so characteristic for these kinds of computer-based 3D models, actually, at least to some degree, brings with it certain taxations (Wertsch, 1998) by de-emphasizing the students' focus on conceptual issues, and on how scientific concepts relate into larger systems (Vygotsky, 1986).

To sum up, while the students are solving the problem, this activity is the main problem to pursue, but when they leave the problem solving mode, they spend time discussing the knowledge at a deeper level. In our data, the school as curriculum deliverer partly hindered, rather than stimulated the students' knowledge construction in science education, at least according to the meaning potential that was inscribed in the knowledge domain and which could have been unfolded in action (Rommetveit, 1984; Linell, 1998). Note how the storyline takes Fredric's attention away from the knowledge domain, and the problem he pursues is therefore how to help the professor. There is a clear tension between the knowledge domain and the storyline. In this case, these represent different voices in the students' interactions (Ludvigsen, in press).

Conclusion about what problems the students were pursuing

The aim of this study has been to contribute to the discussion about students' procedural and conceptual problem solving. We have done this by investigating how different cultural means mediate students' knowledge constructions and we will argue that conceptual issues not are the main aim in the students' and their teacher's interactions. Rather it is to complete the problem they have been asked to solve and to follow up the story-line.

We claim that the students' knowledge constructions in science are primarily and strongly procedurally oriented, although they solved the problem. We have documented that there are only seeds to a construction of more conceptually oriented knowledge, although this has been a demand throughout the whole problem solving process. If we summarize the data there are one main and two subordinate problems the students are concerned with. The most important agenda was to solve the problem, and the less important were, in prioritised order, following the story-line to help the professor, and lastly, understanding the knowledge domain. The students and their teacher gained knowledge about the procedural aspects of the knowledge domain, and developed everyday concepts with reference to the representations in the 3D model, but they did not manage to consider these in relationship, in the sense of being part of a larger system. They only built conceptual knowledge that was necessary to carry out the

problem. In the study here the problem and the environment must be seen as rather complex, which means that the social and cognitive burden of the participants is seen as quite high. So what we need to explore further is under which conditions students go beyond what is needed in order to solve the problem, and be institutionally accountable (Engle & Conant, 2002; Furberg & Ludvigsen, 2007).

Moreover, we actually found that the school as curriculum deliverer limited the conceptual knowledge construction, and that this intersects with the knowledge domain and the tools in a manner that supports procedural knowledge orientations. This has serious implications for how disciplinary interactions can be fostered in a more productive direction, and how future designs are planned. Without an institutional account of the learning processes and outcomes, we risk creating idealized models of learning.

If conceptual knowledge construction is a superior aim, this must both be taken care of by different kinds of teacher interventions that encourage this kind of knowledge construction, and scaffolding strategies inscribed in the designs of the computer tools, and that even these should be further expanded if necessary. The design of a synchronous computer-based 3D model could be considered as very advanced, since it tries to balance procedural problem solving with features that can stimulate conceptual understanding, but a design in itself cannot solve all kinds of problems. Different types of interventions must mutually stimulate interactions that support the students' understanding of scientific concepts in the educational setting, and that these are taken care of as inscriptions in the computer-based 3D model. These inscriptions are important in the computer-based 3D model, but it is even more decisive in relation to the educational inscriptions on the website. It is these types of inscription that work as a starting point for students' participation in disciplinary based activities. The design of the environment and resources could be based on an analysis of the students' proximal zones, both at the level of individual knowledge construction and at the level of the students as collective unit. Then, both the design of the resources and the design of the social activities can be given high priority. These two main dimensions are based on interdependency (Krange & Ludvigsen, submitted; Rasmussen, 2005; Valsiner & Van der Veer, 2000).

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Mixed-Methods and Mixed-Worlds: Engaging Globally Distributed User Groups for Extended Evaluation Studies

Daniel Livingstone and Jeremy Kemp

Keywords: Second Life, research, qualitative analysis, quantitative analysis, mixed methods

Abstract:

At first glance, the goal of the SLOODLE (Simulation Linked Object Oriented Dynamic Learning Environment) project is to develop educational technology – specifically, software for integrating web-based virtual learning environments and 3D multi-user virtual worlds being used for educational purposes. However, a second goal is to research how such integration might best be achieved – and to understand what users might want from such technology. And both goals rely in part on a third – to develop an active and involved community around the project. This paper reviews the mixed-methods approach that have been employed to support research as the project principals have been working to engage with users world-wide through a range of activities held in the virtual world of Second Life, on the world-wide web and at demonstration workshops conducted in-person.

Introduction

The SLOODLE (Simulation Linked Object Oriented Dynamic Learning Environment) aims to bring improved learning support to 3D multi-user virtual environments (MUVE) through integration with web-based virtual learning environments (VLE). Specifically, the project has been working with the Second Life® platform, created by Linden Lab, Inc., and attempting to integrate a range of activities with the Moodle VLE. A contrary view of the project might be that it is attempting to bring activities from more immersive learning environments into the existing Moodle VLE.

There exist a number of VLE systems - also known with a variety of alternative acronyms, including 'LMS' for 'Learning Management System', 'CMS' for 'Course Management System'. The primary reason for selecting Moodle was that it is an open-source system with a licence that permits modification and redistribution (under common open-source terms). Moodle is also notable in that it has been designed to support a social constructivist approach to learning (Dougiamas and Taylor, 2003), although this is not the only pedagogical approach supported by the software. Similarly, MUVEs are often characterised as constructivist learning environments, see e.g. (Dickey, 2003), (Kemp and Haycock, 2008). The Second Life platform was chosen primarily as it was the MUVE being used by the authors at the time of the start of the SLOODLE project, though it also had a number of other advantages over other MUVE platforms at the time of the project start:

- Community. While small compared to now, there was already a sizeable community of educators using Second Life – significantly more so than using any comparable platform.
- User-generated content. At its core, the Second Life platform is built around supporting user-generated content. This is valuable as an educational platform as it allows the creation of curriculum related content – whether by educators and learning technologists or by students.

- Web-interoperability. Scripted items in Second Life are able to communicate via a number of standard protocols with external applications on the internet – without requiring complex changes to the source code of Second Life itself. This was a fundamental enabler for the project.

The initial SLOODLE concept was to realise a Moodle course in three-dimensions – mapping the contents of a course page onto objects in Second Life positioned relative to the positions of matching blocks and activities on the web-page (Kemp and Livingstone, 2006). More recent work has instead focussed on developing tools that enable access to different activities through both the 3D and web-based worlds, or which use the Moodle VLE as a form of back-end for activities conducted in Second Life (Livingstone and Kemp, 2008).

Embarking on this project, the principal participants had little certainty in how best to integrate such dramatically different worlds as MUVE and VLE. But with an understanding that such worlds have complimentary strengths and weaknesses in the forms of interaction and collaboration which they best support (Livingstone and Kemp, 2006), we were hopeful that such integration would be of use and benefit to educators using MUVE. SLOODLE began as both a software development and a research project – aiming to develop the systems which would integrate a web-based VLE with a MUVE, and to conduct research on how such systems could best be designed and developed to support learners and educators.

Rather than spend many months developing elaborate systems before presenting to potential users for evaluation, an early decision was to try to involve Second Life users and Moodle developers in this process – to help drive the requirements analysis, and our understanding of what features users might find most useful or desirable. To obtain this input, it was first necessary to engage potential users and developers. This process is comparable to the development of Moodle, which itself leveraged learning communities in the development of the VLE (Dougiamas and Taylor, 2003). Thus, the third strand of the SLOODLE project became a community development project, and the project itself has three very distinct categories of output:

- product (SLOODLE as software)
- community (SLOODLE as a community of users and developers)
- research (studies on the use/users of SLOODLE for academic and product development purposes)

Fig. 1 shows how these three strands feed into one another. The existence of software/tools is required to attract users; feedback from users is essential for research (both academic and product development); and the research is required in order to develop the product.



Figure 1 The development of better tools feeds into user community growth. The existence of such a community enables recruitment for research activities which feeds into software development (and academic outputs).

The software development itself, individual design decisions, and methodology involved are not of concern in this paper, where we instead review the processes employed in developing and working to sustain a SLOODLE community, and to gather feedback from the community through a range of events and activities held in the virtual world of Second Life, online, and in person.

Mixed Methods

A definition of mixed methods offered in (Johnson et al., 2007) reads:

“Mixed methods research is the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study or set of related studies.” (Johnson et al., 2007), p. 120

In literature, the term mixed methods may have very specific meaning, with a distinction between ‘mixed method’ research and ‘mixed model’ research. The term ‘mixed method’ sometimes being reserved for studies which employ both quantitative and qualitative *phases* in an overall programme of study, while ‘mixed model’ research might utilise e.g. a single survey with both quantitative and qualitative questions or might perform a qualitative analysis on quantitative data (Johnson and Onwuegbuzie, 2004).

Figure 2 illustrates some of the key data collection stages in the SLOODLE project. Surveys were conducted in late 2006 (n=26) and again in late 2007 (n=155) to gauge interest in the project, obtain demographic data on the SLOODLE community, and to ascertain which features users most wanted or felt would be the most useful. The second survey was a mixed-model survey, including a number of questions to be answered using free-text entry, or which allowed comments to be appended in free-text after selecting an answer option. Both surveys were conducted online, using ‘SurveyMonkey’ – a commercially operated web-based survey authoring tool.

The Pilot ran for a period during the first half of 2008, and included focus groups which met in Second Life, interviews via email and in Second Life and discussion in Moodle forums.

We have now entered a second pilot period, during which we will again be using focus group discussions and interviews with SLOODLE users. These will be followed by post-pilot surveys, which again will be mixed-model – combining quantitative with qualitative questions.

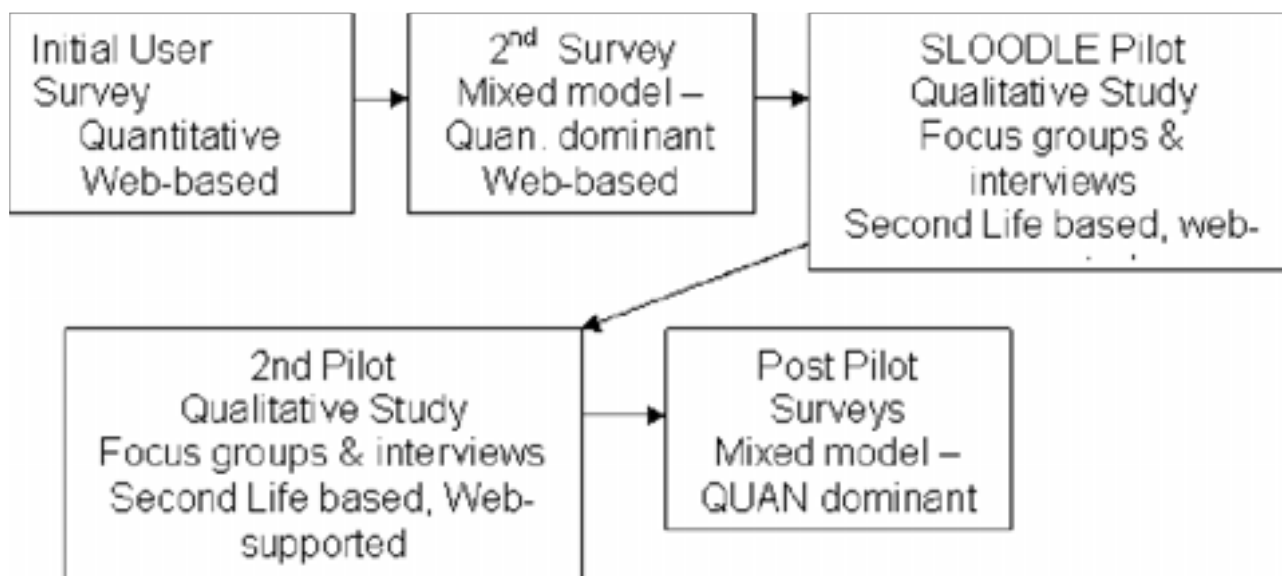


Figure 2 Key research data collection activities. Top row: completed research activities include two rounds of surveys, and one pilot period. Bottom row: Current work is supporting users wishing to get involved in a second pilot, and the preparation of post-pilot study instruments for tutors and students using SLOODLE.

Additional activities from which data and feedback has been collected include regular in-world meetings of the SLOODLE developers group and ‘SLOODLE 101’ classes held most weeks inside Second Life. The SLOODLE 101 classes have been running for over six months and have attracted anywhere from one to twenty participants at each session, most commonly around six or so participants. Additional workshops at conferences have provided additional opportunities to receive feedback from users and potential users.

Engagement in Mixed Worlds

A detailed analysis of the first pilot is incomplete, but an issue that became apparent a few weeks into the pilot was that the level of participation in pilot activities was significantly below expectations. An optional question in the second survey had been used to invite educators to take part in the pilot study – and around sixty had indicated interest in participating. At the start of the pilot, this number was reduced to under twenty. Of these twenty, a number then were unable to attend in-world focus group discussions. Forum discussions were also very limited. A significant interest in the project had failed to result in the desired level of engagement and participation for the pilot study.

A number of discussion meetings were facilitated, but to ensure adequate numbers it proved necessary to open up focus group meetings to allow other members of the SLOODLE community to attend. By having members of the pilot study other than the primary investigators facilitate some of the meetings, it proved possible to obtain some rich qualitative data on the use of SLOODLE – and on some of the existing barriers to use.

Over the period of the pilot several hundred additional users registered at the project web-site, sloodle.org, and attendance at SLOODLE 101 classes and weekly developer meetings remained strong. A number of reasons for the unexpectedly low level of participation have been identified, the key factors being:

- Work load/lack of free time. Second Life can be very time consuming for educators (New Media Consortium, 2007), and participation in the pilot required some additional investment of time. This reason was explicitly stated by a number of participants who either withdrew completely from the pilot or whose involvement was very limited.
- Time zones and scheduling of meetings. Participants were scattered across the globe – primarily in North America, Europe and the Far East. Negotiating times for meetings with such a disparate group is difficult – before even considering individual availability and work timetables. Arranging multiple meetings to accommodate different time-zones resulted in a number of focus group discussions having unsatisfactorily low numbers.
- Class time-tables and calendars. The original idea for the pilot was that most participants would be actively using SLOODLE tools with their students during the pilot. This proved impractical as many educators interested in the pilot were not involved in teaching classes in Second Life during the pilot period – variations in individual and institutional calendars mean that recruiting a number of participants that meet this criterion introduces a further challenge.
- Participant issues and problems in using Second Life. One participant related how technology problems in his institution prevented his intended class in Second Life from running – although he still took part in group discussions. It is not known how many other potential participants were dissuaded from taking part for similar reasons.
- SLOODLE software was not sufficiently easy to install. In particular a number of participants first had to install and configure Moodle before being able to install SLOODLE.

Ultimately, despite these limitations, the pilot resulted in sufficient feedback and data being collected to be considered successful. Some of the information gathered in the pilot was very rich in detail, and one illustrative case-study (providing a detailed example of how SLOODLE may be used to support learners) has already been published following the pilot, and an academic publication detailing some of the research findings is currently in press.

One of the most successful activities for collecting data was to have participants themselves facilitate discussions, presenting details of their classes. This proved to be a rich source of information, and allow the research team and other participants to ask in-depth questions. For two of the participants, their presentations proved to be the only occasions when they were able to attend discussions during the study.

The Second Pilot

In the design of the Second Pilot we have tried to consider the problems encountered in the first pilot and to provide additional support or resources where appropriate. We are unable to address time-constraints or work-loads on participants, nor are we able to resolve local

technical issues preventing access to Second Life, but most other issues can be addressed. While the pilot has only recently started, and the degree of success that these measures will result in is unknown, the strategies employed here may be of interest to others wishing to conduct similar studies on education in virtual worlds – where the educators involved are not members of the research team and are not recruited prior to the start of the study.

Time-Shifting of Data Collection

The second pilot relies less on the use of focus groups, with attendant problems of securing attendance from pilot participants at times suitable for participants in different global locations. Instead, a mixed-model (qualitative and quantitative questions) survey instrument has been prepared, to be supplemented with email, in-world and face-to-face interviews where possible. This also frees data collection from a restricted range of dates, and is more supportive of educators running their classes at different times of the year for varying lengths of class.

Land and Servers

A SLOODLE island has been obtained in Second Life, and will host information, demonstration and meeting areas as well as areas of land which are being granted without charge to educators participating in the pilot. This helps support educators who might not have sufficient space for their classes on their own land in Second Life – or who do not have any land in Second Life at all.

We are also offering free Moodle hosting – with SLOODLE pre-installed. Together these steps remove a number of barriers, both technological and financial. Educators no longer need the technical or financial resources required for setting up their own web-servers for Moodle and can receive assistance in setting up their content in Second Life itself.

Ease of Use

After the conclusion of the first pilot, a new version of SLOODLE was released. SLOODLE 0.3 involved a number of changes to the process used to set up SLOODLE resources in Second Life. Further refinements have removed less commonly used features in the current 0.3.1 release. With this streamlined and simplified setup process, it is hoped that educators will find SLOODLE significantly easier to set-up.

Practical examples also have a role to play – to show educators how SLOODLE can be used in realistic contexts. One example case-study has already been written, following on from the last pilot, and further example case-studies will be developed and distributed online as the second pilot progresses.

Feedback from Students

In the first pilot we collected data from educators – but not from students. Collecting responses from students does raise ethical issues. Because a number of the pilot classes with SLOODLE will be running on an island in Second Life administered by the research team, we will have an opportunity to invite students to complete survey instruments. This has been discussed with, and approved by, the Ethics Advisory Panel at the University of the West of Scotland. We hope that this will provide further insights into the successful and appropriate use of SLOODLE.

Forums

For the first pilot, a Moodle course was set up specifically for the pilot. This was under-utilised and will not be repeated for the second pilot. Instead, existing forums on sloodle.org, email and in-world communication will be used. A mailing list for the pilot is being considered but, as participants will be joining and leaving the pilot at different times, even this may not be used.

Participant Engagement

As noted, one issue we cannot resolve is the work-load on participants. Given this, it is vital that we do our utmost to engage participants with the SLOODLE project to try to encourage continued involvement in the pilot. It is hoped that the free-land and server support will have an effect there. For participants using their own land and servers it will be important to maintain contact and work to provide support when required.

To the extent that the first pilot was successful, running regular classes on the use of SLOODLE in Second Life, holding open developer meetings in the same environment and having a visible presence in the virtual world all contributed to that success. For the second pilot, similar levels of support will be available for all participants.

Conclusions

The most significant challenges faced by the SLOODLE project are not software development issues, but user engagement and support. Educators working in Second Life have a steep learning curve to overcome and there is a great deal to learn about the working in the environment without having to learn about additional software packages such as Moodle or SLOODLE.

We believe that SLOODLE can bring benefits to educators using Second Life and Moodle – and findings from our first pilot support this view. But the project is still in an early state of development, and will continue to benefit from further research on the effective integration of web and 3D virtual learning environments. To support this research and to encourage wider adoption of SLOODLE a range of support activities are required. These vary from providing technical support and resources – such as hosting Moodle/SLOODLE for participants – to email and forum based support and the development of a number of practical example case-studies to provide concrete illustration of how SLOODLE may be used to support learning and teaching.

The issues that have arisen in this work are ones which may face other researchers attempting to work with globally distributed communities of virtual-world education practitioners over a period of time. It is hoped that the methods we are employing for our second pilot will not only lead to increased engagement and participation in that pilot, but that they may prove useful to other researchers conducting longitudinal research studies with similar communities.

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Inbetweenness OR in two places at once . . .

Ronald Macintyre

Keywords: ethnography, Second Life, inbetween, education,

Abstract:

This paper is informed by experiences and observations made while participating in the Open University Second Life Teen Grid education project (Schome), and reflections on observations made on the various educational islands facilities on Second Life Main Grid. The paper explores the role of participant observation as a research tool within Second Life. It acknowledges that Second Life is a knowable social reality with customs and norms that should interest the ethnographer. However, the researcher is increasingly uncertain about the applicability of ethnographic concerns of 'authentic experience', 'dwelling', or 'going native'. One is always aware of a sense of 'betweenness', always drawn back to a body and a keyboard, in a room on your own. The physical and embodied experience of being in between worlds is considered as a challenge and an opportunity for ethnographers. The paper concludes by acknowledging that the authors sense of betweenness is a function of his personal attachment to the concept of embodied experience.

Introduction:

This paper looks at what (if any) role ethnographers can play in understanding the virtual environment(s) within Second Life (SL). Where ethnography is understood as the long term engagement and study of people, places and practices by a participant observer (Crang, Cook 2007). In particular the paper is informed by the experiences and observations made in the Open Universities (OU) SL Teen Grid (TG) education project Schome, coupled with those made in and around various education islands on the SL Main Grid (MG). The paper takes an uncertain stance as to the value of ethnography within SL based on the authors personal experience of attempting to understand his 'place' within SL. In particular, it uses, observations, recollections and narratives to look at the feelings of 'betweenness' that people experience within SL. Where 'betweenness' is understood in relation to ideas of dwelling – of being authentically in the world (Heidegger 2000). It considers how this sense of 'betweenness' might challenge the knowledge claims of ethnography. With ethnographers often drawing on notions of 'dwelling', to gain an 'inside' knowledge. Therefore embodied experiences, coupled with long term engagement and immersion in cultures and practices are read as being key to 'traditional' ethnographic knowledge claims. The paper asks what role these notions might have in ethnography of virtual worlds. It concludes that ethnography does have a role and the 'traditional' ethnographic tools are still relevant. It does so with a caveat. Researchers need to accept virtual worlds as extension of the space they occupy in physical worlds. As, understanding them as separate spaces risks reproducing the Cartesian dialectic (mind body duality). On an intellectual level the author accepts this notion of SL as a part of physical worlds – an extension of this space. However, in practice he finds that his attachment to the ideas like embodied experience and dwelling means he is unable to be anywhere but at desk typing on a computer.

2. Second Life

Second Life (SL) is 3 Dimensional virtual world created by Linden Labs in 2003. To access SL you need a computer with internet access and to download the SL software. Basic membership is free. Once online you choose male or female form to represent you in the virtual world – this is called an avatar. Avatars can move around and explore the world, ways of moving about include teleporting (instantly moving to another location), and flying. SL differs from other virtual worlds in that it affords residents a fairly high degree of autonomy and personal expression. Avatars can and are highly customised, individuals are able to create, share and sell the things they create in world. Individuals and organisations can own land and build as they see fit.

Like many tertiary education providers the Open University (OU) has a presence on SL's Main Grid (populated by over 18's). The OU also have a presence on SL's Teen Grid. The project on the TG is aimed at 13-18 year old children and young people. The collective name for these projects is *Schome* (not school not home). The primary aim of the project is to explore the role of SL within secondary and tertiary education.

3. Research Methods in Virtual Worlds and the role of Ethnography

This is not intended to be a review of the various research methods employed within virtual worlds. It is a partial account based on the research activities within the OU project(s) in SL and an attempt to understand ethnography in virtual worlds

3.1 Knowing in an All Knowing World

SL offers the researcher the ability to collect, store and analyse a range of data about avatars within SL. Chat logs enable you to save the your text based chat and any Instant Messages (IM) to your computer. Changing camera views, maps, and the potential to see friends online mean that we can gain views and information we would rarely have access to in RL. In addition, projects like Schome also have a number of sensors that can record what individuals are doing and where they are doing it (see Sheehy, Ferguson, Clough 2007).

A significant factor in the representation of SL in research is the primacy of textual sources. In many ways these virtual words are composed of texts, and researchers are rendering these virtual worlds as texts. Geo(earth)graphy(writing) have long been interested in landscape as text (Barnes, Duncan 1992). In studies of physical and cultural landscapes one of the advantages of understanding landscape as text is that we can see how people write their stories into the world. For example, Duncan (1993) looked at how the rulers of the Sri Lankan kingdom of Kandy inscribed and reinscribed third century Buddhist texts Asoka doctrine (benevolent fair ruler – landscape dominated by public works) and the Sakran discourse (ruler as god – landscapes dominated by palaces and glorification of ruler) into the geography of its capital. Duncan shows how these competing texts were read and re-read through the geography of the city, and how the ruler using their inscription to legitimate his power. In the case of SL text clearly shapes the landscape, scripts shape worlds, scripts are shared and traded, knowledge and understanding of scripts creates (virtual) power, textuality is the medium that creates form and communication. SL can be understood as a series of intertextualities.

The question arises, how we do decide which texts are meaningful. Personal communications with the research staff within the Schome project indicate that this can be problematic. Data sets are large, and while they may tell us that people spend statistically significant more time in a place, doing one task, as opposed to another. It does not tell us if this is significant. Likewise, the automated coding and analysis of Chat Logs tells us how prevalent a word or phrase is, it does not tell us about their wider meaning. Where meaning is understood to refer to the apparent and inferred meaning of texts within the context in which they were inscribed. In addition, while the chat log system appears to collect a 'true record' of proceedings they actually record your perspective. Transcripts of text chats often appear to be jumbled and disordered. With answers appearing in the log before questions are asked. This is particularly apparent in large gatherings. It would appear that in these circumstances the record that one has of a conversation records your individual experience of the encounter, an experience that may not be shared by others. In addition how you view text chat also alters your experiences. Viewing text chat in the 'normal view' at the bottom of the screen, and viewing chat in a dialogue box alters the timing and occasionally the order of conversations. It is the later being recorded in your text log.

The authors interest in using ethnography was sparked by the partiality, or particularity, that these intertextualities presented. This was coupled with the sense that what it means to be in SL seems to recede as we understand those experiences as a series of intertextualities. As that reading of the world fails to account for the particularity of experiences in world. It also fails to account for the sense of 'betweenness' that virtual worlds seem to engender.

3.2 Ethnography in Virtual Worlds

Ethnography grew out of studies of particular peoples, in practicals places, conducting particular practices. Early ethnographers and anthropologists studied strange and exotic peoples in far of locations (for example Mead [1930] 1975). Recently ethnographers have acknowledged and critiqued ethnographies role in the colonial project , in particular the 'othering' and making these people and places strange and exotic (for a feminist perspective see Harraway 1991, for a commentary of colonialism and research see Gregory 1994). Ethnographers have shifted their gaze to 'ordinary' practices (Crang Cook 2007). Place has also shifted with and increasing interest in tracing people and practices as they move through place(s). The idea that ethnographies can shift in space, the idea that they are 'multi-centred' (Hannerz 2003) is contested by those who claim that it is the long term engagement with people and place that gives ethnography its value (Crang, Cook 2007)

Virtual ethnographies are multi-centred. The critique of multi-centred ethnographies is that they tend to be semi-structured interviews with some participant observation (as opposed to participant observers) (Crang 2005). The issue that arises with virtual ethnography is that the participants are, or seem to be in two places at once. For example, Antonijevic's (2008) ethnography of 'body language' in SL is about the virtual body, about the similarity between non verbal cues in physical worlds and virtual worlds. This ethnography does not account for the body that produced these non verbal cues, nor the site of their production. The physical body draws attention to itself by its absence. This also introduces a methodological question. Like the multi-centred ethnography the virtual ethnographer can tend towards multiple and overlapping methods. Gillen (also part of the Schome project, forthcoming) blends her ethnographic observations with textual analysis to understand literacy in SL and Web2.0. The

author is left wondering, whether the sense that conducting an ethnography of virtual worlds is not enough, develops from the ethnographer being between places – that the holistic sense of ethnography as co-located over extended periods is absent.

4. Arrival Scenes, Bodies and Machines, Inbetweenness

Anthropologists, and by extension ethnographers, are in thrall to the arrival scene. Most 'classic' ethnographies describe the arrival of the researcher in 'the field'. My interest in SL was sparked by the Guardian on the Thursday. I downloaded the client and logged on for the first time in June 2007. I selected a plain male jock avatar and, after wandering round orientation for a few log ins, being given strange advice, I eventually escaped. My first port of call was the Social Simulation Research Lab on *Hyperborea*. As I walked along the paved walkway past the sandbox a number of avatars approached. The click, click, click of typing. NEWBIE, NEWBIE, NEWBIE NEWBIE. When asked I recount the later as my arrival scene in SL. Not the former wandering around the orientation island trying to understand exactly how one might escape. Somehow the later seems a more fitting arrival scene – more real.

My next arrival was at the OU's *Schomebase*. Schomebase was the Main Grid (MG) island for what was essentially a Teen Grid (TG) project. It was generally empty and I drifted between their and various other *education islands* attempting to find a 'place' and and 'purpose'. A little later I got in contact with the Schome project team and joined the forum where people involved in the Schome project discussed matter. At this point I had not been onto the TG. In November 2007 I met the project director in Milton Keynes to discuss becoming involved in the project. During those discussions he told me about the changing character of participants. So far participants had generally been single individuals. Phase 3 would see the arrival of groups who knew each other already, and in many cases would be accessing SL from shared spaces. One of the group leaders wanted to build a shipwreck on the islands beach. These echoes of discovery and exploration, the shipwrecked sailors cast upon a strange shore seemed to say something about the nature of this groups (or the group leaders) understanding of SL. At this point I was very much focussed on how the 'natives' would react to the arrival of a numerically superior group on the island. My thoughts were directed towards place based debates on insiders and outsiders (Cohen 1985) and the links between explorers stories and colonialism (Gregory 1994). It was very much about community. Later, my thoughts drifted towards the reason behind these founder and frontier narratives. This re inscribing of a narrative of colonial exploration onto virtual castaways suggest the exotic, its suggests that SL is being placed out with our normal understanding – it is a world away.

At the tail end 2007 updates meant that SL client was no longer stable on my system (Intel GMA 900 with 128mb shared memory graphics card). My ability to move around the world was constrained, I could stand, I could listen. Often when I logged in the only evidence of other avatars were the green dots on the MiniMap. I could hear the click of text, and read the lines, I could not see anyone. I had mobility problems, walking or even turning would often cause my system to freeze and crash. I lacked the fine control to fly. This experience seemed to give SL a physicality and corporeality that it had previously lacked Corporeality in relation to the dissonance between the experience of my body in SL and my actual physical body. Physicality, followed from this and seemed to be emphasised by the inability of laptop render me in world. Suddenly, the physical architecture of my computer, my location and access to the internet seemed to matter. This sense that the geography of access mattered was compounded when my laptop would no longer run SL. Now I could only access SL at my fathers house. I dipped

in and out of SL. Having been granted access to Schome Park, I found that I was physically unable to access it. SL felt very much like another world, a world that was out of focus and inaccessible. If I did log in world I logged into the TG and Schome Park. When I did access SL very few people seemed to be in world.

Around this time the forum was buzzing with questions about whether avatars should be allowed to use voice. A number of students from the United States had joined the project and many of them used audio. One evening sitting by my partners PC (which had grudgingly decided to run SL). I logged in and bumped into some long term residents and some new arrivals from the US. It was voice chat. Hearing people accents was interesting. Regional English accents, American drawls. Peoples PC mics picked up background noises, phones ringing, parents intervening, door closing. One girl from the US was speaking to her 'mom', the dog was barking, it was mid afternoon, after school. I imagined it was hot, I don't know why. Somehow the trail of what I thought of as actual space seemed to seep into this virtual space. We seemed to spatially and temporally shift to an imagined America. My only experience of that America was of a hot August in Kentucky and Tennessee and this is what it became. Suddenly she was not this avatar but I a person whose family had a house on the outskirts of town, with a porch, and a mosquito net door, with a front yard and a brown dog. Text seemed to allow us to settle into our character, voice and the auditory trail of our surroundings seemed to pull, to put us in our place - real and imagined.

5. Some Reflections

5.1 Forgetting as the first analysis

The notebook or journal is the tool we most often associate with ethnography. The original intention of the research was to use the bliki (a blog style wiki) on the schome website *RoughBounds bliki*. This attempt to create a discursive research journal did not work. The idea of shared reflections seemed to inhibit and constrain the notes, and entries became fragmented, and infrequent. The author retreated to paper and occasionally the screen. One of the strengths of an ethnographic approach is the explicit and acknowledged nature of the ethnography as a record and reflections on particular, partial and subjective accounts. Yes, the ethnography is trying to say something about wider experience, but it is always rooted in the subjective. In physical worlds this understanding of worlds is seen as having a particular value. In part that value is based on the understanding that comes from long term engagement, and in part it is based on the ability to access and record social interactions. In virtual world the level of surveillance and the ability to collect a wide range of data challenges the legitimacy of the later. This seems asks questions about the interpretive space between the experience and the ethnographers record of that experience. As noted earlier adult avatars in the Schome project keep chat log on at all times. When writing up notes it is tempting to clarify a point by referring to the chat log. Often there was a disparity between the textual record of a series of social interactions and the sense, or recollection of them in the journal. Gillen (forthcoming) also notes the need to clarify. This seems to create a tension between the apparently objective record of events (see earlier) from the sensors and chat logs and the fallibility of the researcher. Dodge and Kitchin's (2007) work on surveillance and what they term *sousveillance* (giving, collection and sharing of data – blogs, web cams, Satnav, Amazon suggest list LastFM) suggests a role for forgetting. They suggest that digital memories, mobile phone data, shopping habits, preferences on Amazon, are thin memories. Whereas recollections and are thick memories – they are multi-sensory and evocative. Might the same

distinction also be made between the thin memories of sensor data and chat logs in SL and the thick memories recorded in journals and notebooks. The 'thickness' of those memories is a function of forgetting. The issue arises, to what do those thick memories relate to?

5.2 The problem with bodies

A great deal of research exists about how people choose to represent their bodies in virtual worlds and how they use and orientate their bodies (for example see Antonijevic 2008; Rybas, Gajjala 2007). It seems that much less work has been done about peoples physical bodies, and the physical architecture (access points, infrastructure and machines) that facilitate the creation of those bodies. Work on mobile computing has looked at the way physical architecture required to support 'being connected' (Dourish 2006). Similarly, some place based ethnographers have looked at the idea of collective and shared access to virtual worlds (Isabella 2007). Particularly in South East Asia where participation in online games can be a shared experience (see Dourish & Bell 2007 for a discussion of spaces and technology). Research in SL is very much about what happens within SL. However, the experiences and journal entries above indicate that our experience in SL is about bodies, aptitude, and skill. It asks, us to place those bodies - where are these bodies, what are they doing? Place, in relation to access to the physical infrastructure, as our ability to access a reliable connection, affects our ability to engage with SL. Similarly the physical nature of the machine, its internal spaces and architecture defines whether we can access SL. It also defines how we are in world. As the machines body changes the way we perceive SL and in turn are perceived by others. Place also refers to where we are. Are we in a public space, a private space, or the spaces inbetween; at work, in the home or in an office, on the sofa, or the kitchen table. Where we are, the spaces our bodies occupy and our dealing with other bodies in those spaces alters the way we engage with SL. Thus (following Dourish and Bell 2007) the spaces we occupy inform and in turn are informed by the technologies (and worlds) we engage with in those spaces.

The problem is how can research, in particular ethnographies conducted in virtual worlds, understand and capture that experience. For most people SL use is a solitary pursuit where social contact occurs in shared virtual places as opposed to physical places. One avenue might be ethnographies of secondary and tertiary education students. In Schome some of the students access SL through school based computer labs, and in tertiary education the possibility of conducting similar research also exists. In addition, the shared knowledge and practices within SL and Web2.0 'communities' associated with the Schome project are beginning to seep into physical worlds. Students are starting to use the forums to arrange meeting on physical places, success in student competitions lead to face to face meetings. Isabella's (2007) research on Multi User Domains began in text based worlds but soon incorporated face to face encounters. This extended notion of what constitutes 'the field' in virtual ethnography might be able to capture the embodied experience of being in (and in between) worlds - challenges remain.

5.3 In two places at once

In common with many research papers, this paper and practices it describes (for example the shipwreck), tend to place the virtual as 'other' – a distant presence. This is because above discussions and empirical examples have been predicated on a central assumption. An a priori assumption of 'betweenness', a sense that our presence in virtual worlds means that

we are in some sense in two places at once. This sense of betweenness is understood as a challenge to the notion of 'authentic experience', calling into question the knowledge claims of virtual ethnographies. As a solution the narrative suggests that ethnographers need to account for the physicality of virtual interactions, the bodies, the places, the machines. That ethnographies need to reach from virtual worlds into physical worlds. This extension of 'the field' may not be the only solution. Reflecting on the demarcation of 'the field' within virtual ethnographies the author was struck by the realisation that he had committed a huge mistake. In understanding virtual worlds as somewhere else, in relating and exploring that sense of 'betweenness' the author was reproducing the dichotomy between the body and the mind, the person and the machine. Jones (2006) suggest that we see the reproduction of self online is not just an extension of our identity, he suggest that we recognise virtual spaces as an extension of the spaces we occupy. This phenomenological approach to understanding the relationship between expressions of self in/through different media is much more in keeping with ethnography. Indeed it may the separation of real and virtual, the rehearsing of the Cartesian dialectic, that challenges the knowledge claims of ethnography.

Having accepted that his previous understanding of virtuality was not compatible with his personal and intellectual commitment to understanding the world from a phenomenological perspective (following Heidegger's essay 'Building, Dwelling, Thinking'), the author is left on his chair, at his computer, typing. He is left wondering, whether, as digital migrant his sense of place, of dwelling, of being, is not reconciled with a scripted presence.

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Socialisation and Collaborative Learning of distance learners in 3-D Virtual Worlds

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Keywords: Second Life, collaborative learning, socialisation, knowledge construction, technology-enabled learning

Abstract:

Socialisation or 'knowing one another' is a key element of online learning and knowledge construction. Socialisation needs to be integrated and sustained in the collaboration process through the design of activities which ensure to reduce social distance amongst online learners. Virtual ice breakers early on in collaboration may not be sufficient to develop and maintain shared understanding, mutual trust and social presence. Inadequate early socialisation is a key obstacle in conducting collaborative activities at a distance, as investigated in our research with blogs, wikis and forums, and elsewhere. Socialisation in distributed environments can be enhanced through synchronous technologies such as instant messaging, phone, conference call, video-conferencing, web-conferencing, and so on. In this paper, we will present a review of our recent research which uncovered obstacles in student-collaboration due to inadequate socialisation with tools such as blogs and wikis. We will report the theoretical underpinnings for the pedagogical rationale for adopting 3-D virtual worlds such as Second Life for socialisation and knowledge creation in distance-education. Based on literature review and empirical investigations, we will discuss sample Second Life activities which aid socialisation.

Introduction

Technology-enabled learning through computer-conferencing, social networking tools such as blogs and wikis, and virtual learning environments (VLEs) has becoming increasingly common in higher education. There are several theories of learning that are referred to when discussing the design, evaluation and effectiveness of online learning environments: for example, behaviourism, constructivism, and influence of cognitive psychology (Anderson and Elloumi, 2004). With the advent of social networking tools such as blogs and wikis, social theories of learning have gained prominence (e.g. Lave and Wenger, 1991, Mayes, 2001). Although the views of individual social theorists might differ, there is a general consensus that interaction, dialogue and collaboration are essential for effective learning.

To integrate the social aspects of learning, Felix (2005) has proposed the synthesis of cognitive and social constructivist approaches in course design. In the cognitive constructivist approach, the individual makes sense of the materials on one's own, while in the social constructivist approach, the knowledge is constructed through shared learning in a group and through group- discussions and reflection. Therefore, through activities conducted in collaborative learning environments such as blogs, wikis and forums, the knowledge is constructed individually but mediated socially. Activities such as discussions, collaborative problem solving, group-projects, and games can facilitate social interactions and dialogue.

Student socialisation is a central element of technology-enabled learning (Irwin & Berge, 2006) and, particularly, in distance-education settings (e.g. Baker and Woods, 2005). The

challenges of assessing student preconditions and expectations are often more difficult in an online learning context, because educators are less able to interact transparently with students, and students may not have met face-to-face (F2F). The interactions and development of shared understandings, norms, and rules of conduct are particularly critical in the early stages of the formation of a learning community. It is for this reason that educators make time at the commencement of their learning interactions to provide an opportunity for students to share their understandings and unique aspects of themselves. This sharing can be done through virtual ice-breakers, by the provision of an opportunity for students to introduce themselves and to express any issues or concerns to the educator and the group. This social act of coming together and familiarising with one another and sharing meanings, ideas and information is called socialisation. As a result of shared experiences and interactions, participants are able to become aware of one another, relate to one another and establish a connection (Wegerif, 1998). However, studies have shown:

- early socialisation in online learning environments may not be adequate to sustain the collaboration and co-operation (Minocha and Roberts, 2008);
- general introductions and ice-breakers may not be sufficient for development of shared understanding amongst the learners (e.g. Irwin and Berge, 2006);
- socialisation may need to be integrated throughout the collaboration for development and sustenance of a learning community (e.g. Nicol *et al.*, 2003).

In this paper, we discuss the significance of socialisation in technology-enabled learning. We then discuss the empirical evidence related to students' perceived lack of socialisation and effects on participation and collaboration when interacting in 2-D environments such as blogs, wikis, and forums. We outline the characteristics of 3-D virtual worlds such as Second Life in providing an environment for socialisation, synchronous communication and collaboration. We suggest five generic socialisation activities which can be conducted in Second Life. Educators can adapt these activities for their student-groups and disciplines.

Socialisation in technology-enabled learning

Irwin and Berge (2006) have identified three elements of socialisation: interaction, presence and knowledge construction. Berge (1999) suggests that there should be interactions between the learner and other learners, between the learner and educator, and between the learner and experts. This allows them to collaborate, participate in group-activities, form networks, and establish social presence (Garrison, *et al.*, 2000). The value of interaction lies in its contribution to the participant's ability to establish a sense of being in the virtual environment, that is, social presence.

Social presence is defined as the degree of awareness of another person in an interaction and the appreciation of an interpersonal relationship (Short *et al.*, 1976). In the absence of traditional communication cues of F2F encounters such as facial expressions, gaze, vocal cues, posture, dress and nonverbal cues such as shaking of head or moving of hands while speaking, in an electronic environment, social presence is a measure of the feeling of community that a learner experiences in an online environment (Tu and McIsaac, 2002). According to Shin (2002), social presence is when students feel intimacy and togetherness in terms of sharing time and place. Social presence is an outcome of interactions and also influences interactions.

Social presence and interactions foster socialisation. Socialisation is a pre-requisite for collaboration and is also the outcome of collaboration. Interactions which involve socialisation by sharing mental models and world views, conducting a dialogue, consolidation and synthesis of the learning in documents or other shared artefacts, and finally embodying this shared knowledge through reflections leads to knowledge construction (Nonaka and Takeuchi, 2005) and socially mediated understanding.

Therefore, knowledge construction is achieved by the interaction that takes place within oneself through reflective thinking and by the interaction that occurs in communications and collaboration with other people (Vygotsky, 1978). The active exchange of ideas, dialogue and negotiation of views by looking at and reflecting on the multiple perspectives of fellow students facilitate collaborative and co-operative learning in which students and educators become active participants in the learning process.

Perceived lack of socialisation and need for synchronous communication in 2-D environments

Research in the pedagogical role and effectiveness of forums or online conferencing (Nichol *et al.* 2003), blogs (Kerawalla, *et al.*, 2008, Minocha and Roberts (2008) and wikis (Minocha, *et al.* 2008) has shown that inadequate socialisation at the start of a collaborative activity can hamper participation and commitment to the activity.

In an ice-breaker of a post-graduate Computing course at the Open University (OU), UK which has a wiki-based collaborative activity, the students were encouraged to exchange their names on the group-forum, and discuss their motivation for doing the course, and for how long they had been studying with the OU. The participation on this voluntary activity was low. As the students progressed with the course and the collaborative activities, although the students were making their individual contributions to the group-activity, they were not peer-reviewing or giving comments or feedback on the contributions of other group members. When we enquired from the students about their not providing peer-reviews and feedback, they mentioned lack of awareness of one another as the factor for their hesitation. A typical comment was:

'we don't know each other well enough to critique each other's contributions'.

One student stated:

Where project teams already know and understand each other, electronic communication is fine. Where strangers do not, all non-verbal communication is lost, leading to misunderstanding and potential conflict

The enquiry with the students revealed the following (Minocha and Roberts, 2008 *in press*): perhaps the ice-breaker of introductions wasn't effective; there was a need for the students to become 'aware' of one another; and the significance of socialisation in effective participation and collaboration in a group activity. In the next presentation of the course, we modified the ice-breaker to include a group-activity related task. We asked them to schedule the group activity from month 2 onwards of the course in the ice-breaker introductions at the start of the course. Since this activity was situated in the course's group-activity and didn't involve sharing personal information which some students can be hesitant towards, the participation during the ice-breaker was high with almost every student coming in to mention his constraints or plans for the group-activity. Discussing each other's time constraints and schedules proved

to be effective group-building exercise as some students expressed empathy and offered to complete the group-activity sooner than the deadline if a group-member was going to be away in the time-period closer to the proposed deadline of the group-activity.

Thus, even when tools such as blogs and wikis can facilitate socialisation, there is a need for educators to design activities which engender social presence, interactions and community building through collaborative activities. Further, even though activities designed for asynchronous environments such as blogs and wiki can support collaboration, there are situations in collaborative working when synchronous discussion media such as telephone conferencing, instant messaging and F2F communications can facilitate timely decision making. F2F meetings are generally not feasible in distance-education courses.

