

What evidence do we have that games, simulations and virtual worlds change practice?

Edited by

Martin Oliver, London Knowledge Lab, Institute of Education, University of London



Table of Contents

Preface.....	3
Part one: Case Studies	4
JISC's work on virtual worlds and gaming	5
Learning from online worlds	9
Using Second Life to support Environmental Health	12
A virtual Respiratory Ward in Second Life	14
Designing for navigation and wayfinding in 3D learning spaces	17
A Total Enterprise Business Simulation for Sales Staff.	21
Constructing computer models by composing with micro-behaviours: a new way to learn about complex systems?	24
A polyclinic simulation in Second Life	28
Creating Fun and Learning Using Narrative and Characters	30
Disaster management communication	32
Gaming Subculture and the Subterranean World of Play: a challenge to the educational games agenda	34
<i>SpyWalk</i> : An ARG for second language development	38
<i>Discovery Island</i> : a virtual world for learning English	40
Part two: Issues raised	43
Discussion and agenda setting	44
Claims made on the basis of the work presented	44
Questions raised by the discussion	47

London Knowledge Lab,
Institute of Education, University of London
2011

The copyright for the materials in this report remain with the authors.

Preface

This report draws together the contributions offered during a one-day meeting of the Special Interest Group on Games, Simulations and Virtual Worlds in Higher Education (GAME SIG) held at the London Knowledge Lab, Institute of Education, on April 15th, 2011.

The SIG, which runs with funding from the Higher Education Academy, aims to

- ◆ support research into the uses and potential of games and virtual world technologies in Higher Education teaching and learning and – crucially – to develop links between research and practice in these areas;
- ◆ act as a forum for the exchange of ideas across disciplines; and
- ◆ forge an agenda of educationally relevant scholarship and practice.

This meeting brought together people with experience of working with games and individuals with expertise in specific perspectives or methods. Its agenda was to review examples of practice, build a better understanding of approaches that had worked, and to use this to set an agenda for practice and research.

Participants who shared cases include:

Jeremy Hall, Hall Marketing; Dave Westwood & Agi Ryder, Middlesex University; Maria Toro-Troconis, Imperial College London; Mark Childs & Yung-Fang Chen, Coventry University; Russell Francis, Gothenburg University; Rose Heaney, University of East London; Paul Driver; Shailey Minocha, Christopher Leslie Hardy and Ahmad John Reeves, Open University; Tim Marsh, National University of Singapore; Kirsten Campbell; and Ken Kahn & Howard Noble, Oxford University.

Participants who provided expertise and contributed to the discussions include:

Aristos Protopsaltis, Coventry University; Sam Fowler, Exeter University; Nigel Mehdi, LSE; Di Dawson; Dan Bowen; Patrick Craven, Cambridge Assessment; Remy Olasoji, University of East London; and Michelle Hoyle, University of Sussex.

In addition, Martin Oliver and Diane Carr convened the day, and Clare Killen provided an invited presentation on the Joint Information Systems Committee's (JISC's) work on virtual worlds and gaming. Martin Oliver acted as a scribe on the day, taking notes that have been edited to form the concluding section of this report.

Part one:

Case Studies

JISC's work on virtual worlds and gaming

Clare Killen

What has JISC funded in the Virtual Worlds & Serious Gaming area?

JISC has funded a range of activities in this area, including:

- ◆ Projects
- ◆ Studies
- ◆ Publications
- ◆ Guides

For example, as part of the University of Leicester *DUCKLING* project¹, the University of Leicester Occupational Psychology Masters students visited an oil rig on the Second Life island of the Beyond Distance Research Alliance, to discuss and experience training requirements, working conditions, and health and safety issues in the immersive environment of Second Life.

Another example was developed by the First World War Poetry Digital Archive and the Learning Technologies Group at Oxford University, who collaborated on a Second Life project to simulate areas of the Western Front 1914-18². Visitors to the virtual trenches can explore digitised archival materials like poetry manuscripts, letters and diaries from the major poets of the First World War as they walk around a training camp, a trench network and No Man's Land dressed as a soldier or a nurse.

The *Communication Skills Learning in Immersive Virtual Environments – COMSLIVE* – project³, run by Birmingham City University, developed and evaluated scalable models of teaching and learning using the Open Wonderland Virtual World. Specifically designed to enhance written and verbal communication skills amongst health care learners where poor communication can be a major cause of unanticipated patient death and illness within the UK health care sector.

*SIMILLE*⁴ used Wonderland virtual world technologies to create meaningful contexts for learning a foreign language. This addressed the problem for distance learning students unable to experience the cultural and social immersion when learning a language. The world was evaluated for both its technological and pedagogical utility.

Led by the University of the West of Scotland, *Supporting Education in Virtual Worlds with Virtual Learning Environments*⁵ was a collaborative project aims to

¹ <http://www.jisc.ac.uk/whatwedo/programmes/elearning/curriculumdelivery/duckling.aspx>

² <http://www.jisc.ac.uk/whatwedo/programmes/digitisation/enrichingdigi/ww1poetry.aspx>

³ <http://www.jisc.ac.uk/whatwedo/programmes/elearning/ltig/comslive.aspx>

⁴ <http://www.jisc.ac.uk/whatwedo/programmes/elearning/ltig/simille.aspx>

⁵ <http://www.jisc.ac.uk/whatwedo/programmes/elearning/ltig/vwvle.aspx>

investigate how web-based virtual learning environments can provide effective support for learning and teaching in virtual worlds.

Other work has focused on:

- ◆ Using virtual learning environments for personalised learning in shared virtual worlds
- ◆ Using VLE integration to improve accessibility for virtual world learning activities
- ◆ Providing a layer of structure to teaching and learning through the integration of platforms
- ◆ Developing suitable materials and resources to enable successful third-party adoption and extension of the project's findings and outcomes.

Supporting Education in Virtual Worlds with Virtual Learning Environments (VW/VLE) is a twelve-month JISC project that is due to complete this year. It will analyse and catalogue emerging pedagogical opportunities offered by integrating virtual worlds and web-based virtual learning environments.

It aims to show how the relative strengths of each platform, i.e. administrative capabilities of virtual learning environments and the presentation layer of virtual worlds, can be exploited and subsequently enhanced through such integration.

The project will develop, evaluate and disseminate effective models of good practice, where little guidance or structure currently exists and based on experiences from pilot groups use this integrated approach for teaching and learning at multiple institutions.

JISC Publications, Guides & Articles on Virtual Worlds

JISC has supported a range of publications, guides and helpful presentations in the virtual worlds area. Examples include:

- ◆ Exploring the potential of virtual worlds for learning and teaching (Nov 2009)
- ◆ Choosing the best virtual world for your teaching needs (Nov 2009)
- ◆ Getting Started in Second Life (Aug 2009)
- ◆ Serious Virtual Worlds Report (Nov 2008)

A more comprehensive list of projects, studies, guides and resources that have been supported by JISC can be found on the 'JISC virtual worlds & serious gaming resources' page⁶.

Gaming

JISC has supported a range of projects exploring the educational uses of games, including:

- ◆ HANABI – the University of Edinburgh used Nintendo DS to support placement students in Japan.

⁶ <http://www.jisc.ac.uk/whatwedo/programmes/elearning/tele/gamingvirtual.aspx>

- ◆ Initiatives like *Molenet* gave rise to considerable use of games devices to support FE e.g. Gloucestershire College PSP⁷.

Questions arising from this work

The JISC is interested in developing its work in this area, and would like to know:

- ◆ What practical advice and guidance do institutions need in relation to use of virtual worlds and gaming for learning and teaching?
- ◆ What are the opportunities and challenges in relation to the use of virtual worlds and gaming in UK FE and HE?

Questions raised at the meeting included:

- ◆ Can you integrate Commercial off-the-shelf games (COTS) or should you develop your own?
- ◆ How do games tie into curricula? (Savannah was interesting, but did it fit the national curriculum? Using games as a reward is useful, but are they also useful for learning rather than motivation?)
- ◆ Are people aware enough about games to make use of them in pedagogic settings?
- ◆ What about using elements of games in pedagogy? "Gamification" may be a form of extrinsic motivation, but is it better than nothing? Does it help with learning?

⁷ <http://www.itv.com/westcountry-east/games-consoles-in-school09791/>

Learning from online worlds

Diane Carr, Institute of Education, University of London

We began investigating learning practices in online games and virtual worlds during research funded by the Eduserv Foundation in 2007. Since then, we have continued to incorporate SL visits into our online modules on various MAs. We use SL as a discussion forum when the topic relates to online worlds, online communities and/or virtual worlds and education. The students' first-hand experience of the virtual world informs the discussion about virtual worlds.

While feedback is generally positive (which is why we keep using it) our students have expressed anxieties. These included worries about 'how to act' as a student in SL, for example. To think more about student experience in SL and our teaching practice, we looked at positive and negative feedback from the students with a particular focus on affect – including anxiety, pleasure and frustration. Through analysis we traced the factors associated with affect, and used the idea of 'ambiguity' as a way to think this through further. Ambiguity in this case relates to the potential co-presence of multiple interpretations and experiences.

We found that the interesting discomforts on offer in SL relating to role, content and virtual contexts are not necessarily a 'bad thing', especially if they lead to critical responses and reflections by students. We concluded that designing pedagogy for SL means thinking about the pros and cons of ambiguity, rather than simply attempting to design it out (Carr, Oliver and Burn, 2008/2011).. I will return to this issue, after reporting briefly on relevant research undertaken in a very different virtual world.

World of Warcraft (WoW) is a massively multiplayer online role-playing game (an MMORPG). In contrast to Second Life, WoW is definitely a game - it has rules and goals (as well as chat, exploration, experimentation). Players have to gain particular skills to progress. Players learn from the game and from each other. During previous research (Carr and Oliver, 2009) we set out to explore social learning practices in WoW. We wanted to incorporate game structure, and game-play and the contexts of play into our account. So we decided to focus on couples that play the game together while sharing a real-world space. Out of the interview data we developed a framework for looking at increasing competence as the 'management of resources', where 'management' involves the recognizing, negotiating, accessing and applying of 'resources' - which might be material, ludic or social. Actually these three resources mix all the time, but the provisional classification meant that we could be specific about learning practices while acknowledging the complexity of competence in this context.

We found that 'playing together' can mean various things, including a shared knowledge of the game, turn taking on a single account, or chatting about the game over a meal. We found that learning in MMORPGs involves an ongoing process of sharing, specialization and negotiation as well as a constant blurring

of boundaries between play and other areas of life. We noted that competence is variously constituted and variously assessed by those taking part.

This variability suggests there is scope for ambiguity in WoW, and it also means that there is a need for tact. Well intentioned mentors can be perceived as backseat drivers. Our interviewees talked about the potential for discord over mismatched expectations, different play styles, perceived in/competencies and preferences. They acknowledged the need for tact and flexibility when managing these differences within relationships, and noted that these tensions play out in groups and guilds across the whole game - contributing to their formation and their disintegration

Players in relationships (inside and/or outside the game) would presumably work to manage these different expectations, interpretations and perceptions of expertise. That is why it is interesting to consider how these issues play out in temporary groups, where there is less time and less motivation to resolve or manage any such tensions. To explore this I looked at perceptions of expertise in WoW battlegrounds. Battlegrounds (BG) are a game-within-a-game, inside World of Warcraft. I focused on one particular BG, Warsong Gulch, which is basically a 25 minute version of 'capture the flag'. Most teams are temporary, and randomly assembled. Players communicate within their team using chat-text. Over the course of the game this chat could feature abuse, whining, arguments, moaning, as well as wit, glee and collaboration. (For a full account of this work, see Carr, 2011.)

Most of the 'learning in online games' literature is concerned with mentoring in guilds and people being nice. In Warsong Gulch, things are much more mixed up. Players combat the other team, while fighting their own team-mates via text chat. Collaborative play is mixed with competitive play, while player-to-player pedagogy mixes instruction with abuse. Participants argue about expertise, competence, strategy and credibility.

Examples of instruction from team chat include:

Player: GO GET FLAG don't die...go get flag ffs

Player: goddamit rogue [you have] got 2 %^*&% stuns...use them on healer

As noted, player-to-player instruction is generally assumed pro-social. I don't want to argue that these players are rude, and hence 'bad teachers'. That is not the point. What I want to argue is that if we look at players' pedagogic efforts in Warsong Gulch, while thinking about textual theory, it becomes possible to offer an alternative, less benevolent account of in-game pedagogy, which is that in the presence of multiple possible readings players engage in player-to-player pedagogy in order to impose their 'preferred reading' of the game onto other participants ('preferred reading' is a concept from Cultural Studies developed by Stuart Hall).

So how does this relate to teaching in SL? It is a reminder that considerations of ambiguity, and resolving ambiguity, involve questions of power. What happens if instead of attempting to limit the meanings of a SL session through particular pedagogic strategies, we aim for dissonance, discomfort, multiplicity and ambiguity? These are not new ideas, but they are worth revisiting in the context

of virtual world pedagogy, because it requires that we ask what pedagogy is 'supposed' to look like or feel like in this context. For example, if students don't like it, does it follow that it is 'bad'? If students are 'doing stuff' does it mean that they are 'active learners'? This suggests the need for reflexivity in our practice, and the relevance of critical pedagogy literature to virtual world and education studies, and it also indicates that we are presented with an opportunity to explore the co-opting and de-politicising of the language of critical pedagogy within ICT and education discourse more generally (Chick and Hassel, 2009).

Bibliography

- Carr, D. (2011 in press) Interpretation, Conflict and Instruction in Online Multiplayer Games: Lessons from Warsong Gulch. In Fromme, J. & Unger, A. (eds), *Computer Games / Players / Game Cultures: A Handbook on the State and Perspectives of Digital Game Studies*. UK: Springer. Draft available online at <http://playhouse.wordpress.com/publications/>
- Carr, D. and Oliver, M. (2009) Tanks, Chauffeurs and Backseat Drivers: Competence in MMORPGs. *Eludamos. Journal for Computer Game Culture*. 3 (1). <http://www.eludamos.org/index.php/eludamos/article/viewArticle/56>
- Carr, D., Oliver, M. and Burn, A. (2011) Learning, Teaching and Ambiguity in Virtual Worlds. In Peachey, A, Gillen, J, Livingstone, D, Smith-Robbins, S. (eds) *Researching Learning in Virtual Worlds*. UK: Springer. Draft available online at <http://playhouse.wordpress.com/publications/>.
- Chick, N. and Hassel, H. (2009) "Don't Hate Me Because I'm Virtual" Feminist Pedagogy in the Online Classroom. *Feminist Teacher*, (19), 3, 195-215.
- Hooks, b. (1993) *Teaching to Transgress*. London: Routledge
- Levidow, L. (2002) Marketizing higher education: neoliberal strategies and counter-strategies. In: Robins, K. and Webster, F. (eds.) *The Virtual University? Knowledge, Markets and Management*, 227-248. Oxford: Oxford University Press.
- Visser, J. and Visser Y.L. (2004) Ambiguity, Cognition, Learning, Teaching, and Design. *Techtrends*, 48 (1).
- Webb, L. M., Allen, M. W., and Walker, K.L. (2002). Feminist pedagogy: Identifying basic principles. *Academic Exchange Quarterly*, 6, 67-72. [WebbAllenWalker2002.pdf](#).

Using Second Life to support Environmental Health

Dave Westwood & Agi Ryder, Middlesex University

In what context was the game/simulation/virtual world used?

Second Life is being investigated by members of Middlesex University's Centre for Learning and Teaching Enhancement and tutors teaching on environmental health degrees.

What practical issue and/or pedagogic concern prompted its use?

Historically environmental health modules at the University have been taught using traditional instructionist and enquiry-based learning methods. Second Life is being explored to enhance the enquiry-based learning aspects of the degree. Students used to be presented with a case study book. The case studies aimed to offer students a description of a derelict, rundown town in which they would need to read a number of studies pertaining to problems which would be dealt with by an environmental health officer (building inspections, dealing with nuisances etc). The programme leader for environmental health highlighted a number of problems with this practice:

- ◆ Students have different historical experiences regarding housing, poverty and exposure to environmental health issues.
- ◆ The Case studies were lean and in certain cases possibly ambiguous.

It was proposed that the paper-based town would be reconstructed within Second Life in order to allow students to have similar learning experiences, focused around a 'real' place rather than an imagined one.

How was it used?

The Middlesex Virtual Town has been constructed to offer a macro level understanding of environmental health issues. It is currently being embedded upon all 3 levels of an environmental health degree.

- ◆ First Year students: Enter Second Life on 2 occasions to conduct 2 environmental health inspections (in previous years conducted using paper-based descriptions). These formative assessments require students to write a report and identify the main problems the way in which they would deal with the issues highlighted. The first of these sessions also acts as an introduction to Second Life – the students don't themselves enter but instead watch and 'control' an avatar driven by the lecturer. Upon the second case study students are expected to enter Second Life and perform the inspection independently.
- ◆ Second Year students: Enter Second Life to carry out a building inspection. Students inspect a house in a similar manner to the first-year students and carry out a building inspection, highlighting the most problematic details and discussing how these can be dealt with. This work is summatively assessed. Students have the option to carry out the work either in a physical house or within Second Life.

- ◆ Third Year students: Will be using the town on a holistic level focusing upon how they as environmental health officers can work in key partnerships with other professionals, Police, Councils ... etc, to rejuvenate the area.

What changed for the better as a result?