Against, this backdrop, we now discuss the role of 3-D virtual environments such as Second Life in providing a real-life setting or 'place' for socialisation and its sustenance, collaboration and synchronous communication.

Learning Environments in 3-D Virtual Worlds

3-D virtual worlds are multimedia immersive, simulated environments, often managed over the Web, which users can 'inhabit'. They can interact via their own graphical self-representations known as 'avatars'. Therefore, a virtual world is a cyberspace which has simulated bodies in simulated places. 3-D virtual worlds are being used in many applications: education/training, gaming, social networking, marketing, and commerce. Similar to the 2-D Web (Anderson and Elloumi, 2004), the communication and collaboration characteristics of 3-D virtual worlds facilitate the development of a learning environment (Bransford, *et al.*, 1999):

- a 3-D virtual worlds supports individualised and group activities through asynchronous and synchronous interactions in many formats (text chat, instant messaging, e-mail, voice chat, gestures); and
- it is knowledge-centred as the students can have direct access to vast libraries of content and learning activities in-world (within the 3-D environment).

However, 3-D virtual worlds, unlike the 2-D Web, can offer immersion, realism and interaction through multimedia communication along with realistic, animated and customised avatars. Using, audio, text and gestures the users, via their avatars, can converse in real time. Because of this, a 3-D virtual world offers a sense of social presence via the avatars which may facilitate socialisation, an antecedent for effective operation of a virtual team in an educational context. This sense of presence and sense of place in a 3-D world can make learning, and indeed socialising in a virtual world, a more 'human' experience than many other 2-D environments. Further, a 3-D virtual world enables creation of learning environments to enhance experiential learning, allowing individuals to practise skills, understand course concepts via 3-D simulations and experiment with them, collaborate through role-playing activities and have real-world-like experiences (e.g. Kamel Boudos, *et al.*, 2007).

3-D worlds provide a form of word-communication (through text and voice) and also enable a kind of bodily communication, through the gestures and position of the avatar. Thus they may offer a higher-quality forum of interaction than the chat room or the telephone, neither of which gives scope of the body. 3-D virtual worlds should enable educators and learners to

be more creative and to develop new effective ways of teaching and learning, rather than to purely replicate real life classrooms in 3-D virtual worlds. It is important to identify and focus on what 3-D virtual worlds are most useful for: those activities that can only be effectively carried out in virtual worlds and not, just as effectively in any other electronic medium. We must also determine and disseminate the optimal combination for blended approaches that combine 2-D and 3-D learning environments (Minocha and Roberts, 2008, *in press*). Furthermore, the affordances of Second Life can't provide an effective socialisation and learning experience. The key challenge is in the design of activities for Second Life.

Design of Socialisation Activities

Salmon (2000) has developed a model for e-moderators which outlines the stages an online educator would move through in the process of effectively moderating an online course. The process begins with providing students with access and motivation. In this stage, any technical or social issues that inhibit participation are addressed, and students are encouraged to share information about them to create a virtual presence, as described above. In the second stage, Salmon suggests that the e-moderator continues to develop online socialization by “building bridges between cultural, social and learning environments” (p. 26). These early stages open the way for collaboration and knowledge construction. Salmon’s model provides a useful guide and planning tool for online learning teachers, however it should not be considered prescriptive (Anderson and Elloumi, 2004). Anderson and Elloumi argue that students may be entering the online class with a great deal of technical and social experience of the online learning environment. In such cases, technical and social issues may have been resolved some time ago or addressed by the technical support team. Alternatively, a heterogeneous group may have some very sophisticated and experienced students, and some novices new to the online learning environment. *“Busy adult students may be anxious to avoid what they see as unproductive “ice breakers” associated with Stages 1 and 2, and to proceed to more content rich and potentially more meaningful learning activities associated with later stages [of Salmon’s model]”.*

Further, Kirkwood and Price (2005) found in their research on the use of technologies by students that “regardless of the media being used, it is very unlikely that students will make use of materials and activities unless they are embedded in the course pedagogy. If materials are not linked to the assessment strategy then the medium is likely to be unused and its potential remain fallow.”

Therefore, there is a need to design activities for Second Life which engender socialisation, encourage interaction and dialogue, foster collaboration but also be situated within the course. In addition, the activities could also build in skills for learning to interact with the Second Life environment such as moving from location to another (tele-porting) within Second Life, or using the local chat and other communication media. We now present a set of five socialisation activities which we have designed.

Socialisation Activity 1:

Aim: to enable students to pick up or practise Second Life skills and also to know their fellow students.

Activity: Students will go in pairs to explore the island and retrieving note cards. The note cards could provide them information related to the course or that particular class/tutorial, or

about Second Life which would be useful for them on the course. The note cards could also be links to course-related resources on the Web.

Preparations: Preparing the note cards which would be relevant to the context; setting up flags or other indicators for students to search the note card givers while they are flying or navigating around the island.

Expected outcomes: This activity could have several outcomes depending upon how it is designed: skills to move around in Second Life; searching and retrieving resources in pairs; and navigating and searching together in pairs may help to establish the initial rapport.

Variations to the proposed activity: Students could also be given the task to discuss the contents of the note cards in pairs and then reporting to the rest of the group; a surprise element could be where a pair find a note card (at a rather difficult to find location) with a prize - for example, winners of Linden dollars; or they have earned some points on the course; or they have found a T-shirt or a piece of jewellery; or winners of book token of Amazon.com; and so on. So a gaming element could be integrated within this searching activity.

Aspects to consider: (i) technical - check that the students have access to note card givers; (ii) pedagogical - consider the level of Second Life skills; if the students are already skilled in Second Life, then design the note cards which are more integrated within the course/class rather than on Second Life skills.

Socialisation Activity 2:

Aim: to enable students to pick up or practise Second Life skills and also to 'become aware' of their fellow students.

Activity: Taking students on tours within Second Life; these tours could be to places which are course-related; for example, taking the students to the New Media Consortium's Orientation island where they could explore a place and perhaps would like to visit again for orientation. Each tour takes about 15-25 minutes; so say, in a class of one hour, tour to one location followed by discussion in the main teaching area (island of the institution) will give sufficient time for discussion at the end. The discussion could also include a voting platform (Likert Scale - see Activity 3) where the students could express their choices on statements related to the tour-experience.

Preparations: Preparing the note cards for the activity - giving them SLURLs (Second Life – URLs) for tele-porting and the aspects they should look for while they are on tour.

Expected outcomes: This activity could have several outcomes depending upon how it is designed: skills to move around in Second Life; tele-porting via SLURLs; navigating while on tour; integrating a social activity such as a tour within a class may enable establishing the group feeling.

Variations to the proposed activity: Students could also be given the task to work in pairs or fours (depending on the size of the group) when on the other location. They will be asked to work on particular course-related questions related to the island being visited so that they report to the rest of the group; students could also be asked to paste the pictures and notes

from the tour on the forum (2-D VLE site, for example) or to contribute reflections on the wiki towards an article related to the tour. The possibilities are endless - so far sufficient scope for discussion and reflection is integrated within the activity.

Aspects to consider: (i) technical - check that the students are a part of the class-GROUP, so that they can be easily teleported, located and guided; (ii) pedagogical - consider the level of Second Life skills; if the students are already skilled in Second Life, then design the activity which is more integrated within the course/class rather than on Second Life skills. But if the aim is to impart Second Life skills, then it might be useful to integrate tasks such as taking pictures of oneself and the group on the touring island; or making notes on note cards; exchanging note cards with fellow students; and so on.

Socialisation Activity 3:

Aim: to enable students to practise Second Life skills and also to know their fellow students.

Activity: Using a Likert Scale floor mat such as that used by Esme Quinhua (Second Life name of Jane Wilde, instructor Marlboro Graduate College Centre) in her 'Teaching and Learning Virtual Worlds' course. The statement(s) are read by the instructor and the students express choices by moving in the spaces corresponding to various sections of the Likert Scale: agree; disagree; strongly agree; strongly disagree; and so on.

Preparations: Preparing some statements which will invoke different opinions; and having some follow-on questions to probe the rationale for the differences/similarities in the opinions.

Expected outcomes: This activity could have several outcomes depending upon how it is designed: skills to move around in Second Life; this could be perceived as a fun activity and may enable establishing the group feeling or sense of collectivism.

Variations to the proposed activity: Students might run this activity themselves and thereafter discuss their diverse/similar opinions and report back to the instructor. The percentage of respondents in each part of the Likert scale is shown on a pie chart in the version of the Likert scale that Esme uses. This quantitative information could be linked to some task requiring analysis and reporting it on the VLE (either in the blog, wiki and/or as a part of the assessment).

Aspects to consider: (i) technical - checking beforehand that the Likert scale mat is working; (ii) pedagogical - consider those issues that will raise a variety of opinions so as to give scope for fun and follow on discussions.

Socialisation Activity 4:

Aim: Taking pictures in Second Life

Activity: This activity could be combined with Activity 1 and Activity 2. The students could be asked to take pictures of themselves or the group or of the places they tour.

Preparations: Designing the activity of taking pictures in a way that there is a clear purpose - for example, to teach Second Life skills, or to collect data for discussion in the Second Life class, or to collect data for a project or activity in real life.

Expected outcomes: This activity could have several outcomes depending upon how it is designed: skills to move around in Second Life; camera control skills of Second Life; this could be perceived as a fun activity when taking pictures of the group or a place that the students visit as a group (for reporting to the rest of the class) and may enable establishing the group feeling or sense of collectivism.

Variations to the proposed activity: Taking pictures and uploading them as images and using them as textures in collaborative building activities (see Activity 5); or taking pictures, uploading them as images and using them to aid presentations in Second Life; or taking pictures when flying to capture helicopter views of the locations in Second Life; or uploading their own pictures within Second Life profiles or on their websites in 2-D environments.

Aspects to consider: (i) technical - checking beforehand that students have the basic camera skills and have sufficient Linden dollars to upload images in Second Life, if required; (ii) pedagogical - consider those course-related aspects where pictures/images can aid the discussion or can be a useful set of data for discussions.

Socialisation Activity 5:

Aim: Collaborative building in Second Life

Activity: This activity will involve 2-4 students building in Second Life; it could be as simple as creating a large box for sitting, or building a flag, or some building work which is course-related - for example, creating a large display of pictures/snapshots related to a group project.

Preparations: Designing the activity with a clear purpose and communicating that to the students - is it aimed to teach them building skills; or to achieve a course-related task and through that learn some building skills; or is to teach them programming in Second Life.

Expected outcomes: This activity could have several outcomes depending upon how it is designed: building and scripting skills; working together may enable establishing the group feeling or sense of collectivism; and transferable skills such as those of communication and team-working.

Variations to the proposed activity: This activity could be combined with Activity 4 which involves taking pictures and uploading them as images and using them as textures in collaborative building activities.

Aspects to consider: (i) technical - checking beforehand that students have the basic building skills and have sufficient Linden dollars to upload images in Second Life, if required; (ii) pedagogical - consider those course-related aspects where collaborative building can help in demonstrating course related aspects; or the role-playing while building can help in imparting team-working, leadership, negotiation and communication skills.

The suggested socialisation activities can be combined. For example, Activity 3 can be combined with every activity in the set. A colleague who reviewed these activities stated: *“there is a potential problem with socialisation activities. Our students are very time poor on the whole and resent anything that doesn’t look as if it is directly related to the course content.”* If you also face a similar dilemma where the focus of the course and students is not to teach

Second Life skills but to use Second Life to take them through course-related aspects, then we think that the activities presented here might still be useful. The activities will give you ideas and the activities could be adapted in ways to suit the context, curriculum and the Second Life skills of your students.

In the next section, we discuss how we have adapted some of these generic activities for a course at the OU.

First-level Computing Course at the Open University, UK

M150 (Data, Computing and Information) is a 30 point, entry level, distance learning, computing course. It gives an introduction to a wide range of computing topics as well as study skills for students entering university level distance education. There are five assessments during the course that are marked by the tutor and returned with student focussed feedback. A final, multiple choice, assessment is marked by computer. The students are arranged in tutorial groups, geographically. Typically each tutor will be responsible for about 15 students. A few, optional, F2F tutorials are presented in many areas. However, many students cannot attend these tutorials due to distance, time or their personal circumstances. Students are also encouraged to participate in email forums at both a tutor group and regional level. Some activities are provided to promote discussion on various topics in the tutor group forums and, two of these activities are assessed.

We adapted some of the activities which the students conduct in forums and ran them in Second Life during June – September this year. For example, the activity 1 discussed above was adapted to give students note-cards relevant to the Second Life tutorial. This activity also enabled the students to become acquainted with the University's island. Activity 2 was modified to give practice to the students about evaluating user interfaces with respect to usability principles (a topic which is covered within one of the course-units). On coming into Second Life for this activity, the students were first given a small introduction or recap of the design principles in the teaching and learning area of the University's island. Thereafter the students were taken to different islands within Second Life and were encouraged to talk within their individual groups about the user interfaces and their adherence to usability design principles. Each group was asked to report to the class at the end of the tour in a panel discussion on the University's island. The activity 3 was adapted to teach students about another course topic - the ethical considerations of taking and disseminating photographs in public places. In another activity, students were taken to tours of islands (activity 2) which had libraries to discuss about principles of data and information management, a key component of the course.

The Second Life sessions were well-attended by 'volunteer' students though technical problems with voice/audio at the start of some early sessions did delay the start of the tutorials. The overall response has been positive with some of the students who can't attend the F2F tutorials due to personal constraints or geographical distances remarking that *'It felt that I have met my tutor while sitting in my study at home'*. The students and tutors have particularly enjoyed the tours which have enabled them to appreciate the potential and value Second Life and other 3-D virtual environments can provide. We are currently collecting the data from students and the educators through semi-structured interviews and we will report our results during the conference presentation.

Discussion and the way forward

Research is still needed to make 3-D virtual worlds more accessible and usable. For effective design and conduct of activities in virtual worlds, learners, educators, and developers need to acquire and master new sets of competencies and skills in order for them to make the most efficient and effective use of 3-D virtual worlds in learning and teaching.

Although in this paper we have demonstrated the role of 3-D virtual worlds in socialisation education along with 2-D VLE tools such as blogs, wikis and forums, the pedagogical underpinnings of socialisation and 3-D virtual worlds need further investigation: specifically with regards to elements of socialisation such as presence and co-presence and affordances of social and virtual proximity of 3-D virtual worlds. One possible way would be to analyse the phenomenon of socialisation by applying the activity theory (for example, Engestrom, 2001 and Mercer (2000)).

From October 2008 onwards, we will be conducting socialisation activities in other courses across the University, including on M150. We are developing a research methodology involving participant-observation, in-world interviews, and reflective-diaries to capture students' and educators' experiences and perceptions. Some of the key challenges will be: design the socialisation activities within the course's pedagogy, providing training to students and educators in using Second Life, and to be able assess the effectiveness of socialisation activities on the participation within Second Life and also the associated 2-D environments of the course such as discussion forums, blogs and wikis. Do students find it easy to collaborate in 2-D environments as a result of having 'met' in Second Life and while participating in Second Life activities alongside activities in 2-D environments?

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Design of learning spaces in 3D virtual environments

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Keywords: Virtual worlds, virtual reality, Second Life, learning spaces, design

Abstract:

3D virtual environments have considerable potential for learning. However there is a lack of research into how such environments should be designed to maximise this potential. This paper introduces a project to carry out research into two aspects of the design of 3D learning spaces: the degree of realism; and the degree of immersion. In order to investigate the realism aspect, the project will compare students' experiences of learning spaces within Second Life which have different degrees of realism. To investigate immersion, the project will compare students' experiences in an existing virtual reality environment and an environment built within Second Life. In all cases students will carry out learning activities suited to their course of study. The investigation of realism will involve students from a range of courses at the Open University, UK undertaking activities within Second Life. The investigation of immersion will involve UK's Nottingham University Geography students working with two models of an actual physical environment: one in a virtual reality system and one in Second Life. The findings of this project will contribute to an improved understanding of how the aspects of realism and immersion influence students' learning in 3D virtual environments.

Introduction

Educational institutions are increasingly exploring the affordances of 3D virtual environments for learning. A 3D virtual environment offers a sense of presence and place, which can be more engaging for students than using other e-learning tools (Mason & Rennie, 2008, p. 88). Further, a 3D virtual environment can enhance experiential learning, allowing individuals to practise skills, understand concepts via 3D simulations, conduct virtual experiments, collaborate and have real-world-like experiences (e.g. Kamel Boudos, Hetherington, *et al.*, 2007). The lack of a guiding narrative in virtual worlds such as Second Life provides flexibility for educators and course designers in defining their pedagogy.

An 'island' in Second Life can provide a dedicated environment for learning, which helps to ensure a sense of belonging and purpose for the students. As with the design of physical learning spaces, the design of learning spaces in 3D virtual environments should be a representation of an educator's or institution's vision for learning. A 3D learning space should utilise the 3D affordances whilst taking into account the limitations imposed by the virtual world implementation, and the differences in behaviour between a person and their avatar equivalent.

There are several models of 3D learning spaces. These range from replicas of real-life buildings and spaces, perhaps with the look and feel of a real campus, to the extremes of creating imaginary or fantasy locations (Prasolova-Forland *et al.*, 2006; Jennings & Collins, 2007). However, there is little published research on the design and evaluation of 3D learning environments. Therefore, when institutions aspire to create learning spaces in 3D virtual worlds, there are few studies or guidelines to inform them.

There are many approaches to creating, rendering and interacting with 3D virtual environments. One approach, characterised as 'Virtual Reality' (VR) strives to provide a high level of immersion either via large stereoscopic screens or via head-mounted displays. Moreover, VR applications are typically controlled and experienced by a single user. Virtual Worlds, on the other hand, typically offer an environment of multiple users and collaboration but usually at the expense of representational fidelity. VR and virtual worlds are increasingly being adopted for use in teaching and learning, either to offer a visual exploration of a certain landscape or phenomenon, or as a 'means to an end' in the form of a virtual learning space.

In this paper, we describe research which will investigate models of 3D virtual learning spaces, and the rationale for their designs. The research will be based on theoretical underpinnings from geography, education and human-computer interaction. This research will be of interest to course designers, teachers, staff developers and policy makers who are involved in integrating 3D virtual environments within the curriculum of their programmes and institutions.

Virtual worlds and virtual reality

3D virtual worlds are multimedia immersive, simulated environments, often managed over the web, which users can 'inhabit'. Castronova (2005, p. 11) prefers to use the term 'synthetic world', which he defines as:

'an expansive, world-like, large-group environment made by humans, for humans, and which is maintained, recorded and rendered by a computer'.

In many virtual worlds users interact via their own graphical self-representations known as avatars (Meadows, 2008).

3D virtual worlds are being used for many purposes: education and training; gaming; social networking; marketing and commerce. Some examples of virtual worlds are:

- There.com, Activeworlds.com and Google Lively - for socialising;
- World of Warcraft - a massively multi-player online role-playing game (MMORPG);
- Second Life - for socialising, education and business;
- Children's virtual worlds such as Habbo Hotel and Club Penguin.

There are clear connections between virtual worlds (such as Second Life) and virtual reality technologies. Whereas environments such as Second Life render a conceptually 3D space to a 2D computer screen, virtual reality systems provide a true perspective view via stereoscopic rendering of the 3D space. In virtual reality, the environment surrounds the user, allowing them to experience it in the first person, often through haptic control (Loomis, et al., 1999). In contrast, virtual worlds utilise avatars, usually controlled through mouse and keyboard, with the user experiencing the environment through a constructed representation of themselves.

These differences may result in the spatial interactivity and immersion available to the user being very different between virtual reality and virtual worlds. Where simulations are inherently spatial, or where the spatial configuration is of importance (e.g. in geography teaching), there may be advantages provided by 3D immersive spaces as compared to 2D screen rendering (Burton, et al. 2008).

The DELVE project

The DELVE project (**DE**sign of **L**earning spaces in 3D **V**irtual **E**nvironments) has been funded by JISC (the UK education sector's Joint Information Systems Committee, www.jisc.ac.uk) to investigate the issues raised above. The project (which runs from July 2008 to June 2009) will evaluate a number of 3D virtual learning spaces with students, in order to propose models for different pedagogical requirements. For further information, see the project web sites: <http://tinyurl.com/5oq9rf> and <http://tinyurl.com/56yyzb>

The project involves activities based at the UK Open University and the University of Nottingham, UK. It will make use of the two universities' Second Life islands, together with Nottingham's Virtual Reality Laboratory, which is part of the 'Spatial Literacy in Teaching' Centre for Excellence in Teaching and Learning (www.splint-cetl.ac.uk).

The project will:

- investigate the existing models of learning spaces in a 3D virtual world (Second Life) and the rationale for their designs;
- compare students' and educators' experiences and perceptions of the design of 3D learning spaces on their collaborative learning and teaching, for three distinct models of learning spaces in Second Life;
- investigate the pedagogical benefits provided by a semi-immersive 3D virtual reality environment, as compared to the less immersive learning space offered by Second Life;
- propose a suite of models for the design of 3D virtual learning environments for different pedagogical requirements (e.g. for different disciplines or types of activities) and contexts (e.g. online learning versus face-to-face education).

A model for learning spaces in 3D virtual environments

There are many different ways of characterising 3D virtual environments. In DELVE we have chosen to focus on two aspects which we believe are important in a learning context: realism and immersion.

3D virtual environments can have widely different degrees of realism. For example, a highly realistic Second Life environment might be a replica of a university's real-life campus, with similar buildings, rooms and outdoor spaces (e.g. the Second Life island of Liverpool University, UK). In contrast, an environment at the opposite end of the realism spectrum might be a fantasy space with undersea areas, airships or anything else imaginable (e.g. the 'Media Zoo' from Leicester University, UK). With such a wide range of possibilities, research is needed to investigate which kinds of virtual environments students find conducive for learning and for the socialisation which supports this.

3D virtual environments also vary in the degree of immersion offered to the user. In a fully immersive virtual reality environment, the user is psychologically within the virtual space. The virtual environment is all that they can see, and their bodily movements have appropriate effects within that environment. In a semi-immersive virtual environment, there is an attempt to dominate the user's field of view through the use of a large stereoscopic screen. In a 2D screen-rendered environment, such as Second Life, the user can be psychologically both

within the virtual world and in the real-life setting. Moreover, the user is represented within the virtual world by an avatar, which may reduce the first-person experience.

The two aspects of realism and immersion can be combined to produce the model of 3D virtual environments shown in Fig. 1 below.

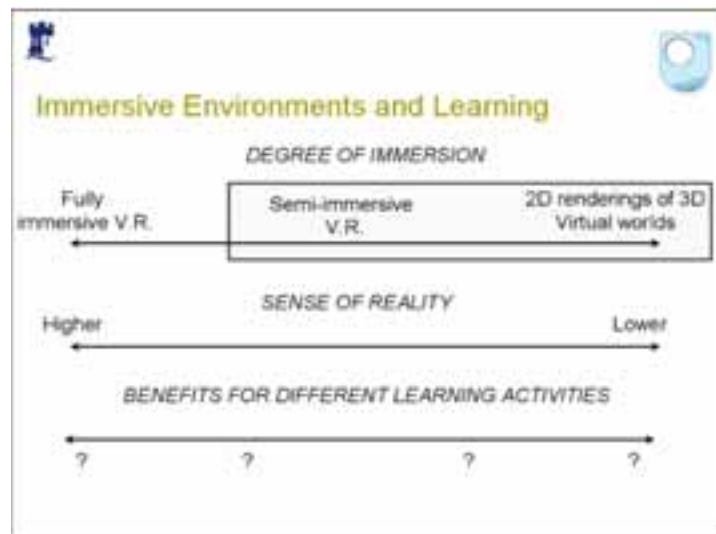


Figure 1 A model of 3D virtual environments with varying degrees of realism and immersion

A given 3D virtual environment can be positioned according to the degrees of realism and immersion it offers. For example, a semi-immersive VR representation of a real-world location might be part-way along the immersion axis, and towards the higher-realism end of the reality axis. A fantasy environment within Second Life might be towards the lower-immersion end of the immersion axis and the lower-realism end of the reality axis. The DELVE project aims to investigate the effect of different degrees of realism and immersion on students' learning.

Investigating the realism aspect

In DELVE, the investigation of realism is led by the Open University (OU), UK. The first stage of the research is to gather information on different learning spaces within Second Life. The educator and/or designer for each of these spaces will be asked about their experience of designing the space and facilitating learning within it. From the range of learning spaces investigated during this stage of the research, three will be selected which represent different points on the realism spectrum:

- one highly realistic space, such as a virtual representation of a real university campus;
- one space with a moderate level of realism, such as an imaginary outdoor setting;
- one non-realistic space, such as a fantasy environment.

With permission from the educators who are responsible for these spaces, the next stage of the research will involve OU students, supported by their tutors, carrying out collaborative learning activities within the different spaces. In order to gain a range of perspectives, we will recruit students and tutors from different types of courses, such as:

- a course which emphasises logical thinking, e.g. mathematics;
- a course with a focus on practical work, e.g. healthcare;
- a course with creative or imaginative aspects, e.g. art.

For each course, a learning activity will be designed which can be carried out in any of the three Second Life spaces. This activity will be scheduled to take place at a suitable stage in the course when it best supports students' learning. For each course, we aim to recruit three tutor groups, so that each group of students can carry out the activity within a different space in Second Life. The research design for the realism investigation can thus be summarised in Table 1.

Table 1 Research design for investigation of realism

	Learning space X: highly realistic	Learning space Y: moderately realistic	Learning space Z: non-realistic
Course A: 'logical'	Tutor-group A1	Tutor-group A2	Tutor-group A3
Course B: 'practical'	Tutor-group B1	Tutor-group B2	Tutor-group B3
Course C: 'creative'	Tutor-group C1	Tutor-group C2	Tutor-group C3

Students and tutors will be provided with training in Second Life before undertaking the activity. As part of this training they will be taken on a short visit to their learning space in Second life for familiarisation and 'ice-breaking'.

While the tutor groups are undertaking the activity, they will be accompanied within Second Life by one of the researchers. The researcher will act as an observer for the activity, and will also record the session, using Second Life chat logs and/or 'machinima'. Before seeking consent from students to take part in the research, it will be made clear to them: that the Second Life activities are entirely optional: that their course marks do not depend on participation; and that the session is to be recorded.

After the session is finished, the students will be sent an email questionnaire to complete as soon as possible after the session. The questionnaire will contain closed and open questions which explore students' perceptions of the learning spaces in the Second Life environment. For example:

- Did students feel comfortable in the environment?
- Did they enjoy taking part in the activities?
- Was the environment conducive to learning?
- Was it suitable for the learning activities they carried out?
- Which aspects of the environment did they find helpful / unhelpful?
- Did they like or dislike the 'realistic' aspects of the environment?
- Did the non-realistic aspects aid or hinder the learning activities?

The resulting data will be used to compare students' experiences with, and perceptions of, the different learning spaces. Direct comparisons will be made between tutor groups for the same course, as well as across the student respondents as a whole. The qualitative data from the open questions will be analysed in order to identify the themes which emerge from students' responses. The aim is to gain a picture of which Second Life spaces are well-received by the students, and why.

Feedback will also be sought from the tutors, using interviews or focus groups. The issues above will be explored, together with aspects related to teaching. The aim here is to gain tutors' perspectives on the suitability of the learning spaces in Second Life for facilitating learning and teaching.

Investigating the immersion aspect

The investigation of the immersion aspect is led by the University of Nottingham. The aim of this part of the research is to compare students' experiences in an existing virtual reality learning space and in a new space to be created within Second Life. The research will involve Nottingham students who are studying a Masters course in Geographical Information Science. The students currently undertake a group activity where they are asked to investigate possible locations for a wind farm. They are provided with detailed information about the local area (the North-West region of the English Lake District, Cumbria) as a basis for their recommendation. They are also given access to a laboratory-based virtual reality system which provides a 3D representation of the landscape, based on actual geographical data. The virtual reality system is semi-immersive: students wear special glasses to gain a 3D perspective, and the viewpoint within the environment can be changed using a gamepad device controlled by one member of the group.

For DELVE, a second representation of the same region of Cumbria will be created within Second Life, again using the actual geographic data. This will provide a similar setting for the students, but with the 2D screen rendering of Second Life, rather than the 3D perspective of the virtual reality system. The students will undertake a second group activity based around the wind farm study, but this time using the Second Life environment. Students will be working with a representation of the same real-world data, but in Second Life rather than in the virtual reality system. The ways in which a real geographic study area can be replicated and interacted within the Second Life environment forms an interesting strand to this investigation. In particular, issues of scale (in relation to the size of an avatar) and distance (visualisation of far objects and landscape) need to be investigated. The differences between the two environments are summarised in Table 2.

Table 2 Differences between a typical virtual reality environment and a Second Life environment

Typical Virtual reality environment	Second Life environment
3D stereoscopic perspective, typically rendered via a large screen or head-mounted display (HMD)	2D screen rendering of the 3D space, typically via a regular computer monitor
Control of viewpoint via 'joystick' device	Control of viewpoint via movement of the avatar with mouse/keyboard
Single user environment	Multiple user environment
No representation of the user within the visual space	Representation of the user or users by avatars
Large geographic areas can be represented	Restrictions apply to representing large geographic spaces

For both of the activities, students will be observed by the researchers. For the virtual reality activity this observation will take place in the laboratory. For the Second Life activity, observation can be both 'in-world' and in the real-life computer lab where the students will

be working. Feedback data will be collected from students (those who consent to take part in the research) via a questionnaire and/or via focus group discussions immediately after each activity. The aim is to gather data on issues such as:

- Is a 3D perspective view important?
- Is it beneficial to have a visual representation of the user in the form of an avatar within the environment?
- Do the mechanisms for navigation and orientation affect the way learners interact with, and learn from, the spatial representations? (See McMahan *et al*, 2006)
- How does the learning activity change when each group member can control their own position and viewpoint within the virtual space?
- How can the issue of geographic scale be handled within Second Life, and what impact does this have on how users interact with, and learn from a landscape model?

As before, the data will be coded and analysed to capture emergent themes. The overall aim of this part of the research is to gain students' perceptions of different aspects of immersion in the two 3D environments, and to relate these aspects to learning.

Conclusions

3D learning spaces can be characterised by varying degrees of realism and immersion. These two aspects are worthy of investigation to advance knowledge in the design of learning spaces in 3D virtual environments and to propose models of 3D learning spaces for a variety of pedagogical requirements. During this project, we aim to develop empirically-grounded exemplars and use cases from students' learning experiences and their perceptions of key variables such as immersion and realism. These examples will also demonstrate whether and how 3D VR applications might be preferable to 3D virtual worlds (and vice versa) for certain disciplines, contexts and pedagogical activities. We will highlight the technological hurdles to developing immersive spaces in Second Life and also identify the range of emerging technological developments capable of impacting the level of immersion and realism in 3D learning spaces.

At the time of writing, the empirical research strands of DELVE are being designed and initiated. The dual focus of the project on 3D virtual worlds and virtual reality technologies is particularly timely. In the wider virtual environments community, there are developments towards more fully integrating virtual worlds and virtual reality, to provide greater immersion and (where desirable) greater realism for users of 3D virtual environments. Therefore, this learner- and educator-centred project not only serves to consider questions of the here and now, but is well placed to play an important role in setting the agenda for design of learning spaces in 3-D virtual environments.

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The Second Life researcher toolkit – An exploration of in-world tools, methods and approaches for researching educational projects in Second Life

Elena Moschini

Keywords: Second Life, research tools, research methods, evaluation, researcher toolkit

Abstract:

Academics are beginning to explore the educational potential of Second Life by setting up in-world educational activities and projects. Given the relative novelty of the use of metaverse environments in higher education many of such projects are often still at pilot stage. However the initial pilot and experimentation stage will have to be followed by a rigorous evaluation process as for more traditional teaching projects. The article addresses issues about research tools and research methods that enable academics to assess and evaluate learning activities in Second Life. The paper introduces a “researcher toolkit” that includes: the various stages in the evaluation of Second Life educational projects; an outline of the in-world tools that can be utilised or customised for academic research purposes; a review of methods for collecting feedback from participants and of the main ethical issues involved in researching metaverse environments; a discussion on the technical skills required to operate a research project in Second Life. The paper also offers an indication of the in-world and “real world” opportunities for the dissemination of Second Life research findings.

1. Introduction. Researching education in virtual communities

Virtual environments are becoming the new frontier of online education. A number of educational institutions are experimenting innovative teaching and learning approaches using immersive online worlds such as Second Life (SL). The Teen Second Life Grid, the special area in Second Life dedicated to users aged 13-17, hosts a number of educational projects. In the “adult” Second Life Grid education activities range from technical training on how to build your avatar, organized by in-world educational groups, to the more formal teaching sessions associated to established schools and universities. Teachers and researchers are attracted to Second Life by its immense potential to support new forms of communication, to enable simulations and experiments, to allow users to construct new identities and new environments, to support distance learning (Livingstone & Kemp, 2006 ; Kemp & Haycock 2008; Ritzema & Harris, 2008;).

Over the past few years the higher education sector has begun to acknowledge the role of metaverse environments in supporting online collaboration and online teaching and there are now quite a few universities that have set up a presence in Second Life. John Kirriemuir has been documenting these developments in his “snapshots” reports for the Eduserv Foundation (Kirriemuir, 2007, 2008a, 2008b). These reports highlight an increased level of educational activities, many of which are still at initial or pilot stage. As these activities become more advanced and more embedded in the mainstream practice they will require more attentive evaluation. This paper outlines the main issues involved in researching learning in Second Life and aims to support those educators that are now exploring the evaluation and research stage of their teaching practice in Second Life by providing an overview of the main issues involved in researching learning in a metaverse environment.

2. Designing Second Life educational research projects

The process of designing research projects in Second Life follows the same cycle as that of any other academic research project: the researcher sets aims and objectives, identify the relevant theoretical background, selects appropriate methods, gathers and analyses data and disseminates results (Cohen, Manion & Morrison, 2007). However, operating in a virtual environment presents a number of new obstacles, as well as new opportunities. Some of the research tools available in Second Life (SL) mimic their Real Life (RL) equivalent while others are totally new and require a certain degree of familiarity with Second Life tools and technologies. Organising a venue for the research project can also be a new challenge, while disseminating findings to the in-world community presupposes knowledge on Second Life media channels and of community and group dynamics. The design of Second Life educational research projects should consider the following issues:

- Type of project: is this a blended learning project or an exclusively in-world or distance learning project? Is this a comparative project where similar educational activities are conducted in Real Life as well as in Second Life?
- Define the learning activity to investigate: practical skill-acquisition, collaboration/group work, communication/presentations, simulation, etc.
- Formulate research questions, identify the appropriate theoretical background.
- Venue: is the project going to take place in a plot owned/rented or managed by the researchers? Or is the project set in an open environment within Second Life?
- Participants: age, gender, background. Do the participants know each other or would participants be able to get to know each other in Real Life or is the project conducted exclusively in-world?
- Research methods: is the project being evaluated exclusively via Second Life tools or is the chosen methodology a blend of online and traditional tools?
- Ethical issues: how to ensure that the project does not infringe the Community Standards and the ethical guidelines for online research.
- Data Analysis: what tools will be used for data analysis? Are there new tools that can assist in analyzing data gathered in a 3D virtual environment?
- Dissemination: what are the best channels for the dissemination of the results, both in Second Life and to the wider academic community?

3. Second Life research tools

The choice of research methodologies and tools for the evaluation of Second Life educational projects is quite broad. Researchers can choose to conduct the project in Second Life but then evaluate the results in Real Life by using traditional research methods involving the research participants; another option is that to use web-based tools; avatars can be prompted with messages directing them to a web page hosting an evaluation kit, for example an online questionnaire, blogs, rating systems etc. There are, however, tools and techniques that allow for in-world data gathering and that are beginning to shape a new, in-world set of methods: “if one wants to study collective meaning and virtual worlds as collectivities exist purely online, then studying them in their own terms is the appropriate methodology... (Boellstorff, 2008, p. 61).

Second Life questionnaires

In-world questionnaire tools can be scripted or bought from vendors that specialize in marketing tools. Second Life vendors can be found via the in-world searching tools, however most of the professional vendors also advertise via the Marketplace in SL Exchange (<http://www.slexchange.com>). The questionnaire kiosks often operate by presenting the participants with notecards with the questions and a choice of options, open questions can be responded by using the chat tool. The responses are then automatically e-mailed to the researcher for data analysis. These kiosks can also offer a gift box or Linden Dollar monetary rewards for the completion of the questionnaires. A relatively low-technology option is also that of distributing notecards with questions and ask the participants to respond to the questions by editing the cards and then return them to the researcher.

Recording interviews and focus groups

Interviews and focus groups can be also be organized directly in Second Life and then recorded, with the respondents' informed consent, for later data analysis. Recording conversations can be enabled by checking the "log chat" box found in the "Communication" section in the Preferences panel; the file can be saved on the researcher's hard disk, it will appear as a written log of the typed conversations. For the best results in video and audio recording it is best to use third party software. *FRAPS* is one of the most popular Windows-based video capture utility for Second Life and games (it can be downloaded from <http://www.fraps.com/>). While Mac users might consider built-in Mac screen-capture facilities or tools such as *Capture Me* (<http://www.chimoosoft.com/products/captureme/>). Captured footage can then be viewed with common media players or edited and decoded with video editing packages such as *Adobe Premiere*, *Windows Movie Maker* or *Apple iMovie*. Screen-capture software usually records scenes from the avatar's perspective, however sometimes it is important to be able to record from different view-points to get a fuller picture of the action. This is particularly relevant in the case of focus groups, action research and ethnographic studies. Acquiring a Second Life camera kit allows the researcher to produce more accurate video documentation, for example Alt-Zoom Studios provide a freely available scripted camera object (<http://alt-zoom.com/>).

Visitor tracking and monitoring, source tracking systems

Quantitative data on avatars' origin, behaviour and frequency of visits can be obtained via tracking systems available from in-world vendors. These tracking devices can produce list of visitors, discover where visitors are coming from, install spying devices that can follow the avatars and report their conversations wherever their are, trigger surveillance cameras that record visitors' movements even when the researcher is not present on site. It is, however, important to emphasise that using such spying devices might infringe Linden Lab Community Standards and research ethics guidelines.

4. Practical aspects of researching education in Second Life

Setting the scene, land and venue issues

The Second Life location where the educational activities take place has a great impact on the experiences produced. Identifying and acquiring access to the right type of venue is a key element in setting up and educational research project. Some educational activities

are carried out in public areas and do not require dedicated spaces. For example students learning about cultural issues can visit one of the many existing museums and galleries or join groups dedicated to the discussion of specific themes. Students researching health issues can visit simulation islands where they can explore and experience the symptoms, treatment and type of care packages available for certain types of diseases. However many teachers and researchers prefer to identify or to set up ad-hoc spaces for their student groups; this allows them to control and shape the learning environments to suit their needs. When looking for an appropriate venue there are several options: buy or rent land privately; buy or rent with institutional support; rent from educational islands; join a community and use their land facilities (<http://secondlife.com/land>). The choice is likely to be dictated by the available budget, long or short term commitments to the project and levels of institutional support. Buying Second Life land privately involves upgrading to a fee-paying Premium account, paying monthly “land maintenance fees”, identifying and buying either a plot or an island; discounts are available for non-profit institutions that purchase educational islands. In any case buying land can be quite pricey, especially if not supported by grants or by institutions. Alternatively plots and venues can be rented from established educational islands such as Education UK Island (<http://www.sleducationuk.net>) or the International Society for Technology in Education – ISTE (<http://www.iste.org/secondlife>). At the time of writing Second Life novices could also join the New Educators Pilot Programme.

Expertise required? The Second Life researcher learning curve

Educators who start researching learning in Second Life must acquire a number of new skills and especially: how to build an avatar, how use in-world communication tools; how to acquire objects; how to use, modify and build tools; how to manage SL currency tools and the SL etiquette. The novice SL user can find useful tutorials via the online Second Life Knowledge base and support tools (<http://secondlife.com/support/>) and the Second Life Wiki (<http://wiki.secondlife.com/wiki>). As previously outlined, many tools and objects can be bought by vendors, however the ability to build and customise tools can greatly enhance the researcher's experience. Knowledge on Second Life scripting language, LindenScript Language or SLS, is a distinctive advantage. There are very useful online tutorials published on the Second Life Wiki and SLS classes are offered by the many in-world training centres such as the Academy of Second Learning.

Supporting and enhancing participation. Second Life cultures and in-world rules

Researching Second Life educational opportunities requires the participation and co-operation of learners and, depending on the type of projects, of other Second Life users and communities. Learners that are new to virtual environments will have to open an account, create their own avatars, acquire new skills, knowledge on in-world rules and etiquette. Virtual worlds are populated by avatars, often organized in groups and communities, each land owner and each virtual group can set rules and regulations for the activities that occur in their virtual plots (Boellstorff, 2008; Meadows, 2008). Some projects involve taking students out into the wider Second Life environment, knowing how to behave when visiting other communities is essential for the success of such expeditions. Community rules are often clearly advertised at the point of entry, it is important for students and educators to respect the environment that they are visiting. However, very often education project are conducted in a specific location, identified as the home for the project, and within a delimited group of participants. In such

scenarios it is appropriate to establish a group that is limited to the designated members and can be managed by the project leaders. This would allow users to establish a sense of community, maintain privacy and manage access to tools and sessions; users would be far more reassured that their participation and activities are protected by the rules of that community. Another serious issue when researching Second Life is the presence of griefers, these are avatars that enjoy disturbing, or even attacking, other avatars and that can infiltrate groups and activities and seriously disrupt the project (Bugeja, 2007). Knowledge of group and land management tools and of the mechanism for reporting abuse (<http://secondlife.com/policy/security/harassment.php>) is essential to avoid griefing problems.

5. Ethical issues

The main issues concerning ethical standards in virtual communities focus on consent, online identities, the nature of communication (private or public), privacy and confidentiality and the community own rules and standards (Eysenbach & Till, 2001). Ethical concerns vary according to the nature of each research project (Ess, 2002) but a major ethical dilemma relates to the standards to be used when working with “human subjects”. As the virtual inhabitants of Second Life can appear to be animals, fantasy creatures, plants or even objects, the traditional safeguards might seem obsolete. However beyond each avatar there is a human user and the usual research ethics considerations still apply.

Terms of Service and Second Life ethical guidelines

There are diverse types of guidelines that can be usefully applied to research activities in Second Life. Terms of Service agreements (also known as TOS) are the fundamental source of information about what type of behaviour is acceptable in a given community. The Second Life set of documents that address policy and regulation issues includes: Privacy, Community Standards, Terms of Service, copyright issues, Second Life brand management, online safety and Value Added Tax issues. Researchers operating within Second Life should familiarize themselves with the above documentation and especially with the Community Standards document that explicitly addresses the thorny issue of the recording of conversations: “... Remotely monitoring conversations, posting conversation logs, or sharing conversation logs without consent are all prohibited in Second Life and on the Second Life Forums.” (Linden Lab, Community Standards). Therefore before selecting the record option in the chat communication preferences the researcher should obtain informed consent from the participants.

Obtaining consent

Obtaining consent can be a difficult matter when operating in a public place with unknown or anonymous avatars; and it is particularly difficult to monitor participation when avatars can frequently change their appearances and hide their names. Requiring an avatar to disclose personal information in order to send/receive consent forms can infringe that avatar/user privacy. A simple option can be the setting up of dedicated spaces and communities where the research project can be conducted in a controlled environment, with known and consenting participants. In this case consent can be gained via traditional methods and the identity of the avatars/participants can be verified. When the research project is set in more open environments it might be possible to notify the community in question about the ongoing data gathering and obtain consent from avatars via cards note-giver tools or by recording chat-

room/voice discussions. However accepting consent from unknown avatars via in-world tools might not entirely satisfy institutional guidelines on ethics. Some of the most innovative Second Life tools, such as chat boxes, visitor source trackers, surveillance tools, visitor monitoring and recording, could provide a wealth of interesting data but create very serious ethical problems in terms of privacy and consent. Consent issues in online research has been widely discussed in the literature, especially in relation to online courses, while new forms of online communication such as Second Life seem to bring new challenges that do not find an immediate solution: “Ethical issues related to e-learning research occur when obtaining electronic consent and ensuring its authenticity. Although these issues are not entirely unique to e-learning research, they do tend to become more complex and hence more problematic when research is conducted over the Net.” (Kanuka & Anderson, 2007, p.8).

Identity and privacy

Other important aspects of research ethics concern the identity of the researcher and of the participants and the privacy of the avatars that might be unwillingly involved in the research project. Virtual worlds allow for greater levels of anonymity, users can assume all sorts of different appearances, open more than one account and create so-called alternative avatars and choose not to disclose their Real Life identity. There might be situations where in-world interviews are conducted with different avatars that in fact are attributable to the same person or there might be more than one user behind the one avatar. It is therefore important to make decisions whether there is a need to require participants to disclose their Real Life identity and whether alternative avatars would affect validity and reliability. Researchers could adopt similar mimetic strategies and therefore mislead the research participants, the best way to avoid this is to clearly indicate the status of researcher in one’s avatar details. Educators and researcher often disclose enough information in their avatars’ Real Life details to allow verification of their status.