Teaching: Lecturers had to change the way in which they delivered the lectures in which Second Life was embedded. They were able to keep referring to what had been experienced and seen within Second Life as an anchor for future teaching and ideas.

Learning: Students were able to learn the way in which an environmental health visit should be conducted. Previously this vocational learning was not available to the first-year students, as they did not need to conduct a walk through when reading the paper case studies. The same is true for the second-year students. The third-year students now have actual buildings and an actual town, which they are able to discuss and use as a common experience to tie their learning to.

Performance and Attitudes: Anecdotally lecturers have reported the students being much more engaged with their learning when using the Virtual Town. There was also no difference in the level of work produced by second-year students using Second Life and those conducting a physical housing inspection.

What issues were associated with the change?

Issues arising through the use of Second Life have predominantly been technical. The University's centralised computers struggle to run Second Life. As a result a small quantity of specialist computing science labs needed to be booked in which the sessions could be run. The way in which Second Life was drip fed into the curriculum (first experience being a tutor lead walk-through) seems to have negated any issues with students not understanding the technology or its value and use within the course. Issues also arose around the lecturers' expectations and prior knowledge of the technology, and using this within their teaching. However, these seemed to be negated through discussions with the technical development team.

What evidence supports these claims?

This project is still within its first year of use. As a result of this the evidence is based upon qualitative data gathered post lectures in short interviews with the staff teaching upon the course. When available statistical analyses will be run to look into the differences of grades awarded for the building inspection.

What are the implications of this work for others?

This work and the proposed presentation will discuss the use of Second Life upon all levels of a single degree. It will describe how this was handled and how the technical and curricula were married in order to produce a coherent learning object. The implications are that it shows how Second Life can be used as a focal point to which learning throughout a degree can be anchored. It also discusses how a vocational element can be added to enquiry-based learning work.

Questions raised at the meeting included:

- ◆ With the practitioner-led walkthrough, does it matter how many students there are working with the practitioner?

The response to this was that there were group dynamics, but the groups were small and no major issues were noted.

A virtual Respiratory Ward in Second Life

Maria Toro-Troconis, Imperial College London

In what context was the game/simulation/virtual world used?

A virtual Respiratory Ward was designed in Second Life following a game-based learning approach.

What practical issue and/or pedagogic concern prompted its use?

The research questions were:

- ◆ Do undergraduate medical students (average age 21 years old) have a positive attitude towards learning in virtual worlds, such as Second Life®?
- ◆ Are young students high gamers in general?
- ◆ Do undergraduate medical students have a positive attitude towards learning using a game-based learning approach?
- ◆ Do undergraduate medical students prefer a game-based learning approach when accessing virtual patients?
- ◆ Are male undergraduate medical students more receptive to learning using games than female ones?

How was it used?

A virtual Respiratory Ward was designed in Second Life following a game-based learning approach⁸. Learners can interact with virtual patients, following certain rules before diagnosing a patient, buying investigations with a certain budget, collecting investigations from different departments, doing a final diagnosis and finally working on the management plan of a patient.

A Component-Based System (CBS) was developed to accommodate the technical infrastructure. At the same time, a pedagogical framework was followed for the design of the game-based learning activities (De Freitas and Martin, 2006), as well as other considerations that look at emergent narratives and modes of representation (Helmer, 2007; Begg, 2005; Murray's, 1997; Gee, 2003).

The CBS was structured as a distributed three-tier architecture. It was designed and developed enabling monitoring and information visualisation of application activity as well as presentation of feedback to learners via a Heads-Up-Display (HUD).

What changed as a result?

Learners' attitudes towards game-based learning was assessed by measuring four components (affective component, perceived usefulness, perceived control and behavioural components) following the survey 'My feelings when playing

⁸ For a demo, please visit: <http://www.youtube.com/watch?v=s1h0siiiHlyo>

games', developed by Bonnano and Kommers (2008) as well a Focus Group. One group was given access to the game-based learning activity for a virtual patient in the virtual Respiratory Ward. The other group was given access to the same content, covering the same virtual patient but delivered as an interactive self-guided online module.

The results show interesting findings in relation to general attitudes as well as gender differences in the use of Second Life and e-modules when accessing virtual patients.

In relation to the Affective Component, it is interesting to note the e-module group felt less apprehensive as well as more confident when accessing a virtual patient using this delivery mode in contrast to the Second Life group. However, it is interesting to note the e-module group felt hesitant to use it thinking they can make mistakes they cannot correct, whereas the Second Life group is more confident. This may be explained by the fact students felt more relaxed when accessing Second Life. According to the feedback received at the Focus Groups they perceived the learning activity as fun.

Some differences were found in relation to the Perceived usefulness Component. Both groups disagreed that learning in Second Life or via e-modules relaxes them so that they could learn better. A 20 min introductory session was provided at the beginning of the session with the Second Life group. However, 20 min do not seem to be sufficient for the students to become familiarised with the learning experience.

Neither group agreed that learning either in Second Life or via e-modules provides more interesting and imaginative ways of learning, which is interesting taking into account the novel aspect of learning in virtual worlds. The students highlighted at the Focus Groups how the narrative focused on clinical diagnosis presented by the current virtual patients became monotonous after accessing few virtual patients. The students were expecting the levels of complexity to increase suggesting these virtual patients at the current level of complexity may be more appropriate and challenging to first year medical students whom have not been exposed to clinical environments yet.

An interesting finding in relation to gender differences is found in the perceived usefulness component. A weak evidence of a difference in perceived usefulness was found between genders with females showing higher medians. This contradicts the general conception that games are for males and therefore males tend to enjoy games more than females. The reasons for females finding learning in Second Life more useful are unknown but worth exploring further. Two female students at the Focus Groups discussed the benefits of being able to meet at the virtual hospital overcoming travelling constraints, enhancing the social aspect of learning in Second Life.

The Perceived Control Component identified feelings and reactive behaviours while using the two different learning platforms. It is interesting to note the Second Life group felt much more in control when using this platform. This may be explained by the fact that they perceived learning using Second Life as more informal compared to the use of e-modules which is already embedded in their curriculum.

Publications supporting this include:

- ◆ Toro-Troconis, M. and Mellström, U. (2010), 'Game-based learning in Second Life®. Do gender and age make a difference?', *Journal of Gaming and Virtual Worlds*, 2:1, pp. 53-76, doi: 10.1386/jgvw.2.1.53_1⁹
- ◆ Toro-Troconis, M., Mellström, U., Partridge, M., Meeran, K., Barrett, M., Higham, J. (2008). Designing game-based learning activities for virtual patients in Second Life. *Journal of CyberTherapy and Rehabilitation*, 1 (3): 227–239¹⁰
- ◆ Toro-Troconis, M., Roberts, NJ, Smith, SF, Partridge, MR. (2010), 'Students' perceptions about delivery of game-based learning for virtual patients in Second Life', in Zagalo, N., Morgado, L. and Boa-Ventura, A. (eds.), *Virtual Worlds and Metaverse Platforms: New Communication and Identity Paradigms*. USA: IGI Global, (In press).
- ◆ Toro-Troconis, M., Meeran, K., Higham, J., Mellström, U., Partridge, M. (2010), 'Design and delivery of game-based learning for virtual patients in Second Life®: initial findings', in Peachey, A., Gillen, J., Livingstone, D., & Robbins, S. (eds), *Researching Learning in Virtual Worlds*. UK: Springer, pp. 111-138, ISBN: 978-1-84996-046-5¹¹

What are the implications of this work for others?

This work can provide a good insight on the advantages and disadvantages of introducing a game-based approach for the delivery of clinical teaching to undergraduate medical students in a virtual world.

Questions raised at the meeting included:

- ◆ Was performance in the VW compared with performance with real patients?

The presenters clarified that the comparison was between two virtual conditions.

⁹ http://www.atypon-link.com/INT/doi/abs/10.1386/jgvw.2.1.53_1

¹⁰ <http://www1.imperial.ac.uk/resources/62DCE340-6816-4254-B4C0-03A16B54EF0A/>

¹¹ <http://www.springerlink.com/content/j36855041272616t/>,

Designing for navigation and wayfinding in 3D learning spaces

Dr. Shailey Minocha, Reader in Computing, Centre for Research in Computing, The Open University, UK

Associated collaborators: Christopher Leslie Hardy and Ahmad John Reeves, Centre for Research in Computing, The Open University, UK.

The ease of navigation and wayfinding in 3D learning spaces can impact on student learning experiences and their ability to conduct activities. In this case, we will report how we derived design guidelines for navigation and wayfinding in 3D learning spaces to aid designers and educators. Our research involved empirical investigations (user observations and interviews) involving students, educators, designers and literature review relating to web usability, game usability and navigation mechanisms in real-world environments.

In our presentation, we will discuss a subset of the design guidelines and present best practice examples for navigational aids such as maps, paths, signs, landmarks and teleportation.