6. Disseminating results

Second Life is not just a virtual environment, it is primarily a community where members are encouraged, and sometimes expected, to collaborate and share their experiences. Disseminating research results, or at least the summary of the results, via the many Second Life communication and media tools is a way to contribute to the growth and development of the community. This can be achieved by setting up dedicated spaces for the project where visitors can obtain information via notecards, presentations, chat boxes, references to web sites and other self-running tools. It is also quite common to organize in-world research seminars and even conferences. Research seminars are regularly advertised via the Second Life search facilities and group notification systems. Joining one of the many groups dedicated to education is the best way to share information about educational projects. The Second Life Research Listserv e-mail list (<http://list.academ-x.com/listinfo.cgi/slrl-academ-x.com>) is also a valuable source of information on research projects, groups and potential venues for dissemination.

Besides the well-established academic journals dedicated to e-learning research there are a now few new periodicals focusing on virtual environments such as the Journal of Virtual Worlds Research, a peer-reviewed online academic journal <http://jvwresearch.org/>.

In-world conferences, education groups, media and press

There have been a few in-world conferences exclusively dedicated to learning and education research. In May 2007, 1300 educators from all over the world gathered at the Second Life Best Practices in Education: Teaching, Learning, and Research 2007 International Conference (<http://slbestpractices2007.wikispaces.com>), this conference was conducted exclusively in-world. In September 2008 the SLEDcc the Second Life Education Community Conference (<http://sledcc.wikispaces.com/>) took place in Tampa, Florida (US) with in-world sessions.

Research seminars and opportunities to present research findings are also offered by the many SL educational islands and associated groups. The European University Island (<http://simteach.net/eui/>) is a non-commercial project managed by a German non-profit organization based in Munich. Education UK Island “is a not for profit educational island constructed in Second Life to provide a ‘safe’ location for U.K. virtual education” (<http://www.slededucationuk.net>), the International Society for Technology in Education – ISTE “sponsors an in world group, hosts weekly networking socials and topical events, and sponsors a weekly speaker series” (<http://www.iste.org/secondlife>). Researchers working in Second Life often publish results in blogs, an excellent example is the Second Life Research Blog <http://secondliferesearch.blogspot.com/>. Second Life has its own in-world media, with periodicals, radios and machinima-based media. Although not academic in nature, these media channels are excellent vehicles for the advertising of events and projects. Examples of in-world media are: the Second Life Herald <http://www.secondlifeherald.com/> and the New World Notes <http://nwn.blogs.com/>, Life For You TV channel (<http://www.lifeforyou.tv>), SLCN Virtual TV (<http://www.slcen.tv>).

7. Conclusion

Educators worldwide are exploring new ways to use communication technology to enhance teaching and learning. Virtual worlds such as Second Life offer exciting opportunities for educational projects and a new area of inquiry for education researchers. The above overview of tools, research issues and opportunities for sharing of experiences is intended to support those interested in starting researching education in Second Life. However, this is just the beginning of a new era in networked communications and networked education; there is a need to further investigate, refine and design new tools, new approaches and new methodologies for metaverse learning and research.

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First Reflections, Second Life, Third Place: Community Building in Virtual Worlds

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Keywords: Second Life, Third Place, community, community building, social constructivism

Abstract:

The Open University supports a thriving informal learning community within its presence on the Second Life virtual world platform. This paper outlines the development of that community over a two year period and demonstrates how it currently maps to the place-driven community concept of Third Place, as defined by the urban sociologist Ray Oldenburg (1991). In the field of community building, Third Place is used to describe a social environment that is distinct from the first and second place norms of home and workplace, for example a regularly frequented coffee shop. Oldenburg argues that a Third Place, "...hosts the regular, voluntary, informal, and happily anticipated gatherings of individuals beyond the realms of home and work" and is necessary for civil society, democracy, civic engagement and establishing an authentic sense of place within a community. From a perspective of ethnography, this paper captures a community development within Second Life and proposes that real world concepts of community and Third Place are exhibited in a virtual world, and that there are equivalent benefits in the sense of support and belonging to a virtual world community.

Introduction

In June 2006 The Open University (OU) purchased its first land in the virtual world Second Life®, a platform that is free from any of the defining narratives often associated with multi user virtual game environments. Second Life is a 3D online world with a rapidly growing population drawn from more than 100 countries around the globe, in which the Residents themselves create and build an environment that includes homes, vehicles, nightclubs, stores, landscapes, clothing, and games.

Over a two year period in Second Life, the OU presence has evolved and grown to a point where an average of 250 unique users in any 7 day period are active in an OU area. In order to continue evolving it is necessary to understand the nature of the core activities of these users, and to consider this in a context of sustainable development and scalability. This paper charts the history of the development of the Open University Second Life community and considers the nature of that activity today, in September 2008. Through reference to aspects of socialisation and physical community, the author proposes that a virtual world environment can be described using the real world concept of a Third Place in the information age, and considers the value of this position to a learning community.

Background and context

In 2006 Cetlment Island was a pilot project in Second Life housed within the Centre for Open Learning in Math's, Science, Computing and Technology, a CETL at Open. A second OU island, SchomeBase, provided a main grid presence for the Schome project, which exists to explore and challenge traditional instructional models and pedagogic practices (see www.schome.ac.uk). In the early stages of their existence both islands were experimental spaces,

working on a small scale, where any user could generate objects and contribute to the island development. Students were welcome to visit, and formal tutorials were run and evaluated on Cetlment (see Bennett & Peachey, 2007), but in order to contain the project there was no formal promotion of these sessions, resulting in little regular activity or casual social interaction on either island aside from during organised events. An Open University UK group was inaugurated inworld as a social focus for staff, but without a critical mass of users activity dwindled to nothing over the course of a few months.

By 2007, evidence of participation and retention rates from the pilot studies on Cetlment was encouraging, and the university was keen to build on this work by expanding access to more students. For the previous few months the Schome project had been focusing much of its attention in the Schome wiki, forums, and on their island in the teen grid. The decision was made to buy a new CETL island and site it next to the SchomeBase, with a development plan to landscape the two islands together as complementary spaces. Open Life was delivered in February 2008, replacing Cetlment as the Open University main grid presence.

With little indication of the scale of future take up for the islands, it was decided to create spaces that were simply as appealing and flexible as possible within the context of the environment. The COLMSCT and Schome projects would continue, and more staff and students would be invited to visit the islands and by their presence, input and feedback to guide further development of both form and function for the University's presence inworld.

An incidental observation from the Cetlment research period was the number of first time visitors who immediately wanted to create a virtual residence. Unless you wish to exhibit for example art, information or items for sale, there is no need to own property in Second Life, as all your belongings can be held in inventory until needed. However, in recognition of this behaviour and in order to explore it further, it was decided to provide a small number of residences on the new island. These buildings would be available for free rent to any member of staff or students for a period of 6 weeks, after which time they would be required to vacate if there was a waiting list. The assumption was made that after this time a resident would either wish to settle down in a higher quality, paid-for apartment elsewhere inworld, would be happy to exist without walls or would have left Second Life altogether. The resulting twenty-four Sholokhov Halls apartments, named for the avatar of a colleague who owned the original Cetlment project, were located on Open Life and built to face into a central quad, with communal seating and a virtual coffee machine. The area was landscaped and a poster was placed in the quad to explain the purpose of the Halls and to provide a note card with information for prospective residents.

The new development of Open Life and SchomeBase opened to a 2 day course event in May, publicised in the relevant course forum. Around 50 staff and students visited over that period, with five taking up residence at the Halls. In the following week an announcement was posted to both staff and student web portals. Over the subsequent seven days on the islands there were over four hundred unique visitors, the Halls were filled and a waiting list was established.

The residents of the Halls, a mix of 17 students to 7 staff, all received a note card with some context, instructions and simple rules for behaviour.

Residents quickly began to decorate their apartments, and the co-location encouraged communication between those who found themselves inworld at the same time. At the end of the first full week at full occupancy there was an impromptu party, with a small dancefloor and a streamed music station. The Open University SL group was resurrected, both staff and students were encouraged to join and membership increased rapidly.

After just three weeks it was clear that activity at the Halls was about far more than the individual process of furnishing a space and, at any given time, a visitor to the island would be more likely than not to find at least 2 or 3 Halls residents chatting in the communal area, significantly more during evenings and weekends. The social aspect of this interaction, along with the shared background of the University, was attractive and engaging to new visitors, and the waiting list for new apartments had to be suspended due to the lack of administrative resources to deal with the subscriptions.

There was one downside to the level of social activity on the island. More tutors were beginning to use the public spaces for tutorial and teaching sessions with their students, and sometimes found themselves with an uninvited and inquisitive audience, drawn from the community socialising at the Halls. The tutors involved were kind enough to extend their sessions and include the visitors, but this was clearly not a scalable solution for the long term. After discussion with Peter Twining, the Schome Project Director, a solution was found.

In 2007 the Schome research had been concentrated on working with a group of learners age 13-17 in the teen grid of Second Life. The Schome project aims to propose a new, cradle to grave model of education for the information age. The project makes flexible use of a wiki, asynchronous discussion fora and other communicative media to support learning processes. There are no lessons that we would recognise according to the traditional definitions of teacher, classroom, curriculum etc, but Schome works as a learning community. For example, "Within the Schomcommunity generally, young people have been empowered by their familiarity and ease with technology, and by the lack of an imposed hierarchical structure in the online environment, to negotiate and establish their own method of governance where anyone can propose and execute a teaching session. Young people are often autonomous in proposing and discussing sessions in the forum, posting a time and inworld location for a session to the events schedule and linking this to an information and sign up page they create on the wiki. It is equally probable that staff will sign up to attend and do so with no other agenda than to learn from what is on offer." (Peachey, Gillen & Ferguson, 2008)

The informal learning and group activities taking place on Open Life were significantly social constructivist, which mapped well to Schome ideals. In social constructivism, the focus is on interaction with people and co-construction of knowledge (Felix, 2005). Social constructivist conceptions of learning assume that knowledge construction is achieved by the interaction that takes place within oneself through reflective thinking, and by the interaction that occurs in communications and collaboration with other people (Vygotsky, 1978). Students and staff were demonstrating communication and collaboration in their activities online, and developing this activity through their individual reflections. This model complemented the Schome activity to date on the teen grid, and an obvious and viable solution to the compromised use of Open Life space was to relocate the Halls on SchomeBase.

At the end of June, residents were emailed and informed of the planned move, which then took place in early July. The new SchomeBase site was much bigger, allowing for more Halls (48 in total) and for a bigger seating area, dancefloor and meeting point for the Open University group. Residents were introduced to the Schome principles, and to use of the wiki and forums for managing collaborative work.

Within two weeks of the move, members of the community were posting events to the SchomeBase events page on the Schome wiki. Planned activities took place in the most context appropriate space on either of the two islands, and between them SchomeBase and Open Life hosted meetings for a literature group, a science group, a debating group, a collaborative build and one-off activities such as tutorials for building skills. One student came forward as a Second Life DJ and offered his services to provide live music for parties, for example the 'Eighties night' shown in Fig 1. Crucially, at this point it was made clear to everyone that the Sholokhov Halls group inworld was for admin purposes (to set land permissions for home decorating in apartments) and that the community was open to everyone as either a Schome or Open University member. Five residents forfeited apartments in the move, as they had not been active inworld for over four weeks, and three of the original residents moved out to apartments elsewhere in Second Life, as had been predicted. All three of these continued to be regular visitors to the space and very active members of the community.



Figure 1 Eighties Night at the Sholokhov Halls

Socialisation

With an increasing number of regular users in our Second Life space, the socialisation process necessary to engage with the surroundings, and with other users, emerges as relevant to any discussion of development and community.

Socialisation defines the process by which individuals develop the habits, ideas, values and attitudes through which they learn to inhabit their culture or community: '[...] it prepares the individual for the roles he is to play, providing him with the necessary repertoire of habits, beliefs, and values, the appropriate patterns of emotional response and the modes of perception, the requisite skills and knowledge [...]' Chinoy (1960)

Early social theorists recognised that socialisation continues in adulthood as a form of contextualised learning relevant only to specific situations. Brezinka (1994) says that 'Socialisation is often described using the concepts of 'learning', 'social learning', 'societally relevant learning', 'taking on', 'receiving', 'acquiring', 'assimilating', 'absorbing' or 'internalising''. Contemporary sociologists and cultural theorists have identified mass communication as a device for socialisation, and echoed the continuity of adult socialisation moulded by the changing culture in which we exist.

Marshall McLuhan, quoted in Wheeler, 1998, claimed that, 'The medium, or process, of our time - electric technology is reshaping and restructuring patterns of social interdependence and every aspect of our personal life. It is forcing us to reconsider and re-evaluate practically every thought, every action...'. This permeation of technology into our lives pushes us into new spaces, of which Second Life is only one, where we must socialise and adjust each time.

Users of the OU space in Second Life often demonstrate and/or report their awareness of this socialisation process as evidenced by the most significant project from the group, who took the initiative to establish the 'nOUBie Centre', a building to house information about both Schome and the OU inworld community, and to provide support for newcomers to Second Life and the community. With administrative support, the group established a building, created a logo, volunteered for Buddy Boards (to provide instant inworld support) and scheduled weekly meetings to continue developing the space. Longer term members of the group will provide a history of the Halls development to anyone showing an interest, and those visitors who behave outside the norms of the local environment, for example by not wearing enough clothes or, with more subtlety, by not allowing someone else the space to express their opinion, are quickly made aware of their indiscretion. Another value that can be a surprise to newcomers in the OU space is the egalitarian nature of the community, where tutors and students have equal voice.

Community Building

In this paper the collaborative social activity centred around the creation of Sholokhov Halls has already been referenced as a community – it is hard to find another word that better describes the group activity. There are numerous contemporary definitions of community that reference group characteristics rather than a location, for example the Open University can be described as a learning community despite the significant geographical distribution of the individuals within it. Similarly, reflections on the teen grid phase of Schome identified the features of a learning community and specifically a community of practice: 'We feel that the concept of 'communities of practice' fits activity within the Schome Park project better than alternative frameworks. Lave and Wenger (1991) describe the links between learning, modifications of identity and practice in their characterisation that we have found relevant to understanding the shifting activities, developing expertise and modifications of identity.' (Peachey, Gillen & Ferguson, 2008) In another paper there will also be convincing arguments for the main grid Schome and OU community as a community of practice as described by Wenger (1988) and Lave and Wenger (1991). However in order to propose a concept of the Sholokhov Halls as a Third Place, it is necessary to consider the authenticity of the community as if co-located in physical space.

Community Building refers to a process described by Peck (1988), who argues that a true community requires a number of characteristics and, when these are achieved, "It is like falling in love. When they enter community, people in a very real sense do fall in love with one another

en masse". Peck, considering physical communities, describes what he considers to be the most salient characteristics of a true community:

- Inclusivity, commitment and consensus: Members accept and embrace each other, celebrating their individuality and transcending their differences. They commit themselves to the effort and the people involved. They make decisions and reconcile their differences through consensus.
- Realism: Members bring together multiple perspectives to better understand the whole context of the situation. Decisions are more well-rounded and humble, rather than one-sided and arrogant.
- Contemplation: Members examine themselves. They are individually and collectively self-aware of the world outside themselves, the world inside themselves, and the relationship between the two.
- A safe place: Members allow others to share their vulnerability, heal themselves, and express who they truly are.
- A laboratory for personal disarmament: Members experientially discover the rules for peacemaking and embrace its virtues. They feel and express compassion and respect for each other as fellow human beings.
- A group that can fight gracefully: Members resolve conflicts with wisdom and grace. They listen and understand, respect each others' gifts, accept each others' limitations, celebrate their differences, bind each others' wounds, and commit to a struggle together rather than against each other.
- A group of all leaders: Members harness the "flow of leadership" to make decisions and set a course of action. It is the spirit of community itself that leads and not any single individual.
- A spirit: The true spirit of community is the spirit of peace, love, wisdom and power. Members may view the source of this spirit as an outgrowth of the collective self or as the manifestation of a Higher Will.

Over the period since the Halls were first opened there is evidence beyond the scope of this paper, including chatlogs, wiki and forum records and informal interviews, that the Second Life community has met each of these criteria. Understanding of our virtual community has developed from a longitudinal perspective of participant observation, supplemented by interview and case studies. This embedded position, also referencing grounded theory (Glaser & Strauss 1967) in a continuing theoretical discussion, has required the author to be at once administrative manager, researcher and Halls resident/active member of the community. Regular members of the community have accepted and absorbed this multiple perspective and quickly settled on an informal title that recognises the unique position held by the author's avatar, Elsa Dickins. Their unprompted decision to call Elsa 'Mummy' references trust, community/family membership and submission/authority, providing a rich seam for future discourse analysis.

In an environment where identity, mediated through an image that can be changed at the click of a mouse, is often seen as a fluid concept, there is currency in demonstrating a consistent identity and in the sharing of confidences to purchase trust within a community. Experience and evidence suggests that the majority of users have a strong perception of the potential

for misunderstanding in discussion that is mediated through text, and go out of their way to support, acknowledge and defer to one another in conversation. When differences have arisen, members of the community have expressed real distress, and have worked together to resolve and move forward. Differences in personality and backgrounds have generally been celebrated, and again the community has worked together to involve the individual members with more challenging characteristics. Leadership has been fluid, changing according to the skills and experience needed within a context, and multiple perspectives are provided by the multimodal communication networks (including the Schome wiki and fora, a First Class forum, email, Google docs and Facebook) in which the group operates. Members challenge each other to explore new interests and provide support in doing so, for example Student A, a regular member of the community, comments that, “As a community, we organise outings to exhibits in Second Life. Not all of them are relevant to my studies but I have a circle of friends in Second Life that broaden my horizons and so my interests are wider as a result”

The Third Place

Oldenburg describes a taxonomy of place wherein a first place is an individual's home and family, a second place is the workplace (where someone may spend more time than their home), and a third place is an informal public/neutral gathering place such as a beer garden, post office, coffee shop, library etc, lending ‘a public balance to the increased privatisation of home life’. He argues that these third places, or ‘great good places’ are ‘anchors’ of community life, essential to community social vitality and to fostering broader and more creative interaction, and are notable generally for the following characteristics:

- cheap or free food and drink
- being highly accessible/proximate for many
- being welcoming and comfortable
- involving regulars/habitual participants
- providing both old and new friends

In contrast to the first and second places, third places encourage and enable the putting aside of mundane concerns so that individuals can live in the moment, enjoying the company, activity and conversation around them. Third places level the status of users, creating habits of public association and providing comfort and familiarity to individuals and communities.

“The character of a third place is determined most of all by its regular clientele and is marked by a playful mood, which contrasts with people's more serious involvement in other spheres. Though a radically different kind of setting for a home, the third place is remarkably similar to a good home in the psychological comfort and support that it extends...They are the heart of a community's social vitality, the grassroots of democracy, but sadly, they constitute a diminishing aspect of the [American] social landscape.” (Oldenburg)

Project for Public Spaces, in New York, developed the Third Place diagram below in consultation with Oldenburg (Fig 2.).



Figure 2 What Makes A Great Place?

The key attributes, in the central segments, provide guidance for the detail of the measurables and intangibles in the outer segments. Glogowski (2007) proposed that an online blogging community he builds with his students each year resembles a Third Place. He took the diagram above and re-versioned the measurables to indicate what the key attributes provide within this new context, as shown in Fig. 3 below:



Figure 3 Blogging Community as Third Place

Glogowski's model is just as applicable to the environment that hosts the Open University community in Second Life. Members have total freedom to interact and network inworld, and although many of these associations have spilled out into other social networking tools and media, SchomeBase and Open Life remain the primary focus for interaction. Social activity is indeed diverse, cooperative, neighbourly, friendly, interactive and welcoming, and is executed with stewardship and pride. Within the environment members have the opportunity to use their creative and expressive voice and do so in activities that are fun, active, vital, special, real, useful, indigenous, celebratory and, to date, sustainable. With no more restrictions than in the real world, members of the community have the freedom to customise, design and build. Those members who rent an apartment in Halls can decorate as they wish, and there is often rigorous discussion about what other changes might or might not need to be made to the rest of the island. The nOUBie centre is often used as a village hall, for meetings and events, and a collaborative building group have taken ownership of one half of the top floor. As a community, should the group wish to add or take away some element of the island environment they are empowered to do so, or to have the action taken on their behalf. However it is interesting to note that the environment can be shown to meet many of the intangibles already listed in the associated quadrant – safe, green, clean, walkable, sittable, spiritual, charming, and attractive (see Fig. 4) - and members are generally satisfied with the 'comfort and image' of their surroundings. In time, it is anticipated that historic will also be incorporated. Finally, the access and linkages quadrant requires that the Third Place has continuity and proximity and is connected, readable, walkable, convenient and accessible, all of which are reflected within the context of the inworld environment. Members of the community promote activity using the Schome wiki (also streaming it inworld) and group notices, as well as notices placed around the island. However this is probably the weakest aspect of the location as a Third Place, and plans for the next phase of the project will address the need for continuity of promotional media.



Figure 4 Images from SchomeBase and Open Life

It is evident that all the characteristics of a Third Place are met in the SchomeBase/Open Life environment. Second Life may not offer a cup of coffee (although the seating area at the Halls will animate an avatar with a virtual one), but users are generally sitting at a computer in their own home, with the refreshments of their choice at hand. With the appropriate hardware and sufficient broadband connection, Second Life has the key aspect of being accessible and proximate to anyone, regardless of physical location. Verbal feedback and evidence of continued use by repeat visitors indicates that SchomeBase and Open Life islands are welcoming and comfortable environments, and there is a consistent mix of regulars and newcomers to both islands, so a regular visitor is likely to meet old friends and make new connections during their visits.

Martin, 2006, noted that 'People are moving away from traditional educational institutions for their day-to-day needs of updating, networking and learning', and Student A would agree; "After studying for 3 years with only tutorials as my main contact with students, interacting with others in Second Life makes me feel less isolated. It's amazing how included you feel. You think it will be just looking at a screen but Second Life makes you more conscious than ever that behind those avatars, there are real people. With the caring responsibilities I have, I would never have been able to take part in the activities offered by the OU if they hadn't been in Second Life - everyone joins in and really helps me learn"

Conclusions and Next Steps

OU students working at a distance have always been vulnerable to a sense of social isolation and exclusion from the collective student identity. The established OU community in Second Life, active enough to support its own learning by organising a variety of special interest and discussion groups as well as social events, demonstrates a significant achievement in using the affordances of a virtual world to overcome some of the core challenges to our student's learning experiences. In addition it has allowed students to enter into learning without social baggage and other disadvantages they may carry in the physical world.

The Third Place community on SchomeBase/Open Life is currently defined by its location at the Sholokhov Halls, although the community activity on the island is unrestricted by membership of these virtual buildings. Tuan (1980) addressed the difference between an identified location and the undefined space that surrounds it, citing a strong 'Sense of Place' for those spaces that hold significant meaning, names or definitions. Without the Halls, would the members and users of the island have a strong enough 'Sense of Place' for the Third Place to remain?

Felix (2005) states that 3rd Millennial education institutions uphold six distinct learning expectations:

- Flexibility
- Inclusiveness
- Collaboration
- Authenticity
- Relevance, and
- Extended institutional boundaries

A learning community in a virtual world has the capacity to meet all these expectations and, as take up for virtual world activity increases and the University considers a long term strategy for going forward in this area, Open Life and SchomeBase are rightly under pressure to provide a model that is inclusive and scalable. It is not possible to know whether the current community would have come together without the catalyst of the Sholokhov Halls, but it is evidenced that the Halls and surrounding island locations have enabled a Third Place environment.

The community that is currently active on SchomeBase consists entirely of Open University students, which although not forcibly restricted can be seen to have some conflict with the accessibility of the Schome programme. A recent suggestion that the Halls be demolished to make way for an extended sandbox (open building area), enabling more freedom on the island, was met with significant resistance from the community. Instead, in order to continue providing the 'psychological comfort and support' (Oldenburg) that a Third Place extends, it is proposed that the community be asked instead to relocate to a dedicated new island. The new island will have a greater capacity for Halls, with dedicated administrative support, and will extend the metaphor of a real world village community, with for example village hall, library, village store, pub etc, creating an interesting provision for third space within a third space. The next 12 months present an exciting challenge in developing the new space with reference to the Oldenburg and Glogowski models, supporting the move and continuing to sustain and grow the community, as well as moving from an exploratory phase of research into a position of extending and defining appropriate research models for this new frontier.

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Towards the adoption of Massively Multiplayer Educational Gaming

Leonie Ramondt

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Abstract:

In 2007, the New Horizons report stated that the time to adoption for Massively Multiplayer Educational Gaming was Four to Five Years. It is difficult to see however, how educators can integrate these environments into their curriculum. Unless of course, key elements that might assist their adoption can be identified. This paper seeks to a) outline theory regarding what make these environments so engaging, b) identify and review existing relevant educational approaches and practices and c) explore how educators and learners might be scaffolded in the adoption and appropriation of these environments. The literature includes Csikzentmihaly's (1975) Flow theory, Heathcote's Mantle of the expert (Wagner,J, 1976), Rieber's (1996) Endogenous Game design, Seely Brown's (2007) Learning by being, Gee's (2005) Learning by designing, as well as a glimpse at quest design.

Introduction

The 2007 New Horizon report foresaw the widespread adoption of Virtual Worlds in education as being two to three years away, while anticipating that the widespread adoption of Massively Multiplayer Educational Gaming would take four to five years. The report recognises that these environments are very costly to produce and predicts that the availability of open source game engines, in particular those that lower the complexity of development, can bring down the cost significantly.

This paper explores the affordances of two virtual environments, Second Life (SL) and World of Warcraft (WoW) as key exemplars of each type of Virtual environment and suggests that Massively Multiplayer Educational Gaming might benefit from a marriage of the best elements of both, to generate an environment for semi-structured collaborative learning.

As Thomas and Seely Brown (2007) point out, although SL is also a highly social environment, it rarely generates the motivation for sustained collaborative work. In WoW this occurs for most if not all participants.

While games like World of Warcraft do present real challenges that need to be solved, much like puzzles, the real challenge that these games present is the problem of collective action and knowledge in action. They involve the experience of acting together to overcome obstacles, managing skills, talents and relationships and they create contexts in which social awareness, reflection and joint coordinated action become an essential part of the game experience. (Thomas & Seely Brown, 2007 p.4)

Flow

It is the careful scaffolding of skills development in the context of the increasing challenge of quests and environment that provide WoW's framework. This plays a key role in keeping learners engaged. Players always have purposeful tasks to pursue alone, while waiting for opportunities to group with others.

Csikszentmihalyi (1992) describes the characteristics of flow as a challenging activity that requires skill, absorption in the task, clear goals and feedback on achieving them, concentration, confidence in one's ability, the loss of self-consciousness and the transformation of time (a sense that it is moving very fast or very slowly).

The experience of flow requires that a person already have a degree of skill in an area and that the challenge of a task remains slightly above their skill level. If the challenge becomes too great, they become anxious and if it is too low, they become bored. The experience of flow motivates a person to sustain a match between their skill level and the slowly increasing challenge.

Although, as with SL, a beginner in WoW is faced with a very complex interface and environment, much of the learning of how to manage the game conventions and interface is embedded in the game play. From level one, quests provide the new participant with clear goals and feedback and simple interface conventions to indicate the degree of challenge to be expected. Quests are coloured green for easy, yellow for normal, orange for more difficult, red for hard – (find help) to ensure that participants can choose the right level of challenge to develop skill at their chosen pace.

Csikszentmihalyi (1992) identified goals as central motivators leading to flow, stating that pursuing goals a person has expressly chosen leads them to “experience a sense of control which is absent when behaviour is not motivated by consciously chosen goals” (p. 242). Once a goal is chosen, the sub goals or tasks that are required, become apparent, leading to the skill, challenge, feedback, and flow cycle.

Quests provide clear goals and give a sense of being freely chosen, even although they are designed to lead the player through a set of key experiences. The sub- goals will frequently require the development of related skills, be it the defined talents of the character type or related “profession” or “class” skills. In the event of a difficult to find quest character or location, there are also a wide range of online resources that participants openly refer to, researching the location or requirements for a specific quest and thereby preventing the boredom of being unable to solve the puzzle or the anxiety of having to spend too long solving it.

Csikszentmihalyi (1992, p.97) states that the strategies for generating flow are:

- to set an overall goal, and as many sub-goals as are realistically feasible;
- to find ways of measuring progress in terms of the goals chosen;
- to keep concentrating on what one is doing, and to keep making finer and finer distinctions in the challenges involved in the activity;
- to develop the skills necessary to interact with the opportunities available; and
- to keep raising the stakes if the activity becomes boring.

Arguably these are inherent in most learning. The success of WoW comes from having refined the mechanisms for embedding these elements explicitly in its design. In contrast Carr's (2007)

description of her experience of developing skills in SL showed that she struggled to initially find clear goals in SL and experienced this as a “pain barrier”, that eased once she became familiar enough with the environment to begin to be able to discern the available opportunities.

Csikszentmihalyi and Csikszentmihalyi (1988) also found the following flow experiences grouped together;

- Friendship and relaxation;
- Risk and Chance;
- Problem Solving;
- Competition; and
- Designing or discovering something new.

This list will resonate with WoW players who participate in large group raids, as they are likely to experience all of these elements every time they login to WoW, at least while they sustain the challenge/skill balance. It is this surprisingly strong engagement, effective design, intrinsic (endogenous) learning and complexity of the WoW environment that suggests that it warrants scrutiny to see whether it might inform future Massively multiplayer educational game design.

Reiber (1996) distinguishes between exogenous games, like Hangman, where the game is the “sugar coating” (p.9) or shell into which any content can be plugged. Endogenous games on the other hand “*employ endogenous fantasies that weave the content into the game. One cannot tell where the game stops and the content begins*”. Virtual worlds provide many opportunities for endogenous learning. Thomas and Seely Brown (2007) describe how detailed the planning, strategy and learning become when team members become engaged in achieving a shared goal. And yet, all the while they are learning advanced skills in remote team management (IBM, 2007) they are merely focused on the task at hand.

Virtual environment affordances

Although WoW may elucidate principles of design for flow, it is the openness of the SL environment that allows it to be adopted for such a wide variety of educational purposes.

The following table is offered as a simple categorisation of the affordances of Second Life, based on the descriptions of SL locations on the Second Life in Education page. <http://sleducation.wikispaces.com/educationaluses>

Table 1 Second Life affordances

Activity	Purpose	Product
Coming together, meetings, co-location events,	To overcome location/ distance barriers, to present to groups	Presentations, Panels and Discussions, Social events eg. dances, conferences.
Displays, exhibits, stylistic locations	Libraries, Art Galleries and Museums, Business,	Photostories and Photo Scenarios, Art exhibits, Fund raising, British literature classroom,
Performance	Preparing and presenting a story or play to an audience	Theatre, music, performance art. Socio drama.
Role play, scenarios, dramatisation.	Allowing participants to experience different perspectives	Developing skills eg job interviews, counselling. Building knowledge eg educational drama, treasure hunts and quests. Cultural immersion/exchange
Design- Using the environment as a design tool	Architecture, Fashion, Set design, Movie storyboard, Interior design, Urban planning, Proto-typing	3D models, Multimedia/Games Design, Machinima. Film design.
Simulation and data visualisation	Allowing the learner to interact with a representational learning object or environments, Real Estate Practice, Financial Practice and Modelling, Commerce	Problem solving eg Turing machine. Artificial life/ ecology project Virtual Tourism. With Role play/performance; Historical Re-creations and Re-enactments.
Programming	Getting a feel for programming	Creating scripts that allow 3D objects to move and respond to input. Making huds for specific tasks.
Research	Design a variety of social experiments or simulations. User-testing and Market Research	Social Science, Economic and Anthropological Research

Shared affordances

Some of the affordances of WoW overlap with those of SL, if to a lesser degree. Members can appropriate the technology to hold social events or meetings in an inworld Inn or Hall. They can also spontaneously coordinate their avatars to dance with others to perform, such as the buskers of Stormwind. Youtube attests to the fact that some people also design more elaborate performances that are video'd inworld and edited for machinima afterwards. WoW and SL are frequently used as elaborate chat environments. In fact, WoW has been described as "World of Chatcraft" (Williams et al, 2006) as players will readily favour a text chat inworld over a text based chat engine. And these chats have the advantage of often occurring while pursuing quests or design tasks as multi threaded conversations and multi tasking become the norm. Both WoW and SL also have a market economy that is influenced by the forces of

supply and demand. Both environments afford progression in terms of skills and experience and this is evident in the increasingly sophisticated appearance of the avatars.

WoW affordances

Where SL is strong in its provision of tools for design and simulation, WoW is strong on its provision of a context for collaboration. The items received as rewards for completing group quests provide motivation for developing social and team co-ordination skills. Quest rewards are in the main carefully designed to be just a little better than the ones before, so that the constant upgrading of equipment sustains the balance between challenge and skill.

Table 2 Some World of Warcraft affordances

Activity	Purpose	Product
Completing quests-alone or in groups	A framework to learn and increase skill, for progression, a context for collaboration	Ensures the environment is explored and progression achieved.
Honing professions eg leatherwork, engineering, alchemy	Creating useful items. A means to participate in the economy	Supports interdependence for guild activity, ensures a thriving economy.
Exploring the landscape, sight-seeing, engaging with the rich narrative .	Engages different learning styles, (Bartle, ND)	Ensures that a range of people are attracted to participate.
Synergistic abilities eg warrior, mage, druid	Ensures interdependence, teamwork.	Allows successful completion of increasingly complex tasks that require planning, training and skilful management.
Large group raids	To achieve difficult, complex tasks with rich rewards.	Remote team leadership skills. (ref)
Creating additional avatars (up to 10 per account)	Exploration of the environment from different perspectives, accessing new material.	Extending experience eg from fighter to healer. Sustains membership base without needing to create new content.

This raises the question whether there might be a way to bring together key affordances of both environments. In exploring this question, a number of questions emerge such as “how might the scaffolding of quests be harnessed in an open environment? “

Making games useful and employing what is unique, new, and powerful about them requires us to change our thinking about what games afford. If we are to see a new set of possibilities for games as learning environments, we need to shift our thinking away from content specific learning objectives toward thinking about games as systems that afford new types of agency and new ways of looking at the world. These games are fundamentally social systems where people learn how to become part of new, often rapidly shifting institutions and to organize socially and solve problems quickly on a short-term basis.

(Thomas & Brown 2007 p.14)

Situated cognition

It is no surprise that Seely Brown has a passion for Learning by Being. Twenty two years previously, Seely Brown (1989) co-authored a seminal article entitled “Situated cognition and the culture of learning”. Describing how apprenticeships foster learning in a safe and supportive environment, he explored how this might translate to a more formal learning environment.

...cognitive apprenticeship methods try to enculturate students into authentic practices through activity and social interaction in a way similar to that evident -- and evidently successful -- in craft apprenticeship.

(Seely Brown et al. 1989)

Brown et al (1989) state that collaborative activities promote: collective problem solving; understanding of the different roles that are required in cognitive work; the drawing out and confrontation of misconceptions and ineffective strategies; and the development of collaborative works skills in preparation for the workplace. At the same time it was recognized that situated cognition requires time and does not readily fit into the established, compartmentalised curriculum. By definition, it had to occur outside of the classroom walls, unless the focus of the cognitive apprenticeship was the teacher or student role.

Around the time that Seely Brown wrote this article, he also employed ethnographers to learn how Hewlet Packard’s 25,000 service engineers solve problems. They reported back that the service engineers used narrative to

“explain every piece of data, every piece of this complex machine. When they have constructed the narrative that explains this, they have actually figured out the machine. And now they can fix the machine. And of course if that doesn’t fix it, then the story goes on.”

(Seely Brown, 2001)

The importance of dialogue and narrative stimulated Seely Brown to develop communities of practice for service engineers. It is no surprise that on retiring, when finally liberated from running Xerox Parc with its 250 PhDs and large innovative teams, Seely Brown immersed himself for a prolonged period in World of Warcraft. He recognized the importance of the learning occurring there. In Wow he found an environment where real world skills are honed and developed “*the chance of failure is high, but the cost is low and the lessons learned are immediate.*” (2006, P.2) Here is an environment where members participate in the meta-process of designing team strategy and tools.

Learning by design(ing)

Gee (2005) explores the principles embedded in effective video games that make them such rich environments for learning. He’s found that sadly they are rarely incorporated in educational games, or in classrooms for that matter. He suggests three categories: Empowered learners, Problem solving and Understanding. His article makes familiar reading to members of virtual worlds. For Empowered learners he talks about co-design, customization, identity, manipulation and distributed knowledge. Under Problem solving are well-ordered problems, being pleasantly

frustrated, cycles of expertise, information on demand, fish tanks (simplified eco-systems), sandboxes (safe spaces for experimentation) and skills as strategies (practicing in the context of relevant goals). When he addresses his Understanding category he talks about System thinking and Meaning as Action image (the meaning of an experience). He asks how we might embed these more effectively in classrooms.

If Veen (2006) is correct in his appraisal of the upcoming “Homo Zapiens” then we already have classes with students who commonly use enquiry based approaches, active learning, networked and experiential learning, are accustomed to teams and roles, are good at self-organising, solving problems and explicating knowledge to others. Perhaps a way to engage them in learning is to enlist them as co-designers. Designing in the sense of “the human endeavor of shaping objects to purposes” (Perkins, 1986, p. 1) and as producing a material product through a creative process, frequently based on trial and error, experimentation in a manner that is “sustained, sequential, and recursive” (Balestri & Ehrman, 1992 p.2).

There is a rich literature in learning by designing. Perkins (1984) states that the people who benefit most significantly from the design process and the resulting tools are the designers, not the people who use the product. Whilst discussing the efficacy of instructional software, Jonassen (1994) states *“I shall argue that we should take the tools away from the instructional designers and give them to the learners, as tools for knowledge construction rather than media of conveyance and knowledge acquisition”* through stimulating *“active, constructive, collaborative, intentional, conversational, contextualised and reflective learning”* (Jonassen, 1995, p. 62). He argues that students build a knowledge base because they need to analyse the subject domain and to develop mental models to represent it. They then frame their understanding within those models. This readily leads to generative learning, learning that extends these mental models.

For this reason, Rieber (1996) involves students in designing games and microworlds because *“(the) creative investment one takes in the design process leads directly to intellectual ‘ownership’ of the game’s content”*. Like Harel and Papert (1992) and Salomon et al (1991), he finds that engagement causes the learner designers to become “mindful” in a manner that is non-automatic, focused and guided by metacognition (Rieber, 1996).

McInerney and McInerney (1994) also found that students engaged in designing became aware of their own and their audience’s knowledge, developed skills in planning, revision and time management, became more flexible as they learned to abandon inefficient designs and developed confidence in their ability to think.

It is precisely in their quest to represent knowledge for others that Harel and Papert (1992) observed students who were struggling to represent the knowledge domain, begin to uncover the deeper structures of mathematics. This “gradual evolution of different kinds of knowledge” (1992, p. 69) was reflective and metacognitive.

And in a world of increasing complexity, understanding underlying principles becomes a key strength. Turkle (2002) raises concerns that computer based simulations are used increasingly in all professions for a wide range of tasks. As their complexity increases the underlying assumptions that inform their design are increasingly hidden. There is a strong tendency to accept the simulation as if it is real. She argues that;

Increasingly, understanding the assumptions that underlie simulation is a key element of political power. People who understand the distortions imposed by simulations are in a position to call for more direct economic and political feedback, new kinds of representation, more channels of information. They may demand greater transparency in their simulations; they may demand that the games we play (particularly the ones we use to make real-life decisions) make their underlying models more accessible.
(Turtle, S. 2002)

Arguably, engaging in designing simulations has the potential to assist students to build a critical literacy in a manner experienced by students who write and film their own documentaries and thereby come to understand the constructed nature of today's media.

Equally, designing scenarios as a simulation of professional disciplines and subject domains might serve as a cognitive apprenticeship. Fortunately, there is a body of knowledge and a number of websites such as www.fablusi.com and www.unigame.net that assist with designing scenarios.

However, the motivation to participate as experienced by players of WoW could be difficult to replicate unless a means is found for making scenarios extremely compelling.

The gift of drama

Dorothy Heathcote (Wagner, 1976) has a special talent for building participation and belief through educational drama. She can cohere a class of disgruntled students into a group united by a purpose and a goal, and enroute to achieving their goal they will research relevant elements of science or history and dialogue about philosophical issues of import.

Wagner (1976) argues a key reason Heathcote has such a strong talent is that "her left hand of knowing" is intact. She is able to access her imagination, creativity and connection to the human experience in a manner foreign to those who become primarily focused on analysis. Wagner cites Mecker (1975) stating that university is "often confusing because it relies on only half of the human brain". (p. 167) This subject is more recently explored by neuroscientist Bolte Taylor (2006) and the feminist academics (Horsfall, 2008). It is this "left hand of knowing" that allows Heathcote to connect readily to universal experience and to enrich the narrative.

Although Heathcote worked primarily with young people, several devices she uses to build a story might equally apply to a university audience. She uses questions extensively to generate interest and build ownership of the scenario focus. She also uses a strategy she calls "The brotherhood code", that allows her to quickly find relevant parallel domains of interest to the group. By identifying "the inner experience" of a group she will quickly scan across time, place, profession and class to identify others facing a similar experience. With her disgruntled school students she might suggest that they are miners facing a shutdown or a motorcycle gang finding out that their race was rigged.

Heathcote' is best known for her development of "The Mantle of the Expert". This is a strategy for assisting students to adopt the role of experts. They then interact with others as that expert. They might run an enterprise, consult on key issues, write a project bid or design a product or service. As an educator, Heathcote (Wagner, 1976) prefers to withhold her own expertise, asking questions to motivate her students to find information for themselves instead.

Narratives can also be animated through quests or treasure hunts (Clark et al, 2004). In WoW, quests are ostensibly to Kill non player characters (NPCs), Collect items or Deliver them, Escort and defend a NPC, Find or explore a new location, learn about WoW history, or initiate into a new skill. The meta-quest in WoW however is about learning skills, contributing to a team and guild (that functions as a community of practice) and even managing the guild. Seely Brown and Thomas (2006) describe the role of a Guild master in WoW as a “total immersion course in leadership” p.2. They recount the experience of Gillet who became the director of engineering at Yahoo. His skills as a Guild master prepared him for his leadership role in the company. Gillet explains (Seely Brown & Thomas, 2006) that he sees all challenges in his role with Yahoo as quests.

Discussion

As the New Horizon report (2007) indicates, Massively multiplayer game environments are expensive. This paper asks whether the best features of the Virtual world technologies of SL and WoW might be brought together to provide an environment for building narratives and scenarios, using quests to motivate engagement. Cognitive apprenticeships might assist the development of communities of practice around particular disciplines. It is also suggested that the next generation of learner might be more experienced in self-directed learning and collaboration. They might be encouraged to participate in designing these environments, primarily to motivate their own engagement with the discipline they are learning. It is possible however that they might also help to prototype new ways of using virtual environments. Motivation might include giving them credit for their contributions and allowing them to track their learning journey through the use of portfolios. With a little courage and imagination it might be possible to bridge the conventional boundaries of our institutions and harness the power of participative communities of practice (think wikipedia!) to renew the dynamism, individualisation and passion of higher educational learning.

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16 Ways to Use Virtual Worlds in Your Classroom: Pedagogical Applications of Second Life

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Keywords: Second Life, virtual pedagogy, action research, virtual worlds, educational technology.

Abstract:

This paper examines the emerging ideas for implementing the usage of virtual worlds as an educational tool. It is part of an ongoing doctoral researcher project being conducted at Lancaster University in the United Kingdom (UK). The majority of the information used to create these 16 pedagogical approaches was derived from a series of participative inquiries, personal observations, formal and informal interviews, surveys and ten months of documenting the perceptions of teachers and students using (and trying to use) Second Life as an educational tool. Both qualitative and quantitative methods were used within an action research strategy. The majority of the data remains in raw form (datasets) and are currently being analyzed. However, 16 pedagogical approaches have thus far emerged. How teachers apply the use of this technology is of growing interest throughout the academic world. These strategies offer teachers pragmatic solutions to implementation and usage dilemmas.

Introduction

All dressed up and no where to go? Educators new to virtual environments spend time getting themselves 'ready' to teach *inworld*. They search for the perfect virtual outfit, they adjust their avatar's physical features, and they practice moving around. But after the preparation is over and it's time to ring the virtual school bell, they start to get cold feet [Dataset 3]. Unsure of what to do next, they often never bring their students *inworld*. This phenomenon is not uncommon and it is fixable with a little pedagogical planning.

The context in which we use the terms *virtual world* and *virtual environment* is intended to refer to desk top applications of *virtual-reality-like* software platforms, such as Second Life. We tend to use these terms interchangeably. An *inworld* experience is that which occurs within the virtual space, often called islands. This document discusses sixteen pedagogical applications supported by learning theories and exemplified through specific examples. For more detailed explanations and implementation strategies, please refer to the work of Michele Ryan (2008).

The 16 Ways...