In what context was the game, simulation/virtual world used?

In our recently completed research project, our research question was:

- ◆ In the design of 3D learning spaces to facilitate navigation and wayfinding, can the principles of game usability and Web usability complement the mechanisms of real-world navigation?

Although the research was carried out in Second Life, it is hoped that the findings from our research will be applicable to the design of learning spaces in other avatar-based virtual worlds.

What practical issue and/or pedagogic concern prompted the research?

As the use of 3D virtual worlds as an educational environment continues to grow, it is important that designers pay more attention to interaction design and usability of 3D virtual learning spaces. Second Life is the most commonly used virtual world for educational purposes. Virtual environments exhibit a number of usability problems. Two usability problems that can impact on student learning and engagement are difficulties in navigation and wayfinding. From the user-observations that we carried out with students we found the following effects on student experience: students were often frustrated or confused; they sometimes incorrectly guessed or made the wrong assumptions; they sometimes wandered aimlessly looking for the destination while carrying out a learning activity; the learning activities often took longer than necessary; or students may abandon the learning activities; or they teleported or flew to the entry point of the island to look for guidance.

What did we do?

Based upon empirical investigations of a number of islands in Second Life, guidelines were derived for the design of 3D virtual learning spaces to facilitate navigation and wayfinding. A major contribution of the research has been the derivation of more than 100 heuristics for the design of 3D virtual learning spaces. The heuristics were developed based on the literature, empirical research (both user-based studies and heuristic evaluations) and expert reviews. Methods of data collection comprised of heuristic evaluations, interviews, and user observations that incorporated think-aloud protocols and retrospective protocols.

What changed for the better as a result?

The project resulted in several positive outcomes:

- ◆ collaboration with designers of 3D learning spaces;
- ◆ breaking down the barriers between designers and researchers;
- ◆ raised awareness as to the importance on navigation and wayfinding with designers;
- ◆ improved usability of 3D learning spaces such as The Abyss Observatory, Vassar Island and Genome Island in Second Life; and
- ◆ a structured methodological approach to the ethical considerations of conducting qualitative research in Second Life which will help other researchers involved in empirical research in virtual worlds.

The findings of the user observations showed that a lack of appropriate navigational aids affects wayfinding, which can impact on students' ability to conduct learning activities in 3D virtual worlds. Qualitative data arising from heuristic evaluations and user observations enabled a variety of navigational aids to be assessed for their suitability in designs of 3D virtual learning spaces. Design considerations for 3D virtual learning spaces and best practice examples for navigational aids such as maps, signs and teleportation have also been derived.

The research has demonstrated through empirical investigations in Second Life that, whilst navigating and wayfinding in 3D virtual learning spaces, avatars use a combination of real-world navigational mechanisms and those available in 2D and 3D virtual environments. Interviews with designers and educators have shown that the design aspects from 2D and 3D virtual environments such as the Web and computer games, respectively, can be successfully applied to the design of 3D virtual learning spaces.

What evidence supports these claims?

There have been changes in the designs of Second Life islands as a result of the research findings.

Following analysis of the user observation and heuristic evaluation data, designers were presented with summaries of the findings relating to their island. The summaries were used to sensitise designers about the usability defects and to inform them about good practice in their designs from a human-computer

interaction perspective. The summaries served as reflective tools for designers and subsequently they modified the designs based on the feedback. For example, new directional signs have been added to Genome Island, the paths in Vassar Island maps have been modified, and the designers of Vassar Island are considering modifying some of the island's directional signs.

The Abyss Observatory has undergone dramatic change as a result of collaboration between the island's designer and us. During this research we conducted detailed heuristic evaluations of the island and improvements were made while this project was being conducted. The island now features a revamped entry point, improved identification signs, improved teleportation devices and the use of colour coding in directional signs and information boards.

The design changes are reflected in the ease with which the students and visitors can now navigate and find their way in these islands.

What are the implications of this work for others?

This research has an implication for several audiences:

- ◆ designers of 3D learning spaces;
- ◆ educators using learning spaces for teaching;
- ◆ students interacting with learning spaces; and
- ◆ researchers of virtual worlds.

Designers of 3D learning spaces: In the literature, there were no guidelines for best practice to which designers of 3D learning spaces could refer. A key contribution of this research project has been to develop a toolbox of heuristics and guidelines for designers: 104 heuristics for the design of learning spaces and 209 guidelines. The heuristics were developed based on the literature, empirical research (both user-based studies and heuristic evaluations) and expert reviews. In addition, design guidelines have been developed by interviewing designers and educators, and by conducting user observations with student participants.

Educators and students: The design guidelines for improving the usability of learning spaces will benefit educators and students by helping them to deliver and learn e.g. reducing obstacles to learning by making resources more accessible.

Researchers: For researchers, a contribution to knowledge is a methodology for conducting user observations in virtual worlds. The methodology involved the use of pre-interview information sheets, user observations, think-aloud protocols and retrospective protocols. Overarching this methodology was the consideration of the ethical implications of conducting research in virtual worlds.

Previous empirical research in Second Life by Minocha et al. (2010)¹² involved interviews and focus groups. The methodology in this project has extended their methodological approach by utilising heuristic evaluations and user

¹² <http://oro.open.ac.uk/25134/>; other publications of the research team are listed on <http://oro.open.ac.uk/view/person/sm577.html>

observations in Second Life. Further, the principles relating to research design, ethics and maintaining anonymity and privacy of the participating avatars will be useful for researchers who are aiming to conduct research in virtual worlds other than Second Life.

Acknowledgements

Funding for this work was received from: Learning and Teaching Innovation grant of JISC, the Innovation fund of the Faculty of Maths, Computing and Technology, The Open University, UK and a two-year teaching fellowship from Centre for Open Learning in Mathematics, Science, Computing and Technology (COLMSCT-CETL) at The Open University, UK.

The attendees recognised the problem of navigation and wayfinding in virtual worlds and its effect on learner experience and commented that it was easy to relate to the problems identified in the research. Attendees also commented that the self-assessment tool (guidelines as a checklist) that was developed would be very useful for evaluating a learning space for its usability with regards to navigation and wayfinding aspects. Finally, it was noted that it was useful that the work included both good and not-so-good examples as points of reference in the guidelines checklist to aid the evaluator (user of the guidelines: designer/educator).

A Total Enterprise Business Simulation for Sales Staff.

Jeremy Hall, Hall Marketing

In what context was the game, simulation/virtual world used?

The case focuses on classroom use of a business with a group of sales staff working for Schneider Electric in the USA. Simulation involved them in running an Electrical Distributor (the businesses run by their clients).

Schneider Electric is the world's power and control specialist. The American division sells via electrical distributors.

The purpose of the simulation was to:

- ◆ Improve sales engineers "Business to Business" knowledge
- ◆ Replicate a Schneider Distributor

The context was in-company rather than academic use – Andragogy rather than Pedagogy.

What practical issue and/or pedagogic concern prompted the research?

The simulation had to be run by Schneider staff – would they have the requisite business and training knowledge?

Active Learning – this was necessary for andragogic learners. Engaging sales staff is particularly difficult.

The simulation should last no more than a day to avoid possible cognitive overload.

An existing business simulation provided a foundation but this would require significant customisation and it already lasted a day.

Electrical Distributors have low margins and are difficult businesses to manage – this could cause problems with affection.

What did we do?

The development involved radical customisation of the existing computer business simulation:

- ◆ Increasing number of decisions by 67%,
- ◆ Simulation Model increased by 46%
- ◆ Number of Parameters increased by 63%
- ◆ Number of Reports increased by 55%

Decisions and issues were introduced progressively.

A pilot was undertaken to 'stress test' the simulation, check cognitive load & familiarise trainers. This was followed by a Pilot Review/Train the Trainer session, which allowed discussion of the learning focus, calibration and tutor support.

On first live run, trainers were shadowed to ensure tutoring had been effective and provide any final tuning. Remote support was also provided (in the event, one phone call was made).

What changed for the better as a result?

Trainees were better able to relate to clients and help them with their business needs.

What evidence supports these claims?

The evaluation drew on Kirkpatrick's levels.

Level 1 evidence was provided by feedback from Schneider Electric/Square D after the first year's use (2004). Recalibration ensured the simulation was sufficiently 'real world'. The continuous introduction of new ideas kept everyone interested.

Training by Schneider employees was more about local market knowledge than cost. Each decision needed to be accounted for by another to maximize impact. Schneider has been trying to teach thinking through the process for years – this class helped them understand.

There was a viral spread of interest in the training – although originally developed just for sales staff, after the simulation had been run a few times marketing staff took part and an area director insisted that all his staff (sales, administration & management) took part. The simulation still in use (2010)

Issues with evaluation: Arguably a return on investment (ROI) analysis or evidence at higher Kirkpatrick Levels (2, 3 & 4) would be preferable to just Level 1 evidence. However, there are major issues with evaluation cost and difficulty. Further, learners and trainers were experienced business people and hence are in a position to judge the effectiveness of the learning.

What are the implications of this work for others?

- ◆ Reality & Stylisation – this was seen as real by trainers and learners but easier to be profitable and much simpler than the real world (fewer decisions and results) – balancing cognitive load, with learning and affection.
- ◆ Customisation was much cheaper than creating and new simulation by an order of five to one – i.e. creating a new simulation of similar duration takes five times the development time and involves five times the cost.
- ◆ Tutor Support/Information from the simulation to help tutors manage learning – facilitation, coaching, challenging & transfer.
- ◆ Simulation customisation is only the first step. Ultimately the whole experience must be embedded – having trainers involved in the learning process.
- ◆ Embedding depends on the business wisdom and training skills of the people who run the simulation.

Case Presenter: Jeremy Hall, Churchill Fellow, FRSA

Jeremy is a fulltime designer and provider of business simulations to large corporates around the world. His work won the World of Learning “Outstanding Contribution to the Training Industry” and he is a winner of a National Training Award. He is author of two books on business simulation and numerous papers on business simulation design and use. He is Treasurer of the UK’s Society for the Advancement of Games and Simulations in Education and Training (SAGSET), Director at Large of the US’s Association for Business Simulation and Experiential Learning (ABSEL) and on the Editorial Board of Simulation and Gaming. He has keynoted the International Simulation and Gaming Association (ISAGA). His research interests are business simulation design and use.

Questions raised at the meeting included:

- ◆ Could clarification be provided of what people did in the simulation?

They were involved in making business decisions, in groups; someone would input the decision, there would be a report on outcomes, and another decision would need to follow.

- ◆ Are the issues similar for HE Business Schools?

The Corporate design was focused on duration; business schools run over a term or semester, with a decision/week, allowing complexity *etc*; this also gives chances to reflect during the process.

- ◆ What about evidence beyond Kirkpatrick’s Level 1?

This was not formally measured, so no have been made about these levels.

Constructing computer models by composing with micro-behaviours: a new way to learn about complex systems?

Howard Noble and Ken Kahn, University of Oxford

In what context was the game/simulation/virtual world used?

60 second-year Zoology students at the University of Oxford opted to take a module about infectious diseases. They were divided into two groups and given 2 x 3 hour computer-based practical sessions where they constructed simulations of the spread of a virus through social networks.

An academic teacher, two demonstrators and three members of the modelling4all project team helped run the session. We used a white-board, overhead projector and each student had access to a networked PC (although many chose to work in pairs).

What practical issue and/or pedagogic concern prompted its use?

- ◆ Gain an appreciation that computer models are not black boxes and gain a basic understanding of how models are constructed.
- ◆ Compare and contrast building the Susceptible-Infected-Recovered (SIR) model when built using the R statistics tools and an agent-based modelling (ABM) tool (modelling4all.org).
- ◆ Use the ABM approach to model the spread of a virus through different social networks where the number of connections between people is constant, or based on a normal or power law distribution.
- ◆ Develop a healthy scepticism of the modelling process i.e. a modelling literacy.

How was it used?

In the first 3 hour session:

- ◆ A teacher gave a general introduction to agent-based modelling (ABM)
- ◆ A teacher led a class discussion to design a predator-prey system on a white board (pseudocode)
- ◆ Students used the modelling4all software to build and experiment with a predator-prey simulation
- ◆ A teacher led a discussion about the similarities and differences between the approach previously taken to build the SIR model with the R software (aggregate mathematical approach) and the modelling4all software (agent-based approach).

In the second 3 hour session:

- ◆ A teacher briefly introduced the session
- ◆ Students worked alone or in pairs to:
 - ◆ Build the SIR model by following a guide
 - ◆ Experiment with the model to gather data
 - ◆ Use a plot of the data to answer some questions.

A teacher then used a plot of data generated by the model to illustrate a few key points about the model.

A few days after the session:

The students are sent each other's answers to the class questions, and model answers written by the demonstrators.

What changed for the better as a result?

Previously the session had not existed - the SIR model had been taught using the R software alone. The introduction of the ABM approach is welcomed by teachers and students because it is generally seen as more intuitive, less mathematical, makes it easier for students to experiment with variations of the standard SIR model e.g. introduce different types of social network.

The practical was first advertised within the department as a modelling exercise. Only a handful of students signed up, most likely because biology students have limited experience of using computers in their learning and prefer to steer away from the unknown. When the course title was changed to a general session about epidemics 60 students signed up. The feedback from the session by students was very good which hopefully means they are less averse to computer modelling now.

A number of students were very inquisitive as to how the modelling4all software worked, how it related to the NetLogo software, and what else it could be used for. This has resulted in a few researchers building ABM into dissertations and research grants.

What issues were associated with the change?

Some students found thinking about modelling at the individual-level and programmatically troublesome. This was probably due to their recent previous sessions where they used the R software to build a population-level model but it could also reflect a deeper issue.

The sessions tend to bring up methodological questions about the 'nature' of modelling that are very difficult to answer e.g. the precise similarities between ABM and the techniques most students are conversant with where mathematical approaches are used (e.g., differential equations).

There was of course the inevitable issue of technical support (up to date Java on machines, reliable internet connection, modern browser etc).

What evidence supports these claims?

2011 was the 4th year we've run this session and the number of students that sign themselves up is increasing.

We run similar sessions in the business school and have just started working with an academic who wants to use ABM in her politics course.

The answers to the formative questions all students do at the end of the practical session show a good level of understanding.

We recently started to run introductory courses for anyone in the University; 150+ people have so far attended and the feedback has been good. The most recent cohort has asked for a more advanced taught session (scheduled for early June 2011).

The ABM courses have resulted in several academics starting to use ABM in their research (anthropology - explaining religions project).

We have participant feedback form data from a wide range of sessions (Zoology undergrads, MBA students, Business MSc, Introduction to ABM), which tends to be positive.

We used the modelling4all.org software as part of a two week event organised by the Royal Society last year. Our stand was about infectious diseases and 1000+ people of all ages used the software alone or with the help of demonstrators.

What are the implications of this work for others?

Graduates, postdocs and other academics seem to be increasingly interested in using ABM in their teaching and research. The modelling4all.org software can be used to allow people to quickly appreciate the potential of this approach to computer modelling i.e. a stepping stone to learning how to program in the more conventional sense. Put more abstractly this might suggest an increased awareness of the value of computer modelling, as Epstein outlines succinctly in his 16 reasons other than prediction to build models:

- ◆ Explain (very distinct from predict)
- ◆ Guide data collection
- ◆ Illuminate core dynamics
- ◆ Suggest dynamical analogies
- ◆ Discover new questions
- ◆ Promote a scientific habit of mind
- ◆ Bound (bracket) outcomes to plausible ranges
- ◆ Illuminate core uncertainties.
- ◆ Offer crisis options in near-real time
- ◆ Demonstrate tradeoffs / suggest efficiencies
- ◆ Challenge the robustness of prevailing theory through perturbations
- ◆ Expose prevailing wisdom as incompatible with available data
- ◆ Train practitioners
- ◆ Discipline the policy dialogue
- ◆ Educate the general public
- ◆ Reveal the apparently simple (complex) to be complex (simple)

(List taken from Epstein 2008 paper, Why Model?:
<http://jasss.soc.surrey.ac.uk/11/4/12.html>.)

A polyclinic simulation in Second Life

Rose Heaney, University of East London

In what context was the game/simulation/virtual world used?

A simulation of a polyclinic has been created on Second Life (SL) to provide an alternative form of clinical education for undergraduate students of herbal medicine, physiotherapy and podiatry.

What practical issue and/or pedagogic concern prompted its use?

The development was intended to:

- ◆ Increase students' exposure to a wider range of patients and conditions than can be met in live patient situations (herbal medicine)
- ◆ Provide a more realistic setting than paper based exercises in the classroom to practice clinical reasoning (physiotherapy)
- ◆ Prepare students for placement by familiarising them with hospital settings (physiotherapy)

How was it used?

The ward/outpatient clinic of the polyclinic was populated with a range of patients with which students could interact via their avatars to devise a working diagnosis (herbal medicine) or a treatment plan (physiotherapy). In the podiatry section currently under development students will assess patients prior to nail surgery and then carry out a local anaesthesia procedure.

What changed for the better as a result?

Students felt it:

- ◆ was more fun and realistic than alternatives e.g. textbook cases, role play in classroom
- ◆ increased confidence to face real patient situations

Staff and students felt it had potential to transform learning and teaching practices though that is still to be realized for the most part

What issues were associated with the change?