1. Adding a Visual Element (Data Visualization)

Virtual worlds are highly graphical in nature. This, in combination with their open source environment, implies that any user can create 3D objects. From a teaching perspective this means that the ability to demonstrate ideas, visually, is now exceedingly possible. There are numerous examples of the use of visualization to teach complex and often abstract concepts. In the hard science disciplines these include 3 dimensional DNA strands, students creating complex chemical molecules, teacher created solar systems, mechanically accurate space ships, detailed and enlarged versions of microscopic organisms are all popular uses of the visualization possibilities [Dataset 4].

In the social sciences visualization is often based on theoretical concepts or datasets. For example, at Lancaster University (UK), we attempted to visualize the accounting concept of *balancing the corporate books* using the *scales of justice*. The idea was to create an interactive learning object that would respond, in real time, to data entries made by the students. Despite attempts to develop this tool, it remains uncompleted and does not currently operate properly. However, students who were engaged in the endeavour were able to achieve the learning objectives by participating in the process of attempting to produce the learning object [Dataset 5].

Therefore, as the educator, you can either use visual tools to teach your content, or make the creation of these tools part of the learning experience. In a 2002 study, researchers examined the implications of visual learning in a virtual world. Student's work after using the visual features of a virtual environment were "... more accurate, more complete, and showed a better conceptual understanding" than those in a control group (Trindade et al, 2002, p.486).

2. Interactive Library

In the field of educational technology, there is a common expression regarding the use video for educational purposes. *A talking head is still a talking head regardless of whether it is projected from a video, or in the form of a real life lecturer.* Using multimedia only as an alternative method for delivering content will have no significant effect on student learning (Clark, 1983). It merely allows linear delivered content to be delivered electronically. Yet, educators indicated that there was a time and a place when talking heads and linear delivered content were pedagogically appropriate [Dataset 1]. The balance between linear and nonlinear delivery is an important factor in the success or failure of an educational technology. Utilizing the features of a technology, in conjunction with good teaching, can significantly improve the educational effect (Bates & Poole, 2003). Having a database of multimedia resources is more valuable if it is not the primary mode for delivering the content of the course.

Virtual worlds can be used a data repository to host interactive learning objects, text based documents and provide links to other learning materials such as recorded lectures. These can be used to supplement the synchronous classroom activities and provides a new resource for students to use in exam preparation. On demand learning tools also allow students to take responsibility for expanding their knowledge base.

3. Connection Device

Virtual worlds provide an excellent platform for communicating with people who cannot physically be present. Not only are virtual worlds operating in real time, but they can also host material that can be accessed at a later time. Table 1 is a list of the features of the many virtual worlds compared to other technologies that you may be more familiar. This list is not intended to be all inclusive, but we use this chart to help explain what virtual worlds are and to help spark ideas for their usage.

Table 1 A comparison of the communication features of virtual worlds. Created by Michele Ryan, Lancaster University, March 2008.

Communication Features	
Virtual Worlds have	Which is similar to
Real time text chatting-private	Instant messaging
Real time text chatting-group	Chat room
Delayed time text chatting	Email
Real time voice	VoIP / telephone & conference calling
Real time video stream w/ audio	Video calling
Searchable networking tools	Social software / Web 2.0
Note card messaging	RSS / newsfeeds
Ability to create content	Forum, wiki, blogs
Record activities for later access	Podcasting
Uploading documents	File sharing

At Lancaster University (UK) some educators use Second Life to hold office hours so that others can reach us in a real time environment when we are not on campus. The

Open University (UK) recently concluded a series of pilot studies, conducted in Teen Second Life, referred to as Schome Park. This project brought together students from a wide range of locations to work together. In addition, the staff included a variety of teachers and researchers that were likely to have never collaborated without the virtual world [Dataset 6].

4. Role Playing Device

Virtual environments allow teachers to create fictional situations where students can assume roles. They provide a safe environment where students can immerse themselves in a scenario that would otherwise not be possible. Because the space is virtual, students can take chances, make numerous attempts and fail without the real world consequences. "Social simulators" or role play computer experiences allow students to work on the development of soft skills and "discovery-based learning" opportunities (Kapp & Hamilton, 2006, p.6).

Consider a Spanish language class, for example. Students meet inworld, in what looks like a Mexican marketplace. They assume roles such as shopkeeper, vendor and customer. In the virtual environment students practice their foreign language skills by communicating with one another [Dataset 8]. On Harvard's (USA) Berkman Island law students practice their litigation skills [Dataset 9]. While educators in Singapore have used space on Teen Second Life to conduct role playing lessons to practice negotiation skills (Rappa et al, 2008).

5. Simulation Device

There is a significant distinction between using a virtual world as a role playing device and using it for simulation purposes. Simulations may or may not include assumed roles. Most

importantly, simulations are designed to allow the students to practice a process. This provides an environment where students can learn through doing, and learn through it wrong.

According to Kapp & Hamilton, “The real benefit of simulations is their ability to reduce trivial computations and to allow students to deeply discover and test hypotheses” (2006, p.7). Trial and error allows for practice, and when combined with visualization, simulations can offer a safe learning environment for complex processes.

Activities organized on Minerva Island, by Andrew Macías-Díaz for the School of Management at the University of St Andrews (Scotland) use Second Life to teach film students how to arrange and hook up production equipment [Dataset 10]. Students move objects and simulate the connection of particular pieces of video equipment. Failure to connect them in the proper sequence with the proper items results in them not working. Correct connections allow the students to see the final arrangement functioning properly.

6. Games for Learning

3D online multi-user games are considered a “gateway drug” that can help students achieve more “intellectual practices” (Steinkuehler, 2008). Their immersive atmosphere and engaging interactivity can lead to experimentation with more complex virtual activities. Non-game based virtual worlds, such as Second Life, have no overall objectives and may not foster competition in the same manner that games do, but learning in these worlds feels like playing a game [Dataset 2]. In addition, their game-like appearance and functionality can provide a venue for game creation and/or execution.

At Fontys Hogeschool-University of Applied Sciences (Netherlands) students can play a knowledge game. Similar to a question and answer game except that avatars must move to a different location before answering and before the time runs out. The scramble to move against a clock while trying to think of the correct response is both fun and challenging [Dataset 11].

The process of planning and creating a game will get your students thinking through the content material in greater detail. However, if time does not permit, you may be able to find games created by others that can serve your purposes. Students can partake in a game that was created by another institution. After participating in the learning game students can be required to write an essay about their experiences and tie the subject content into the paper by answering several questions proposed by the teacher.

7. Soft Skill Development

Interactive learning environments are required in order to transfer soft skills to the real world (Kriz, 2003). Clark outlines the attributes of a soft skill learning model that uses examples and problems, lets students inquire, provides feedback quickly, allow students to play out the consequences of their actions and allows for repeated attempts (Kapp & Hamilton, 2006, p.2). Similarly, Klabbers has a four step process for teaching soft skills which includes 1) model the desired behaviour 2) students deduce the key elements individually 3) use examples within select contexts 4) allow students to practice and adjust based on feedback (Klabbers, 2000). In the virtual world these skills can be practiced in a variety of ways. In general, the concept of soft skill development is applicable when the pedagogy is not task-oriented. In other words, the assigned virtual task is not the learning objective in itself. Instead it is a method for practicing the desired skills.

These may include less tangible skills such as critical thinking, problem solving, team building, and collaboration. Teachers start by assigning a task that is easy enough for the students to accomplish based on their inworld experience; yet difficult enough that the execution of the task will require them to use the skills you desire they use. In the virtual world when students do not know how to perform a task, they often figure it out through collaboration and end up practicing these skills along the way [Dataset 4]. If, however, the skill can be directly related to the task then the learning experience may be even more powerful.

8. Research

Virtual worlds can be used as a backdrop for learning about a course's content. In this sense they become an engaging reference point. Due partly to the fact that they are open environments with a large number of participants engaging in a diverse range of activities. Teachers wanting to use them as a research tool can assign students to study various aspects of the virtual world.

Anchored Instruction allows students to explore, question and contemplate course material presented in a specific context (Bransford et al, 1990). In addition, by scaffolding these learning experiences, educators can transfer what is learned in the virtual world to a different context. For example, students can learn about economic topics by studying an inworld economy. The Second Life currency exchange resembles similar aspects of a real world currency. Sociology students can create avatars of a different race or gender and examine their experiences. Anytime the subject being studied is represented as a natural part of the virtual community, students can study it from a first person point of view [Dataset 4]. Depending on your subject area, there is probably a locale of Second Life that students could study.

9. Virtual Tourism and Field Trips

Imagine being able to take your students on a field trip to anywhere in the world, and to any time in history. Where would you go? Virtual worlds host a variety of recreated places that can help engage your students within your defined context. Exploration of these spaces is an enjoyable way to imitate an undoable physical adventure.

Schank & Cleary tell us that when students are having fun, they may not notice how much they are learning. Good story telling that poses problems and allows students to navigate to solutions, does not have to be realistic to be effective. It needs only to provide the backdrop necessary to engage the students. (Schank & Clearly, 1995). If students are engaged, and having fun, then they will stay in the learning environment longer and do more and thus learn more (Regian et al, 1992).

10. Social Device

Virtual worlds are a social space. In this context, you can hold social activities. These events can be excellent ice breakers to help team members get to know one another. It has an added benefit that it will inevitably help students practice communication and other social skills. These social events break tensions, plus they are a lot of fun!

Throughout the Open University's (UK) Schome Park project in Teen Second Life, teachers, researchers and students gathered together for various social occasions. Avatars shared gestures, students played music and sang. It added a lighter atmosphere and helped new

users integrate into the group. At the end of the third phase of the project, a going-away party was held. Avatars took turns giving speeches, dancing and saying goodbye [Dataset 2]. While at Lancaster University (UK) starting new people out together proved to be a great team building experience as well a fun social activity [Dataset 1].

Creating avatars and going inworld for the first time is also an excellent class project. Even students, who were physically in the same room, enjoyed going through the discovery process together. They helped one another and the sharing of the new user experience helped overcome reluctances. It is not uncommon for schools to have technical barriers that prevent account creation from within the institution. In this case, information could be gathered in advance and accounts created off campus. The participants then meet in a campus computer lab and log on for the first time altogether. Students play and experiment with their avatar's appearance. Keeping the first sessions socially focused can help build camaraderie. The main goal for the first class is to simply help students get more comfortable in the virtual world. They will learn from each other and probably have an enjoyable experience. Students appeared to connect strongly as a group when they logged on together for the first time [Datasets 1,4]

11. Create Anonymity

Have you ever wondered what your students would say about your class if they could hide behind avatars? Virtual worlds can be used as a place where students can express themselves more honestly, talk about sensitive or confidential matters, take social risks, and overcome fears. Nearly any situation, where anonymity enhances the quality of the communication, virtual worlds can be valuable.

Although at Lancaster University (UK) we have not yet attempted this, we cannot help but wonder if our course evaluations and focus groups conducted inworld would yield the same results as paper surveys. If complete confidentiality is required then consider providing generic or rotating avatars. This means that you have a slate of user names and passwords that are used for one purpose and then reused by a different person. No singular person can be associated with one avatar. Take caution to ensure that you do not infringe on the *Terms of Service* agreement with the virtual world platform owner.

12. Machinima Creation (Video Filmed Inworld)

A Machinima is a video created through screen capturing software. Using Machinima as a class project requires a plethora of project management skills. Thus the assignment will force students into planning, organizing and structuring their content based message. Learning theories based on a Gestalt view believe that accomplishing the overall project is more significant than the individual tasks required to achieve it (Hergenhahn & Olson, 2005).

Machinima can be used as an assigned task, part of an e-portfolio or added to traditional PowerPoint style presentations. However, Machinima can be too complex for short courses or for novice inworld students. Students at Lancaster University (UK) actually worked around the concept of Machinima by simply placing a video camera in front of their computer screens. This happened, partly due to their ignorance of screen capturing technology (and our neglect to properly inform them) and partly due to technological barriers associated with Second Life's inworld filming capabilities when running on Microsoft based PCs. The result, however, did yield accomplishment of some of the learning objectives [Dataset 13].

13. Recruitment

There is a growing sense of urgency, especially within the educational sector, to establish a 3D web presence [Datasets 1,4,6,7,12]. Just as we saw in the early days of the original internet, we are starting to see in Web 3D development. Schools, who have developed their islands (or virtual spaces) and use them regularly, find that they is a valuable tool for recruitment [Datasets 7,12]. Islands are being used to promote institutions, degree programs, specific courses and research projects.

Nine institutions of higher learning in the European community battled for the right experiment with virtual worlds. Four of the nine were repeatedly denied funding for island development intended for educational purposes. Two schools were offered funding contingent upon their ability to recoup the expenses. Three other intuitions secured funding for pilot projects only to have their virtual spaces taken away from them at the end of the projects. In all nine cases, when the ability to use Second Life as a recruitment tool to showcase the institution was suggested, the funding became easier to obtain [Datasets 7,12].

Although some of the literature on virtual world education condemns the replication of real world campuses, institutions often start there. This helps provide the stakeholders with a tangible way of understanding why their school is using the virtual environment. Providing an island intended for student recruitment may be an easier way to convince governing bodies to allow such development. Once the virtual space is established then it can take on other, perhaps more educational, purposes.

14. Build Awareness and/or Promote an Event

Peer pressure can be a powerful motivator in teaching. If students know their work will be viewable in a public environment, they are likely to be motivated to work more diligently and produce at a higher level. Students will pressure each other and increase their own expectations (Dillon & Walsh, 1992).

Virtual worlds can be used as a platform for displaying student work, promoting events organized by students and supporting inworld social issues. Students involved in such projects may be motivated by the fact that their work will be available in a public arena. This motivation may increase their commitment to achieving the goals, and thus learning the material. For example, Hope University in Liverpool (UK) hosted a series of *open-days* (built by the students) to engage in conversations about issues at their university [Dataset 14].

15. Building for the Sake of Learning How to Build

The ability to create content in an open source environment is a primary feature of virtual worlds. The term *building* in this context refers to creating and combining primitive objects (prims), textures and scripting to limitless possibilities. For those that teach a computer science course, virtual worlds can be the ultimate platform for learning by doing.

In virtual worlds, users can experiment with 3D rendering, scripting, spatial relationships, animations, database and grid management issues and using third party software applications such as Adobe's Photoshop and Illustrator, video and audio capturing programs. In many computer science courses these same areas are part of the content knowledge that students strive to achieve. Therefore, using virtual worlds to teach them appears to be a simple method for applying learning by doing into the curriculum.

Aldrich believes that learning through doing may be only way to teach explicit computer skills to a tacit level of understanding (2005). If computer education embraces virtual worlds for teaching, then it may be possible that more students will become proficient with these technologies. This could lead to a new generation of virtually literate people who can then help re-define the future of education in other subject areas.

In addition, if you teach a class that requires the students to learn about the theoretical foundations of computing concepts then you can use the virtual world to link these concepts. Learning by doing is a powerful pedagogy. The nature of virtual worlds offers a valuable way to apply and practice using the various technical features. For example, Temasek Polytechnic (Singapore) uses Second Life to explore the concepts of data structures and algorithms (Seng et al, 2007).

16. As an Open Learning Environment (Virtual Action Learning)

The final pedagogy explored in this document is that of an open learning concept with the theory of Action Learning applied. Action learning draws from the work of Reg Revens (1988). When this method of teaching is used in an environment such as Second Life, it could be considered Virtual Action Learning. Virtual Action Learning (VAL) draws from several learning theories, such as experiential learning of Kolb & Dewey, reflective problem solving of Schon, Knowles' Andragogy theory and combines them with e-learning pedagogies like those of McFadzean. Dickenson, Pedler & Burgoyne define VAL as "...action learning which takes place in a virtual environment... via a range of enabling, interactive and collaborative technologies" (p.3). In virtual worlds, VAL can be used as the underlying pedagogical strategy.

In its simplest form, using VAL involves getting your students to participate in the decision making process. Through collaboration your students decide how to accomplish the learning objectives. This is done through cycles of learning sets that involve inquiry, action and reflection. We found few examples in Second Life courses using VAL exclusively. However, the University of Southern Queensland (Australia) reports using Second Life specifically for action learning sets. The Open University's Schome Park project used a similar pedagogy for some of the phases of their project [Dataset 6].

Conclusion

Virtual worlds, as an educational technology, may be exciting for both students and educators. However, it is only through the utilization of the technological features, along with the required re-thinking of the teacher's pedagogy, that will make them successful educational tools. To put it in the words of Tony Bates, "Good teaching may overcome a poor choice in the use of technology, but technology will never save bad teaching; it usually makes it worse" (1995, p.12).

It is for this reason that these sixteen approaches were developed. They are intended to help educators improve the quality of teaching by enabling them to experiment with new, often more constrictive pedagogies. Further research at Lancaster University (UK) will expand on these ideas and provide more empirical evidence in the near future. It is our desire that these sixteen pedagogical approaches and our experiments with virtual assignments will empower and inspire educators. While simultaneously challenge them to re-think what and how they are teaching.

Appendix: Dataset Descriptions

Dataset 1: Documented conversations, both formal and informal, workshops and inworld activities involving the volunteer group of educators at Lancaster University. This group later became known as LUSLUG (Lancaster University Second Life Users Group). October 2007 to present.

Dataset 2: Semi-weekly inworld conversations with educators, students and researchers participating in the Schome Park project met inworld and communicated via email. February 2008 to present. For more information on their activities see http://www.schome.ac.uk/wiki/Main_Page

Dataset 3: Formal interviews with 4 educators who had dropped out of the Schome Park project. April 2008 to May 2008.

Dataset 4: Ideas derived from semi-daily journal entries made from observed inworld educational activities from a variety of institutions involving students, teachers and researchers. October 2007 to present.

Dataset 5: Focus group consisting of first year accounting students with no prior Second Life experience. Met in person at Lancaster University. May 2008.

Dataset 6: Ethnographic journal entries documented while volunteering inworld with the Schome Park project from February 2008 to May 2008.

Dataset 7: Documented conversations, inquiries and discussions with virtual educators at European conferences between January 2008 and July 2008. In person followed up via email and inworld communications.

Dataset 8: Documented extensive brainstorming sessions with educators regarding specific topics. Ideas then further explored with members of LUSLUG; experiences shared and ideas investigated. Met both in person and inworld from October 2007 to present.

Dataset 9: Personal observations and informal conversations with participants on Berkman Island between November 2007 and June 2008. Communication via email and inworld at <http://slurl.com/secondlife/Berkman/204/65/25>

Dataset 10: Personal conversations, in person, inworld and via email with Andrew Macías-Díaz for the School of Management at the University of St Andrews. Contactable via: <http://www.askin.tv> . From May 2008 to present.

Dataset 11: In world exploration of school's island and in person conversations with Albert Sleutjes and Paul Dirckx of Fontys Hogeschool. From July 2008 to present.

Dataset 12: Usage Survey #1. Mixed-method survey conducted by Michele Ryan, concluding in July 2008.

Dataset 13: Personal observations of learning activities, inworld exploration of course project and formal interviews with participants in Masters course on Computing & Psychology (Lent term 2008) at Lancaster University.

Dataset 14: Documentation of personal conversations, inworld exploration and ongoing collaborations with educators and students at Hope University in Liverpool. From October 2007 to present.

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Developing sustainable Library services within the context of a parallel universe

Non Scantlebury, James McNulty and Nicola Dowson

Keywords: Second Life, Libraries, eMPhil, collaboration, case study

Abstract:

The Computing Department of The Open University's Faculty of Mathematics, Computing and Technology, convened a project team to develop a new eMPhil programme to be delivered entirely online by Autumn 2009. The project team approached Library staff to collaborate on the development of specific library services to these students. Library services needed to be delivered and supported via both the Open University's Virtual Learning Environment and "Deep Think Island", the programme's Second Life presence. Given that there is an increasing trend to provide contextualised and personalised services to students within these spaces, librarians needed to work in close collaboration with faculty academics and commercial technical developers to provide appropriate solutions. This case study outlines the process, risks and issues encountered in attempting to provide equitable experience and access to library services across these platforms. The study documents the collaborative approaches adopted by the project team and concludes with recommendations for further collaborations needed if we are to fully enable students to engage with licensed content for research purposes within the 3D web.

The eMPhil

The Computing Department of The Open University's Faculty of Mathematics, Computing and Technology, redirected a portion of their production budget to fund the development of a 3D web component as part of the online research programme. A project team was brought together and working to tight deadlines needed to envision a suite of services and spaces which could be rapidly deployed to support student activities related to the programme. The intention of the programme was to use both the organisation's Moodle based Virtual Learning Environment and Second Life as parallel but co-existing learning and research environments to be offered to the students. A key brief for Library Services was to develop solutions which were sustainable and equitable within the current models of service delivery whilst also enabling the prototyping of new types of interactions between library content, skills resources and support services. Library staff regularly track publications and initiatives which outline practice in this field (Kirriemuir, 2007, Parker, 2008).

The Project Team and project methodology

The project team, led by an academic project leader from the Computing department, comprised of the eMPhil academic development team and the library services development group. The library services development group comprised of the Head of Library Research and Innovation, the Mathematics, Computing and Technology Faculty's learning and teaching librarian and the Library's chief technical developer. The Computing department purchased the Second Life land from Linden Labs and then commissioned "TwoFour Communications" to shape and develop its content. The academic project leader and the library services development working group worked closely with the commercial technical developers during the project to implement the

initial work around library's specifications. The library services development group were keen to develop ideas collaboratively both within their own subgroup and across the broader project team. To facilitate this, the team adopted a library wiki as the main tool with which to develop a collaborative library vision and specification for library services for the Programme. Due to administrative issues with granting access permissions to the wiki for project members outside of the library the content was moved to the University's Knowledge Network workspace created for the team. In addition to using the wiki, the library team participated in synchronous meetings within Second Life with the broader project team and "TwoFour Communications" technical developers. Additional e-mail communication was used to support information dissemination and decision making. In addition to this, full use of the University's Digilab was made to convene face to face meetings with the academics, the librarians and library chief technical developer to review progress and deal with risks and issues as they arose. Digilab was one access point on campus which supported wireless network access to Second Life, and the team used it to support synchronous meetings in world with the "TwoFour Communications" developers responsible for delivering the Programme's "Deep Think Island".

Library Services and the 3D web.

Before developing a vision of library services for the eMPhil Programme, the Head of Library Research and Innovation and the chief library technical developer undertook a benchmarking exercise to identify broader library service practice within 3D web. The key trends which emerged from this were recorded on the wiki. It was established that most library activity in world was largely a replication of the existing physical library. Presence within the 3D space tended to replicate the idea of a virtual branch library. There were many examples of libraries populating their in world spaces with linked objects which took their users directly to their web pages and their catalogues. The model was very much based on re-routing. Within Second Life, there were examples of more innovative use which attempted to capitalise on the pedagogical potential and socialisation aspects of 3D web, such as the events hosted through the Centre for Information Literacy and the enquiry support services and outreach programmes delivered via Alliance Library System's Info island. Enquiry services were being supported by volunteer librarians.

Following on the benchmarking activity the library team made full use of the wiki to develop their own vision of how services to the eMPhil programme might build on existing practice but also support more personalised and customised services as well as supporting potentially more creative services for licensed content discovery and reuse.

Vision and specification for eMPhil Library Services

The library team were aware of the key constraint around not developing something specific to "Deep Think Island" which would disadvantage students who chose not to engage in using Second Life for their Programme activities. The main portal for accessing content and services on the Programme would be their VLE. The team were also keenly aware of the need to link any library specific support services with existing resource. The project had only allocated three days of technical development from "TwoFour Communications" for library specific service work, so we were very aware of the need to be realistic around what might be achieved in the first instance. Given these constraints and the fact that the team wished to establish a more personalised and contextualised range of services for students, the following vision for services on "Deep Think Island" were specified:

- Create a librarian avatar called “Callimachus” who would morph between human and non human shapes in order to prevent service stereotyping. Callimachus would operate as a semi-autonomous intelligent presence or bot that could answer and support student and staff queries.
- Establish four key zones which would support student interaction and creativity with library licensed as well as free content. These would be an ‘Open’ environment called “Meet and Greet” and a ‘Closed’ environment supporting Explore, Playback and Swapshop spaces. In order to provide access to authenticated licensed library content and services, there was a need to ensure these were situated within ‘closed’ spaces.

The wiki was used to specify what the package of service provision would be in relation to “Callimachus” and the four zones and to propose a technical solution for bridging existing services with the “Deep Think” environment.

Fig. 1 provides the initial map of how the librarians envisioned the spaces and the service provision within them to work. This work was done at the very early stages of the project and helped to inform the broader thinking and development around the eMPhil Programme spaces on “Deep Think”.

Table 1 describes the suggested technical solutions with their associated risks and issues in achieving the vision.

The Project Team were extremely supportive of the library working group and were quick to appreciate the value of our attempts to provide more customisable and personalised library services for their students. After the initial visioning and requirements gathering the Academic project leader compiled a more detailed requirements specification for the “TwoFour Communications” developers and this was released to them in a Phase 1 design specification for the project.

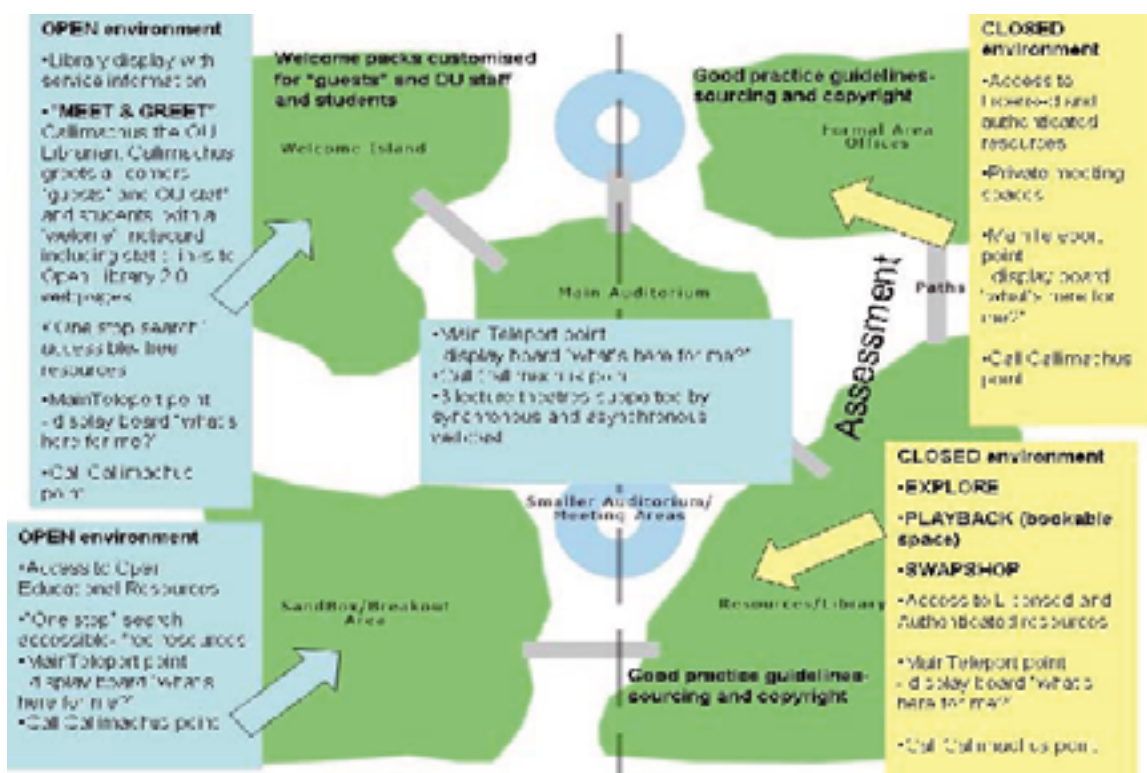


Figure.1 Mapping the vision for eMPhil Programme library services on “Deep Think Island”

Table 1 Initial requirements, technical solutions, risks and issues for library integration on “Deep Think Island”

Requirement	Location	Technical solution	Issues	Risks
Callimachus the OU Librarian. Morphs regularly. Semi autonomous bot.	Replicated on following areas OPEN <ul style="list-style-type: none"> Welcome island Sandbox/Breakout area CLOSED <ul style="list-style-type: none"> Main auditorium Formal areas/offices Resources/Library 	Hyperlink Callimachus to the existing Helpdesk service being staffed by librarians. “TwoFour Communications” to investigate and specify programming requirements for ‘morphing’ and to enable semi-autonomous functionality.	Existing helpdesk services not visibly promoted via the VLE. Librarians concerned that Helpdesk would not cope with rise in queries based on current staffing levels. Mitigated by only implementing within Closed spaces. Implement evaluation once Programme is live.	Lack of take up with students-no return on investment for service. High take up with students-managing impact on current service levels. Insufficient funding and technical resource being available to achieve more creative solution proposed by implementing full functionality
Embedding search services and “One Stop Search” (library’s federated search tool for databases) via a range of Search Pod provision	OPEN (Free content) <ul style="list-style-type: none"> Welcome island Sandbox/Breakout area CLOSED (Licensed content) <ul style="list-style-type: none"> Main auditorium Formal areas/offices Resources/Library 	Library chief technical developer to provide “TwoFour Communications” with scripts to embed recommended search engines within dynamic objects being developed for Deep Think	Reliance on “TwoFour Communications” technical team for specialist programming skills Configuration of “One Stop” to search free content in open areas and licensed content in closed. Mitigated by plans to train library developer in programming skills.	Reliance on “TwoFour Communications” to deliver to specification on time and in budget. Library staff not having expertise to maintain technical services and support development post project.

Table 1 Initial requirements, technical solutions, risks and issues for library integration on “Deep Think Island”

Requirement	Location	Technical solution	Issues	Risks
Provision of notecards and display boards.	OPEN (Free content)	Use of existing objects developed within Second Life.	Engagement of librarians to work with faculty to provide appropriate content	Librarians prioritising the development of appropriate content with the potential for delivery into parallel spaces.
Development of a range of interactive whiteboards which use RSS feeds to aggregate content from outside services e.g. “del.icio.us” social bookmarks, links to information literacy skills activities, blog posts and video streams.	<ul style="list-style-type: none"> • Welcome island • Sandbox/Breakout area CLOSED (Licensed content) <ul style="list-style-type: none"> • Main auditorium • Formal areas/offices • Resources/Library 	“TwoFour Communications” to investigate and specify programming requirements for absorbing RSS feeds more effectively than current environment allows.	Mitigated by close working with broader eMPhil programme team on specifications being developed for VLE requirements	Inefficiencies in provision of content if RSS feeds are not able to be centrally supported developed and delivered for both VLE and Deep Think spaces.
Embedding of Licensed content either through RSS feed delivery or hyperlinks within dynamic objects	CLOSED (Licensed content) <ul style="list-style-type: none"> • Main auditorium • Formal areas/offices • Resources/Library 	Use of existing hyper linking approaches to deep level link to third party licensed assets e.g. chapters, articles, images, videos	Licensing constraints around key databases specified as highly relevant to the Programme Mitigated by collaborative working with third party content suppliers and publishers	Access and authentication to third party content becomes too difficult and time consuming for students to use. This will result in poor take up of key content for those using Deep Think as their preferred working environment. Librarians not able to market key resources.

In discussion with the team and the “TwoFour Communications” developers it was decided that there was insufficient resource in Phase 1 to develop Callimachus to meet the original specification. Table 2 describes the extracted revised Library requirements given to the commercial technical developers to deliver by the end of July 2008.

Table 2 “Deep Think Island” design and build work still to be undertaken for final iteration of Phase 1

Description	Time
Welcome area	
Exotic garden style, welcome to the course (Mary’s journey) descriptive information. To include “search pod” that searches several different search engines from within SL.	1 day
4 Viewing Areas:	
A viewing area will contain the following objects; ‘Video Display/linker’, ‘PDF linker’, ‘In-world research linker’ and the ‘Web linker’. Each object will allow the user to browse all ‘Research Topics’ then browse the related material in-relation to that topic. Admin will be able to add links to research topics and topic content (video, PDF, etc)	1 day
Swapshop:	
Open air swap shop, with free gifts, SL clothing, Avatars (4 of each). Including the Toolkit as specified in the original brief. (Toolkit to include; Presentation Screen, chair sets, timer, mini break out tower)	1 day

The technical specification also included a range of generic objects required which could be customised and implemented across all areas within Deep Think island.

These included:

Teleportation points
 “What’s here for me” information points
 PowerPoint/Video displays
 Video Display/Linker
 PDF Linker
 In-world Linker
 Web Linker
 Server/Admin Control Unit
 Information Boards
 Notecard drop boxes
 Deep Think Groups and Security

The librarians were particularly interested in prototyping new types of content discovery, access and reuse, particularly around using or reusing third party licensed content using the presentation display materials and linkers. It was not possible during the Phase 1 of this project to pursue these proposals further. However, there are plans to

hold negotiations with these stakeholders and to engage them in the potential for using their content in new ways to support research developments within the 3D web. Initial approaches have been made to four key suppliers and further work is planned to attempt to collaboratively review existing licenses relevant to the Programme with a view to secure permission to prototype and evaluate the use of this content within the Programme's online research environments.

The project did encounter some delays to the delivery of the island and this had an impact on the speed of development for Phase 1. The delays also coincided with the summer leave period which resulted in a delayed review of the Phase 1 deliverables.

Phase 1 deliverables

The library team were able to enter "Deep Think Island" at the beginning of September 2008. Considering the time and funding constraints within the budget the team has managed to achieve a significant amount. "Deep Think" was now a reality for us and we were able to traverse the 3D spaces developed for the students and view how the developers had responded to our requirements. Although the library team were keen to move away from a physical metaphor for the library space on Deep Think, there was still a desire to maintain some form of 'geo-spatial' boundary for the Library/Resources area in world. Any recognisable physical reference to the library has been confined to the seven pillars of wisdom which are erected in front of the current physical library building at The Open University. The vast majority of our users are studying at a distance with us, so the key driver for us was to enable users to engage with their extensive library of electronic content and our online helpdesk services.

Supporting Search and Discovery

The initial Welcome Area (Fig. 2) has been established complete with Search Pods (Fig.3) which link to the top search engines recommended by the Librarians for use within the Programme. The list of recommended search engines had been compiled using an RSS feed for efficient delivery to the VLE Programme website. Under a separate project the Library had been involved in developing an RSS feed generator tool which could enable users and librarians to compile lists of useful resources for a course or programme in one place. Compiling feeds in this manner enabled the librarians and faculty to keep versions of feeds and reversion feeds in between course or programme presentations.



Figure 2 Jaz inspecting Deep Think Island Library Welcome Area



Figure 3 Jaz inspecting Deep Think Island Library Search Pods

Second Life uses its own bespoke programming language and ways of creating objects which places limits on what can currently be achieved. Second Life has the ability to display web links, when clicked open in either the internal browser or a browser of your choice, but you cannot really interact with these resources in the way you can do out of world. For example, the Library's use of RSS feeds to syndicate content to different systems, such as the VLE and the users own environment cannot currently be implemented in world. Currently, the environment can only display the title of an item within a feed and show this on screen as hovering above an object, but doesn't allow any interaction with it. Currently you cannot import content to Second Life to be displayed on objects. This has to be done manually, which increases the resource required to maintain the content. Although the technical work required for Second Life to render these RSS feeds in ways which are meaningful to "Deep Think Islanders" is yet to be achieved, there was progress in configuring the individual search pods for users to interact directly with the search engines recommended as useful to the Programme. The pods have been modelled as 'barbeques' and configured so that once activated students will be able to action keyword searches linked to specific search engines by typing in queries using their Second Life chat box. The key search engines targeted for the Programme include the library's "one stop search", a federated search tool which can be configured to target a group of related databases holding third party licensed content. Fig. 4 shows the basic design of the 'resources portals'. The Portal will be configured to assemble a range of relevant resources on topics and themes of relevance to the Programme, specific research questions and activities being undertaken by students. Content will be aggregated from a range of sources and formats including text, audio, video and image.



Figure 3 shows Jaz inspecting the 'Resources Portal' in the closed Library/Resources area on "Deep Think Island"

Key lessons learnt and recommendations for next phase

Through open and regular communication with the eMPhil Programme team, the library has managed to establish excellent working relationships over this project. The use of the Wiki was paramount in the library working group being able to rapidly develop a proposed model for new ways of delivering library services in world, whilst balancing the needs of existing service models. Achieving objective discussion and practice compromise with the core Programme team ensured effective solutions could be developed to provide equitable experiences for students discovering and accessing library content and services via both platforms. The key concerns which surfaced during the project were principally

- initial lack of technical skills within the library team to implement rapid prototyping of services
- reliance on external developers to deliver implementation on time and on budget
- meeting tight project deadlines within traditional summer leave period
- identifying suitable services from existing collections for embedding in a 3D context
- constraints of current licensing models for using third party content in new ways or working
- requirements for accessing Second Life with high specification machines and bandwidth
- achieving an equitable balance of services for students operating in parallel environments

Further recommendations

Although it was not possible to achieve the development of Callimachus as originally planned, the library working group are keen to pursue avenues for further funding or collaborations to prototype such support services. Librarians are often stereotyped in the physical world and the 3D web potentially offers an environment where they could recreate themselves and promote the added value of their services in new engaging ways.

The excellent relationship that many librarians have with third party content suppliers and publishers, positions them well to enter into negotiations to improve on existing licenses making them more flexible for use in a learning, teaching and research context. In addition to pursuing the potential further work that the project has surfaced, the librarians will be working closely with the eMPhil Programme to evaluate how the students receive and work within “Deep Think Island”. Establishing a range of library related services to support them with their initial encounters is merely the first step of an important conversation that we need to have with our students, our academics and our content suppliers. It is only by increasing awareness and access to these emerging models to support constructivist learning and further research that we will evolve at solutions which work across domains to provide the most effective and sustainable solutions longer term.

Librarians also need to engage in what the 3D web means for students and upskill themselves to work within such environments in order to continue to provide relevant services and support. The Illinois Alliance Library System in cooperation with the Graduate School of Library and Information Science provide fee based training courses online for librarians and educators but there are also plenty of freely available resources through the Second Life education wiki which provide good grounding on the potential pedagogic values for using the 3D web for learning and research.

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Virtual environments: Issues and opportunities for developing inclusive educational practices

Kieron Sheehy

Keywords : Inclusion, special educational needs, pedagogy, avatars,

Abstract:

Virtual environments offer new research areas for those concerned with inclusive education. This paper considers the affordances offered by virtual environments for the development of inclusive educational pedagogies. It considers the relationship between specific features of inclusive pedagogy, derived from an international systematic literature review, and the affordances of different virtual environments. Examples are drawn from research in Second Life, virtual tutors and augmented reality. In doing this the paper challenges a simplistic notion of the virtual environment and indicates opportunities for researching and developing inclusive educational practice

There are a growing number of virtual worlds in which identified educational activities are taking place, or whose activities are being noted for their educational merit. In this context the term 'virtual worlds' is used to encompassing modern MMORPGS such as World of Warcraft and non-themed worlds such as Second Life and Active Worlds. All of these have been identified as being useful and creative educational environments (Delwiche, 2006). This suggests that new educational insights are possible from outside traditional educational environments. If virtual worlds are to be considered with regard to being a tool or space for inclusive education, then a vision of what constitutes inclusive education is needed. International initiatives and policy developments have created a movement which seeks to establish educational environments and practices, where

"all children have the right to be educated on equal terms with their contemporaries, regardless of their physical, intellectual, emotional, social, linguistic or any other condition,".

(UNESCO, 1999, p9)

Inclusive education therefore accommodates a diverse range of learners, rather than segregating groups identified by specified impairments or differences. It is underpinned by a notion of social justice and access for all to equal educational opportunities (Cole, 2006). This view of inclusive education has been seen as challenging existing educational structures and practices. However, the degree to which any systemic change has actually occurred is debatable (Daniels and Porter, 2007). This may be because creating inclusive educational environments 'for all' requires the difficult, and resisted, transformation of our current 'industrial age' (Slaughter, 2002) learning environments and practices. Ironically this stalling is occurring at a time when we are experiencing the 'most significant technological revolution since the move from oral to print methods' (Best and Kellner, 2001). The question is raised as to whether virtual worlds are being used largely outside the formal education system because other technologies fit more comfortably into traditional classroom practices. Technologies such as virtual worlds make it imperative that educationalists critically reflect upon what they want to achieve with education and how technology might be used in creative and productive

ways within this endeavour (Kellner 2004 cited in Sheehy and Bucknall, 2007). That virtual environments could be a significant factor in transforming pedagogy has long been predicted.

A child who has grown up with the freedom to explore provided by such machines will not sit quietly through the standard curriculum dished out in most schools today. Already, children are made increasingly restive by the contrast between the slowness of School and the more exciting pace they experience in videogames and television. But the restiveness is only a pale precursor to what will come when they can freely enter virtual realities of animals in Africa or wars in ancient Greece... reading will no longer be the unique primary access road to knowledge and learning, and it should therefore no longer be the dominant consideration in the design of School.

(Papert, 1993 p)

If we are not to remain hidebound by the exclusionary practices of the past our reflections should explore and define the principles and practices we would wish to occur in our 'inclusive future'. There are several frames through which one might research the relationship between virtual worlds and inclusive education. These include the economic and social barriers which delineate possession and usage of virtual technologies (Sheehy, 2003). There is evidence to suggest that whilst disabled learners have potentially the most to gain from new technologies, as a section of society they have amongst the very lowest rates of usage of such technologies and this lack of access is related to low income (Kaye, 2002). One might also examine intra-world factors influencing social and educational inclusion/exclusion and the extent to which these experiences promotes the development of personal agency (Seale, 2001). Another aspect is the nature of the pedagogical practices themselves (Sheehy, Ferguson & Clough, 2008). It has proved challenging for those developing inclusive education to highlight and disseminate pedagogical practices which could include a diverse group of pupils effectively. However, examples which offer some insights into inclusive pedagogies do exist and the extent to which these practices can be delivered, developed or denied within virtual environments would seem an appropriate research area. During the period of 2003-2007 a series of three linked systematic literature reviews were conducted. The overarching review question was 'What pedagogical approaches can effectively include children with special educational needs in mainstream classrooms?', with different sub questions asked for each year. The review team considered 3462 research papers before applying selection criteria in relation to positive educational outcomes (Sheehy and Rix, in press). In terms of identifying the nature of inclusive educational practices synthesis of the research lead to the identification of five emerging themes in the final year.

- pedagogic community
- social engagement being intrinsic to the pedagogy
- flexible modes of representing activities
- progressive scaffolding of classroom activities
- the authenticity of classroom activities.

Sheehy and Rix, in press

A pedagogic community contains within it an informed perspective of how pupils learn and therefore learning is facilitated. This perspective is developed and supported through access to a group who share these pedagogic beliefs and which offers support through discussion or

training i.e. knowledge created and valued by that community. However, different groups of educators are not necessarily aiming to provide inclusive experiences and it is easy to transfer existing exclusionary practises to 'in-world' situations, for example the creation of "virtual grammar schools". The Schome group explicitly set out to use a virtual world as a site for the exploration of new pedagogies (Schome Community, 2007). As well as identifying real world social barriers to access they found that there was a pressure from funders to impose existing real world teaching practices. However, in the virtual world itself the young people themselves were able to subvert these (for example the use of formal induction sessions) and began to gain a direct involvement in their learning, influencing the manner and topics which they learned to a considerable degree. The learners were clearly part of developing the pedagogic community rather than being the recipient of practices and outcomes. For disabled learners also virtual worlds have the potential to give greater control over the way they are taught, if they are enabled to have equal access in the first place. There are now many examples where disabled people are owning and developing virtual sites. However, these are often focussed on 'education about a disability' or a space for a group to meet. There is some evidence to suggest that disabled (users and the educational communities are assumed are distinct in virtual communities (Carr, 2008). Innovative inclusive spaces might therefore be predicted to develop outside of the 'designated' educational ones. Therefore a key (research) issue will be the place and power of disabled learners in developing virtual pedagogical communities.

Social engagement refers to learning experiences in which social engagement is held to be the site for the creation of knowledge. There is a large body of empirical evidence to support such approaches (Howe and Mercer, 2007). These emphasises the friendship and social relations aspects of the classroom as important in their own right, and there is evidence that they can also achieve significant 'academic outcomes'. Avatar mediated interactions can facilitate social verbal and non-verbal communication skills (Babu et al, 2008) and this suggests that real world social pedagogical approaches might become useful virtual world pedagogies. For example Interloc is a virtual/text environment where learners interactions are scaffolded by a vocabulary which they choose from within a dialectical discussion 'game' (Ravenscroft and McAlister, 2006). This would transfer well to a larger scale avatar populated worlds and could be particularly helpful in scaffolding the interactions of people with learning difficulties. Another dialogic approach (Ravenscroft, Wegerif and Hartley, 2007), locates its merit in enabling the learner to consider other people's perspectives and roles. Virtual worlds are an ideal environment for such activities, and can help to mediate and influence children's use of language, provide an opportunity for them to try out alternative social interactions and reflect upon their feelings and thoughts (Sheehy and Ferguson, 2008). Successful inclusive pedagogies use, monitor and develop the learners' social interactions as a way of developing, or facilitating the development, of knowledge. Virtual worlds allow the collection of more 'learner data' than has been possible in the traditional classroom (Sheehy, Ferguson & Clough, 2008) and this could be used to inform the application of these social constructivist approaches with a finesse not previously possible. Within this approach the student would be able to review and reflect on their own interactions, problem solving and knowledge within a particular curriculum area or social context.