Not all students felt the same. Usability issues continue to be a barrier to SL use by staff and students. Development is resource intensive not just in terms of SL technicalities but also of patient cases

What evidence supports these claims?

Formal studies of both physiotherapy and herbal medicine student experience (see references, below).

What are the implications of this work for others?

It is resource intensive, requiring a high level of technical expertise and academic staff commitment. Students need considerable support in using the environment. Collaborative approaches across disciplines and institutions are an important consideration if this sort of work is to be sustained in the longer term.

References

Dawes, J., Bradley, N.A., Heaney, R. (2011) *Second Life®: a qualitative evaluation of using a computer-based virtual world, to facilitate undergraduate physiotherapists' clinical reasoning skills*. Paper presented at World Physical Therapy 2011. Retrieved from

<http://www.abstractstosubmit.com/wpt2011/abstracts/> under Education: Methods of teaching and learning.

Heaney, R., Timmins V-S., Booth, P & Dawes J. (2010) *Student Perceptions of a Second Life® Virtual Patient to Complement More Traditional Forms of Clinical Education*. ECEL 2010: 9th European Conference on e-Learning. Instituto Superior de Engenharia do Porto, Porto, Portugal, 4-5 November 2010. Reading: Academic Publishing Ltd, pp 236-243.

Questions raised at the meeting included:

- ◆ Has this been used to support inter-professional development, e.g. through the use of characters for different professions/roles?

This has been considered, and could be developed if supported by an appropriate collaboration, but it hasn't yet been developed.

Creating Fun and Learning Using Narrative and Characters

Tim Marsh, Assistant Professor, National University of Singapore.

email: dr.tim.marsh@gmail.com

web: <http://ap3.fas.nus.edu.sg/fass/cnmmt/>

web: <http://www.seriousgames.sg/>

In what context was the game/simulation/virtual world used?

The game for learning, *Waker*, was developed as a test bed for our collaborative research project between the National University of Singapore (NUS) and Massachusetts Institute of Technology (MIT). This is part of the Singapore-MIT GAMBIT Games Lab.

The game is intended to be used by high school/secondary school students, aged approximately 13-14 with no prior classroom-based lessons on the topics of learning; having their first exposure to the topics through the *Waker* game versions.

What practical issue and/or pedagogic concern prompted its use?

Our interest is in education games and in particular, games for learning about science and mathematics. We are interested in developing games for learning, serious games and simulations for students to learn about topics from the curriculum.

In this research project, our interest is to investigate is the relationship between learning and particular well-known components of games. The component we have focused on in this research project is investigating the role of narrative in puzzle-based learning games in engaging students, their learning experience and understanding of aspects related to the physics concepts of displacement and velocity.

How was it used?

We development four versions of our game *Waker* (puzzle only, puzzle in narrative, extended narrative and character, and extended narrative and character with replay and recall functions) and carried out a comparative study in a Singapore high school with 57 male students. The purpose of the study was to compare puzzle and narrative learning games in engaging students, their learning experience and their understanding of the physics concepts of displacement and velocity, and in addition, test the effectiveness of an extended narrative and (off-screen) character as storyteller and learning partner. Students were divided into four groups and each group played one of the four versions of our game *Waker*.

What changed for the better as a result?

Results from the comparative study show that while some aspects of learning are comparable in both puzzle and narrative versions of the games, the extended narrative and character game versions: provided an opportunity to introduce

technical/scientific terms and a language connected with the topics of learning in simple manner incorporated in the narrative rated higher on every aspect related to game play/features including: fun, exciting, engaging, with players less distracted to activities outside of the game, and less frustrating, with players preferring to play the narrative versions again and in their free time, and surprisingly, players appreciated the artwork and music more in the narrative versions even though they were almost identical to the puzzle only version.

What issues were associated with the change?

Blending design and development dimensions, including: constructionist and instructionist learning, and hidden/incidental and direct/explicit learning, to create opportunities for reflection without disrupting the flow of the game.

What evidence supports these claims?

See study outline above.

What are the implications of this work for others?

Results demonstrate that seeking creative solutions such as, in the development of a well-crafted narrative, can increase both fun and learning. While relatively simple, it is argued that this approach is cost-effective and accessible in informing academics and teachers in schools in customizing their own virtual environments, simulations, games for learning, serious games, and commercially available off-the-shelf titles (COTS) with topics from the curriculum.

Questions raised at the meeting included:

- ◆ Were the puzzle element and reflection/narrative separated?

No; these were interwoven in the same environment. Narrative was originally an introductory cut-scene, but a second version of the game drew this through the game with an ongoing narrative.

- ◆ If someone else tried to do this, were the production values (artists, scriptwriters) really critical?

Not sure that it "wouldn't work", but this helps with the fun, which has a synergy with learning.

- ◆ How much did development cost?

The initial 3 month development was a student project, so the costs are unknown. The 2 year project, cost \$400k.

Disaster management communication

Mark Childs & Yung-Fang Chen, Coventry University

In what context was the game/simulation/virtual world used?

A table-top exercise, previously used to teach Disaster Management and Emergency Planning is a BSc Honours degree taught at Coventry University was adapted to run in Second Life. In the exercise, a volcanic eruption has occurred on the northern island of two and the residents must be evacuated to the southern one. Students form into groups representing different agencies and are set an agenda for their group, and specific issues that will inform their actions (such as a history of previous conflicts with another agency) and have to negotiate with the other agencies to enable their agency's goals to be met.

The activity was an experiment with a group of 14 volunteer students, and was not part of a regular module.

What practical issue and/or pedagogic concern prompted its use?

There were limitations of space in running the exercise as a table-top exercise, also it was felt that the opportunities for students to immerse themselves sufficiently in the exercise were constrained.

How was it used?

Students were allocated an agency and a role within that agency, indicated by the given name of their avatar. Stage one of the activity involved orientation. After logging on to Second Life and finding Coventry Island, the students teleported their avatars to the Islandia sim, located their offices and familiarised themselves with the layout of the buildings. Students also spent some time adapting their avatars during this phase.

The second stage involved initial planning, in which the students moved their avatars to their agency's office to meet with their colleague and read through their instructions. Once this phase was completed, the students with a researcher role moved their avatars from building to building to interact with information officers from other agencies. The researcher also needed to periodically return to base to liaise with the information officer. The final phase was a debrief, also conducted inworld, in which the students met within a conference room, in order to discuss their experiences of the session.

What changed for the better as a result?

Students felt that this was a more effective environment in which to conduct the exercise than in the physical room, because Second Life provided a more accurate simulation of the experience of disaster management communication and was also a better environment for roleplay. Students felt more at ease with roleplay via an avatar, and could conduct their roleplay more effectively. In short, even though the virtual world is not real, it is less unreal than attempting to simulate the experience in a classroom.

What issues were associated with the change?

Students felt that the choice of avatars of some of the students undermined the realism of the exercise. Others felt that the design of the environment could make the experience more realistic. Communication within the environment was also difficult, as was dealing with the interface.

What evidence supports these claims?

Data come from a series of interviews conducted with the students after the learning activity.

What are the implications of this work for others?

The case study identifies a type of activity for which virtual worlds are particularly suited, i.e. that of role play scenarios. The experience of this case study is that students are more motivated and more willing to participate within a virtual world's roleplay than in a table-top exercise.

Questions raised at the meeting included:

- ◆ Did you structure the orientation/training session?

Students had a training session in the use of Second Life in the week preceding the activity. The orientation that took place during the disaster management session was simply to enable them to familiarise themselves with the layout of the buildings and alter their avatar's appearance.

- ◆ Why not develop something more realistic to start with?

Time, cost, and the focus on communication/offices in the initial design. The accompanying disaster was not often encountered at strategic level – it was usually presented as a tactical issue.

Gaming Subculture and the Subterranean World of Play: a challenge to the educational games agenda

Russell Francis (Linnaeus Centre for Research on Learning, Interaction and Mediated, Communication in Contemporary Society, LinCS, University of Gothenburg)

In what context was the game/simulation/virtual world used?

The study explores a gaming subculture that emerged following the introduction of an Xbox console into the communal area of a student house. It explores how popular first person computer game, *Halo: Combat Evolved* started to mediate the formation of a sub-cultural affinity group among house members. Unlike the majority of design-based research that explores the use of video games in structured educational contexts, this study attempts to understand a collaborative video game play as a form of non-alienated activity that emerges spontaneously within specific socio-cultural contexts.

What practical issue and/or pedagogic concern prompted its use?

Squire (2005) has argued, 'what's missing from the debate on gaming and culture is any naturalistic study of what game-playing experiences are like, how gaming fits into people's lives, and the kinds of practices people are engaged in while gaming' (p.3). This paper sets out to make a small step towards compensating for that deficit. It attempts to understand the appeal of gaming, conceived as a distinctive form of sub-cultural practice, situated in the ecology of a domestic environment. It connects with insights gained by studies of high end gamers (Linderoth & Bennerstedt, 2007) Furthermore the insights gained are used to critique assumptions taken for granted in main stream educational games discourse. In particular, the study suggests that that the appeal of gaming for many young people is inextricably bound up with the opportunities they afforded for perpetual innovation, authentic self expression and subversive identifications outside off or at least within the margins of work-a-day routines of university life.