For some learners, for example those with Autism, the social environment of the traditional classroom is challenging. Research on Brigadoon, an island in Second Life, suggested that this type of environment had some beneficial features for autistic people (Biever, 2007). The

relative *lack* of potentially misreadable subtle facial communication and also a slower pace to social interactions, gave more time to understand comments and formulate appropriate replies. The social interactions, and therefore the potential use of social pedagogies, become more accessible for these learners in virtual environments. However, this assumes a text based communication through relatively simple avatars. Both of these aspects can change.

Avatars, in different virtual worlds, can communicate via text, voice, signing (Adamo & Villiami, 2007) or symbols (Sheehy, 2003). In theory this should create the possibility of more inclusive communities. However, in the larger worlds there is often conflict outside of the 'classroom'. For example the status of non-voice players in World of War craft (Sheehy, in press) or the relative neglect of the Deaf communities position regarding the roll out of Voice in Second Life (Carr, 2008). At a more fundamental level some learners may be denied access to virtual education because of the perceptions of their carers and guardians regarding the status of virtual social interactions. For example it has been suggested that virtual worlds have significant potential for supporting young adults with severe learning difficulties: rules and abstract concepts can be made comprehensible through additional language and symbol support, skills, such as navigation, can enhance real real-world abilities (Rose, Brook and Attree, 2001). At a recent workshop some young adults who had never visited a virtual world (Second Life in this case) successfully used their avatars to communicate, create objects and play. In the post session debriefings they mentioned that they had enjoyed themselves, would like to do this sort of thing again and how it would be a good place to meet up their friends. However, their carers saw this type of virtual world as being a 'play activity' with therefore little educational potential, and as an unnecessary distractor from 'fresh air' exercise. The pedagogic community which informed these views would not prioritise, or include, virtual environments in their educational programmes. The young peoples engagement with such worlds are likely, as with the millions of other young people, to occur outside of their 'designated' educational experiences. For example, regarding World of Nardi, Lye and Harris, (2007) note.

No teachers, coaches, or curriculum explain the game. None of the familiar supports of formal education are in evidence—but no one fails World of Warcraft

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A third factor, flexible modes of representing activities, refers to the affordance of presenting activities and interactions through different modalities: visual text-based, verbal or kinaesthetic. Being able to manipulate the modality of teaching materials can act to improve curriculum access for a diverse range of learners. For example the 'Accessibility In Virtual Worlds' project used an Active Worlds environment in which items were described and their positions indicated by sound, enabling navigation by blind students and such approaches are beginning to emerge allowing blind students to interact with sighted peers in virtual worlds and games (cited in Sheehy, in press).

In real world classrooms manipulating objects to discuss and solve mathematical problems allows learners to share and 'see' the thinking of others. 'The teacher can have a direct view of the strategies and heuristics used by learners in solving problems and thereby monitor, or facilitate, their progress in mathematical thinking' (Sheehy and Rix, in press). This is also possible in-world and learners can present their work and ideas in different ways, through multimedia presentations (Schome Community, 2007).

However, virtual world modalities are typically limited to visual and auditory modes, although haptic approaches have been being developed for some time (Colwell, 1998). For some learners, such as those with profound and multiple disabilities, kinaesthetic options are needed. The limitations of virtual environments are considered in the TEALEAF framework (Teacher Embodiment and Learner Affordances, Sheehy in press). This maps out four areas which describe the possibilities of different teacher embodiment and virtual learning environments. So far we have discussed only one of these four areas—a virtual teacher in a virtual environment. However, another ‘area’ of TEALEAF is that of virtual tutors in physical spaces.

‘Sam’ acts as a virtual peer, in reality he is a projection onto a surface within a child’s classroom. He is surrounded by real world objects which the child manipulates. Sam is programmed to respond to the child’s behaviour. For some disabled children, Sam has more successful than their real life peers in helping them develop contingent social responses (Casell and Tartaro, 2007). This type of situation has some advantages of using an avatar—it can be given the ‘patience and reliability of an AI bot’ (Sheehy, in press) moreover the learner can interact with real world tactile objects and engage a fuller range of senses. Moving further into the application of augmented reality allows learners to work and collaborate through virtual or physical objects, and gives the option of communicating through natural expressions, or avatar mediated ones. Goldiez (2004) highlights how adding augmentation to the real world decreases the difference between virtual and augmented experiences. This not only increases the sensory experiences of learners but also enables some of the scaffolding potential of virtual worlds to directly support real world activities and potentially to be accessible on demand. Initial work by Richard (et al, 2007) suggests that children with learning disabilities engage well with AR and are motivated in using it. This raises the question of which platforms to use. In research that examined the experiences of young people designated as NEETS (not in education, employment or training) a lack of use of computers was indicated (Sheehy and Kumrai, 2008). However, this might not apply to mobile phones or internet enabled game consoles. Recent developments have shown that AR via handheld devices can provide engaging educational experiences (FUTURELAB, 2008) and it could be that these are the more accessible than currently expensive ‘legacy platforms’ of computers and their real world affordances enable more flexibility in interacting with materials.

Lastly, there is the issue of the authenticity of the learning activity. This relates to situations in which an activity is meaningful to the learner and which might also reflect a ‘real life’ skill or activity. Virtual activities may also be authentic in terms of knowledge valued by the ‘pedagogic community’. The Schome group pilot project, working in the Teen Grid in Second Life, developed a range of in-world activities that could be seen as authentic practices within the scientific community for example running physics experiments, discussing governance and submitting proposals to create a satellite based measurement of Earthshine (Schome Community, 2007; Schome wiki, 2008). The virtual environment facilitated the development of these authentic activities, and they would not have occurred, for the participants, without it.

In the sessions with young adults with severe learning difficulties, mentioned previously, our discussions suggested that they saw virtual worlds as being ‘like a play station game’. They had experience of these games and being able to ‘do’ them was valued by them. The potential to communicate with friends online was similarly a real part, or desired part, of their lives. To see their experience as ‘irrelevant play’ would be to misunderstand the place of

similar activities in their lives. What seems to be missing from is the concepts that 'playing games' is an authentic activity for millions of people. Virtual world skills may be relevant to developing information age skills (Sheehy and Ferguson, 2008), but they can have authenticity in their own right. This view raises an important research issue. Virtual worlds can also give access to representations of real world experiences, to which learners are denied. This denial may be because of the fear of risk by carers or due to access difficulties (Cooke, Laczny, Brown and Francik, 2002). In virtual worlds learners mistakes are unlikely to have dangerous consequences, hence their established use in a range of training activities for high risk real world roles. In these professional settings virtual experiences are a precursor to real world involvement. For disabled and disadvantaged groups the question is raised here as to whether such 'virtual reconstruction' will be used to open up educational opportunities, provide authentic alternatives, or further a denial of access to real world inclusion.

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Mathematics in a virtual world: How the immersive environment of Second Life can facilitate the learning of mathematics and other subjects

Breen Sweeney

Keywords: Second Life, Mathematics, Immersiveness, RuneScape, Eye tracking

Abstract:

This paper examines specific aspects of learning in multi-user virtual environments, with particular relation to the teaching of mathematics. The author held several one-hour tutorials in the virtual social world Second Life, with students studying an Open University course in pure mathematics. The tutorials occurred in 2008 and took place in a variety of virtual settings. Telephone interviews and log analysis were used during the research. Eye tracking hardware was used in a pilot study to investigate how volunteers were immersed in Second Life, by comparing it with the role playing game RuneScape.

The research addressed whether such learning is effective, what an efficient student-to-facilitator ratio might be, and whether the virtual environments affected learning. The eye tracking study gave quantitative results which allowed comparison of how immersive the experience was for the different worlds.

The results suggested that Second Life is a valid mechanism for learning, a low student-to-facilitator ratio is desirable, and that the environment does have a noticeable effect. It was found that RuneScape was a more immersive experience than Second Life, and that eye tracking might be a valid method of quantitatively measuring immersion.

Introduction

Increasingly virtual worlds are being used for education. This paper describes tutorials held by the author with mathematics students in the virtual social world Second Life. Qualitative data was gathered to investigate how students learn in such a world, and different environments were used to investigate their affect on learning. An eye tracking pilot study was carried out which aimed to provide a quantitative measure for immersion in virtual worlds, by comparing users in Second Life and in the massively multi-player online role playing game RuneScape.

The learning experience

There are many theories of student learning. One influential theory suggests that the student goes through an experiential cycle where abstract concepts and generalisations are formed, these are tested in new situations, which leads to concrete experiences, followed by observations and reflections, leading into the formation stage again (Kolb et al., 1991). Adopting this as our model, when students attend a learning session it will be expected that they will participate in some of these stages. Therefore anything that helps the student concentrate will aid in the process, whereas conversely anything that disturbs the student will hinder them. Thus immersiveness is a key aspect contributing to learning.

Much work has been done on studying virtual worlds and other online environments. For example Tisdell et al. (2004) discuss the literature on online learning, before going on to describe their own action research on student cohorts. Specific research in virtual worlds has also been carried out to discuss learning in these worlds. Delwiche (2006) used the game Everquest and also Second Life to teach research methods, game design and cyber culture.

The educational community seems divided. Some educationalists are sceptical about using virtual worlds for learning (Foster, 2007). Others however are enthusiastic, and feel it is possible to achieve ambitious educational goals (Oishi, 2007).

In a virtual world the surroundings may or may not look like the real world. As well as investigating the effectiveness of virtual world learning in general, this paper examines the hypothesis that the environment in Second Life can have an effect on student learning.

Immersion in virtual worlds

The terms 'immersion' and 'immersiveness' are used to describe the degree of involvement in a virtual world, and the terms are usually applied to games. Although their meaning is intuitively understood by participants in those worlds, as explained by Brown and Cairns (2004) there is no agreed definition of the terms, and they attempt to develop a grounded theory of immersion, based on interviewing gamers to learn about their experiences. Other attempts have been made to quantify immersion using specific tasks, or eye tracking techniques (Cairns et al., 2006, Cheng and Cairns, 2005).

Eye tracking hardware can determine where a user is gazing at any time and hence record eye movements. When this is used to test immersiveness the usual approach is to see if the nature of the eye movements are altered as a user becomes more immersed (Cairns et al., 2006). This paper discussed an alternate use of eye tracking techniques. As a user progresses through a virtual world they are presented with a range of stimuli, and will look at various parts of the screen. The second hypothesis put forward in this paper is that the more immersed a user is, the more they will concentrate on their own avatar, rather than look at other areas of the screen. This is because they will be more interested in what their own avatar is doing, and identify with it, rather than looking at other activities or objects in the surrounding area. It was considered that while this may be hard to test objectively by examining Second Life alone, a comparison might be made between Second Life and RuneScape, to see if there were any differences observed, as a first step towards quantifying whether users became more immersed in a game or in a social virtual world. How this was done is described later in this paper. It was also considered whether the average fixation duration might differ between worlds.

Learning in Second Life tutorials

Six volunteer students attended a series of learning sessions with the author. The students were studying an Open University second-level course in Pure Mathematics (M208), on the presentation which occurs from February to October 2008. The course covers introductory material, linear algebra, group theory and real analysis. Tutorials took place on the Second Life islands of SchomeBase and Open Life.



Figure 1 Students attending an orientation meeting

The in-world voice facilities were used, and conversations controlled via turn-taking. The students could use text-chat to ask questions or say they wanted to speak. Three orientation meetings were held, followed by seven mathematics tutorials. The initial sessions were deemed essential to allow students to overcome technical problems and learn about the environment. Written material was circulated beforehand for the mathematics sessions, and the author then discussed the material during the tutorials.

To examine the first hypothesis and investigate how the environment affected learning the tutorials were held in a variety of settings. These were two different platforms in trees, one which had couch-like seats, a purpose-built classroom and corridor in the sky, the same room with the roof removed, a purpose-built chessboard room with wall and chairs, and a bandstand.



Figure 2 One of the locations used for tutorials

A forum was set up using the university's First Class system, and agendas and minutes of each session were posted for the students and interested staff to view. A personal log was kept of comments made and lessons learned, in particular with relation to the practical and technical aspects of teaching in Second Life. Three students not currently on the course sat in on some sessions, but were not included in the analysis. Four of the students then took part in telephone interviews, so data could be gathered. They were then offered a book token as thanks.

Evidence gathered from the students

It was broadly the case that three students were positive and one negative. All agreed that Second Life had advantages similar to other online learning mediums.

Student 1 said: *'With the orientation I could log on to Second Life and get to somewhere within 3-4 minutes, so within 5 or 10 minutes of coming home I could be there ready for a tutorial. Now normally at face-to-face tutorial I would have travelled an hour into [town mentioned], and then parked the car etc., got there and all of that time's invested in it before you actually sit down and go through it, ...'*

Student 2 said: *'They were quite easy to get to, we didn't have to commute. It was quite easy to get a meeting together. ... I'm not able to get to the face-to-face tutorials because of my family commitments, and the amount of travelling that it would be.'*

Student 3 said: *'It's got its advantages there's no commute time, saves travel costs for both students and tutors For a student it's easier to attend than a live tutorial. I think it's got a lot of potential for the future.'*

Student 4 said: *'I've been to tutorials, face to face, on other courses, I've found them very helpful, em, but, usually they're kind of quite a way from where I work ... an hour's travel either way ... whereas online, it's there.'*

The students thought that it is a very efficient way to learn.

Student 1 said: *'No, I think it went well. It felt much more like an interactive tutorial. It was really quite interesting to talk to the other folks before or after, or during. I think it's very efficient so that the time spent was spent very well, and for me it kind of opens up the possibility of kind of more frequent tutorials, or conversations that you can have without investing a hell of a lot of time. Much more efficient use of time and maybe a possibility of more frequent interactions which I think is something that would be really beneficial to the OU type of student'*

Student 4 said: *'[The tutorials were] very useful. Sometimes it's, em, very useful to actually hear someone explain something, or explain something in a different way, rather than just reading text.'*

The benefits of the initial orientation meetings were agreed upon. Despite this students raised some negative aspects, mainly to do with the technological barriers. Most of the tutorials did suffer delays as the author helped students overcome problems, either with their equipment or arising from lack of familiarity with the world.

Student 1 said: *'I remember trying to navigate using the co-ordinates and I couldn't quite get it, and I know what I was doing wrong now, I was typing the co-ordinates without having clicked on the map first, so it was just simple things like that,. ... I did try a headset but it wasn't working on my system. It was the headset that actually came with the same set up, and as soon as I plugged it in I could speak but I couldn't hear, so I stopped fiddling with it and said, look I've got a system that works just leave it.'*

Student 2 said: *'There were various things about Second Life that I thought got in the way of the actual tutorial. What I really needed was to actually see some worked examples, and it's very difficult to do that because there was no way of writing things down for us all to see. ... The other thing was it was very distracting if I'd been familiar with Second Life in the first place it would have been a lot easier, but having to learn the Second Life skills on top of the participating in a tutorial was a little bit too much. ... The other thing that I found difficult was I had earphones but they didn't work very well, ... In order to devote the time to doing that I would need to see a significant benefit from Second Life itself, and as I say I cannot see a benefit of Second Life over for example using [commercial instant message program mentioned], and we all just sit around and messenger one another, because again some people were typing rather than speaking because they didn't have the equipment, or indeed something like a telephone conference would have been far simpler, and of more benefit than Second Life was. I can't see that Second Life actually gave anything.'*

The social aspects of Second Life were considered in a positive light.

Student 3 said: *'Well it seemed quite relaxed to meet in Second Life. It was probably easier to be relaxed than maybe in a live tutorial. ... I'd say easier in Second Life than real life. ... Well less scary I suppose. You've got a representation of yourself that you've put in there which is not necessarily your real live self. You can present yourself in different ways.'*

The students agreed there was tremendous potential with this form of learning, even the student who had been critical.

Student 1 said: *'Yeah, and I think one of the important things actually was getting used to the other people as well, meeting the other folk and just interacting a bit. That was really good, and it's really quite different from a face-to-face tutorial. One of the things that I find, especially during those orientation ones is we spoke to each other a lot more, and I remember after the tutorial a few of us stayed behind just to talk through a few things. That was really good, whereas some of the face-to-face tutorials we have, people are kind of quite keen to get off at the end, and you don't necessarily chat to people as much, so I thought that was good. ... I thought it would be very useful to see if you could use that [screen in the learning and teaching space] almost for some of the geometry pieces for instance, you know where you need to see the pieces turned or reflected or whatever, that would be quite useful. ... Yeah, 3-D objects I think would be quite useful especially when you need that visual aspect in geometry'..*

Student 2 said: *'... the other thing that Second Life would give, particularly for Open University students, if you'd not been in a classroom for a long time, or if when you were last in the classroom you were very shy about putting your hand up and making comments, Second Life . . . it's like a second layer between you and doing that isn't it, cos it's not you putting your hand up, it's your Second Life personality, so you can actually be somebody different.'*

Everyone was positive about the future of learning in Second Life.

Student 2 said: *'I think that we're definitely moving in the right direction, and I'm glad that the Open University is willing to embrace these things, even on an experimental basis to see what is available to us. I've always been very impressed with the different media that comes with my package every time I get a package. in January there's always DVD's, and CD's, it used to*

be tapes and videos and things like that, and I think that's fantastic that they're using so many different formats, because people learn in so many different ways, and I think 'yeah' that's the way forward to keep doing this.'

How the Second Live environment affected learning

When the students were asked about the different environments, in general their opinion was that the differences didn't have a great effect.

Student 1 said: *'I quite liked the tree house. ...Silly reason for that is that going back to primary school it's quite nice sitting outside doing various things, and it kind of reminded me of that, and I thought this is kind of fun, it's good. ... The one with the roof open was quite interesting. As you said last night at that time as well we went through a complete day, where we had the dawn and then watched the evening and the stars came out. ... Yeah, it just reminded me of a sort of bar outside of a hotel you know where you sit in an evening. That was OK actually, but there is something about somebody sort of standing around who you're not quite sure who they are, 'Oh, who are they then?'*

Significantly however none of the students likes the classroom without the roof removed, because it was closed and had no windows. Two did admit to being mildly claustrophobic in real life.

Student 3 said: *'I think the only one that I actually disliked was the M208 classroom with the roof on. It just felt very weird, it was like going down into a cellar it was very closed in. It was just, er, I just found it quite unpleasant. It reminded me ... that I'd just sort of gone down into a dark cave. Once you removed the roof, once you got into the corridor it was pretty much the same as the others. ... I don't like small spaces without light, so that probably had an effect on it.'*

Student 4 said: *'I didn't like the one we had the roof on. ... I'm a bit claustrophobic ...'*

The student who was mainly negative was more affected by the environments than the others.

Student 2 said: *'I felt the actual surroundings were distracting, and detracted from the lesson considerably. I mean they were very pleasant surroundings. It would have been nice to have been there in person, ...'*

Conclusions from the student survey

At the very least a virtual world such as Second Life can offer the same advantages as other forms of online instruction, although the technological barriers at present will preclude some students from participating. These difficulties and the learning curve required to engage with Second Life means that at present a low tutor/teacher to student ratio is desirable, perhaps about five students to one facilitator.

While the nature of the environment within a virtual world doesn't have as much effect as in the real world, the responses clearly show that it can affect learning, which is more evidence that there is a genuine 'sense of presence' in virtual worlds. The conclusion is that the first hypothesis is supported, and the design of the learning environment is an important consideration in virtual worlds.

Carrying out the eye-tracking pilot study

It was stated earlier that as users become more immersed they may concentrate on their avatar and ignore other elements of the virtual world around them. To test the hypothesis, and to make comparisons between Second Life and the game RuneScape, a pilot study was carried out with six Open University staff. All were adult females, and none were familiar with either of the worlds, although participant five had played some other role playing games.

A male and a female Second Life avatar was created for the experiment. To comply with RuneScape regulations and to ensure each person had the same starting point in the game, individual avatars were created and brought through the game's orientation tutorial, and placed in the same position in the game world. This was important because in an role playing game as a player progresses their avatar's characteristics change. Each participant were then asked to log into Second Life and carry out a number of standard tasks, such as navigation, teleportation, changing avatar appearance, and so on. After a break the participants then carried out standard tasks in RuneScape, such as navigation, fighting monsters, fishing, starting quests, and so forth. The sessions lasted about thirty minutes. Due to technical difficulties the RuneScape session for participant 1 ran slowly, but it was decided to include the data, as without it the results are still broadly the same, suggesting that the technical issues didn't affect the analysis.

The test was designed to get people engaged and immersed in the tasks as soon as possible, as the aim was to compare the different worlds rather than study how a person first encounters them, or how they might overcome obstacles. To this effect the instructions were called out, and participants were free to ask for help if they didn't understand anything. Each participant would of necessity carry out slightly different activities, but the verbal instructions ensured they approximated each other's tasks to keep comparisons fair.

A Tobii T60 eye tracking monitor was used for the pilot, connected to a purpose-built computer running Windows. After a calibration exercise, as the user sits and controls the avatar, the Tobii monitor fires lasers and tracks the position of each eye's gaze on the screen every 16 or 17 thousands of a second. An average gaze point is worked out. When the eye's gaze moves across the screen this is known as a saccade, and the person is effectively blind during this movement (Jennett, 2008, pp.648-649). Although the position of the eye's gaze changes fractionally all the time, when the gaze has been in the same area for some time, this is called a fixation. Hence a longer average fixation time (or equivalently a fewer number of fixations in a minute) means the eyes were focussed on fewer points on the screen, whereas a shorter time means the eyes were moving about and observing more parts of the screen.

The participants were also recorded on camera from the side and the front, so they could be combined with the video of the screen and a qualitative analysis could be carried out later (not reported in this paper).

The Second Life screen was divided into the top controls, the bottom controls, and the game window. The game window was further divided into a top and bottom region, and a left, central and right region. The RuneScape screen was similarly divided into the top browser controls and advertisements region, the bottom controls, and top, bottom, left, middle and right sections of the game window. The size of the regions where chosen so that the center region was proportioned similar to the 5:4 screen resolution and such that if a participant's gaze was

directed at all parts of the game window equally, they would spend twenty percent of their time focused on the central region (to within an error less than 0.2 per cent).

The raw data from the sessions (TSV files) were placed in MS Excel so the average fixation duration could be determined, and in MS Access Database, so SQL procedures could be developed to analyse the data, and extract what percentage time was spent in each part of the screen.

Results of the eye tracking experiment

The results for average fixation duration are shown in table 1.

Table 1: Comparison of Fixation Duration

	Average fixation duration (seconds) in Second Life	Average fixation duration (seconds) in RuneScape
Participant 1	0.3853880661	0.3661889843
Participant 2	0.3088540512	0.2881853435
Participant 3	0.4757050118	0.4554075305
Participant 4	0.2382597320	0.3810752630
Participant 5	0.5068433515	0.4191527130
Participant 6	0.2188112158	0.2421717268
Overall	0.355643571	0.358696944

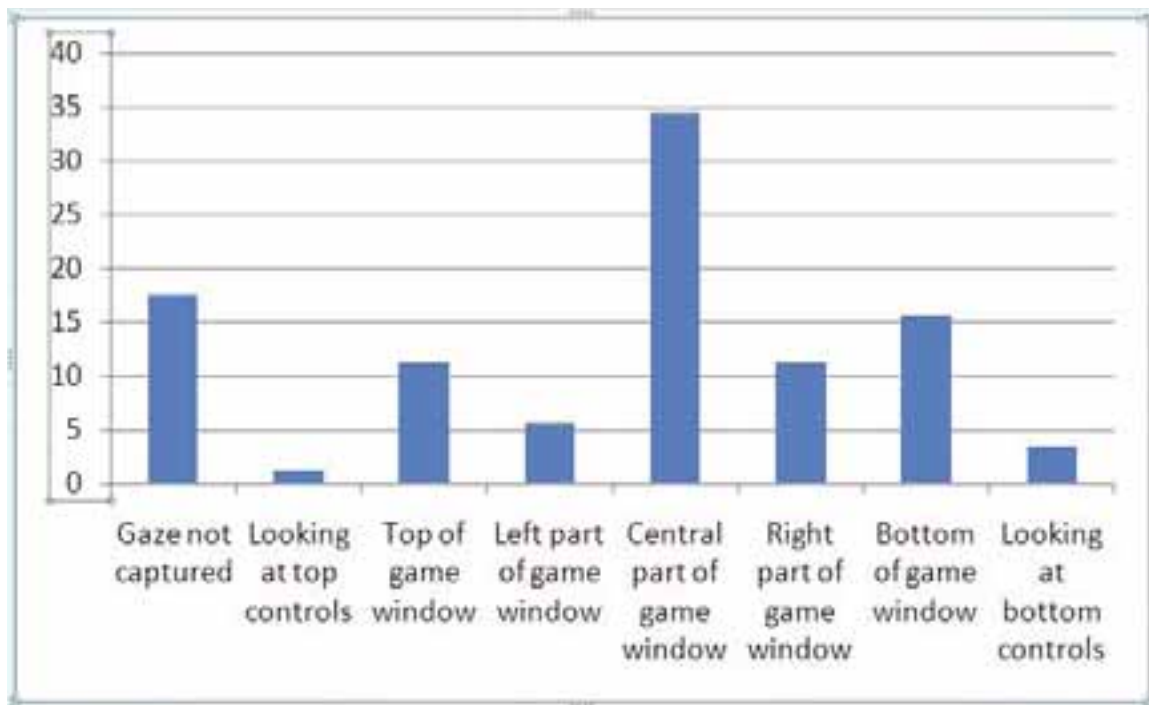
From this data we can see that the fixations in Second Life were longer for four participants, but shorter for two, and the final averages were very similar.

The percentage times spent in various areas of the screen are shown in table 2. It was difficult to determine the exact position of the controls, so it is possible some small amount of time spent looking at the controls was attributed to time spent in the game window. However as the figure we are looking for is time spent in the centre, this would not affect the overall conclusions.

Table 2: Percentage time spent in screen areas

	Second Life Percentage of total area	RuneScape Percentage of total area	Second Life Percentage of game window	RuneScape Percentage of game window
Gaze not captured	17.54832825	21.27215494		
Looking at top controls (Second Life) / Browser/Ads (RuneScape)	1.145668877	2.046574464		
Top of game window	11.14461636	10.49035438	14.2918846	13.83749015
Left part of game window	5.649756166	7.718010652	7.245261796	10.18058041
Central part of game window	34.38094236	40.69165337	44.09020865	53.67505538
Right part of game window	11.19496193	10.68237491	14.35644789	14.09077826
Bottom of game window	15.60835702	6.22871314	20.01619706	8.216095809
Looking at bottom controls	3.327369049	0.870164147		

This data is graphed in fig. 3 and fig. 4.

**Figure 3** Second Live overall percentage totals

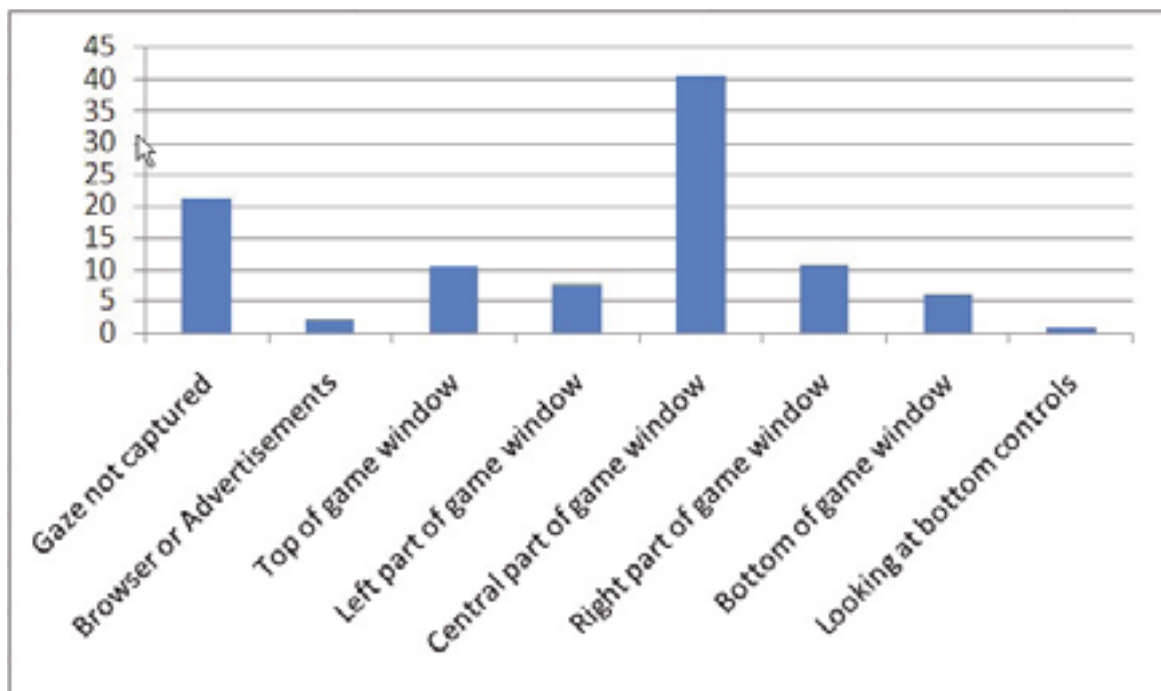


Figure 4 RuneScape overall percentage totals

In RuneScape the avatar is in the centre of the game window, and under normal circumstances the focus of the Second Life avatar is focused there. Hence it is to be expected that the gaze would be in this area more than twenty percent of the time. Nevertheless the validity of the experiment depends only on a comparison between the worlds. In fig. 5 and fig. 6 we can see the time spent in the central area as a percentage of the game window, which was 44% for Second Life and 54% for RuneScape to the nearest integer.

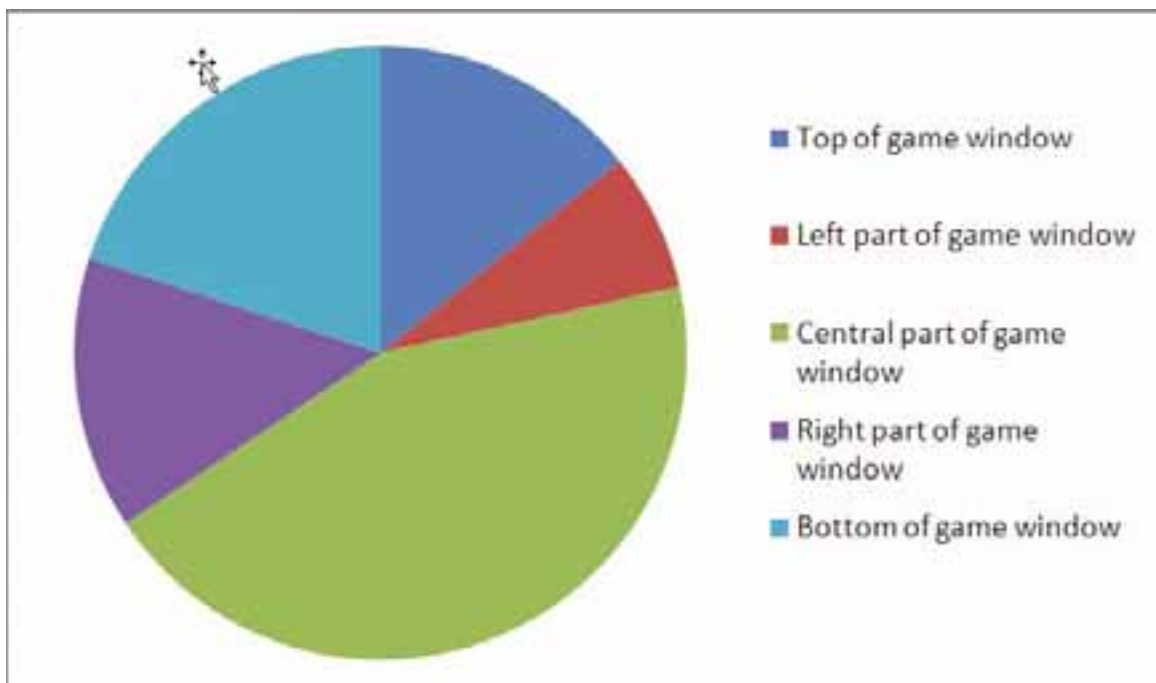


Figure 5 Second Live game window percentage totals

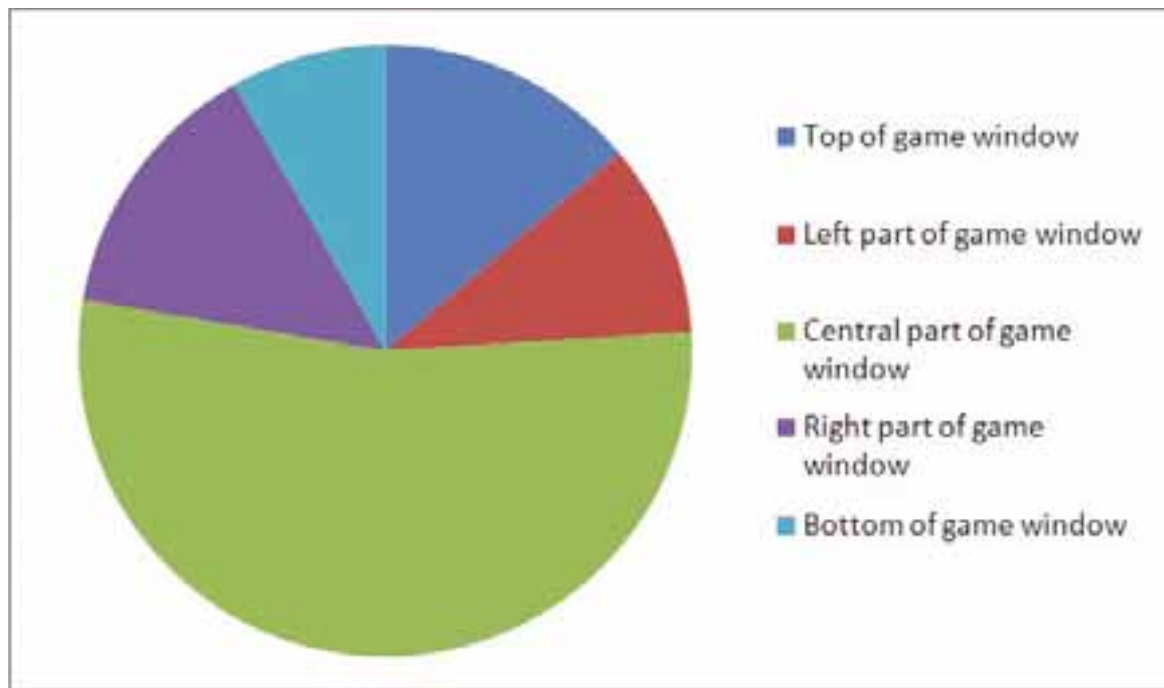


Figure 6 RuneScape game window percentage totals

Conclusions from eye tracking

The similarity in average fixation duration between the two worlds suggests this test was inconclusive. The overall percentages also show a similar pattern for each world. However the percentage time spent in the central area of the game window did show a significant variation.

This supports the second hypothesis, that differences may be measured in this manner, and suggests the participants were more immersed in RuneScape than in Second Life. The small number of participants along with the different natures of the worlds means the support must be considered weak.

Overall Conclusions

The students' experience as reported in this paper has shown evidence that Second Life is a useful learning environment, although technological barriers are currently an obstacle to be overcome, and a low student-to-facilitator ratio is desirable. Second Life also holds the promise of using other tools and techniques in future which can increase student understanding, particularly for the teaching of mathematics.

It is difficult to objectively define and measure immersion in virtual worlds, however examining the percentage time spent in various areas of a game window may provide one such quantitative method for measuring immersiveness.

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Embodiment in 3D virtual retail environments: Evolving the perceptions of collaborative art and design research as avatars

Andrew Taylor and Rosemary Varley

Keywords: Second Life, collaboration, design, retail, education.

Abstract:

Being a fashion design lecturer and a fashion retail marketing lecturer, we were, until recently working on the same courses, in the same open plan office. Academically we had also been distinctly, yet independently aware of the debate surrounding the hyper un-realistic and non-sensory interface of online 2D shopping for clothes spanning the last decade. Until the advent of Web 2.0 interactivity, the customer's inability to actualise, and communicate with both the product and the brand had been the main inhibitor to online shopping.

Following a paper presented to the subject area research forum about 3D fashion design research in Second Life. The authors met and chatted for the first time over coffee. We discussed the cultural and digital convergence happening within design and retail business. We acknowledged that in our polarised module delivery of design/retail content on the supply chain, we were missing out on the opportunity of teleporting into online 3D virtual worlds to do new research as a team.

From this basis we agreed to create space and collaborate. By applying an experiential, exploratory and real-time approach to research methods we began investigating Second Life in collaboration. We aimed to explore main fashion brands with established virtual 3D stores, and intend that this research will support next stage collaborative teaching integrating both design and retail marketing. In conclusion the paper provides a context for collaboration amongst art and design academics. The research is an attempt to inspire 'non virtual' lecturers into working together to translate the tacit qualities of the physical into virtual design, making, buying and merchandising experiences for increasingly virtually tech- confident undergraduate art and design learners in 2008/09 and beyond.

Introduction

This paper reports on an exploratory research investigation that has grown out of a rare collaboration between a design academic and a retail marketing academic in the Design Business subject area, (Design Business was recently devolved in July 2008 and merged into a broader school profile of Fashion and textiles courses in the Department of Design) of the School of Art, Design & Architecture at the University of Huddersfield. The central focus of this paper is the investigative study of fashion brands in the online 3D virtual environment Second Life for teaching and learning development. However, it is the evolving design and retail collaboration between the two academics that is emphasised as guiding this process throughout the paper.

The Design Business subject area had previously provided a suite of courses offering business orientated courses within the School: BA (Hons) Fashion & Textiles Buying/ Management/ Retailing; BA (Hons) Fashion, Media and Promotion and BA (Hons) Advertising Media Design Management. Earlier research papers on 3D virtual environments (Taylor and Unver 2007,

Unver and Taylor 2007) had been presented to the Design Business subject academic team resulting in a fruitful discussion of the potential value of using this environment for teaching and learning in Fashion & Textiles Buying, Management, Retail and Fashion Media and Promotion. The research collaboration began because we believed there was in particular, a real need to investigate the phenomenon of increasing retail presence of fashion brands in Second Life, both for teaching and learning input and design business pedagogic development.

The focus of this paper is an evaluation of using an avatar, as a virtual customer to experience shopping in mainstream fashion brands within the online 3D virtual environment Second Life. The recent proliferation of research on virtual fashion design and online retail presence compelled us to immerse our physical selves and investigate online shopping in Second Life, through the experience of being avatars. Adopting an experiential, exploratory and fun attitude to our research, we teleported into window shopping and browsing at the virtual 3D stores of fashion brands in Second Life during typical UK prime time Saturday afternoon shopping and buying hours.

A definition of a virtual body: the avatar as a collaborative tool

The word avatar has several meanings which require clarification; originally, it is an ancient Sanskrit word *Avatara* meaning “the descent of God” or simply “incarnation.” In English language, the word has come to mean “an embodiment, a bodily manifestation of the Divine.” However, in virtual terms, in 1985 on the computer game series *Ultima VI* the term “Avatar” was introduced as the player’s visual on-screen in-game persona which could also be customized in appearance. (Wikipedia, 2008)

As a potential tool for collaboration and communication, the avatar is an instrument of user-expression and individuality. The more it can reveal the intentions, emotions, and thoughts of a user, the more powerful it is. (Ventrella, 2005) Avatars are now widely accepted as the virtual extensions of ourselves, and this has resulted in a population boom of avatars. On attending the ‘Virtual Worlds conference 2007’ Breck, (2008) was apparently shocked to learn that there are more avatars in web space than there are people in the USA.

Avatars are widely available to acquire or purchase from numerous online brands and we, the consumer are avidly encouraged to create and populate virtual spaces with them. At the start of the collaborative strategies team blog, Coleman (2006) states that,

“Those 15-25 year olds that every online marketer seems to be targeting in the consumer space are a generation that grew up with computers. This generation is willing to spend real money on ring tones, wallpaper (almost a billion dollars in 2005) and now avatars.” (Coleman, 2006)

Humans living, working, playing and shopping in Second Life interact with each other through their fully three dimensional motional avatars, although in Second Life avatars are often referred to colloquially as “residents”. Residents or avatars can explore, meet other residents, socialize, participate in individual and group activities, create and trade items such as virtual property or services from one another. Experimentation with all aspects of fashion and identity are especially popular lifestyle choices in Second Life, as Harkin attests to in the Los Angeles Times (2007),

“Second Life allows you to be a celebrity in your own lunchtime ...you can design the body you’ve always wanted, and indulge your fashionista fetish for very little money. You can be the most attractive, best-dressed version of yourself you can imagine.”

Background

In the expanding, and increasingly competitive metaverse of online 3D virtual worlds Second Life is no longer the big name on the style conscious avatar’s virtual lips. Brave new and some not-so-new virtual worlds such as Activeworlds, There, Google’s Lively, Sony Playstation’s Home, Kaneva, China’s HiPiHi, Barbiegirls and MTV’s Virtual Laguna Beach, are now attracting the diverted loyalties of millions of new customers looking for alternative out-of-body lifestyle experiences that can only be bought through investment in online virtual retail experiences.

‘Virtual retailing’ is a buzz-word of the moment in retail marketing. But what exactly is it describing? In basic introductory terms, KZero (2007) define virtual retailing as “using a digital virtual environment to facilitate and create a purchase”. There is, however, clearly far more to the evolving virtual retail phenomenon than meets the eye, as we found out by immersing our real selves into a Saturday afternoon virtual shopping research strategy. We chose Second Life because ongoing online, and journal research led us to believe that fashion brands were developing new approaches to merchandising, and we felt much pedagogic value could be derived from documenting how physical human experiences are being simulated by the mainstream brand fashion retailers setting out their virtual stalls.

Physical or virtual: blurred boundaries between worlds

The alchemic mix of the anticipation, the magazine flicking, the window shopping beforehand, the journey into the city, on arrival the atmospherics within and around stores, interacting with other customers/ retail personnel, trying on and sampling products have always been the sartorial narcotic that fuels the shopping addiction for the physical retail environment.

The communication and interaction between retailer and consumer in both virtual and physical worlds are changing and becoming more flexible; merging visual data through the promise of wider, faster bandwidths, Web 2.0 and soon 3.0, integrated 2D and 3D technologies and increased public fluency in programming language.

How you look and what you wear is über-essential to every fashion conscious person and your avatar is no exception, in whatever choice of virtual worlds you immerse yourself into. Fashion brands are making the transition from the real world to simulated environment as consumer interest in dressing and styling their avatar becomes more frantic in online 3D virtual worlds. It is Second Life however, that has the widest and most diverse range of fashion brands at the moment.

The presence of high profile brands is an indication that retailers consider branded virtual space as a strategic option worth exploring, as the investment of resources to set up the land and buildings in Second Life is not inconsiderable. This development is interesting from a number of viewpoints, but the research question we found most compelling and relevant to the conference theme is the one concerning the direct relationship between the fashion company,

representing their physically present and omnipotent brand image and product range in virtual space, together with the human consumer embodied as the avatar. We felt it was important to access that interaction personally by moving within the virtual retail spaces and encountering any programmed activity within it, and evaluating the physical autonomy and functions of the virtual body.

Methodology

The combined methodologies used during this study are descriptive observation (Robson, 2002) and exploratory experimental practice (Schön, 1987). Schön describes how the,

“Exploratory experiment is the probing, playful activity by which we get a feel for things. It succeeds when it leads to the discovery of something there.” (Schön, 1987)

The study of a new phenomenon in a new medium requires flexibility and creativity in research design, and so the research for this paper resulted in the compilation of narrative case study experiences from within virtual retail space as a avatar(s). This approach allowed the unexpected to be recorded and eventualities to be pursued in a situation that was truly exploratory. For the purposes of this stage of the research we did not feel it was necessary to find and specifically interact with other visitors to the store we were visiting in Second Life; we were recording and observing the virtual experience as we encountered it. We therefore did not need to deal with the issues of validity and reliability of data being generated through carrying out research with avatars (World Advertising Research Centre WRAC, 2007). Likewise, at this initial stage no ethical issues were presented because our experiences were as ourselves, albeit as avatars.

New experiences creating and testing a new avatar

Varley made a request to the University computing services team to enable download and installation of the Second Life software from www.secondlife.com. She created her avatar called Rosina Iwish and completed the basic tasks on Orientation island. The following Saturday afternoon both authors met in the University, sat in our separate offices, illustrated in Fig 1. and tried to use our separate PCs and struggled with the reality of the steep learning curve that stood in the way of our virtual shopping research. Immersion in the Second Life environment requires the user to have an above standard graphics card on a PC and a skill level practice acquired through practice to navigate the interface and the avatar effectively. We had not anticipated the difficulties that we would encounter, both being relatively new to being inside virtual worlds. Limitations to be considered when approaching future research are:

- Above standard graphics card and fast processing speed on PC
- Limited gaming/virtual world skills put new avatars can be a disadvantage
- Interface user know-how must be acquired through regular ‘in world’ activity.
- Sharing/networking of avatar location information through the inventory
- Practice camera tools for viewing the avatars surroundings
- Practice navigation tools for moving avatars and communicating

Andrew Taylor's desk and computer used for our collaborative research

Redline illustrates real world office path of proximity/distance

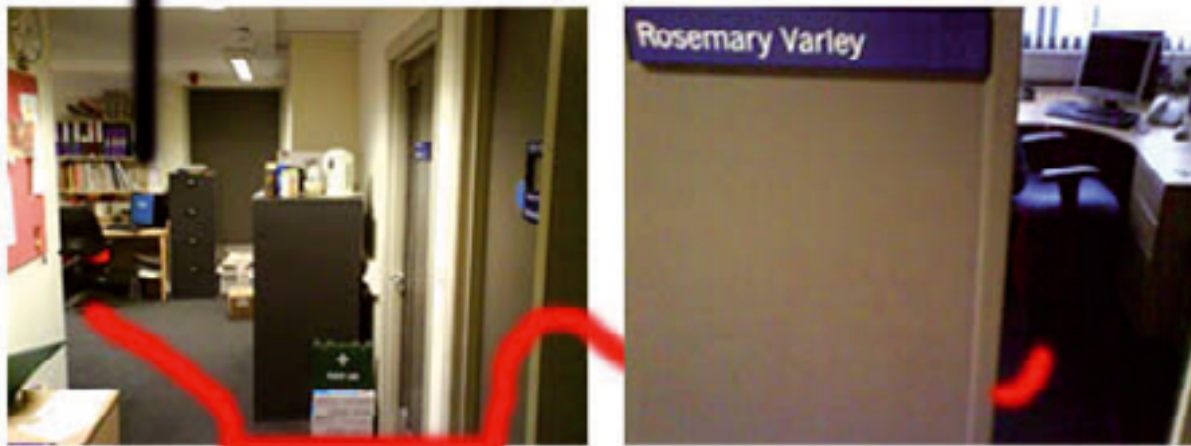


Figure 1

Progress was very slow and we were limited in the time available. We made the decision to work together on one PC shown in Fig 1, using Taylor's Ay Taov avatar; Taylor operated the avatar and Varley recorded the sequences, steps, and processes of finding and accessing the stores, and documented our initial customer perceptions. Taylor used the Second Life camera in the user interface to take snapshots of the locations, events and products. We used online blogs, and Google searches to locate the Second Life universal resource locators (SLurl's), which are Second Life location addresses on the web. Second Life does not obviously publish links to brands in the search function menu. Combining searches on online brand specific websites and user blogs was the most useful resources for linking into Second Life retail locations.

Collaborative approach to shopping in Second Life

Having been used for half a century in the context of the store as physical space, the concept of image is an important one for evaluating the branded retail environment by consumers (Varley 2005). We have applied the recommendation of McGoldrick, who in 2002 suggested that researchers may need to elaborate and sharpen their tools of image research for the digital store, and have based our assessment of the Second Life fashion stores around key store image components (McGoldrick 2002:188). McGoldrick grouped image components into eighteen general areas, of which we felt the following thirteen were the most applicable: merchandise price, quality, and range; sales personnel; clientele; services provided; promotional activity; store atmosphere, layout and personality; institutional image; visual imagery and associations. Using these constructs to provide a loose framework for our narrative we use case studies to describe the shopping/brand experiences in Second Life.

Second Life retail case studies

Yves Saint Laurent

We had located the YSL Island SLURL from a Google search, and teleported directly from this page (now no longer available), into the ostentatious pink palatial grounds of the iconic fashion French house's virtual launch of the new Elle perfume. A towering pink monolith, a simulation

of the YSL Elle perfume bottle rose into the clouds in front of our tiny avatar. Ay Taov looked very small as he walked up the grand walkway lined with neat rows of daisies and entered the pink temple of Yves Saint Laurent. Shown in Fig.2.



Figure 2



Figure 3



Figure 4

The immediate impression inside was of a heavily branded, and overpowering bright fuchsia pink space illustrated in Fig 3. The main colour theme was different shades of fuchsia contrasted with grey and trimmed with white and gold. Placed in the entrance was a large gold YSL brand statue and in the centre of what we found to be the 'ground floor' a square structure was signposted as an elevator shown in the centre of Fig. 3. A discreet sign invited the customer to take a seat although we found it hard to climb onto the elevator; several attempts later, the avatar must be correctly seated on one of the pink cushions which activated a three level floor choice and we were transported in an instant to level 1. Fig.4

Floor 1 of YSL was the perfume department, which struck us as superbly ironic as virtual worlds are obviously scentless. However, in Fig.4 as we moved amongst the virtual plinths over which bottles of the new Elle perfume were hovering in suspended animation, Ay Taov was engulfed in cascading, misted sparkles and the scentless scent was almost virtually evoked. Strangely the immersive brand experience was having an effect as our curiosity to smell the scent was activated.



Figure 5



Figure 6



Figure 7

We noticed two smartly dressed avatars. The male was behaving rather in a very erratic way and didn't respond to our greeting (both can be aspects of typical behaviour in Second life and real life!) In Fig.5 the female avatar approached and greeted us in French. We had just met our first virtual shop assistant, and she asked Ay Taov if he had been in YSL before and if he would like to be shown around the gallery. Our avatar followed her into a long, dark tunnel that, once the avatars were inside, activated psychedelic disco effects and simulated sensation of being transported into a different part of the building. We followed the avatar into a spacious pink room with a series of large format photographic

fashion 'boudoir' images displayed around the walls also shown in Fig.5. The YSL assistant explained this was an exhibition of the photographic artist Minah Pessoa. There was no other information available, so we attempted further interaction with the YSL assistant, but no further communication was offered. Perhaps this was because the avatar had 'done their job' by directing us to the gallery or perhaps explanations of brand promotion were reserved for the media and an approved audience. We returned to the research exploration of YSL, and jumped on the central elevator up to floor two, which arrived at another gallery housing a variety of untitled and unremarkable paintings and photographs.

Feeling slightly deflated, and just about to teleport out of the YSL space, when we noticed the most interesting artefact installed on floor 2 shown in Fig.6, which was a scaled down 3D model and exhibited hand drawn idea sketches of the YSL island and building development. The model of the building enabled us to share in the vision of developing YSL Island and how the brand spaces were designed. We flew into the centre of the room and landed on floor three which was empty and had no opportunity for interaction. The general impression of floor 3 seen in Fig.7, was of irrelevant and unnecessary use of unused space, with a few rows of pink seats, and a few 2D photographic Elle promotional posters.

Armani

The location where the Armani store has been established appears extremely bleak and unfriendly. In Fig.8 the store looms darkly out of the Second Life haze, imposing, dark and austere and placed on a straight street, lined with trees. From a distance, in Fig.9 the Armani shop appeared rather like a 1970's style low level urban development, but on close inspection the store was made of a virtual marble or granite, with gold door handles and canopies on the windows, just as one might expect to see in Milan. As the avatar Ay Taov approached the store in Fig. 8, high resolution photographs of models wearing this season's collection appeared on billboards along the sidewalk on the opposite side of the road.



Figure 8



Figure 9



Figure 10

The entrance to the store was relatively small and difficult to navigate, the light level inside was very low, so our general feeling was that it was difficult to find our way around. The store design was, in our opinion un-inspiring and like shopping in a maze, being constructed of straight lines, with too many walls and blocks. This feeling was exacerbated by a tight structure of square black pillars throughout, bare black partitioning walls and other box-like structures that appeared to have no purpose for merchandising in store. The product presentation seen in Figs 11-13 was limited and sparsely laid out on shelves and rails. On closer inspection of each garment detail, we found the image quality to be very low, and no obvious construction detail was added to the product images shown in Fig.12.



Figure 11



Figure 12



Figure 13

Paradoxically, we spent more time in Armani than in any other store. Struggling with navigation and did not find anything that we could interact with or purchase for our avatar. A very select number of large, high quality photographic in-store images on posters were curiously hidden behind pillars and walls, and their relationship to any product could not easily be determined. Eventually, after bumping in a frustrated fashion around the store, we found some signage, Fig.10 that was difficult to view, listing the sub-brands available on the ground floor; however there was no other signage around the layout to indicate different areas might relate to different sub-brands. We did encounter one male shopper, shown in Fig.13 who looked like he was experiencing the same navigation problems with the Armani store layout, and asked if he would like to talk and declined by teleporting out of Armani.

After a number of attempts we managed to navigate the staircase to the first floor, where we found a bold logo for Armani Red emblazoned on the wall leading to the Armani Red boutique. Also, on this level we found a book department selling books about Armani, but not much else, and due to the frustrations experienced with the navigation around all the screens and columns that were in the virtual customer's way, we were disinclined to continue the Armani shopping experience.

Reebok

Ay Taov was teleported onto '50 Cent Lane'. The approach to the Reebok building appeared to be designed to be urban, tough and cool, with quirky New York style buildings shown in Fig.14. The Reebok store is made in glass panels and has an entrance made from a concrete archway Fig.15. The entrance was clear and wide and easy to navigate; Ay Taov walked up wide shallow steps that led through the glass doors and was immediately met by a central product fixture of white Reebok trainers on shoe boxes and a sign informing customers to; "Get your blank shoes here" shown in Fig.16. Using avatar interactivity Ay Taov opened a notice of the price, (L\$50) and a pair of customizable trainers could be purchased. The action of potentially purchasing the blank trainers automatically triggered a link directly to the Reebok website (www.rbk.com) where the real you can locate the nearest store and design and buy (real-life) personalised trainers. At this point we didn't buy the trainers, but did experiment with the customisation process. In four corners of the Reebok space trainer customization and visualisation booths allowed those who had purchased the blank trainers to select from a palette to add colour in sections of the shoe. The booths also allowed a 360 degree view of the design.



Figure 14



Figure 15



Figure 16

Exploring further into the store, in Fig. 18 illustrates how we found the women's sportswear section and encountered a 'free goody bag' of attachable complimentary products. Floating hearts attracted the customer, inviting them to interact with this female-focused product promotion. If activated the free items were imported into the avatars inventory file to remind them of the experience. Ay Taov is now wearing the free 'bling'-style heart shaped diamond earrings!

The Reebok store visual displays were very similar to other virtual stores, showing an image of the product being worn by a model above the merchandise stacked on shelving. Fig. 18 shows a unique and interesting additional interactive visualisation tool. The garment the model is wearing changes colour according to the product touched by the avatar. The point of sale posters, in Fig.19 included technical product detail and a recommended retail price in L\$. Photographic lifestyle posters around the store supplemented the images specific to the limited number of women-only products on display.



Figure 17



Figure 18



Figure 19

Ay Taov walked up a flight of reasonably easy to navigate stairs (passing an interactive can of paint – that appeared to spray but didn't mark our virtual clothing !). Level one had little to show, apart from a row of seats on a square structure reminiscent of YSL's elevator (possibly one in the making for Reebok), and some fashion model photo promotional posters. Overall, the experience in Reebok was very interesting and relatively easy to navigate. The interaction was at a high level, but was quite restricted in terms of product variety.

Adidas

Ay Taov, the avatar had previously visited Adidas, and in an earlier research paper, (Taylor and Unver, E, 2007) Taylor had evaluated the store and customised and purchased a pair of 'A3 microride' trainers for the avatar; however, unfortunately at the time of writing this research the store location was not available for teleportation.

The Adidas store is built in a rocky moon-scaped area. The building is very striking, large, spacious and highly styled around space travel and space futures. Glass predominates around a white and black spacey open structure shown in Fig.20. Adidas have one clear aim for this virtual store, to market a training shoe called the A3 Microride illustrated in Fig.22 . The trainers are available in black and red, and white and silver and are shown displayed on black boxes in Fig.21. The trainer is the product with the highest quality 3D model from all the stores we evaluated. The A3 Microride product is embedded with a jump, bounce and land programming script, and the Adidas store provides a testing launch space where you can test the bounce and landing properties before making a purchase, although this is not easily signed and located in store. The shoes are a good, fun translation of a real-world product into the virtual realm, and at L\$50 (about US\$0.20), they're easily affordable for any size of avatars!

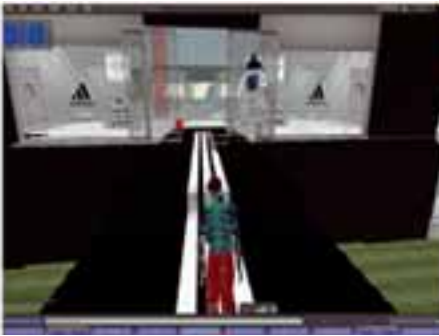


Figure 20



Figure 21



Figure 22

Bershka

As exploratory shoppers we immediately felt happy on arriving on Bershka Island. Bershka's interactive media specialists Mosi-Mosi have developed a southern European holiday paradise island within their virtual space. The Bershka store is surrounded by palm trees, an inviting azure, Mediterranean Sea, that laps against secluded islands each with their own shady beach hut. In fig.24 a billboard explains the brand structure; three spaces; a party space, the Bershka store and relaxing space.



Figure 23



Figure 24



Figure 25

A wide opening, under the large yellow Bershka sign, made the entrance easy to navigate, and the feeling of space inside immediately reflected the retail image and style of the brand, illustrated in Fig.23



Figure 26



Figure 27



Figure 28

The clothing on the rails is simulated using detailed texture mapped 2D images to suggest a 3D garment effect. In Fig. 26 a range of screen grabbed images of male and female avatars modelling a selection of the garments on the rails are displayed on the walls in each store section and impressive large format photo shoots of models are positioned around the store in Figs.25 -28 showing young human male/female models wearing the latest funkiest selections from the summer season ranges

As we browsed the store with our Ay Taov avatar, we checked different garments and found that everything could be easily bought by pointing the mouse to the garment. The avatar's hand then shoots a beam in the direction of the item and an on screen window is activated that gives a price and the model name of the item. The price for a sweatshirt was L\$25. We found the two changing rooms, Fig.28 with more large, magazine/billboard style model photo shoots. A pay desk with a cash machine and in-store promotional leaflets on the desk added to the surreal and perhaps unnecessary but intriguing attention to in-store detail.

Overall the store felt inviting and spacious, but, sadly empty as there were no other shoppers in Bershka during the time we were investigating. The visual impression was stunning and captivating making us feel happy, sociable and inclined to buy. On leaving the shop we investigated the relaxing spaces, which were designed with decking, sun shades, beach towels, beach huts, and mini islands affording the opportunity for some private space maybe to 'de-stress' the virtual shopper. Not far from Bershka we also found a 'Sloogi' booth designed also by Mosi-Mosi, offering navigational help, which we thought would be very useful for future research!!

American Apparel

We were aware that American Apparel had closed however we decided to investigate the store to experience the result of the closure. American Apparel was the first fashion brand to open in Second Life. The LA based company opened its virtual doors on Saturday, 17 June 2006 and closed them a year later. The store was designed by Aimee Webber, a Second Life resident and designer, in conjunction with the American Apparel architects (Springwise.com, 2006).



Figure 29



Figure 30



Figure 31

In Fig.29 the avatar was teleported into a dreamlike, almost surreal LA style oasis of palm-trees, flowers, waterfalls, rock and streams; and set off walking on a winding path through the sunny haze to the square glass fronted building with a huge American Apparel sign emblazoned on the store front shown in Fig.30. As Ay Taov approached the store, the area looked abandoned, and fallen-down palm-trees were scattered alongside the path. Ay Taov walked to the main entrance and in Fig. 31 looked through the padlocked glass doors into the empty store. The grey store interior had been stripped of all promotional images, apparel products and retail furnishings and appeared to have ripped wall-paper hanging from the interior walls. The green sign on the doors relays an apology to their virtual customers: "Sorry We're Closed. Learn More Here. American Apparel". A web link on the sign connects the avatar to a page on their online web page: <http://americanapparel.net/presscenter/secondlife/>. The official statement from the online American Apparel press office (Americanapparel.net, 2007) reads:

"Last summer we opened up our Second Life American Apparel store with a grand opening party with tacos, a few cases of beer, and a piñata. We didn't know what to expect or if anybody would even show up. Needless to say, it's been quite a year. We've had thousands of visitors from all over the world and made a ton of new friends, seen some interesting things from furry folks to virtual terrorism, caused a bit of a clamor, and sold some virtual t-shirts and it's been great. But we feel like our time is up here. So we're closing our doors on Lerappa Island for now. This doesn't mean we're finished with the virtual world. Stay tuned to see what we do next."

Discussion and Conclusions

Our embodiment as a avatar(s) in Second Life allowed us to experience virtual shopping in an entirely new way. Sharing and recording our experiences together allowed us to analyse both design and retail from the perspective of informed academic researchers from two different disciplines. The technical learning curve we encountered constrained our research progress, but added an experiential dimension to our work. This new type of retail space and its access via the avatar, presents some interesting suppositions about the purposes of Second Life retail presences, which seem to fall into a number of discussion themes.

By shopping and researching together as an avatar we became very aware of the challenges associated with navigating the virtual sites. Some were much easier to gain orientation and manoeuvre within than others and we suggest that the fashion brands must be exploring the relationship between their designed space and the medium of a virtual persona within their space. Mastering the programming that controls this navigation aspect will allow the fashion brands to improve the experience of browsing and exploring the retail environment. Ease of navigation was identified early as a success factor in 2D on-line retail outlets, with usability difficulties being a major source of frustration (Bowman et al, 2002, Dennis et al, 2004, Seock and Norton, 2007) therefore, the mastery of movement in the new 3D virtual environment must be a priority for the retailers, if they want customers to spend time in their virtual space.

We felt that the inclusion of changing rooms at Bershka shown in Fig.28 demonstrated consideration for the development of dressing and undressing in future virtual shops through improved 3D technologies. According to Rayman (2007), an exciting opportunity for the online world is the creation of avatars with the exact dimensions of 'players', enabling a customised try-on facility for either on-line or in-store shopping.

Our evaluation of Second Life as a desirable and popular retail location remains reserved, however we are confident that 3D virtual environments, and the avatar-persona will continue to evolve as valuable tools for on-line fashion design and retailing. In future projects fashion/textiles educators will ask students to build a 3D virtual customer according to their (students) own measurements, rather than giving the typical photocopied hand out size specification chart. This will facilitate an interactive, experiential and no doubt collaborative learning exchange. Students can then virtually upload personalised clothes instantaneously and in the shared 3D environment discuss the properties of the products and the retail brand.

Certainly, from our two different, yet now more connected academic polar perspectives, we have a clearer understanding of 3D virtual environments and the infinitely exciting opportunities they can offer for our future collaborative, curriculum and pedagogic developments.

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Difficult, Dangerous, Impossible...: Crossing the boundaries into Immersive Virtual Worlds

Liz Thackray, Judith Good and Katherine Howland

Keywords: Second Life, boundary crossing, collaboration, learning experience, diffusion of innovation

Abstract:

The use of Immersive Virtual Worlds (IVWs) for teaching and learning has been attracting increasing attention recently, and a number of universities already have a virtual presence in environments such as Second Life. Given the newness of the endeavour, there is little guidance on how to best make use of the affordances of virtual worlds, however, a number of educators are experimenting with these environments and beginning to share their experiences.

In this paper, we describe our own use of Second Life in a course designed to teach students about the creation of interactive learning environments. In our case, Second Life was used in conjunction with real life sessions as both a vehicle for teaching and learning, and also an environment in which our students could create learning experiences for others.

Moving into teaching and learning in Second Life requires crossing a number of boundaries in addition to the obvious boundary between the real and the virtual. In discussing this experience, we describe the boundaries encountered, and the opportunities they presented.

Finally, we analyse this experience from the perspective of the “Diffusion of Innovation” model and its extensions to educational contexts. Our analysis suggests that students and staff have different profiles in terms of their attitude to risk, and their focus on learning products or process, and that part of the learning experience involves helping students become aware of these characteristics, and allowing them to experiment with situations of greater risk.

Introduction

Immersive Virtual Worlds (IVWs) have gained a great deal of attention in the education community in recent years. The 3-dimensional nature of IVWs enables activities and interactions which are not possible in 2-dimensional virtual environments, and may provide a platform for activities which are not easily accommodated in normal classroom environments. Our particular focus has been on teaching aspects of subjects which might be considered difficult, dangerous, or even impossible to teach in real life for various reasons.

At the present time, there is no primer for how to teach in an IVW. Many educators are beginning to explore the possibilities and to share information about what they are doing, but all are on a journey of discovery. That journey involves utilising knowledge and experience gained from other classroom experiences and from the general body of learning theories, but it also means confronting the unknown, taking risks and developing new approaches which may or may not be linked to previous knowledge and experience.

Not only are IVWs unfamiliar territory for teachers, students are also being asked to engage in a new learning experience which may present unexpected challenges and involve a degree of

risk taking. The diffusion model (Rogers, 1962) may be useful in examining the learning curve for both teachers and students.

In this paper, we explore some of the challenges and opportunities experienced by teachers and students on a module taught at the University of Sussex in Spring 2008 on the topic of Interactive Learning Environments (ILE 2008). The module introduced students to a number of learning theories and technologies for learning, and required them to work in teams to develop interactive learning experiences within Second Life (SL), a well known IVW. This was the first time the staff team and the students had worked in SL and this paper discusses a number of the challenges encountered by both.

The rest of the paper is structured as follows: Section 2 provides a brief overview of the module and context, Section 3 identifies various boundaries which were encountered and crossed during the course, Section 4 examines the challenges from the perspective of the diffusion of innovation model (Rogers, 1962), Section 5 explores this model further and Section 6 provides a brief conclusion.

2. ILE 2008

The Interactive Learning Environments course has been running for a number of years. It is offered as an option to 3rd year undergraduates and Masters' students on a range of computing and IT degree courses. Although some of the students have a strong foundation in computer science, many have studied music, languages and arts within their degree profiles. Additionally, the Master's degree is a conversion course, which means that the postgraduate students have a wide range of educational and professional backgrounds and experience.

As part of their studies, students are required to develop a learning experience, utilising the learning theories taught within the course. In recent years, Moodle has been used as a platform for this practical exercise. For ILE 2008, the decision was taken to use SL as the environment for developing interactive learning experiences.

In addition to the change in platform, there was also a decision to offer students projects which had real world relevance, and the potential to be taken up and used in an educational setting. We adopted a problem based learning approach, as described in (Good et al., *in press*). Recently, there has been an emphasis on vocational learning, or learning for work, within UK education. ILE 2008 was taught by a small team, bringing together expertise from the Sussex Learning Network (SLN) and the Open University as well as experienced teachers from the University of Sussex. In order to provide the students with realistic scenarios, partner institutions of the SLN were asked to identify areas of their teaching which were difficult, dangerous, or impossible to teach adequately in a classroom setting. This resulted in eight projects with foci as diverse as mental health assessment, child protection issues, numeracy for nurses, drug search procedures for police officers and elements of systems theory.

Students registering for the module were advised to familiarise themselves with SL over the Christmas break, and were provided with information on how to register an avatar in SL, and how to keep themselves safe in the virtual environment. Although a few students followed this suggestion, the first session of the course provided an opportunity to ensure all students had an avatar. During the second week of the course, students were introduced to basic building

skills through a class taught inworld by an experienced SL resident. During this early part of the course, students formed themselves into teams and were allocated their projects. Each team had the opportunity to interview the client for their project either face-to-face or using telephone conferencing or Skype. Following the interviews, students drafted initial project specifications and received feedback on these from each member of the staff team.

As part of their assessment, students were required to create an interactive learning experience in SL for their clients, to prepare a machinima describing their work, and to prepare three written pieces of work, namely, a project specification, a group description of the process, and an individual, reflective document.

The course was supported by weekly lecture/workshop sessions, group consultations and staff presence in SL. Some of the teaching content utilised videoconferencing. There was a course website, hosted on Moodle, with background reading and other support materials.

3. Boundary issues

During the course planning, it became clear that we would be confronted by a number of potentially complex organisational and logistical issues. Each of these presented both challenges and opportunities. ILE 2008 was an established course in an institution with a strong academic reputation. In seeking clients who were teaching vocational courses in other institutions, including teaching further and higher education courses in further education colleges, we would be crossing a number of boundaries. It was only when we began to work with our colleagues, both within the ILE 2008 staff team and with colleagues from the SLN partner institutions, that we realised the extent to which we were not only crossing institutional boundaries, but that we had very different approaches to learning, to curriculum development and to assessment.

As well as institutional, curricular and professional boundary issues, we encountered a number of challenges and opportunities which related to working within the Second Life environment. We were very much engaged in a learning experience alongside our students.

This section considers the various boundary issues we encountered, which we summarise as:

- Boundaries between institutions with different learning emphases.
- Boundaries between curriculum disciplines.
- Boundaries between first and second life roles and persona.
- Boundaries between face-to-face and distance education delivery methods and expectations.
- Boundaries between safety and risk taking.

Boundaries between institutions with different learning emphases

One of our aims in setting ILE 2008 in SL was to explore the affordances of the virtual environment as a learning and teaching platform. Our observations of the virtual environment suggested that much learning and teaching activity within SL mirrored real life classroom activity. We were aware of many replica classrooms and lecture theatres, and had observed, or participated in, learning activities which mirrored real life tutorials or seminars. Although we knew there were educators seeking to push the boundaries in SL, we were interested in how

students would approach the environment. Our hope was that they would be unencumbered by the baggage of teaching experience we carried, and might be free to engage in more innovative activity than professional educators.

Although we were happy to give our students a problem and a blank canvas, not all of our clients were happy with this freedom. In vocational education there is considerable emphasis on skills development and preparation for work. Although we had emphasised to our clients that we wished them to present our students with a problem scenario only, several of our clients found it difficult not to present possible solutions. While our emphasis was on *process* - and we told the students that in some cases they might not find an appropriate solution - many of our clients had an emphasis on *product*, and in some instances had very clear ideas about what they expected students to build for them. This led to frustration for both students and teachers, and involved the ILE 2008 staff in troubleshooting between the students and clients.

The staff team was drawn from different institutions. Although we shared a similar vision for what we wanted from ILE 2008, there was a need to clarify differences in institutional practice and expectations. For example, marking scales were markedly different with a bar at 70 for a first class pass in one institution and at 85 in another. Although the expectations were similar, the quantitative measure of those expectations was very different.

Boundaries between curriculum disciplines

Although students had a wide range of backgrounds, they were being asked to work with clients in curriculum areas about which they had little or no knowledge. We regarded this as a reasonable requirement, as IT professionals frequently have to work with colleagues with different areas of expertise and have to demonstrate understanding of these different fields in developing solutions. Although many of the students demonstrated an ability to grasp the nub of the problem quickly and to clarify their understanding through the project specification, some found it extremely difficult, verging on impossible, to understand the nature of the problem and to respond to it in a meaningful way.

ILE 2008 was a relatively short course, running over 10 weeks, and on reflection we expected a great deal from our students. Not only were we asking them to familiarise themselves with a new environment, Second Life, but we were asking them to gain an understanding of an unfamiliar discipline and to propose a solution to a problem, which clients had already defined as presenting difficulties in real life teaching contexts. In general, our students are to be congratulated for the alacrity with which they addressed the problems they were assigned.

Boundaries between first and second life roles and personas

In most education settings, the role of the teacher and the role of the learner are clearly understood. Although teachers will frequently learn from their pupils, they are regarded as having some knowledge and expertise, which they impart in various ways. Teaching normally takes place in formal settings such as classrooms and lecture theatres. Students are able to consult with their teachers at predetermined times.

In ILE 2008, the usual rules of staff student interaction were challenged. Although the staff team had explored SL, none of them claimed to be experts in working in that environment. They were able to offer resources to students to enable them to explore and familiarise themselves with the virtual world, but rarely were they able to suggest solutions to student dilemmas. The teachers were no longer the experts with domain knowledge, but were fellow learners with the students.

Although students continued to attend formal classes and were offered consultation in predetermined office hours, much of the interaction between students and teachers took place in the virtual world. Some of these interactions were by appointment, but many took the form of chance encounter, or were initiated by the students. For example, a student noticing a member of staff was inworld might offer a teleport to their location so that they could discuss the building activity in which they were currently engaged. Similarly, members of staff spent time in the location students were working in and would engage in conversation as to project progress. As well as these project focused discussions, on occasions staff found themselves simply chatting with students while sitting in treehouses and other unlikely places.

Students quickly learned to use other sources of expertise available in the virtual environment, and freely shared these with their teachers. On one memorable occasion, one team was offered considerable support by a lecturer from another institution, who provided the students with skates in recognition of their work. From then on, those students were rarely seen in SL without skates. At times, the experience was surreal.

Boundaries between face-to-face and distance education delivery methods and expectations

ILE 2008 was delivered in a traditional face-to-face classroom. Classes were timetabled on a weekly basis, students met each other in class and some of the teamwork took place on campus. The course was supported by a Moodle site, with links to reading and other resources. Each project group was also given a wiki, and encouraged to make use of it for collaboration and resource sharing.

One member of the staff team was more familiar teaching distance students using online resources. She had a number of preconceptions, of which she was quickly disabused, that students in a brick university would be far more familiar with working together, would frequently interact, and would experience little difficulty in arranging to meet together to plan their projects.

Some aspects of the course were delivered online, primarily the building tutorials which took place in SL. Use was made of videoconferencing in a variety of ways: some of the client interviews took place using videoconferencing or Skype, one of the staff team attended some of the classroom discussions using a video link, and the staff team communicated regularly using Skype and e-mail with minimal face-to-face contact. Without the casual interaction that might occur 'around the water cooler', members of the staff team had to rely on the skills each member of the team brought to the project and a high level of trust quickly developed. This was reinforced by using the available communication channels and engaging in email conversations.

Boundaries between safety and risk taking

The first presentation of any new course carries with it a degree of risk. In general, this risk is mitigated by the experience of teaching staff and the ability to change elements of the course in response to student need. It is usually possible to identify in advance the parts of the course which are likely to be problematic.

ILE 2008 had a number of potential risks. The course was using a virtual environment, which neither staff nor students had expertise with. Although the staff team had met to plan the course, they had not worked together as a team before and did not know each other's

strengths and weaknesses. In deciding to look for clients from the SLN partner institutions, it was unclear whether clients would be forthcoming and whether they would be able to offer projects appropriate to the course. Students were being asked to undertake a number of untried and untested tasks including working with an external client, developing a learning experience within SL, creating a machinima and presenting the outcome of their work within a ten week timeframe. In addition, students were being asked to engage in group work, and that group work would be assessed.

The virtual environment of Second Life presented its own risks. From a technical perspective, there was a need to ensure that access to SL would be available on the University network, that the SL software would run on University computers and that software updates would be installed as needed. A further area of risk was uncertainty about the stability of the SL platform, and how downtime might affect the work of students.

Students needed to be introduced to SL and made aware of some of the risks inherent within the virtual environment. The staff team discussed at length how we might appropriately fulfil our duty of care to the students. Although it could be argued that, as a rule, we are unaware of what students do in their lives outside the real life classroom, it is also true that we do not ask them to do any particular activities in their lives beyond the classroom which would lead them into personally risky situations. In this instance, we were asking the students to engage in activities in SL, and we were aware that they might have encounters which they might find embarrassing, challenging or threatening. The written material introducing students to the course included information about how to register an avatar and alerted students to the risks in SL, providing strategies for avoiding, or if necessary escaping from, situations where they felt vulnerable or at risk. Although some risks might have been mitigated by purchasing our own island, we felt it was important for students to explore the affordances of SL for themselves.

In mitigating the risks, our main concern was to ensure that the students knew that we were asking them to engage in a high-risk project and to make them aware that the assessment criteria were not dependent on successfully creating a solution to their client's problem within the SL environment, but on the students' reflections on the process and outcomes. This was particularly important for the third year undergraduates, who were coming towards the end of their university studies, and inevitably were concerned to achieve the best possible degree classifications.

4. The diffusion of innovation model and its applications to education

In designing the course, we were mindful of a number of different learning theories underpinning our planning, including constructionism, problem based learning and threshold concepts. We have reflected on ILE as a case study in problem-based learning (Good et al, in press) and have plans to explore further the contribution of learning and teaching in the virtual world to threshold concepts and troublesome learning.

In considering boundary issues, we have found Rogers' (1962) diffusion of innovation model helpful, together with the extensions to this model offered by Geoghegan (1994) and Moore (1991). Rogers suggested that individuals will adopt new technologies or innovations at different rates, dependent upon their social and psychological characteristics. He identified five categories of adopters along a continuum, namely innovators (2.5% of the population), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%).

Geoghegan (1991) applied these categories to categorise educators as follows:

- Innovators (“techies”): individuals who are interested in the technology itself and understand the hardware and software requirements;
- Early Adopters (“visionaries”): individuals who explore new technologies as a way of expanding the range of available methods of teaching effectiveness; they are risk-takers who apply an interdisciplinary approach to teaching, learning and research.
- Early Majority (“pragmatists”): individuals who are willing to adopt new tools in order to stop all the day-to-day problems of teaching and research. They listen to the success stories of colleagues. Generally pragmatists are more risk-averse and less likely to cross disciplinary boundaries.
- Late Majority (“sceptical”): educators who adopt well-established technologies, which come as complete packages with support. They tend to have little interest in technology.
- Laggards: these may be considered the Luddites of instructional technology and are unlikely to adopt technology, except under pressure.

Moore (1991) suggested there is a chasm between early adopters and the early majority, and bridging this chasm determines whether or not a technology moves into the mainstream. The characteristics of the Early Adopter and the Early Majority are listed in Table 1. Jennings and Collins (2007, p. 181) draw attention to ‘striking differences between these two groups’ and suggest that there is ‘an opportunity to examine the early adopters and early innovations to discover those aspects that may appeal to the early majority in anticipation of widespread use’ of virtual worlds. We would suggest that in a learning and teaching context at the present time, teachers are more likely to be characterised as early adopters and students as early majority, but there is scope for movement between the groups, suggesting the existence of a continuum rather than a chasm. It may well also be that viewing teachers as early adopters and students as early majority has less to do with their overall comfort with virtual worlds, and more to do with issues of control. Indeed, students may be very “au fait” with virtual worlds and other such technology-based innovations, but are rarely in a position to implement changes in a formal teaching and learning context.

Table 1 Characteristics of early adopters of technology and early majority.

Early Adopter	Early Majority
Favour revolutionary change	Favour evolutionary change
Visionary	Pragmatic
Project oriented	Process oriented
Risk takers	Risk averse
Willing to experiment	Want proven applications
Generally self-sufficient	May need significant support
Horizontally connected	Vertically connected

5. Application of the Diffusion of Innovation Model to ILE 2008

As researchers and educators, the staff team of ILE 2008 could be considered early adopters. Within the team there was considerable technical expertise, a willingness to take risks, and an active interest in exploring the affordances of SL. There was an awareness of the potential risks and a willingness to mitigate these in various ways. We were interested in experimenting and learning from the experience in developing future courses.

Although there was some evidence from students on previous ILE courses that they wished to work with cutting edge technologies, in general, the student group were risk averse and focusing on results. In many ways, this was understandable, given the particular stage in their learning journey, and the general culture which often surrounds learning in higher education. However, as learners, they were interested in new knowledge and acquiring new skills provided sufficient support was given. In essence, although their risk-averse stance was understandable, as a staff team, we aimed to overcome this by limiting the negative consequences that can be associated with risk taking, and by encouraging students to explore creative solutions necessitating a degree of risk taking and challenging personal boundaries. That this approach was successful with some students is evidenced by a student's comment on the course evaluation questionnaire: "It has opened new doors to an entirely different field of computing, which is very interesting, and the course has made me realize that there is so much potential out there to do anything you can think of!"

The project clients were educators, who would not have considered adopting SL as a learning and teaching environment on their own, but who were interested in knowing more about what SL might offer them as long as they themselves were not asked to take any risks. They would probably categorise themselves as members of the late majority. As a result of seeing the outcome of the student projects, some of the project clients are wanting to develop and use the projects with their students. Whether they would want to take a step further and initiate their own projects in SL is still to be determined.

Geoghan's (1991) model provides a useful framework in embarking on any learning activity with a substantial use of technology. By understanding that the different participants are individually at different places on the technology adoption continuum, it makes it possible to identify and address concerns.

The recognition that a student who might be an 'innovator' or 'early adopter' in their personal approach to technology can be far more cautious when engaged in an assessed learning experience is an indicator to educators to clarify the purpose of the learning activity. If there is a product focus, for example, learning how to use a piece of software in order to produce a specified product, then it is necessary to overcome the anxiety and focus on the task and the product. If, on the other hand, the learning experience is more about exploring and experimenting what might be possible, the focus is on the learning process and the student's own developing understanding, requiring a different type of assessment and different input from teachers.

To some extent, most, if not all, formal learning experiences include elements of both product and process. However, as we found from our interaction with colleagues from different institutions, the relative importance of product and process can be very different. It is perhaps

inevitable that a product focus leads to a more risk averse stance, and even a resistance to exploring a new technology altogether – *if it's not broke why fix it*. There is a need to clarify the relative importance of product and process, especially if we are working with colleagues who may have a different stance.

The following diagram (Fig 1) is offered as a somewhat tentative tool for assessing the stance of different participants in a new technology learning experience and shows the journey we anticipated students would make during ILE 2008.

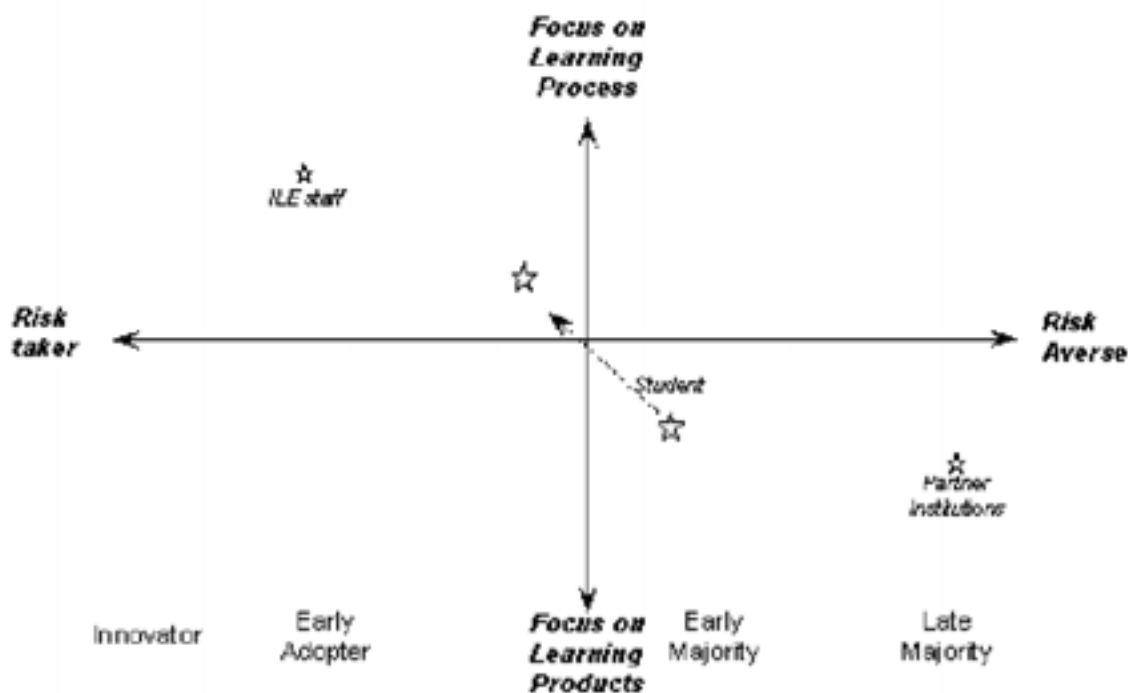


Figure 1 Relationship between willingness to take risks and focus on learning process or product

Although Moore (1991) associates project orientation with the early adopter and process orientation with the early majority, we would suggest that in a learning context, our experience and observation might indicate that in designing learning experiences, the risk taking early adopter may have a greater investment in the learning process, while the more risk averse focus more on products resulting from the learning experience.

6. Conclusions

On reflection, we took a lot of risks embarking on ILE 2008 and learned a great deal whilst doing so. Although the open-ended nature of the experience was unnerving at times, for both staff and students, the students rose to the challenge and far surpassed any of our expectations in the projects they presented to us and to their clients. Although working in partnership is not always easy, the boundaries and difficulties present challenges and opportunities leading to new learning experience for all engaged in the process.

We have found the diffusion of innovation model useful in understanding some of the challenges we faced, and suggest some refinements to the model for application to the relationship between risk orientation and product/process in learning and teaching in technologically rich environments.

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Technical infrastructure and initial findings in the design and delivery of game-based learning for virtual patients in Second Life

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Keywords: game-based, learning, MedBiquitous, Second Life, 3-tier architecture, virtual patients

Abstract

Online multi-user virtual environments (MUVEs) offer rich interactive 3D collaborative spaces where users can meet and interact. One example of such an environment is Second Life (<http://www.secondlife.com>).

Second Life marks a paradigm shift in the possibilities open to those wishing to adopt game-based approaches. The Faculty of Medicine at Imperial College London has developed a region in Second Life (<http://slurl.com/secondlife/Imperial%20College%20London/150/86/27/>) that aims to deliver game-based learning activities for delivery of virtual patients that can drive experiential, diagnostic and role-play learning activities within the 3D world, thereby supporting learning about patients' diagnoses, investigations and treatment. 'Virtual patients' is one of the models developed to support the delivery of clinical teaching; it offers opportunities for 'game-informed learning' using experiential and problem-based learning approaches as prime pedagogic drivers.

The game-based learning activities developed for virtual patients were based on the four-dimensional framework developed by De Freitas and Martin, as well as other design considerations that look at emergent narratives and modes of representation.

This paper will present the interaction and call-management structure implemented between the Second Life virtual world environment and the web world environment. This model accommodates the delivery of a one-to-many relationship between the user or student and several virtual patients.

This paper will also present an overview of the different virtual patient components implemented following the MedBiquitous Virtual Patients Model.

Finally, an overview of a recent trial will be provided. This trial aimed to explore gender-related differences and attitude towards two e-learning delivery methods including the delivery of game-based learning for virtual patients in Second Life.

Introduction

Medical education faces difficult challenges in the 21st century. Increasing pressure upon doctors to deliver service targets, the European Working Time Directive, and changes in the way in which healthcare is delivered (Olson et al 2005), coupled with higher numbers of students entering medical education, have increased the demands on academics, resulting in less time for teaching (Ruiz et al 2006). Various forms of representative simulation, many of which use digital technology, have become an increasingly common alternative in healthcare education (Begg et al 2005b).

Many high-quality e-learning materials are being produced by medical schools and healthcare organisations (Ruiz et al 2006). 'Virtual patients' is one of the models developed to support the delivery of clinical teaching. A virtual patient is an interactive computer simulation of real-life clinical scenarios for the purpose of medical training, education or assessment.

There are many ways a virtual patient can be used in an educational setting. For example, the role of the learner may take many forms with respect to the part the student may take and the role of the physician, the patient, etc. The learner may be acting independently, or under the guidance of an instructor, or in a collaborative setting. The learner may progress through a predefined scenario or may start from scratch (Ellaway et al 2006).

In the area of medicine, however, there are limitations to what traditional virtual patients can offer in terms of either a game-informed learning experience or a real patient experience, as the narratives that accompany and describe many current virtual patient scenarios are simplistic and linear (Begg et al 2005b).

Anecdotal evidence from teachers suggests that the impact of gaming on millions of 'digital natives' who grew up playing best-selling games such as SimCity is starting to be felt (Squire 2002). The term game-based learning has emerged as a generic name for the use of games for learning or educational purposes. It has also been termed 'serious games', and includes fully immersive environments (or 'metaverses'), in which learners can take on virtual presence in virtual worlds (Joint Information Systems Committee 2007).

Virtual patient scenarios offer opportunities for 'game-informed learning'. This is due to their experiential and problem-based learning approaches as prime pedagogic drivers (Begg et al 2005a). The process of gameplay is so similar to the learning processes outlined in problem-based learning that the two are almost interchangeable (Begg et al 2005a).

The lack of immersion in current virtual patient delivery, as well as the familiarity of our 'digital natives' with virtual and game-based environments, have been the motivation for this piece of research.

Second Life – multi-user virtual environment

We have outlined the factors that are currently driving the design, development and evaluation of game-based learning activities for virtual patients in a multi-user virtual environment (MUVE). One example of such an environment is Second Life (<http://www.secondlife.com>), currently being developed and used by our team.

Online MUVES offer rich interactive 3D collaborative spaces where users can meet and interact (Livingstone 2007). Second Life users are represented by avatars and can be moved in the environment using mouse and keyboard controls. Users can communicate using instant messages, voice chat or text-based 'notecards'.

Some authors recognise Second Life as a game-based application providing a space in which games can be created, allowing highly structured linear experiences as well as more open-ended ones. However, some do not classify it as a game, because of its lack of predefined goals (Livingstone 2007).

A framework for the design of game-based learning for virtual patients

The framework for evaluating games and simulation-based education developed by De Freitas and Martin (2006) has been followed for the design of game-based learning activities for virtual patients in Second Life.