How was it used?

I studied the gaming activity as it emerged over a three month period using multiple qualitative or ethnographic methods. This involved a sustained period of participant observation within the group and periods of playing a) the single player game; b) fiercely competitive four way 'death matches' and; c) more co-operative 'capture the flag games' games that required strategic planning between two teammates. Throughout this period I wrote descriptive and theoretical memos about the experience and participated in dozens of informal conversations. Towards the end of the study I attempted to capture episodes of game-play (including in-game dialogue) on video and conducted semi-structured interviews with each player.

This ethnographic approach produced a rich but messy data set. In the analysis, I use an activity theoretical schema to frame the analysis (Engeström, 1999).

However, the aim is to tease out patterns in the data and identify emergent themes that help us understand the interrelationships between learning, motivation, identity and play within a gaming subculture. To this end, I draw extensively on field notes and memos compiled into a journal that contained insights that I develop with reference to the literature.

What issues were associated with the change?

The paper explores emergent features of the gaming activity that might account for the compulsive levels of engagement observed.

- ◆ Compulsive game-play and perpetual innovation and the search for new experiences
- ◆ Games within Games
- ◆ Gaming activity as a form of authentic self expression
- ◆ Gaming activity as psycho-social moratorium
- ◆ Gaming as non-alienated activity

Each theme is grounded in analysis of the data and elaborated with reference to theory. I argue that an older tradition of critical ethnography that explores identity play within youth subcultures offers a particularly powerful resource for understanding the appeal of video games cultures. In particular, drawing on Jock Young (2005) I argue multiplayer Halo death matches constituted a form of 'non-alienated' activity for the young professionals studied; a form distinctive form of sub-cultural activity that broke down barriers among the group and facilitated the formation of strong emotive and affective bonds. It is offered as an alternative to the games as 'psycho-social moratorium' thesis proposed by Turkle (1997) who draws on Ericson's (1963) analysis of adolescent subcultures in the 50's and 60's.

The gaming as non-alienated activity thesis accounts for the enduring appeal of video-gaming as a form of social practice that has become a routine (if invisible) part of many adults everyday lives in post-industrial society. In this paper it is heavily associated with the opportunities the game affords players to seek out new experiences, invent games within games and acquire distinctive sub-cultural identities within the affinity group that emerged. In this respect, I argue that video games may afford young adults a relatively on-going opportunities for authentic self-expression and playful experimentation outside of workaday routines and institutionalise structures that position young adults in professional roles.

What evidence supports these claims?

The argument is grounded in analysis of a large qualitative data set generated by the use of multiple qualitative methods (Francis, 2003). The insights gained are also triangulated with the findings of existing studies of gaming activities and critical ethnographies of youth subcultures (Gelder, 2005). In the discussion, I attempt to strengthen the argument by asking why so many popular commercially available games allow players to make subversive identifications with dark, deviant or superhuman characters. The trajectory of thinking is also

influenced by my experience of conducting a series of design experiments to explore the educational potential of a purposefully designed educational games (Francis, 2006, 2011) and an wider interest in the disjuncture between formal (accredited) and informal (self-directed) learning facilitated by students expanding access to new media (Francis, 2008, 2010).

What are the implications of this work for others?

This study draws attention to the need to understand gaming activities mediated by video games within a wider socio-historical context. In this case, drawing analogies with wild fire activities like Skateboarding and BMX biking the activity was identified as a distinctive form of subcultural practice. Further, draws attention to the inherently social and co-constructed nature of the play activity characterised by humour, self mockery and the co-construction of a specialist 'insider' language. From this perspective, the idea that we can somehow harness the 'holding' power of games for education is shown to be highly problematic. In the discussion I use the insights gained to problematize the idea that so called 'epistemic games' Shaffer (2005) that allow players to enact professional roles and responsibilities are capable of engaging players in the same way as popular commercial games. In short, rather than evolving in every more efficient environments that support 'good learning' (Gee, 2003) this argument suggests that video games are evolving into ever more sophisticated virtual playgrounds that afford exciting new possibilities for deviant modes of participation in a subterranean world of play.

Selected References

- Engeström, Y. (1999). Activity Theory and individual and social transformation. In R. Miettinen & R.-L. Punamèaki-Gitai (Eds.), *Perspectives on activity theory* (pp. 19-38). Cambridge ; New York: Cambridge University Press.
- Erikson, E. H. (1963). *Childhood and Society* (2nd ed.). New York: Norton.
- Francis, R. (2003). *Learning, Motivation, Play and the X Box generation: An investigation into the educational potential of collaborative computer games*. Unpublished MSc Dissertation, Oxford University, Oxford.
- Francis, R. (2006). *Towards a theory of a games based pedagogy* (Audiovisual Web Presentation). Paper presented at the *Transforming Learning Experiences: JISC online conference*. Retrieved from <http://www.online-conference.net/jisc/content/Russell%20Francis/index.html>
- Francis, R. (2008). *The Predicament of the Learner in the New Media Age: an investigation into the implications of media change for learning*. DPhil. Oxford University, Oxford. Thesis available from the Oxford Research Archive.
- Francis, R. (2010). *The Decentring of the Traditional University: the future of (self) education in virtually figured worlds*. London: Routledge.
- Francis, R. (2011). *Revolution: experiential learning through virtual role play*. In S. de Freitas, P. Maharg & H. Jenkins (Eds.), *Digital Games and Learning* (pp. 83-103). London and New York: Continuum Press.

- Gee, J. P. (2003). *What Video Games Have to Teach us about Learning and Literacy*. New York ; Basingstoke: Palgrave Macmillan.
- Gelder, K. (Ed.). (2005). *The Subcultures Reader* (2nd ed.). London and New York: Routledge.
- Linderoth, J., & Bennerstedt, U. (2007). *Living in World of Warcraft: The thoughts and experiences of ten young people*. The Swedish Media Council.
- Shaffer, D. W. (2005). Epistemic Games. *Innovate*, 1(6).
- Squire, K. (2005). Cultural Framing of Computer / Video Games. *Game Studies*, 2(2).
- Turkle, S. (1997). *Life on the Screen: Identity in the Age of the Internet*. London: Phoenix.
- Young, J. (2005). The Subterranean World of Play. In K. Gelder (Ed.), *The Subcultures Reader* (2nd ed.). London and New York: Routledge.

***SpyWalk*: An ARG for second language development**

Paul Driver

*SpyWalk*¹³ is a technology-enhanced location-based urban game, combining physical setting, allocation of time, and the interactions of participants with each other and their environment. It applies the principles of experiential learning, embodiment and situated language development in order to provide an engaging opportunity for context-relevant language emergence in response to the perceived weaknesses of traditional classrooms for second language development.

The game mechanic is intentionally employed in order to frame the experience in time and space, as well as loosely encouraging the perception of a “magic circle”, distanced from the participants conventional ways of interacting, that would enable them to more freely play with different identities. *SpyWalk* emphasizes experience and process-led learning in contrast to traditional content delivery and consumption.

In what context was the game/simulation/virtual world used?

SpyWalk is used for promoting the internalization of English as a second language for Portuguese students in higher education.

What practical issue and/or pedagogic concern prompted its use?

SpyWalk was created in response to the limited affordances and lack of context provided by brick and mortar classrooms as learning spaces for language learners. It was conceived as an attempt to apply the concepts of situated learning and emphasize the role of the body and the importance of the interplay between presence, place, context and movement in the process of acquiring a second language¹⁴.

How was it used?

I conceived and developed the project and designed and tested the game.

What changed for the better as a result?

This is difficult to quantify but a significant proportion of players of the game report that during the game play they begin to think in the target language. Players also report increased motivation and a more positive attitude towards learning English. Recordings reveal that players are frequently required to overcome linguistic barriers and adapt their knowledge of the language in response to a wide range of unpredictable and unscripted occurrences.

¹³ http://web.me.com/paul_driver

¹⁴ See <http://www.youtube.com/watch?v=VGPDNjU5sbo>

What issues were associated with the change?

Traditional language teaching in the classroom context typically fragments and isolates language into artificially tidy, graded “chunks” which are fed to students in a linear fashion.

Attempts at providing a context for learning are frequently contrived or abstract and the body is ignored upon entering the learning space.

What are the implications of this work for others?

As a key part of the game, students are required to record their thoughts, observations and intentions in English. These recordings are then geo-tagged and shared on Google Maps along with other media generated through the game play. The students were also recorded as they shared their impressions and experiences immediately after its completion. These recordings reveal a strong emotional response and high levels of engagement, essential criteria for the formation of long-term memory and the internalization of the target language.