The framework requires consideration of four main dimensions in advance of using games and simulations. These focus on the:

- particular context where learning takes place, including macro-level contextual factors
- attributes of the particular learner or learner group
- internal representational world of the game or simulation
- pedagogic considerations, learning models used, approaches, etc.

According to De Freitas and Martin (2006), the four dimensions provide a framework for consideration of both existing and future educational games and simulations, as well as other forms of immersive spaces, such as virtual reality. This framework provides a close relationship with the systems of activity theory (Kuutti 1996).

Different learning types identified and discussed by Helmer (2007) have also been taken into account in the design of game-based learning activities for virtual patients in Second Life. These learning types are demonstration, experiential learning, diagnostic activities, role play and constructive learning.

The three potential influential factors of emergent narrative discussed by Murray (1997) – emergent narrative (linear content), the responsive environment and the psycho-social moratorium (cyclical content) – which allow the learner to feel their interactions have real consequences, were also taken into account in the design.

A region has been developed in Second Life (<http://slurl.com/secondlife/Imperial%20College%20London/150/86/27/>), where a virtual teaching hospital has been created. A series of activities was developed covering the different areas of a virtual patient (medical history, differential diagnosis, investigations, working diagnosis and management plan). Different narratives and modes of representation were developed within the areas described above (introductions, scaffolding information, diagnostic capabilities, assessment and triggers).

Scaffolding activities take the learner through the virtual patient experience making them progress through the virtual patient activities from Medical History to Final Diagnosis. Fig. 1 shows the Differential Diagnosis and Investigations section.



Figure 1 Differential Diagnosis and Investigations area

Fig. 2 shows one of the triggers implemented. The learner has to click on the wash basin and wash her hands before talking to the patient.



Figure 2 Triggers – hand wash

The following sections describe the *web world environment* implemented, consisting of a three-tier architecture, and the technical architectural model followed based on the MedBiquitous-user virtual patient architecture.

Web application development

The web application development implemented involved the creation of a website service which aims to record the in-world user interaction in the database external to Second Life and then create a presentation layer for when placing these data into the various report formats. The web application has the following key modules:

- Authentication module for accessing the web site (Fig. 3)



Figure 3 Authentication

- Report module for presenting the various reports (Fig. 4)



Figure 4 Reports

- User in-world activity record and virtual world to web world interaction-handling module.

The Second Life simulation environment consists of the Second Life client installed on the user's machine. The Second Life client communicates with the Second Life engine for catering the user responses and rendering the media assets for the user. In order to access the external web world, the http Request call is established through Linden Scripting Language (LSL) from the Second Life simulation environment. The LSL compiler takes the active role in validating the script statement before execution.

Fig. 5 shows the interaction and call management between the Second Life virtual world environment and the web world environment.

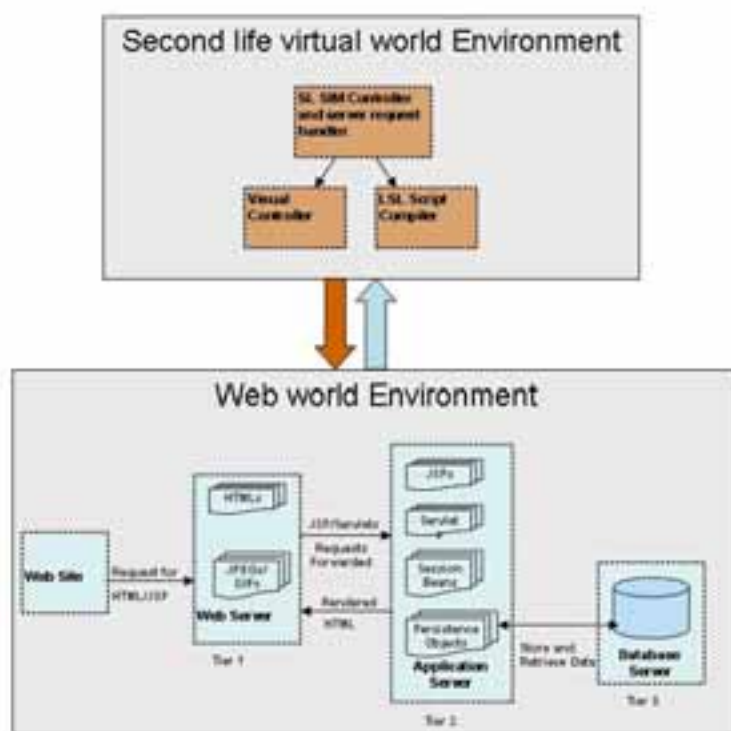


Figure 5 Interaction and call management

The *web world environment* consists of the three-tier architecture based on Java 2 Platform Enterprise Edition (J2EE)'s model view controller (MVC) design pattern.

- **Tier 1** (web server): static content such as HTMLs, media elements (JPEG, GIFs, JavaScript) are directly served from the web server. The web server forwards requests for server side components such as Java Servlets, JavaServer Pages (JSPs), and other Java classes (Action classes, Delegates, Service Locator) to the Servlet runner.
- **Tier 2** (application server): the application server is responsible for deployment, object pooling (Activation and Passivation) of session beans, and transaction support to the session beans. The persistence layer is also implemented on the application server.
- **Tier 3** (database): the third tier is the database, which is the central repository of all data that the system generates and queries to create the reports.

Architectural model

MedBiquitous is a consortium focused on the development of XML standards for healthcare education and training (A). It has been developing a data standard for the exchange and reuse of virtual patients, which is defined as the MedBiquitous Virtual Patient (MVP) standard (Elleway et al 2006).

This architecture consists of five MVP components. These five and other related components, such as user input and feedback, student profiles, and tracking, are shown in Fig. 6.

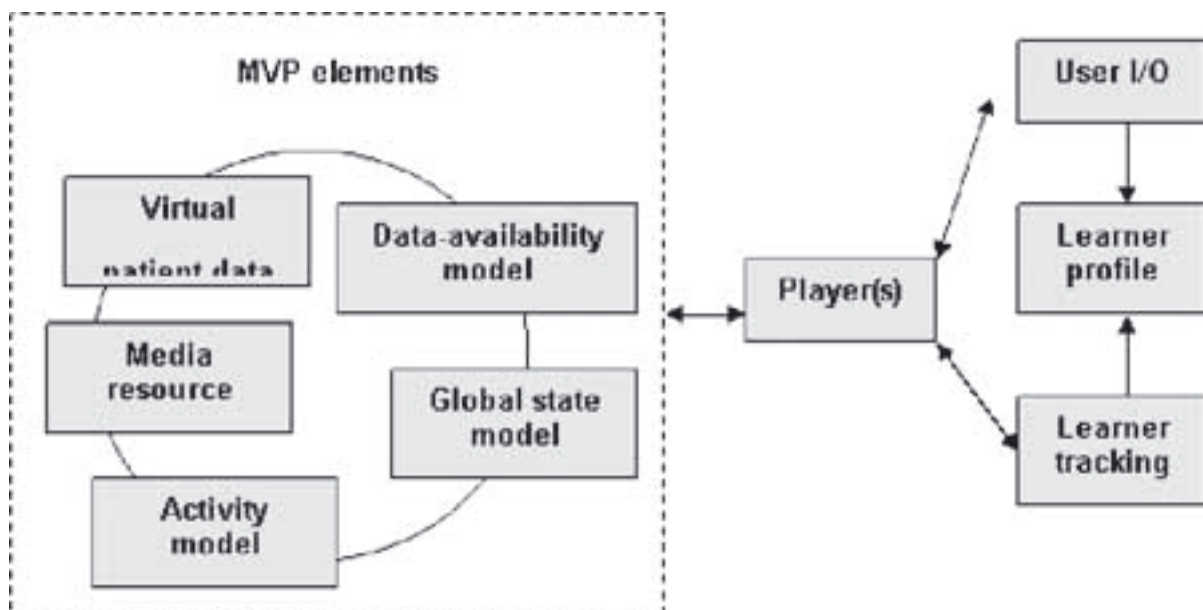


Image used with permission from MedBiquitous

Figure 6 Components of the MVP architecture

MVP components

The five core MVP components are described below. These components are explained in the context of Second Life and how they have been implemented within this virtual respiratory ward (Toro-Troconis et al 2008):

- **virtual patient data (VPD):** the VPD provide the personal and clinical data relevant to the clinical scenario being simulated. A series of 'notecards' is provided in Second Life, with information about patient history and patient information
- **media resources (MR):** media resources are all of the images, animation, videos and audio files that are associated with the virtual patient at any point during the simulated case. The respiratory ward provides various multimedia files, such as: breath sounds, slideshows for patient-management information, and images to represent different investigations to be purchased, as well as images showing the results of different investigations, such as chest X-ray
- **data availability model (DAM):** this component enables the sequencing and progressive disclosure of data embedded in the VPD and associated media resources. Data within each section in the respiratory ward in Second Life are tagged with identifiers so that patient data can be disclosed progressively. User decisions determine which state is reached next and when
- **activity model (AM):** this component encodes how the learner will be able to engage with the virtual patient. A number of different learner activities are possible with the same underlying virtual patient dataset. Some examples of activity models are: observation, free navigation, diagnosis formulation and decision making. The decision-making approach was implemented in the design of the activities for virtual patients in Second Life. In this approach, the learner is asked to make clinical decisions based on current information, and acquires new information as a result of different decisions

- **global state model (GSM):** this component provides the top-level modelling of student activity and the logic for the allocation and regulation of activities. At the virtual respiratory ward, GSM provides information about how a particular virtual patient interacts with the learner. The GSM may also provide information about how a particular virtual patient interacts with several learners, playing different roles for example. This will be explored further in the near future.

There are several applications and datasets that are relevant but external to the MVP standard:

- **player:** this is the application that presents the virtual patient to the user, and gathers and processes user input
- **learner tracking:** this component captures and stores interactions and performance metrics about the learner from the player component. A database integration captures and manages the information sent and received between the Second Life virtual world environment and the web world environment
- **learner profile:** this component is a dataset of information about the user. It includes general information about the user which, in the case of the respiratory ward, represents the user's Second Life name and the virtual patient usage information and provides details about when the virtual patient was accessed, including progress markers.

Levels of MVP components

This section describes how the components are related and how they can be connected to create a learning experience. In the case of the game-based learning activities developed at the respiratory ward in Second Life, patient data and media resources are referenced in an activity model accessed through a DAM (see Fig. 7).

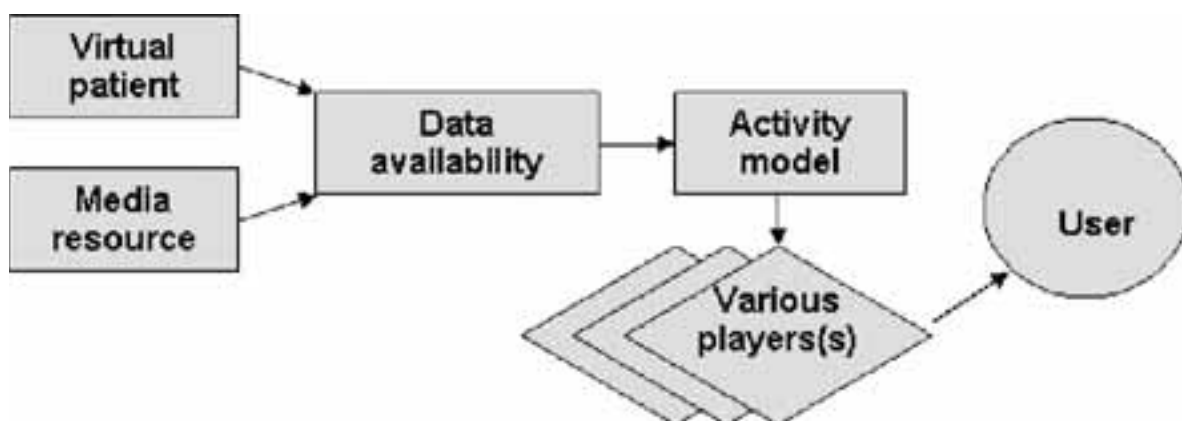


Image used with permission from MedBiquitous

Figure 7 MVP architecture – Patient Data and resources are referenced in an activity model accessed through a Data Availability Model

The structure outlined in Fig. 7 is co-ordinated by a GSM and rendering mechanism. Fig. 8 shows the different activities developed for the delivery of virtual patients following a game-based learning approach in Second Life, which are referenced through a single GSM.

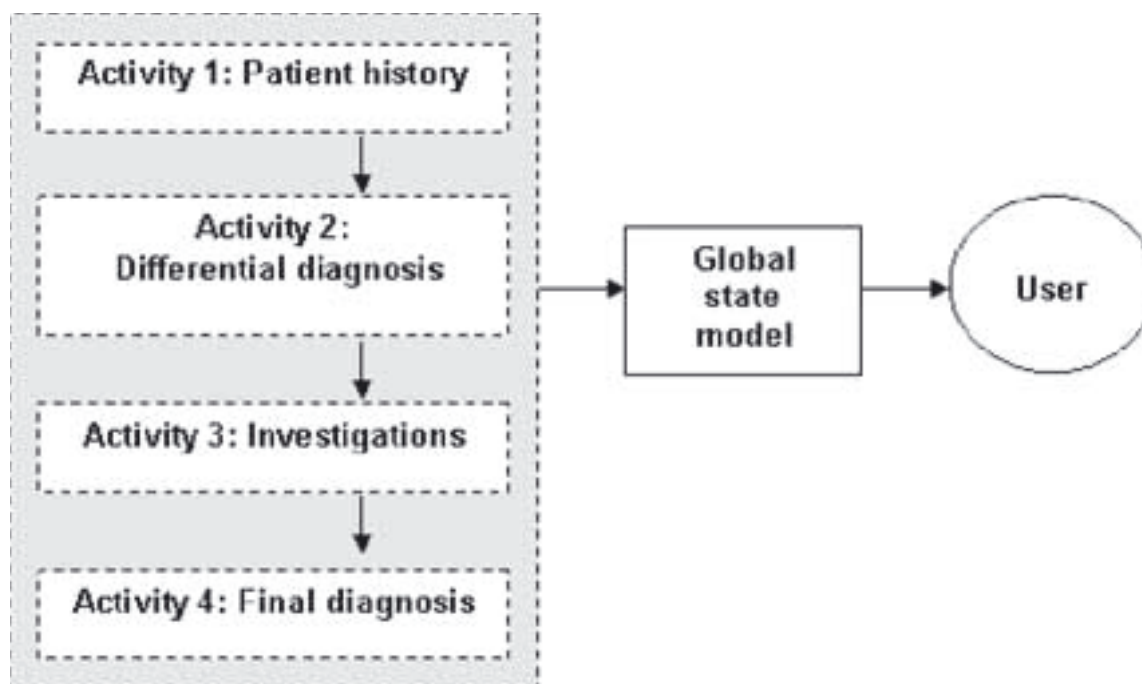


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Figure 8 Activities developed for the delivery of virtual patients following a game-based learning approach referenced through a single global state model

Fig. 9 provides more information about the different activities developed for the delivery of virtual patients following a game-based learning approach at Patient History level. Certain triggers at DAM level, such as not washing hands, will halt learners' progress through the virtual patient scenario.

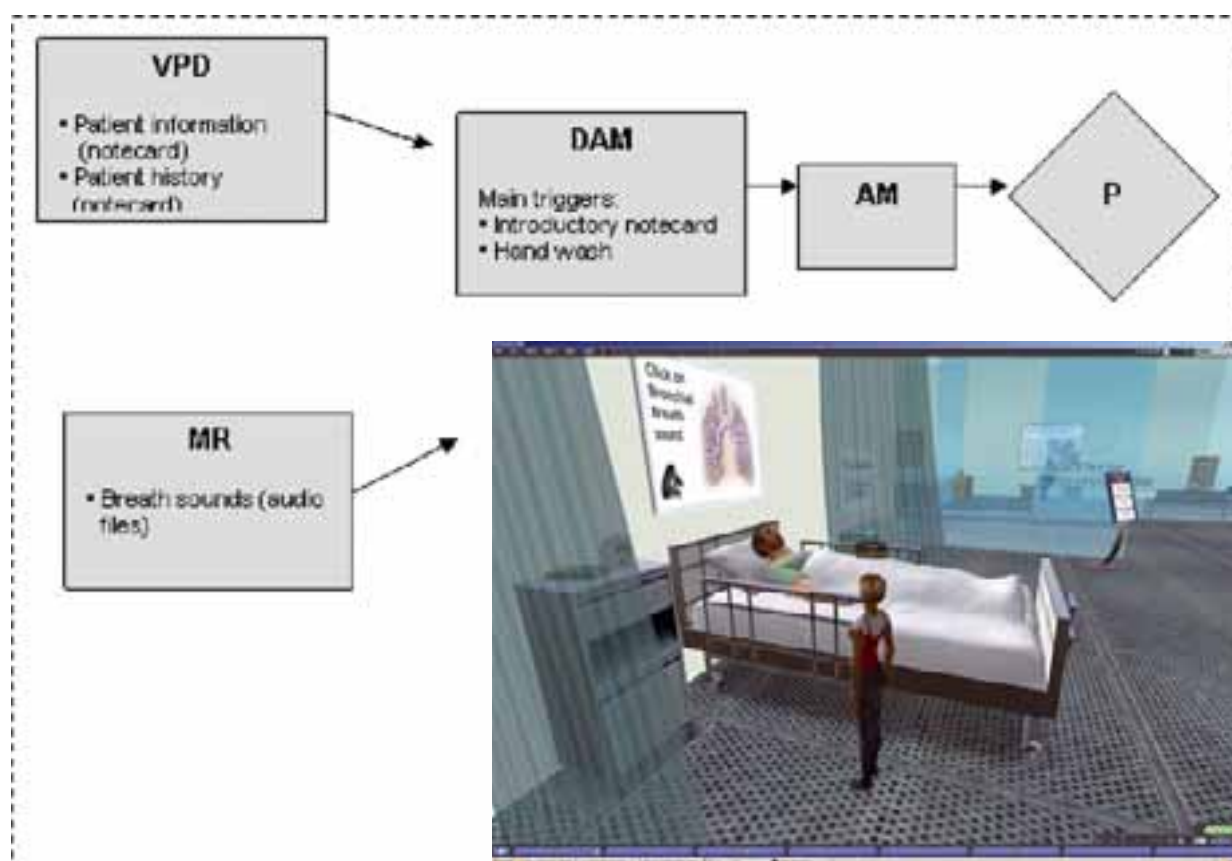


Figure 9 Activity 1: patient history

Experimental methodology

Subjects

This investigation involved 42 undergraduate medical students (21 years old). The gender distribution of the respondents was 42.85% female ($n = 18$) and 57.14% male ($n = 24$).

Instruments

The survey 'My feelings when playing games', developed by Bonnanno and Kommers (2008), was applied. The survey comprises 21 statements. Six statements relate to the *affective component*, five statements are about *perceived usefulness*, six statements about *perceived control* and four statements about *behavioural components*. All statements describe behaviours while using games. The statements were adapted depending on the groups: 'My feelings when learning in Second Life' and 'My feelings when learning via e-modules'. Situations with positive feelings, as well as situations with negative feelings such as fear, lack of control, and hesitation have been addressed. A five-point Likert scale was used.

Gaming competence was addressed by identifying participants under two different computer/videogame categories: high gamers or low gamers.

- **High gamer** includes all participants who responded having played computer or videogames a few days ago or a few months ago.
- **Low gamer** includes all participants who responded having played a few years ago or never.

Procedure

Data about gaming competence were collected at the beginning of the investigation, aiming to identify gaming tendencies among undergraduate medical students.

The sample analysed included 118 full-time undergraduate medical students of average age 22 years. The majority of respondents (47%) were male, and (34%) of all students completed the survey.

The majority of participants surveyed were classified as high gamers (70%). The majority of male participants were high gamers (87% of all males surveyed), while only about half of the female participants were high gamers (54%).

The majority of the participants had never heard of Second Life (66%). However, 50% of male participants had heard of Second Life, in comparison to only 13% of female participants.

From this group, a stratified sample ($n = 42$) was selected according to gender and high- and low-gamer categories. One group ($n = 23$) was given access to the game-based learning activity for a virtual patient on respiratory medicine developed in Second Life following the framework described in this paper. The second group ($n = 19$) was given access to the same content, covering the same virtual patient but delivered as an interactive e-module. The surveys 'My feelings when learning in Second Life' and 'My feelings when learning via e-modules' were given to the groups, to be completed at the end of each session, which lasted 40 min each. The scores for the separate statements were coded in Stata version 10, using reverse scoring for unfavourable statements.

The results based on computer and videogame player categories by gender for the Second Life group are shown in Table 1, and those for the e-module group in Table 2.

Table 1 Computer and videogame player categories by gender for Second Life group

Second Life	Total number	Total %	Male (%)	Female (%)
Low gamer	7	30	4	26
High gamer	16	70	48	22
Total	23	100	52	48

Table 2 Computer and videogame player categories by gender for e-module group

e-module	Total number	Total %	Male (%)	Female (%)
Low gamer	3	16	10	6
High gamer	16	84	53	31
Total	19	100	63	37

The Second Life group was given an introduction (20 min) at the beginning of the session. The introduction covered basic navigational techniques in Second Life, e.g. how to access notecards.

A focus group was also carried out with only the Second Life group at the end of the activity, in order to address the social dimension for collaborative work when learning in Second Life as well as other accessibility and usability issues not addressed in the survey.

Results and analysis

Data about gender, gaming competence and identified attitude components were entered in Stata using the appropriate codes. A number of variables were constructed by computing individual scores for the different statements related to the affective components, perceived use, perceived control and behavioural components.

Chi-square or Fisher's exact test was used to compare categorical variables between both groups. The questions were combined into groups 1–3 (disagree) and 4–5 (agree). Another variable, labelled 'general attitude' was created by summing these four computed variables.

Tables 3 and 4 show the computed variables for both groups.

Table 3 Computed variables – Second Life group

	Second Life P value	Median (IQR) (females)	Median (IQR) (males)
Computed <i>affective</i> variable	0.925	20 (18–23)	20.5 (19–23)
Computed components for <i>perceived use</i>	0.0751	14 (12–15)	11.5 (10.5–13)
Computed components for <i>perceived control</i>	0.2878	20 (19–21)	21 (18–22)
Computed <i>behavioral</i> components	0.6130	9 (6–10)	10 (8–10)
General attitude	0.66		

IQR: interquartile range

Table 4 Computed variables – e-module group

	E-module P value	Median (IQR) (females)	Median (IQR) (males)
Computed <i>Affective</i> variable	0.3038	22 (20–24)	23.5 (21.5–25)
Computed components for <i>perceived use</i>	0.6988	14 (13–16)	15.5 (13.5–16.5)
Computed components for <i>perceived control</i>	0.2739	17 (17–18)	17 (16–18)
Computed <i>behavioral</i> components	0.5472	8 (6–9)	7.5 (5–9)
General attitude	0.8649		

Is there any gender-related difference regarding the identified four attitudinal components making up the general attitude towards learning using the game-based learning approach implemented in Second Life?

Discussion is organized around the four major attitudinal components, and the statistical significance of each statement is discussed in relation to the pedagogical implications.

Affective component

The affective component addresses feelings of fear, hesitation and uneasiness experienced before and while learning in Second Life. Learning using these two different delivery modes is perceived by both sexes as an intelligent and socially accepted activity. Males, median 20.5 (interquartile range (IQR) 19–23) and females, median 20 (IQR 18–23) show nearly the same median values and thus manifest an overall positive attitude for the affective component. This could be explained by the fact that learning via e-modules is something the students are used to. E-modules are embedded in different undergraduate medicine blended learning programmes.

Perceived usefulness

The Second Life group shows weak evidence of a difference in perceived usefulness between genders ($P = 0.0751$). Females show higher medians 14 (12–15), compared to males 11.5 (10.5–13), demonstrating a more-positive attitude overall for the perceived usefulness component. This involves behaviours arising from beliefs about the advantages of using Second Life for learning.

This is an interesting finding. Normally females are more sceptical than males about the instructional potential of game-based instructional models. Females generally perceive gaming not as a unique learning and entertaining experience, but as just another way to learn (Bonnanno and Kommers 2008). This disposition ought to be exploited by adopting and promoting game-based learning in MUVes.

Perceived control

Perceived control refers to one's feelings and reactive behaviours while manipulating technological tools. This includes the ability to self-teach task-related skills, acquiring control over learning software, and the degree of reliance on others' help to execute requested tasks. There is no evidence of a difference in perceived control between genders ($P = 0.2878$). The medians for both genders are very similar: females 20 (IQR 19–21) and males 21 (IQR 18–22).

The Second Life group shows higher medians and thus a more-positive attitude overall for the perceived control component.

Behavioural components

Positive behaviours are manifested as willingness to use Second Life or e-modules for learning. Negative behaviours involve avoidance tendencies. There is no difference in a behavioural attitude between genders ($P = 0.6130$). The medians for both genders are very similar: females 9 (IQR 6–10) and males 10 (IQR 8–10).

Conclusion and recommendations

Learning in immersive worlds is beginning to have a wider range of uses and applications (De Freitas 2006). Second Life provides a space in which games can be created, and the infrastructure for the design of open-ended, game-based immersive 3D experiences.

The literature demonstrates that game-based learning shows some initial evidence of accelerating learning and supporting the development of higher-order cognitive and thinking skills (De Freitas and Jarvis 2007). The survey 'attitude to learning in Second Life and via e-module' is a useful instrument from a pedagogical perspective because it addresses attitudinal components. The survey findings have helped to identify key elements that should be looked at more carefully during the design of game-based learning for virtual patients in Second Life. These initial findings have shown very little evidence of gender-related differences in attitude towards game-based learning for virtual patients in Second Life. Further research will be carried out in the near future with a larger sample.

General findings have driven the implementation of a series of changes in the original design, aiming to support learners under the different categories identified in the survey (affective component, perceived control, perceived usefulness and behavioural component).

Based on this evaluation and findings, the following general recommendations have been made and implemented in Phase II of this project:

- 1 General feedback and guidance for cyclical content should be provided at all times for students accessing game-based activities for virtual patients in Second Life. Learners can now have access to the 'Imperial College Badge' (Fig. 10), which they can wear and by which they can receive feedback from the system. Feedback will be delivered to the learner if they have not carried out any activity for the last 5 minutes. The feedback will inform the learner about the patient they last treated and the last activity carried out on that patient.



Figure 10 Imperial College London Badge

- 2 'Demanded feedback' for cyclical content has also been implemented. A 'Virtual Patient Panel' (Fig. 11), has been provided, located by the patient's area. The student can click on a 'Check Status' sign and receive feedback on where they were left last time they accessed the patient

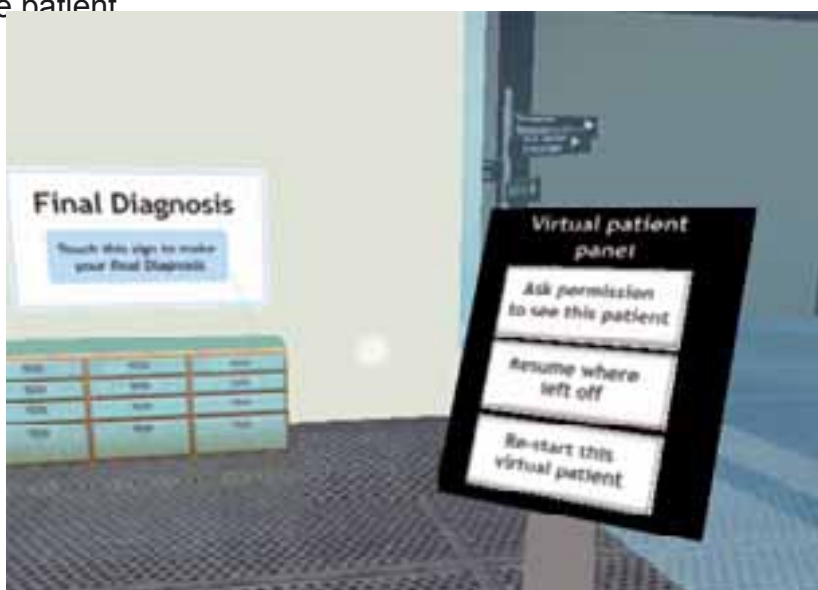


Figure 11 Virtual Patient Panel

- 3 The Virtual Patient Panel also offers a 'Reset' option which the students can access to reset the virtual patient activity in case they want to start all over again and therefore have more control over the activity.
- 4 The virtual patient areas have been redesigned to be as spacious as possible in order to accommodate several avatars accessing the virtual patients at the same time.
- 5 It is suggested that individual feedback is restricted to notecards or individual text messages in order to avoid congestion of the general chat text window and thus reduce confusion among the students.
- 6 More guidance has been provided within the messages delivered when learners are not doing the right thing.
- 7 It is worth pointing out that although a high percentage of the students in the Second Life group were high gamers they still found problems navigating in Second Life. It is important to keep in mind that the interface offered in Second Life is unique. The traditional navigational functions offered in current web browsers are very different from the ones available in Second Life. Therefore, it is recommended to make sure the students are exposed to Second Life for at least 4 hours before engaging in any learning activity in this environment.

It is important to highlight the fact that following the four-dimensional framework and technical development processes discussed in this paper has helped implementation of the learning outcomes originally proposed for the delivery of game-based learning for a virtual patient in the area of respiratory medicine. The pilot carried out has been extremely important in the evaluation of students' attitudes towards learning using this delivery mode. The feedback received has informed the development of Phase II, which incorporates a multi-patient approach. Five virtual patients suffering from different respiratory problems, such as asthma and chronic obstructive pulmonary disease (COPD), were implemented during Phase II. The same narrative and activity model is applied for all these patients, including different modes of representation.

The three-tier architecture model as well as the MedBiquitous Virtual Patient model has provided a consistent and reliable architecture for the implementation of game-based learning activities in Second Life. Activity information is stored efficiently, and user-friendly reports can be generated. Virtual patients' activities can be easily redesigned following the architecture implemented.

It is worth pointing out that further analysis has to be carried out in order to continue evaluating attitudes towards game-based learning for the delivery of the potential next generation of virtual patients.

It is also important to bear in mind that the research project is still ongoing and the findings highlighted above form part of a larger research project.

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Fearing your Avatar? Exploring the scary journey to the 3rd Dimension

Kathryn R. Trinder

Abstract

Glasgow Caledonian University are currently, like many H.E institutions, developing an island in Linden Lab's "Second Life" for a variety of reasons (Kirriemuir 2008). GCU's initial top-down push comes from a marketing and recruitment perspective, but will be closely followed by uptake for teaching & learning activity and student support.

Recent staff induction has shown up some rather intriguing outcomes - new technologies have always had their enthusiasts and sceptics but our current experience shows that the 3.D Internet appears to polarise this normal state to extremes, potentially causing engagement, development, and uptake to be particularly problematic. We're finding that many people are initially rather 'scared', unsure, negative about this as a technology. Personalisation of an 'avatar' can be troublesome (Warburton, 2007), or the concept of a 3D world difficult to grasp.

This paper reports on early stages of enquiry into the experience of staff who have recently embarked upon exploring 'Second Life'. The study aims to capture initial experiences (of both person and 'avatar'), followed by later data collection as participants progress through stages of early exploration, personalisation, understanding, and eventual engagement or rejection of the technology.

The research design adopts a holistic approach where participants are perceived as experts in their own experiences. It aims to capture the participants' "lived experience". Through allowing participants themselves to highlight issues, problems, and fears pertinent to them (Sharpe et al, 2005) the study will develop an evolving conceptual framework that allows their stories to determine which issues emerge as significant.

Background

This strand of research was inspired by a perceived need to understand why members of staff are finding new 3d Virtual Worlds unnerving and are displaying negative attitudes to becoming involved in this technology, even though the initiative at GCU is being supported at an Senior Executive level.

Exploration of negative attitudes and resistance to change whilst important aspects of this issue will be explored at a later date. The current focus of the research is this 'unnerving' aspect of the early experience.

The Caledonian University Virtual Worlds project known as 'C U There' has initially attempted to recruit staff and students in the University who had an interest and the enthusiasm to dip their toe in the water. At this early stage there is no intention or desire to attract the 'general mass' or those who are very resistant to the concepts of the 3d internet or virtual worlds for learning & teaching.

Part of the projects' initial activity was to gather like minded individuals together in a community atmosphere to share, bounce ideas and help each other with this new technology.

There is a well recognised pattern in learning technology for small islands of activity, often by individual teachers or early adopters, who have little or no support from managers, colleagues and support staff. Projects come and go and often fade and disappear when an individual moves on. Our desire is that our project will become self supporting and self sustainable and not reliant on individuals. To generate an early sense of community a shared community space was developed (Trinder, Francino & Littlejohn, 2008).

The fact that this project was initiated top-down, driven by marketing and PR purposes also poses potential problems, whilst on the other hand providing unparalleled support for exploration of the environment as a learning technology

Since the “CU There” project began a series of demonstrations, meetings, talks and ‘taster’ session have been run to give staff an idea of what this virtual world was about. These sessions were varied from demonstrations of the environment to a range of sub-groups and boards within the university; invited talks from visiting academics; 1 hour lunchtime introductions & discussions; visits to local council and business. There were also tailored 2 hour sessions for groups of staff – i.e. librarians or module tutors from a particular school (interestingly these sessions were universally referred to as ‘avatar training’, even though those running the sessions had not called it such.)

The other major initiative was the running of a weekly evening class by the project manager. The class was initially advertised to students, but quickly had participation from interested members of staff and the local community as well.

The result of these events was that a number of staff took an interest in the initiative. Some took this further and either contacted the project team to find out about how to sign up and be involved, some entered a teaching & learning pilot project competition¹, and some signed up and have initiated in-world events; are developing their own ideas for teaching and learning or for meeting and socialising with their students in world.

Not all of those who appeared to be interested have remained active. Some, whilst showing interest, got as far as registering, creating an avatar and sending friend requests to gain admittance to the GCU Pioneers Group, but we have not heard from them since.

Whilst much of this is to be expected, and appears to follow accepted technology acceptance models² and change process to institutionalisation predictions (Collis & Moonen, 2001), it potentially gives issues to need to be dealt to encourage staff in their engagement and uptake of this technology.

As a staff development issue, we wish to know what the potential barriers are and how we can overcome these.

1 “Competition - Use of 3D worlds for Teaching and Learning”: <http://www.academy.gcal.ac.uk/news/index.html>

2 TAM: http://en.wikipedia.org/wiki/Technology_acceptance_model

Method

Observation has prompted us to consider, then:

- What is it specifically about 3D worlds that can be so emotive?
- How may this ‘consternation’ and these ‘fears’, be overcome?
- What are the implications for this technology’s potential use and uptake?

The Research Design

To address the questions it became evident that an approach was required that allowed for the whole early experience to be explored. The research attempts to take a holistic approach in order to elicit a range of feelings and insights in to what it is that causes such ‘consternation’. It was felt that an open ended methodology would allow those involved to speak with their own voice in order to highlight the issues that were relevant to them, rather than starting with any hypothesis as to what these potential issues and barriers may be.

As the main researcher already had experience of prior research exploring the experiences of e-learners - The Learner Experience of e-Learning (LEX) (Creanor, Trinder, Gowan & Howells 2006), using a methodology adapted from a particular approach, it was decided to use a similar approach here. This would give the added benefit of extending/appending that work in developing this methodology.

In the course of their research the LEX team developed a methodology that adapted aspects of an Interpretative Phenomenological Approach (IPA) (Reid, Flowers & Larkin 2005). This approach *“rests on the premise that the interviewee is expert on their own experience.”*

IPA allows participant to highlight what is important to them, and provide the researchers with an understanding of feelings, intentions, motivations and attitudes, rather than answering a set of questions previously devised by the researchers (Sharpe et al, 2005).

“This inductive approach deliberately avoids testing hypotheses and making prior assumptions, but rather encourages participants to provide their own detailed narrative, interpreting their understanding of their experiences firstly for themselves and subsequently for the researcher.”
(Creanor et al 2006)

The approach has the added advantage in that it can draw out shared experiences across a group and so was deemed very suitable in this situation as a way of finding out and presenting shared meanings, interpretations and experiences within the group of practitioners who were being studied.

The LEX team also combined loosely IPA with what was termed ‘InterviewPlus’ (See Creanor et al, 2006). This is a technique that uses an artefact or activity that allows the participant to ‘think aloud’ as they talk through the activity and show the interviewer what they have create or how they go about an activity.

InterviewPlus seemed a useful addition to the research reported here as it was envisaged that it would allow a participant (where they had got beyond orientation), to show what they had achieved already with their avatar and to talk about this in detail. It was expected that in

doing this the person would naturally demonstrate their relationship with their avatar as well as highlighting issues such as motor skills, conceptual understanding of a 3D environment, or more general IT ability.

Another angle for exploration of data gathering was to consider interviewing not just face-to-face in the physical world, but to also interview in-world. It was hoped that this may add a 3rd dimension of immersion and embodiment by being in the virtual environment itself. This would be a way of seeing at first hand how the participant as avatar reacted to the virtual world and how they coped. It would give an insight into their navigation skills, search skills, interaction and communication skills as well as showing adaptation to the culture in terms of appearance and etiquette.

IPA sampling

IPA samples are usually small in number, with around 10 being the optimum size before saturation takes place (Flowers, 2005). Sampling is purposive and therefore suited to study of a group, though it is accepted that this does not allow for inclusivity or range (i.e. gender or ability) (Smith 2004). IPA is also not appropriate for comparative analysis, though in this first phase of the study where the focus is on a particular group this is not a concern.

In this study an initial group of 6 will be interviewed. These will be chosen from a known number of staff members who have already show an interest in the use of this technology. The participants may already have a professional relationship with the researcher, which in some aspects is a cause for concern, though again the IPA technique allows for this in that rapport needs to be achieved between interviewer and participant in order to draw out a deeper dialogue.

Practicalities

This approach requires interviews of a duration of approx 1 hour. Interviews are between 1 interviewer and 1 participant. The face-to-face interviews are audio recorded and sent to a transcriber. The transcripts then provide part of the data set.

In-world interviews are carried out using the text based instant message facility available in Second Life. Interviews are logged through the private chat channel, directly between the interviewers' avatar and the participants' avatar.

One of these in-world interviews was tagged on the end of an audio interview, with the interviewer and participant sitting at a desk together with 2 computers, side by side and with the audio recorder still running between them. It was envisaged that the interviewer would be able to observe how the participant moved and which controls were used, how easy this was for the participant.

The second in-world interview was carried out remotely, at a distance. Unfortunately much of the chat text was lost due to a Second Life client crash.

The audio transcripts and chat-logs from the interviews will be coded for emerging themes that will then be further analysed and grouped into 'super themes' for further analysis. In order to do this the documents are divided into 3 columns. The transcript text is left in the middle column. The right hand and left hand columns are used to mark codes and emerging themes.

For a more detailed overview of this technique please see the LEX methodology report. (Mayes 2006)

Discussion of the technique

Interviewing in-world was a novel experience for all concerned. Whilst it does offer a rich technique, combining an open style with InterviewPlus, the mechanics of this as technique should be considered. The main problem is that most of the participants involved so far are not regular users of 'chat' style instant messaging (IM), and their on screen reading and typing skills make dialogue slow and difficult. The ebb and flow of conversation becomes somewhat lost, and typing errors can make later coding tricky and meaning becomes lost.

If used with more experienced Residents³ and an interviewer who is also experienced at using IM tools, then this should be much less of a problem and becomes a very tempting technique to explore further.



Another benefit of in-world interviews is the possibility afforded to take photos of the interview session, providing richer evidence of the interview and interaction. It may also be worth considering in-world 'machinima'⁴ recording of interviews.

As was mentioned technical difficulties were encountered but to some extent these can be overcome, for example if the Resident/participant had also logged chat, effectively providing a backup, then the loss of the interviewers records would have been less problematic.

Even with these problems this is still an interesting combination.

It is not yet clear if the IPA style of interview is entirely suitable for this subject matter. An open style is certainly required to enable participants to tell their own stories, it was felt by the researchers that in many ways the participants did not yet have enough experiences to share and discuss in-depth. Perhaps this will change in subsequent interviews once more experience has been gained.

³ Second Life avatars are traditionally referred to as 'Residents', as they reside in the virtual world.

⁴ <http://en.wikipedia.org/wiki/Machinima>

Results so far

To date 4 participants have been interviewed, all volunteer members of staff.

3 participants were interviewed face-to-face. During the interviews they were asked to log in to Second Life and show the interviewer their avatar whilst talking about what they had done with it, show how they moved around, and to further talk through how they felt about their experiences.

One of the participants agreed to use chat in-world during this process. The chat logs were subsequently saved as transcripts. The 4th participant was interviewed entirely in-world.

Several themes have already begun to emerge from early analysis, though these are still to be further analysed within the bulk of the full data set, once finally collected.

Early emerging themes include mention of aspects such as feelings and emotions, perception of ability and skill in using technology, age and gender, prior experience of being a computer gamer, and pre conceived notions of what the world and technology are, or what they offer. Issues such as motivation, investment of time, and relevance to own work also feature. All participants so far have given an insight into their relationship with their avatar.

Here we present a small sample of some of the emerging themes.

Perception of Ability

Participants have mixed views on their existing abilities and how this may impact on their ability to use a virtual world. All participants so far are regular computer users with reasonable levels of skill and ability for self-learning, however confidence can be lost quickly in an unfamiliar environment, leading to further unsure-ness about their ability to use Second Life.

“...well because I’m so old of course I get very scared about anything that’s new.”

“I found it all pretty straightforward, it was reasonably intuitive, yes there was no problem with registering or anything like that, it was fine.”

One participant mentioned age and how he therefore feels less likely to develop his skills using this technology. He compared himself to the young students whom he works with and felt that they would have an easier experience:

“I suspect that the students are far more comfortable with that because the chances are it’s not as “foreign” to them as it probably is to me, so it might be a, it might be a generational thing, a kind of native versus immigrant thing.”

Control

Control of the avatar (navigation), and control of the experience were commented upon, and how this leads to feelings of embarrassment when a lack of control is shown in front of others:

“Even navigating around that kind of introductory landscape was quite difficult for me because I’m going well I’m not entirely sure even what it is that I’m looking for”

“...of course there’s a whole kind of control thing ... you press a button and all of a sudden your perspective changes or you’re suddenly not sure where you’re looking...so orientating yourself physically as well sometimes right, where am I now? Aha and I think at one point I actually hit a button and started to fly and didn’t know how to stop flying. And of course at that, at that point even although you know this is a virtual environment, even although you know that these people could be anywhere you’re thinking I must look really stupid flying about [laughs].”

One participant expressed a need to find a more familiar environment in which to practice, and told how once he’d got to the university island it felt familiar, home like, and how that then gave him confidence to go out and explore further:

“So I found myself in [the University] space and kind of because that was a familiar environment to me then I felt slightly more comfortable walking round about there. Because I thought well I know this space. I, I know where I am, I am orientated within it. ..So and I felt more comfortable trying stuff out in it just in terms of basic control you know so flying up and down places and getting myself down and changing my views and my perspective erm, and then searching for, it was almost like well now that I’ve got a base ...it’s like well I know where I’m coming back to and I’ve got, it’s almost like a kind of comfort blanket, a comfort zone.”

New social experiences

It seems that many participants were uncomfortable because they felt that they had been ‘dropped into’ a situation about which they knew nothing - *“...literally being a stranger in a strange land”*, as one put it. They all reported feeling at a loss as to what to actually ‘do’ in-world, other than the initial orientation activities supplied by Linden Labs.

“...here I am suddenly making a transition into a completely new environment with you know a whole, a culture that I don’t understand, a way of doing things that I don’t understand, an environment that I don’t understand that I have no information about ... when you’re put in those shoes again in a real situation because very often...looking at from the well I know what that feels like because I’ve done it but the Second Life thing strangely enough it’s like wow! Here I am. What do I do now?”

“I went to orientation island and I had a wee kind of scout around there and that was, I found it a very bizarre experience. “

“... I think I was sort of struck by the technology you know that there were other people in that environment who could have been from you know, there’s typically I don’t know, forty thousand people online at any one point in time. ...who could be from anywhere in the world and it just seemed because I’m not really up with this field yet, it just felt just bizarre that you know you could be standing next to somebody in a different kind of reality but it was real in a sense.”

It may be that the usual affordance of an online environment that allows a new members to ‘lurk’ on the sidelines in order to observe practice, etiquette and socialisation before making themselves visible to an existing community, and to introduce themselves to a community in a controlled way (for example by initial postings to a forum), are stripped away in Second Life.

When you log in for the first time you immediately 'land' right in the middle of a seemingly busy area with a lot of other avatars landing next to you, or on top of you, bumping into you, etc. You suddenly find, even though you may not even know how to chat or even move your avatar, that you have people talking to you and this seems a very unusual situation, not one normally encountered in the 'real' world:

"Do they talk to me? What, I don't know what I'm doing and so I'm just randomly walking about this, this place touching and clicking and stuff to see what happens. Yes so just that whole feeling of uncertainty about where I was, unsure about how to behave and really well what am I supposed to do now."

"...that again probably goes back to this thing about my not being, comfortable's not the right word, but not being confident enough in the environment that you know it's like if I'm walking along the street and a complete stranger comes up to me and starts talking to me you go oh, what's going on here....it felt a bit like that and I didn't feel threatened, I didn't feel threatened at all but it just felt strange, who is this person that I've never met before who wants to talk to me?"

Concern was also expressed that it would be easy, in turn, to offend:

"...am I doing something foolish, am I doing something wrong...am I behaving in a way that is you know just daft or offensive or improper."

Withdrawal

Some of the fears expressed possibly get to the heart of the matter of why staff do not continue with exploring this technology:

"...being the kind of typical technophobe that I have become I just thought I'd better log out now you know."

A typical reaction to an unknown situation is to withdraw. This attitude has emerged in all of the interviews so far, in varying degrees. All participants felt that they had done this at some point. When they went back in they reported often just popping in and out, and felt that they would need a large chunk of time, an hour or two, to really get to grips with the environment in a more meaningful way. This time investment was proving problematic to achieve at work, due to the expected and usual work pressures we all face, plus technical problems with hardware and access. The most successful so far were those who had found time at home - where they could log in in relative peace without being disturbed by colleagues and students and where they could gain help from family - or those who had attended one of the sessions or evening classes.

Relationship between avatar and self

Warburton, in his article "Loving your avatar" (2007) comments on perceived stages that Residents may go through when creating an avatar as a personal representation of self, from initial early stages, up to the point where one bonds with the avatar. Participants here have shown similar feelings and emotions. A transition period is discussed in relation to developing a relationship with their avatar. This was seen in various stages with one participant feeling that she had now 'bonded' with her avatar, whilst another still referred to his avatar as 'it'.

“...there’s been an interesting transition has taken place I’ve noticed. Originally I didn’t really see the avatar as being part of me, it was just a being that was separate from me and something that I had to do in order to fulfil the proposal requirements and proceed with this project.”

Most participants referred to their avatars at first as ‘my avatar’, but this changed the more they talked about it.

One continued to call it ‘my avatar’ until the point in the interview he logged into SL and the interview continued in IM. At this point the avatar was then referred to as him or by its name. After 10 minutes or so in-world the researcher was corrected where she mis-spelt the avatars’ name.

One participant frequently mentioned that she had invested a lot of time on the appearance of her avatar, and admitted that this time had in fact created a bond and sense of self in the avatar:

“...but I never actually saw myself getting particularly involved in it and I’m not sure that I still do if I’m being completely honest but having said that I’ve since spent a long, long time on my appearance and I’ve thoroughly enjoyed it and what I’ve noticed is that I’ve actually started to bond with [laughs] with my avatar and I think I have started to invest in it much more and I almost do now see it as and this sounds really cheesy but almost an extension of myself. I could see myself getting quite protective if I needed to be, do you know what I mean?”

This again is commensurate with Warburton’s observations (2007).

Another participant explained his lack of time spent on appearance in a way initially unexpected by the researchers, but since observed elsewhere:

“But you know I wasn’t at the stage where I wanted to spend an awful lot of time you know putting on clothes, I’m a typical man you know [laughs] it’s like just give me a pair of jeans and a T-shirt and let me get out. ..I’m fine you know, keep my hair short, low maintenance erm, I ended up bald [laughs] so yes so it was a case of OK, fine, I’m not naked, let’s get out of here.”

As an interesting aside it can be noted that 3 of the 4 participants, when asked on the consent forms if they would prefer to be anonymous or named and if named were they happy for their avatar names to be given, decided that it would be nicer if their avatar name was the only name used against any quotes. This also seems to point to the beginnings of a bonding process with, and a projection of self in to, the avatar.

Early conclusions

Initial findings do seem to support the anecdotal observations that when faced with this new ‘world’ members of staff, even though they have great self motivation to join up and that use of this technology is relevant to their work, that there are many factors at work which can potentially hinder this process and hinder staff from investing in this technology.

It seems that a supportive environment for the early experience is important to most participants, in spite of their existing abilities and motivations. Those who went through a 2 hour 'avatar training' session reported that they felt a lot more comfortable after they had done that, and had got much further forward in their learning about the environment than they were managing during occasional and sporadic 15 minutes or so here and there.

Mutual support during the early experiences seem to be key to most participants, either via colleagues, in 'formal' sessions, or from friends or family at home.

It was observed in the formal sessions that small groups of 2 -4 appeared to get further through orientation than individuals and that these small groups, would help each other and would also diffuse fears with humour and mutual support. This has been reported in 3 of the interviews so far.

Knowing what these potential barriers and pitfalls are will help us develop a framework for support structures and activities that will allow staff to engage in the technology

Further into the study we will target participants who have dropped out and it will be interesting to see if any of these themes emerge as barriers to some.

Further Research

Research is ongoing at this time. Further interviews are lined up both within the institution and outside with local business partners in order to explore this issue further and inform the training needs of both.

Analysis will continue on existing data and on the new data still to be collected. It is envisaged that more in-world interviews will take place, though the technique for this will be further refined, for example shortened session may be preferable to help overcome problems with typing skills. The researchers also wish to try voice chat interviews in world.

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5 TinyURL <http://www.tiny.cc/>

Learning to walk before you know your name

Pre-Second Life scaffolding for noobs

Ian Truelove and Graham Hibbert

Keywords: Second Life, collaboration, OpenSim, Art, Design

Abstract:

Induction into Second Life is often a traumatic and bewildering experience for new users. Through the course of many inductions over the last two years, the authors have observed the difficulties that students have experienced when asked to simultaneously take on board issues of identity, appearance, role play, technical skills, forced communication with complete strangers, economics and etiquette, to name a few. As part of the JISC funded Open Habitat project, the authors have piloted an alternative approach to inductions into Second Life, with the overall aim of providing pre-Second Life scaffolding through real life workshop activities and the use of OpenSim.

OpenSim is an open source, reverse engineered implementation of the server software that provides the land for the Second Life client to access. The standalone version of OpenSim provides the opportunity for educators to give each of their students their own private island to play on before signing up to Second Life. OpenSim allows educators to delay the inevitable focus on identity forced by name choosing when signing up to Second Life, and to draw students' attention to more fundamental competencies such as walking and, in the case of art and design students, building. The initial outcomes from the first pilot study indicate that OpenSim inducted students subsequently engage more meaningfully and effectively with Second Life.

This paper also reviews other challenges and opportunities that were examined in the first pilot study, including a 'quest' based learning approach drawn from previous research into World of Warcraft, the blended approach to learning in virtual worlds, identity scaffolding, collaborative working and the concept of the virtual art studio.

Introduction

This paper presents details of the first pilot study of the JISC funded Open Habitat project, and draws on the authors' initial observations of these activities. A full evaluation of the pilot by the project team is currently in progress and will be subsequently published on the project website at openhabitat.org

History

The authors of this paper are Art & Design lecturers who, in 2005, developed an interest in the creative potential of Second Life. The initial action research strategy for exploring this potential was to assume the guises of virtual artists. Drawing on real world skills and experience as digital media artists and designers, the authors learned how to produce and exhibit virtual art and inventions in Second Life. These personal learning experiences revealed the potential for similar learning opportunities for art and design students. Informally, Second Life inductions were offered to small groups of undergraduates to test the potential for using Second Life as a tool for creative development. These inductions proved to be problematic in several ways.

Students found the initial tutorial phase overwhelming, reporting feelings of confusion and anxiety, whilst failing to see the purpose of this virtual world. Observation and analysis of users identified that the requirement to simultaneously address many fundamental issues in the first few minutes of engagement was the cause of many of the negative aspects of inductions. Issues that a standard Second Life induction requires new users to address include: Creating a new identity through the choosing of a name and the dressing of an avatar, role-play with this new character (including interaction with strangers), the rapid acquisition of technical skills, economic considerations (The prospect of making money, and the fear of accidentally losing it), and the complexities of social interaction and etiquette. The aim of exploring the potential of Second Life as a tool for creative development through the generation of content was quickly swamped by these issues. It became apparent that there was a need to create some form of scaffolding (Hmelo-Silver, Duncan & Chinn, 2006) to support early learning in Second Life.

JISC, Emerge and Open Habitat

Evidence from these initial pilot studies enabled the authors to join the JISC funded Emerge community of practice, where partnerships were forged with researchers at the University of Oxford, Kings College London, the University of Prince Edward Island and the University of Essex. The Open Habitat project was subsequently successful in gaining funds from the JISC Users and Innovation strand to explore the potential for learning in virtual worlds. This 18-month project is divided into two phases, with two pilots running in each phase - the Art & Design pilot referred to in this paper, plus a separate pilot exploring social presence with Oxford philosophy students. The phase one pilots are accompanied by a formative evaluation to guide the design of the phase 2 pilots.

Phase 1 Art & Design pilot

The Art & Design pilot was designed to test out an alternative approach to induction for students from a creative arts background. The aim was to delay the exposure of students to as many of the overwhelming aspects of induction until after students had experienced the virtual world as a tool for creating content. This was achieved by using OpenSim. The land that avatars walk and build on in Second Life is hosted on Linden Lab's proprietary servers. OpenSim is an open-source, reverse engineered version of Linden Lab's server software. Users connect to OpenSim using a tweaked version of the standard Second Life client, and the user experience is almost identical. The networked version of OpenSim can be configured to provide public or private grids that work in a similar way to Second Life. Over 30 public OpenSim grids are currently available as alternatives to the Second Life grid. In addition to the networked version of OpenSim, a standalone version is also available which runs locally on the hard drive of the user's computer.

The OpenSim standalone version was chosen to support the design of an alternative induction for several reasons:

New users do not need to sign up before logging into OpenSim.

Observations of previous inductions revealed the huge significance of choosing a name. As students are asked to do this at the very beginning of a standard Second Life induction, many do not spend the time required to choose wisely. Students' subsequent experience of Second Life is often clouded by an inappropriate name. Entering a world as "Test User" delays this important but initially overwhelming issue of identity until students are ready.

All user look like 'Ruth'

OpenSim standalone provides a default female avatar (often called 'Ruth'). This obscures the important but initially overwhelming issue of appearance, and sets up a less intense relationship between the user and the avatar.

Each user has a private island.

As OpenSim standalone runs locally, there is no danger of a student experiencing the anxiety of meeting and trying to communicate with another strange avatar. Each student has a personal, private island to hide on whilst they learn the basics.

Students can get building within minutes

OpenSim standalone allows students to view a virtual world primarily as a content creation tool. This creates a more familiar learning scenario for them, as they see the induction as more similar to something like a PhotoShop workshop.

The Pilot

The pilot was designed to take advantage of the points above. The participants in the pilot were a group of 11 first and second year undergraduates studying on the BA(Hons) Graphic Arts & Design course at Leeds Met, who volunteered to take part in the study. The pilot was scheduled to run intermittently over three-weeks, and took place after the students' final level assessments had been completed. For the full pilot plan used, see:

http://www.cubistscarborough.com/oh/Day-by-day_A&D_pilot_plan.pdf

Although OpenSim was central to the initial induction phase, the ultimate aim was to induct students into Second Life. One of the primary areas to evaluate was the ability of students to engage more meaningfully with Second Life after an OpenSim induction.

Students took their first step in OpenSim, and within 5 minutes had been directed to build their first plywood box. The teaching approach taken was to 'drip-feed' new skills as appropriate, with tutors responding to the needs of the group and providing additional support to those struggling. The importance of a blended-learning environment was brought into focus in this initial induction, particularly when helping students to learn the navigation and building tools. As well as the importance of eye contact and body language when supporting learning, being able to see the interface elements of the OpenSim client and being able to press the relevant modifier keys, gives a blended learning approach a distinct advantage over distance based inductions into virtual worlds.

As well as attempting to maintain a zone of proximal development (Vygotsky, 1978) for each student during the induction, we also adapted a 'Quest' based learning strategy drawing on research into the tutorial approach of World of Warcraft (White, D. 2008). This approach, which has much in common with problem based learning, involved setting mini tasks for students to complete. One such quest asked the students to build a tower as tall as possible using their initial building skills. This helped to focus students on the importance of camera controls when building and the issues relating to flying.

The other learning approach that was used in the induction drew on theories relating to observational learning (Bandura, 1977). Mid way through the first day, one of the tutors gave

a high-speed demonstration of how he would build a gallery space in OpenSim. The aim of this demonstration was not to instruct students in specific skills, but to allow them to witness an experienced master at work. The aim was to provide students with a sense of what it is possible to achieve when creating artifacts in a virtual world. Students were then asked to build their own galleries, with individualised assistance provided as appropriate. This task also gave students the opportunity to bring their existing 2D artwork into the virtual world, teaching not only specific image uploading skills, but also giving students a greater sense of ownership of the virtual space.

The final task at the end of the OpenSim stage of the induction was for the students to build a 'den' to hide in. Although the installation of OpenSim was the standalone version, it was discovered that two OpenSim standalones could be connected together to allow two users to share one island. The students were then set a 'hide and seek' quest, which allowed them to learn about the map and mini-map. By introducing the multi-user aspect of virtual environments at this late stage in a way that allowed students to see both a real person and their avatar in a shared space, students were better able to understand the relationship between the two.

Identity scaffolding

In addition to blended learning, the real life classroom environment permitted some more conventional activities to help prepare students for Second Life. One of the most powerful but intimidating aspects of Second Life that was identified in previous inductions was the issue of identity. The importance of choosing the right name in a conventional Second Life induction is underemphasised by the fact that it is the first thing that is demanded on sign-up. Over-eager new users tend to make spur of the moment decisions that they often regret afterwards. To address this problem, a simple game was devised to focus students' attention on the importance of names. The pre-set surnames available on the Second Life sign-up page were printed out and given to the group. Students were asked to choose their favourite names and write them in the centre of a whiteboard. They were then asked to write their least favourite names towards the edge of the whiteboard. They then invented a forename for each surname. After a discussion speculating on the characteristics of these newly invented people, students spent time searching the Internet for definitions of the words used in the names of the characters that they had created. This activity emphasised the importance of choosing the right name, in preparation for signing up to Second Life.

Second Life

The validity of the pre-Second Life induction activities was tested in the next stage of the induction. This followed the standard Second Life induction format, with students signing up for a free account with Linden Lab and entering Second Life for the first time. Students engaged with the Orientation Island tutorial section with much greater confidence and sense of purpose than had been witnessed in any previous induction. Within a minute, one student was giving advice to a stranger, and the whole group tackled the various tutorials with a sense of adventure, rather than the usual trepidation. The identity scaffolding activities resulted in students having a greater connection with their avatars through their carefully chosen name, resulting in more adventurous exploitation of the appearance tutorial. By the end of the Orientation Island experience, all the members of the group were sufficiently equipped to venture out onto the grid.

The Virtual Studio

The next stage of the induction took place on the LeedsMet sim, which is a flat island designed as a virtual studio space for the creation of content. As the emphasis of this pilot was on user-generated content, students were allocated personal plots to build on for the remainder of the project. This virtual studio concept is central to the learning approach adopted by this pilot. This mirrors the real-life learning environment of art & design students, who tend to learn through the production and discussion of artwork in studios and technical workshops. Virtual environments provide an ideal opportunity to provide a cheaper, easier and more accessible version of these types of learning environments. As well as providing the opportunity to stimulate general creative development, virtual environments also provide art & design students with a new type of media to work with, and a new audience to satisfy.

The social aspect of studio culture is very important, with peer support forming an important part of the general learning strategy. Before continuing with the building focused induction, a number of socialisation activities were organised for the students. This involved pairing up avatars and providing landmarks to popular and relevant locations on the Second Life mainland. As well as helping students to become familiar with the various modes of expression and communication, and hinting at the cultural aspects of Second Life, this activity also showed what it is possible to create using the in-world building tools. Our initial observations of students engaging in these activities suggested that this phase was more significant than anticipated, and that it should be expanded in future inductions.

The final formal group learning activities took place on LeedsMet island, and followed the quest-based format initiated in OpenSim. The final task was designed to test out the potential for collaborative working in Second Life. A small 'river' was created, and students were asked to pair up, share building permissions, and stand either side of the river. They then had to build a bridge together and meet in the middle. This proved to be hugely problematic, as the shared permissions system in Second Life is complicated and buggy. The exercise was repeated, but with all shared building rights revoked, and this proved more successful. However, this experience highlighted that collaborative working in virtual worlds is much more than building something together. Collaboration has emerged from the first pilot as the major area for development, and is likely to become the focus for the phase two pilot.

Each student was allocated a building plot on LeedsMet, and four project briefs were set to guide the learning of the students for the remainder of the pilot.

The first brief asked students to create a shrine to their avatar, enabling them to explore and develop their new identity. The second asked students to tackle to the same brief that the authors were working on for the International Symposium of Electronic Art 2008, enabling students to benefit from a master-apprentice learning approach. The third brief required students to take their usual practice and translate it into the 3D space, enabling them to draw on existing creative skills. The fourth project brief asked students to forget their usual working practices, and explore a completely different working practice, allowing them to role-play alternative ways of being. For the full briefs, see:

http://www.cubistscarborough.com/oh/Final_4-pilot_briefs.pdf

A variety of levels of engagement were witnessed over the remainder of the pilot. Although blended learning sessions were booked, they were not as well attended or successful as informal sessions conducted at a distance between avatars. Initial observations indicated that the overall level of engagement seemed much higher than previous inductions. Most of the work created by the students was at a level that the tutors judged good, and some of it was excellent. As none of the participants were users of Second Life prior to pilot, the high level of building expertise that some of them gained in 3 weeks was surprising. One student in particular developed a technique for improving the quality of his usual creative practice. This student had spent a year developing a technique for creating graphic novels based on photographs, and discovered that he could quickly and easily build sets in Second Life to use as a basis for his illustration work. Another student produced a stage and instruments, subsequently sold many items to her fellow students, and sought advice about setting up her own shop. Many students reported that the prospect of a new external audience for their creative output was a motivating factor. The requirement to work in a public space also created a sense of peer pressure, which has been shown to be a motivating factor in student achievement (Gibbs, 2008).

By the end of the pilot, students were starting to move beyond the set briefs and develop individually relevant ways of learning in Second Life.

Summary

The Open Habitat evaluation process will extract structured and thorough conclusions from this first pilot, but the initial observations of the authors indicate that the following point were significant:

- 1 OpenSim standalone equips students with a set of skills that help their subsequent engagement with Second Life to be more meaningful and productive.
- 2 Collaboration in virtual worlds is more complex than sharing building rights. In particular, socialisation emerged as an important prerequisite for collaboration.
- 3 Formal blended learning strategies are effective in the early stages, particularly when students are using OpenSim standalone. Distance learning is more appropriate when students are 'in character' in Second Life.
- 4 Creating content is not particularly difficult for new users when this is introduced early and in isolation.
- 5 Frequent feedback and just-in-time instruction is an effective approach to learning in virtual worlds.
- 6 The potential new audience for student generated content in Second Life, and the peer pressure experienced by students working in a public space can be a motivating factor.

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The Schome Park Programme – exploring educational alternatives

Peter Twining and Shri Footring

Keywords: Virtual worlds, schome, pedagogy, future education systems.

Abstract:

The Schome Park Programme set out to extend thinking about what the education system for the information age (schome) should be like. The first three phases of the programme spanned 13 months and involved hundreds of 13 to 17 year olds and around 50 adults using our 'closed' island(s) in Teen Second Life™ virtual world alongside a wiki and forum. Having explained the context in which this work took place the paper outlines the initial educational design underpinning the programme and describes some of the activities which took place. It goes on to explore some 'dimensions of practice' which emerged from the data analysis towards the end of Phase 3.

Introduction – the context

The Schome Initiative set out to design schome, an education system that would meet the needs of individuals and society in the 21st Century. Schome was envisaged as being a system that would support people learning throughout their lives, from the cradle to the grave. Unlike other initiatives to transform education the Schome Initiative took the view that you needed to start with a vision of the ideal education system that would genuinely meet the needs of society and individuals in the 21st Century and was unconstrained by pre-conceptions of existing education systems. Having established a vision of the optimal education system for the 21st Century (i.e. schome) the next stage would be to devise a strategy for moving from our current systems to schome.

Initial work on developing visions of schome involved looking at different approaches to education and existing education systems around the world (see <http://www.schome.ac.uk/>). Analysis of these resulted in the Educational Programmes Typology (Rix & Twining 2007). This 'desk research' was complemented by explicit vision building activities with focus groups, which were set up to include people who one might expect to have diverse views on what an effective education system should be like, such as home educators (see Sheehy & Bucknall 2008). Subsequently the Aspire Pilot set out to work with secondary school pupils and teachers in two schools over a period of seven months to develop visions of schome (see Craft, Twining and Chappell 2007). The visions that emerged from the focus groups and the Aspire Pilot tended to be very similar to existing schools. They focussed predominantly on the surface features of school such as the physical environment, rather than 'deep educational structures' such as curriculum, assessment, roles and power relationships, accountability, etc..

The limitations in people's thinking about schome was perhaps hardly surprising given that all those involved were immersed in a society in which school is the dominant educational model. People's thinking is inevitably informed and constrained by the social contexts in which they operate. This lead the Schome Initiative team to suggest that we might enhance people's

ability to think more radically about what schome could/should be like by providing them with radically different experiences of education. Open virtual worlds seemed to offer the possibility to do just that.

Why use an open virtual world?

Open virtual worlds (OVRs), such as Second Life™ virtual world, are online applications in which users, represented by an avatar, have the facilities to interact with each other and create their own environment using open ended tools.

OVRs appeared to have a number of features that made them the ideal vehicle for extending thinking about future education systems. Firstly, they provide a way for people to have ‘lived experiences’ which would be difficult or even impossible in the physical world. For example, setting up an educational community in an OVR was more feasible than creating such a community from scratch in the physical world. Secondly, our experiences of OVRs suggested that they encouraged experimentation, playfulness and breaking of physical world conventions. Thirdly, OVRs provide new forms of representation and interaction with your (virtual) environment. For example, buildings take on a different significance in an OVR because they no longer serve physical world purposes such as protecting you from the elements, or providing a structure in which to locate furniture (a display board doesn’t need to be attached to a wall as it can float in mid air).

In early 2006 Second Life™ virtual world was the optimal example of an OVR and became a core element within the next stage of the Schome Initiative’s work - the Schome Park Programme.

The Schome Park Programme

The primary aim of the SPP was to extend our thinking about visions for schome – the education system for the information age. Subsidiary aims related to the educational potential of virtual worlds and in particular the extent to which learners developed ‘knowledge age skills’ such as collaboration, ‘real’ problem solving, communication, and learning to learn.

Schome Park, our island in Teen Second Life™ virtual world, was set up as a secure space that was only accessible to specific avatars. Thus it is closed in the sense that avatars are contained on Schome Park. The students were all aged between 13 and 17. All adults involved in the programme had current enhanced CRB clearances or the international equivalents.

The initial design of Schome Park was closely linked with the eSIR Reference Statement (Twining et al 2006) which is summarised in Figure 1. The eSIR Reference Statement was developed to provide an indication of the implicit vision of ‘good practice’ within the English government’s eStrategy (DfES 2005).

Aims	'Smarter learners better able to cope with changing contexts' – focus on enhancing learning, motivation ⁷ and lifelong learning ⁸ as important elements of this.
Environment	<p>The learning environment is the whole environment of the learner that is recognised as being relevant to the education system. It has two components:</p> <ul style="list-style-type: none"> • The spatial environment – where learning takes place • The temporal environment – when learning takes place. <p>Both the spatial and temporal environments that are considered relevant to the education system will expand⁹. In particular there will be greater emphasis placed on the home¹⁰, working across physical settings¹¹ and virtual settings¹², and extending 'the school day'¹³. This is all summed up in the phrase 'anywhere/anytime learning'¹⁴.</p>
Actors	<p>The 'actors' are people and/or organisations involved in supporting learning, including teachers, support staff, learners, learners' peers, parents and employers. There will be an increase in the involvement and availability of actors owing to the facilities that ICT offers, especially in relation to interaction 'at a distance'¹⁵. In particular, greater emphasis will be placed on the role of parents¹⁶.</p> <p>Collaboration will be a key element to this diversification of actors and environments¹⁷.</p> <p>Learners' choice, responsibility and control will become increasingly important as part of the 'personalisation' agenda¹⁸.</p>
Curriculum	The curriculum includes everything that learners learn. There will be a broadening of the curriculum both in the 'subjects' available ¹⁹ and in learner choice ²⁰ . In particular, the curriculum is likely to offer more vocationally-oriented options ²¹ , and will place a greater emphasis on 'core skills' ²² .
Support	The range and nature of support, which includes teaching, will increase and diversify as the environments, actors and curriculum expand. In particular, there will be an increase in learner choice about when, where and how learners are supported ²³ .

Figure 1 Summary of the eSIR Reference Statement (Twining et al 2006 p.14)

During its first 18 months the SPP progressed through three phases of activity. Figure 2 shows how the design of Scheme Park Programme related to the eSIR Reference Statement during each of these phases. The eSIR Reference Statement provides a 'high level' description of how the design of the Scheme Park Programme changed over time. Thus, Figure 2 is an overview, which conceals some important 'dimensions of practice' which emerged from comparisons across the three phases.

Comparing Phases 1 to 3

In early March 2007 the first cohort of 149 students were given access to Scheme Park and the Schomcommunity wiki and forum (<http://www.scheme.ac.uk>). These students were dispersed around the UK and the vast majority of them were 'strangers' to each other. All of the students were accessing Scheme Park in their own time rather than as part of their school activity.

Initially student activity focused on individually exploring Scheme Park and experimenting with changing their appearance, buying things from the Scho-Op and trying their hand at building. They then started to attend the sessions organised as part of the three main strands (physics, archaeology, and ethics and philosophy) and commenced work on activities of their own devising. Despite the staff's encouragement for students to work together and help each other the students tended to work on individual projects to begin with. Thus, for example, several students each developed their own separate 'learning centre' to help other students

Aspect	Phase 1 (March to April 07)	Phase 2 (June to December 07)	Phase 3 (January to May 08)
Our focus (Aims)	<p>To explore the educational potential of virtual worlds (with a particular focus on developing Second Life skills and 'Knowledge Age Skills')</p> <p>To build a community of learners</p>	<p>To enhance 'Knowledge Age Skills'</p> <p>To increase student control and responsibility for the environment, the curriculum and support</p> <p>To widen the community (not just gifted and talented)</p>	<p>To enhance 'Knowledge Age Skills'</p> <p>To balance control and responsibility for the environment, the curriculum and support.</p> <p>To widen the community and increase its size</p> <p>To explore the co-existence of the schome ethos with school culture</p>
Environment	<p>Island divided into seven areas:</p> <ul style="list-style-type: none"> • Physics • Ethics & philosophy • Archaeology • Scho-op (generic support) • Shared meeting areas • Sandbox • Unrestricted space over 200m <p>Island, wiki and forum available 24/7/365</p>	<p>Island as naturalistic and attractive environment with some core generic areas – student control of planning/building</p> <p>Island, wiki and forum available 24/7/365</p>	<p>Two islands: One student controlled + one staff controlled. Immersive game theme for new island.</p> <p>Island, wiki and forum available 24/7/365</p>
Actors	<p>250 students from NAGTY (The National Association of Gifted and Talented Youth)</p> <ul style="list-style-type: none"> • Staff from four universities • Staff from the National Physical Laboratory • PhD students • Consultants 	<p>Ongoing students from Phase 1</p> <ul style="list-style-type: none"> • New students from range of sources (inc USA) • Staff from two universities • PhD students • Consultants • Teachers • Parents 	<p>Ongoing students from Phase 2</p> <ul style="list-style-type: none"> • New students from range of sources, including: South East Grid for Learning (broadband consortium) and 'School groups' from UK and USA • Staff from two universities • PhD students • Consultants • Teachers • Parents
Curriculum	<p>Three strands of formal activity (Physics, Ethics and Philosophy, Archaeology)</p> <ul style="list-style-type: none"> • Discrete 'taught sessions' (e.g. research methods) • Student led activity 	<ul style="list-style-type: none"> • Student led activity (inc continuation of formal strands from Phase 1) • Machinima creation • Discrete 'staff led' sessions (e.g. Sudoku) 	<ul style="list-style-type: none"> • Student led activity (inc continuation of strands from Phase 2 and new strands such as Time Travellers) • New strands led by staff (e.g. Interactive Art¹; Savvy Avvies)
Support	<p>Staff scheduled sessions for each formal curriculum area</p> <ul style="list-style-type: none"> • Information in wiki • Discussion in forum • Emergency help button to summon staff • Peer – peer support 	<ul style="list-style-type: none"> • Peer – peer support • Staff available to provide support in Schome Park • Information in wiki • Discussion in forum • Emergency help button to summon staff 	<ul style="list-style-type: none"> • Peer – peer support • Greater staff support for strands of activity (e.g. Maths). • Greater support for student led activity • Information in wiki • Discussion in forum • Emergency help button to summon staff

Figure 2 Mapping the design of the SPP to the eSIR Reference Statement

¹ Daruma Picnic introduced the notion of interactive art on the Main Grid of Second Life.

learn how to build in Schome Park. As students became more familiar with the environment the nature of activity diversified, with students organising activities such as a regatta, a murder mystery evening and even a wedding.

The students were free to build anything they wished in the air 200m above Schome Park. The amount of building was prolific and there started to be difficulties due to there being too many prims (objects) for the server to manage. The only way to resolve this was to delete thousands of the objects on Schome Park. This was a real problem which the community had to resolve, which helped to focus the students on the needs of the community. Thus, for example, it was agreed to collaborate on one 'learning centre' rather than having three separate ones. This tied in with the push for students to take greater control of and responsibility for Schome Park. Discussions about possible government structures took place, and towards the end of Phase 1 a student organised government structure was agreed, with seven departments including: Education, Government coordination and Building and Planning permission.

Phase 1 could be characterised as a time of experimentation. The students were positively encouraged to work together (rather than individually) and to feel safe in trying things out and making mistakes.

One of the criticisms of Phase 1 was that the students were atypical because they had all been identified as being gifted and talented. In Phase 2 the community was opened up to any 13 to 17 year old who wished to take part and approximately 100 schools were asked if they would publicise this opportunity. In addition contact was made with a number of other organisations, such as pupil referral units, City Technology Centres and the South East Grid for Learning. The majority of the new participants signed up in ones and twos over the course of Phase 2. 34 of the original Phase 1 students asked to join Phase 2 and regained entry to Schome Park on the 15th June 2007. Part way through Phase 2 a group of 14 students from an after-school club in the USA joined the programme. These students met face to face in the physical world with the teacher who had established the club, in addition to engaging with the programme at other times. The changes in the student population were accompanied by changes in staffing, with a shift towards greater reliance on volunteer staff.

Whereas in Phase 1 students had started by going straight into Schome Park new students in Phase 2 were asked to sign into the forum and find a buddy before going into Schome Park. The buddy system was intended to help new members of the community over the first stage of entering Schome Park, which we knew from Phase 1 was a time when many students left the programme. Of the 41 new avatars created in Phase 2 only 28 ever ventured into Schome Park.

Following the perceived success of student led events in Phase 1, and the departure of the original strand coordinators, it was decided to focus in Phase 2 on student initiated activities. This was reflected in the redesign of the island between Phases 1 and 2, which involved removing all the designated teaching areas linked with specific strands. The students were given responsibility for, and control of, all building anywhere on Schome Park. Discussion boards had been established in the forum for each of the government departments towards the end of Phase 1. Perhaps inevitably, the continuing students from Phase 1 were elected as the officers in the various government departments.

The planning department set about developing rules for managing building activity. A small number of students were very active in proposing and discussing planning applications in the forum. They also monitored building activity in Schome Park. One of the unintended consequences of this was that building became concentrated in the hands of a small number of students, most of whom had been part of Phase 1. To try to counteract this a large sandbox, where anyone could build without needing planning permission, roughly half-way through Phase 2.

A wide range of informal activities took place in Schome Park during this period, many of which were not publicised on the events page and thus were only attended by small numbers of students who had been directly involved in their organisation or happened to be in Schome Park at the time.

With encouragement from staff a regatta which spanned three days was organised by the students. The preparation for this took several weeks and involved the students in setting up pages in the wiki, creating courses and maps showing the routes, checking boats and the scripts to control them, devising mechanisms for calling back boats if there were false starts, publicising the races, and ensuring everyone understood the rules.

With support from their teacher the students from the after school club engaged with the wiki and forum as well as starting work on a collaborative group project to develop a skateboard park in Schome Park (having first obtained planning permission). They also participated in and organised a range of other activities both as a group and individually. For example, one student organised a series of popgun games, having first negotiated to ensure that nobody would be upset at the use of popguns.

One member of staff organised and led a project to create a machinima (a film in-world) of the real story of the Hindenburg disaster. This involved over 20 scheduled 2 hour sessions as well as many hours of individual student work at other times. The project involved: writing the script, creating the scenes and props, acting out and filming the scenes, editing the video clips, and merging the clips to create the final film (which can be seen at <http://schomepark.blip.tv/> - select AirShip Hindenburg (Final Version)).

Phase 2 could be characterised as a period constrained by well intentioned bureaucracy and dominated by the 'core' students, most of whom had also been active in Phase 1.

In an attempt to overcome some of the problems evident in Phase 2 some substantial changes were planned for Phase 3. A second island (Shome Park beta) was set up adjacent to the original island (Shome Park alpha) and the sandbox on Schome Park alpha was expanded so that it took up around a third of the island. It was agreed that the government would retain responsibility and control of building on Schome Park alpha, whilst the staff would manage Schome Park beta. Just over half-way through Phase 3, it was decided that the changes had not had the desired effect and the management of Schome Park alpha was totally overhauled in order to remove the planning permission restrictions. Teams working on particular projects were allocated parcels of land which they had total control over.

The focus of recruitment also changed before the start of Phase 3, moving from targeting individual students to bringing in 'school' groups. The intention being that 'pre-existing groups' of students would find it easier to establish themselves as part of the community than individual students had done. In practice 38 students joined Phase 3 from Phase 2, and 70

new avatars were created, 40 of which joined part way through Phase 3. 18 new staff, most of whom were volunteers, also joined at various points throughout Phase 3.

Student led projects continued, with a small number of established students being very active. For example, one student who was engaged in a large number of projects set up a vehicle building group 'Animotion' and created a racetrack. Groups of people could often be found racing the vehicles they had created around the track. This same student worked hard to support new students and help them develop their building skills.

Another student developed a Steam museum equipped with replica steam engines and displays of information. This expanded to include a steam train with railway track, which was used in the filming of a machinima called 'Murder of a gentleman' (which can be viewed at <http://schomepark.blip.tv/#978362>).

Students in one of the school groups (Group A) which was using Shome Park during school time worked in pairs on projects of their own choosing which included: organising a wedding, recreating a version of the Boston tea party; building a replica of a 1960's American diner; and holding a music recital. These students then created videos about their projects (see http://www.shome.ac.uk/wiki/Second_Life_demos#Shome_Park_videos).

Whilst student led projects were still strongly encouraged staff led strands of activity again became a priority. For example two staff organised a series of 'interactive art'¹ sessions in which students each created an object which when an avatar approaches it played an audio track.

Another member of staff organised a strand called 'Savvy Avvies', with the intention of providing a regular scheduled activity where both newcomers and established folk would feel welcome and which would help:

- newcomers to develop basic second life skills
- participants to be adventurous about altering their avatar's appearance

Underpinning the Savvy Avvies strand was a desire to support other strands of activity, for example by creating togas for the history group, and to help new members of the community to feel more included by blurring the differences in appearance between them.

Two other projects within Phase 3 were linked with external competitions:

- The Surrey Satellite Technology Ltd and British National Space Centre competition (see <http://www.bnsc.gov.uk/content.aspx?nid=7254>)
- The Learners Y Factor competition (see <http://www.handheldlearning2008.com/handheld-learning-conference-and-exhibition/learners-y-factor>)

Both these projects involved a group of students, who had volunteered to enter the competition, working as a team to develop their submissions over a prolonged period of time. In both cases a member of staff coordinated the team's activities and provided them with support.

Phase 3 could be characterised as representing a shift towards supporting groups of students who were committed to specific projects, often with 'externally' specified constraints.

¹ Daruma Picnic introduced the notion of interactive art on the Main Grid of Second Life.

Dimensions of practice

In looking back over the activities and approaches evident in the first three Phases of the Schome Park Programme a number of differences were evident, which can be encapsulated in the form of dimensions of practice. These appear to have relevance in comparing and thinking about learning in any context. Due to space limitations only two sets of dimensions are described here.

Curriculum dimensions

The curriculum throughout the first three Phases differed along two dimensions. The 'Curriculum choice dimension' relates to the degree of choice that students had about their engagement with an activity (see Figure 3). Within Phases 1 and 2 the students were engaging in their own time and had total freedom of choice about whether to engage with activities or not (Free choice). With the competitions which were introduced in Phase 3 the students had free choice about whether to become involved or not, but those who wanted to be part of one of the competition entries had to commit to seeing through the process (Self-imposed commitment). With the introduction of 'school groups' of students working during school time came greater imposition of curriculum choice. For example, each of the students in Group A had the choice of engaging in the Schome Park Programme or doing some other activity in school time this was Imposed choice as they had to attend school and had to choose between a small number of options). Typically in formal schooling students have a limited choice of subjects to choose from (Imposed choice) or no choice at all (Imposed).

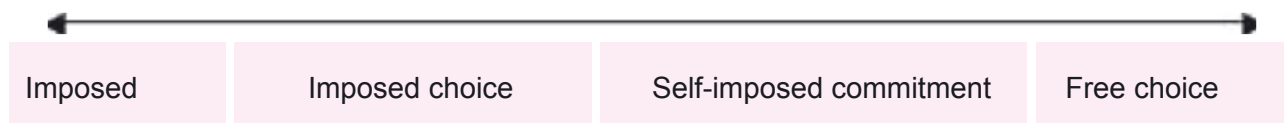


Figure 3 The Curriculum choice dimension

The Curriculum definition dimension (Figure 4), relates to who defines the curriculum (the 'content' of the activity). 'External' on this dimensions means external to the student. Within the Schome Park Programme most of the individual activities were Self-determined, the students had total freedom about what to do. Collaborative activities inevitably required agreement within the group about what was going to be done (i.e. Free negotiated). Thus for example, when it came to their paired project work students in Group A freely negotiated within their pairs what their projects would be. The two external competitions provided specific restrictions on the scope of the activity, but within those constraints the students had a great deal of choice about what to do and how to do it (Externally constrained). Similarly, in the Hindenburg machinima project the member of staff chose the focus on the Hindenburg disaster, though the students had a good deal of creative freedom. In the case of Group A the curriculum was initially 'Externally defined', in that the teacher organised some introductory activities to prepare the students for their project work.



Figure 4 The Curriculum definition dimension

These two curriculum dimensions interact, as illustrated in Figure 5, and the location of activities might vary over time as was the case for Group A, whose original activities were externally defined (by the teacher) but whose project work was freely negotiated within each pair.

Curriculum definition	Externally defined	Traditional School	Group A's preparatory work		Hindenburg machinima
	Externally constrained			Space competition & Y-Factor	Ethics & philosophy debates
	Freely negotiated		Groups A's projects		
	Self-determined				Animus' stuff
		Imposed	Imposed choice	Self-imposed commitment	Free choice
Curriculum choice					

Figure 5 Interaction of the two curriculum dimensions

Experimentation vs Control

There were clear differences between Phase 1 and the other Phases in terms of the degree to which students felt able to experiment and learn from their mistakes. This could be thought of as a Playfulness dimension. Throughout all three phases staff persisted in trying to create an ethos in which making mistakes was recognised as being an essential part of the learning process and therefore something to be valued. However, in Phases 2 and 3 the 'established' members of the community were often unsupportive of 'newcomers' who made mistakes:

- Staff 2 How do you feel the newer people have formed their views on this subject [the Schome ethos]?
- Student 4 "It seems as though in too many cases it's been through making a bad misjudgement about what the ethos is and being strongly reprimanded by the alrwady existing members, or through seeing this happen to someone else. Being more tolerant of the mistakes would be much preferable, but I can't claim to do it myself, so I think I have to do some eye-plank extraction already. :-)"

Extract from interview

The change in degree of playfulness was most evident in terms of building activity. There was a noticeable shift from most people initially having a go at building in Phase 1, to a small core of students dominated most of the building activity during Phases 2 and 3.

Re: Moving from Phase 2 to Phase 3

From Student 1

I think I'm not going to build anything in the new area. I want someone else to have a go! It's not a great feeling owning everything (well obviously not everything, but you know)

...

Re: Moving from Phase 2 to Phase 3

From Student 2

I think that's a bad idea <Student 1> - you're one of the better builders, and it wouldn't be putting your talent to use, would it? New people need to have the courage to build, and the ability to learn, but I think existing builders should carry on. 🤨

Re: Moving from Phase 2 to Phase 3

From Staff 1

I actually agree with <Student 1> on this one - I think that the current building is totally dominated by a small handful of people and everyone else is being excluded. Now I know that is not intentional - and agree that the quality of builds has increased, but that is perhaps part of the problem: you kind of feel that you can't build well enough and so don't try and so don't learn. ...

There seemed to be two key dimensions underpinning this shift, which might be labelled the Regulation dimension and the Product-Process dimension.

The Regulation dimension is evident in the change in complexity of the rules for who could build on Schome Park. In Phase 1 anyone could build anywhere above 200m without having to ask permission. In Phase 2 you had to obtain planning permission from the Planning department before you could build, and it could take weeks of negotiation and debate before a decision was made. Indeed some students started to question the degree of control that the Planning department exercised:

Re: Too much control?

From Student 2

Yes, well. The things that happened last week suggest people think we have far too much control. ...

Whilst some of the dominant builders rejected this claim, other members of the Planning department recognised the impact that the increased bureaucracy was having:

Student 4: ... the government was great for giving at least the sensation of power and responsibility, and I like to think it's kept the community together quite a bit. Having said that, I ended up being rather pragmatic, and the bureaucracy, which I'm to a large extent responsible for, started to cause quite a lot of friction. With hindsight, I was too keen to keep the status quo rather than try new things, and so the government became, clunky, as it were-we ended up having rather a lot of disagreements not only over particular builds but over the system as a whole. ... we lost the focus somewhat that, in the end, the government was meant to be a means rather than an end.

Extract from interview

This insightful comment reflects a change on the Product-Process dimension in relation to the government. This shift was also evident in relation to building, with a growing focus on the quality of the finished products rather than on the process of learning to build:

Re: Summary Of Schome: <Student 5>

From Student 4

...

As regards the groupings in schome, I do think it is a shame that tiering formed itself, with only a few people doing most of the action in each area, although this doubtless meant that what was made and done was of a very high quality. It certainly seems that many people were put off by seeing others do much better than their own first attempts.

...

Clearly, there were other factors at play here too. However, there seems to be a relationship between the Regulation dimension, the Product-Process dimension and the Playfulness dimension, as illustrated in Figure 6.

Conclusions

The Schome Park Programme was set up to help the Schome Initiative develop its thinking about visions for schome (the education system for the information age) by giving learners a 'lived experience' of radically different forms of education within Teen Second Life™ virtual world. As this paper has illustrated, the experiences

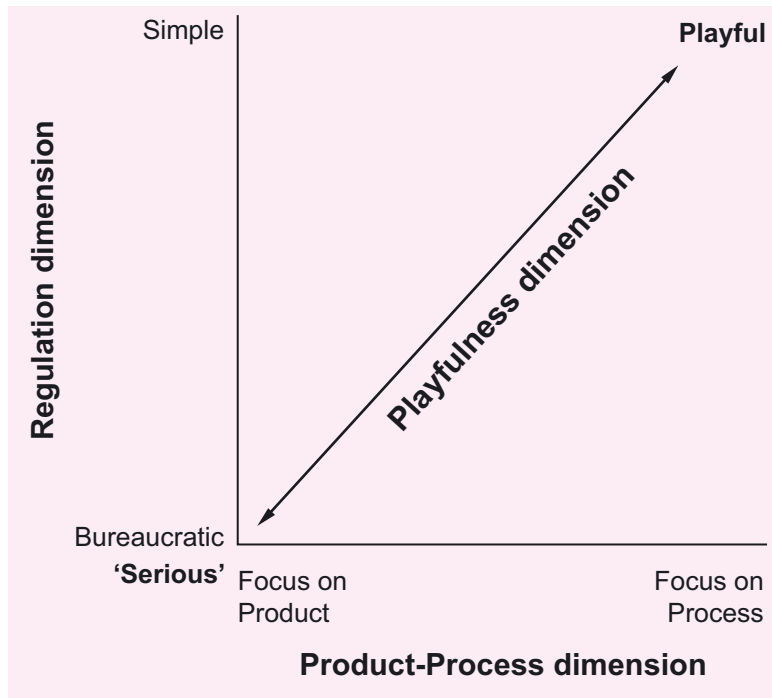


Figure 6 Interaction of the Regulation and Product-Process dimensions

within the first three phases of the Schome Park Programme highlighted aspects of practice that are important in thinking about schome. Thus it has been useful in focussing our attention on dimensions which might otherwise have gone un-questioned. However, Schome Park was never intended to be schome, and whilst the dimensions of practice emerging from the

Schome Park Programme raise important issues to be considered it has not provided 'the answers'. Judgements about 'the best place' to be on these dimensions, and how to achieve that are complex and contestable, not least because they are likely to vary across contexts.

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