Discovery Island: a virtual world for learning English

Kirsten Campbell, Games Designer and EFL (English as a Foreign Language) teacher

In what context was the game/simulation/virtual world used?

Game details: Our *Discovery Island*, online virtual world for children aged 6-10 in non-native-English-speaking countries¹⁵. It is a digital companion product to a series of textbooks for learning English. Release date: August 2011.

Although this game has not yet been released, there has been some usability testing conducted with children in Japan and Greece.

As a vocabulary and grammar booster for young children learning English (in Tokyo and Greece for this round of testing). It introduces target language in a fantasy world context and allows learners to practise their listening and reading skills.

What practical issue and/or pedagogic concern prompted its use?

The need to engage young learners of English; to present learning to them in a context they are familiar with (videogames; online virtual worlds). Pedagogical concerns: presenting grammar and vocabulary in a new way; reinforcing textbook study; practising listening and reading skills in a semi-real context; bridging the gap between home and classroom study.

How was it used?

I wrote the script, incorporated the syllabus, co-designed the game play mechanics and designed the testing parameters.

What changed for the better as a result?

Teaching: through a heavy marketing and teacher training effort, Pearson is educating its network of teachers about the benefits of digital and game-based delivery for language learning. Many teachers are open to this, although some are held back by worries about their own lack of familiarity with the technology as well as doubts about the efficacy of GBL (games-based learning). Pearson sees this as a seeding of the market, and anticipates a sea-change in coming years, with greater acceptance of the medium and greater demand for these types of products (especially with the advent of interactive whiteboards in many language schools, and the accompanying need for media to display on them).

Learning: although it is too early to say with any certainty, but initial testing showed a very high level of engagement with the product. Even very young children maintained attention, concentration and enthusiasm for this style of

¹⁵ Access details: <http://173.203.200.152/dev/Level4/index.php>. Username: ELT. Password: password1. (Note: this is a development site. It is a good representation of how the final product will look, but it is not complete.)

learning. Currently the only clear result is that engagement levels increase, as does attention, and this has the potential to facilitate learning. The fact that some of the testers were able to navigate through the graded tasks shows that they had understood the language (the tasks are – for the most part – designed so that the learner must understand the language in order to make progress). However, it could be that the testers were already familiar with this vocabulary from their regular English lessons, so it is not clear whether they learnt anything new from the game. Pre- and post-game tests of target language recognition would need to be carried out before we could demonstrate actual progress in English with any certainty.

What issues were associated with the change?

Intense negativity towards game-based learning from a small but vocal minority of teachers and writers. Indeed, one of the writers of the accompanying textbook series all but refused to promote the product, as he saw no value in it. However, each child who took part in testing expressed a desire to continue with the game, some even asking for details so they could play at home. This despite some frustrating game play design and a lot of very unfamiliar language.

What evidence supports these claims?

Results of usability testing in Japan (these can be supplied if requested).

What are the implications of this work for others?

This is a groundbreaking product. It will most probably succeed or fail based on Pearson's marketing strategy. Once kids begin to play it, they enjoy it, but if teachers or parents are initially resistant, it may not get into the hands of the children at all. If it does succeed, all the big publishers of ELT (English Language Teaching) series will be required to produce similar products and the market will change quite significantly.

This is the first ELT series for Pearson where a games-based product has had greater investment than the accompanying print product (between 600,000 and 1 million GBP), indicating their confidence in the medium.

Implications for Higher Education: I have spoken to a teacher of Japanese at Edinburgh university, who has used Ubisoft's Japanese Trainer product (for the Nintendo DS) in her classes. She has found her students resistant to the concept of games. They see this as 'dumbing down' language learning. However, the teacher was positive about the potential benefits of such technology, if properly designed, especially for teaching repetitive writing skills such as stroke order and placement for characters.

Questions raised at the meeting included:

- ◆ Isn't it better to be frustrated than bored?

Experience with this game suggests that the most appropriate level of challenge changes during the process – if it's too daunting at the start, this makes people give up, but later on, it's engaging.

◆ Why didn't practitioners like this?

There was more hostility in Asia than had been predicted, even though the infrastructure was worse elsewhere. This seemed to be because parents in Asia thought gaming was trivial.

Part two:

Issues raised

Discussion and agenda setting

The final part of the day involved a structured discussion, in which presenters and critics staked claims that could be made on the basis of the work, and identified questions that remained to be answered. This discussion is summarised here.

Claims made on the basis of the work presented

There is considerable conceptual confusion evident in work in the field. For this reason, we need to be clear about the concepts that we employ. For instance, terms like 'learning', 'pedagogy' and 'education' should not be used interchangeably. Similarly, it can be important to distinguish between games, virtual worlds and simulations.

This need for clarity extends to the measures used and claims made. For example, analysis of design, pedagogy and designer intent should not be confused with claims about user interpretation, learning or experience. Further, users are not homogeneous. There may well be a difference in experience between reading Wilfred Owen's poems and going into the Second Life war poems island; however, this experience might also have a different impact on people who have a prior knowledge of the poem, have been using Second Life for several months or associate more with their avatar. Gee's idea of tripartite identity can help to explain this.

Similarly, in assessment, it is suggested that there may be 'mode effects' on performance – in other words, differences attributable to the technologies used to present and manage the assessment process, rather than the assessment tasks *per se* – that are related to environmental competence. A 'newbie' may not demonstrate competence because they don't know the interface, rather than because they don't understand what is asked of them.

While there are issues to be resolved, there is also evidence of the educational usefulness of virtual worlds. For example, in the *CommsLive* case, control groups were assessed regarding their ward room communication with no prior opportunities to practise, while the experimental groups trained in Second Life before being assessed in the ward room. The groups that trained in Second Life performed much better, suggesting that communication skills can be transferred. Being able to show that this transfers to practice, or even just to other settings, is important to many educators.

However, once again, this touches on the issue of conceptual clarity. How learning and transfer are defined and evidenced needs to be made explicit, not least because these definitions vary according to disciplinary background and epistemology. While this diversity is welcome in itself, it does make it necessary to recognise and reflect on the 'situatedness' of our practice, theorising and research.

This separation of discussions about curriculum, assessment practices and format raises questions about whether and how such elements can best be brought together. Even if games are not good at preparing learners for exams, they may still help people to learn; it may be better to change assessment

regimes, thinking with more creativity about forms of assessment that are more relevant, but which remain accessible and scalable. (Skills-based performance in medical settings was identified as one area that had attempted to develop diverse approaches.) Again, this emphasises the importance of making explicit how learning is conceptualised in our work.

Since simulations allow people to learn from their failures in a safe environment, training in such settings may lead to gains in confidence (e.g. asking fewer questions, performing tasks more quickly) even if they do not improve competence (performing better). The need to be able to fail adds to the importance of making these environments more complex. However, it is important to ensure that the complexity is appropriate to the learning goals, to avoid distracting environmental decisions that might be too complex for the users. (The example given was that you don't need to be able to design a car to be able to drive them.)

Related to this, questions were raised about whether virtual worlds lend themselves in a particular way to medical education. It was felt that fields such as this (and also Business) have difficulties doing training in real settings, and failing safely is desirable; these factors may make simulations particularly appealing. It was also noted, however, that these areas are also relatively well funded, which makes development more feasible.

Nonetheless virtual worlds have their limits: for example, it was noted that you couldn't treat patients' bodies in *Second Life*, hence the importance of resources such as mannequins as a bridge between virtual worlds and practice. For example, Peninsula Medical School uses 'virtual patients' as a way of teaching treatment planning. However, supplementary use of video and photos of teeth, jaws and so on helps to make the experience more useful as a preparation for practice. The distinction in medical education between "knowledge about" (concepts) and "knowledge of" (application) may be useful in understanding this progression. *Second Life* may remain good in settings like medicine where physical access may not be needed, whereas Augmented Reality Games may be much more useful for things like exploring historical sites.

While it is useful to identify the features that make these disciplines well suited to support by games, simulations and virtual worlds, there is a risk that this might limit future developments. If practice converges on 'what works' (i.e. existing practice), there is a risk that less common approaches (such as the War Poems island) will be ignored or unsupported.

Evocative environments that offer a sense of place could be used to explore an historical setting – which may support the development of holistic, tacit knowledge. In these cases, it may be particularly important to be realistic (although this assertion might be complicated by ideas of graphic reality, psychological reality, etc., all of which emphasise the importance of developing clearer definitions about what the concept of 'realism' entails). Nonetheless such learning may then be hard to articulate, abstract or transfer to other settings.

Games on their own may be better at supporting holistic experiences than reflection, which is why debriefing is recognised as an important complement to such experiences. Similarly, clearly stated learning outcomes can help focus attention and set expectations, making users appreciate what the purpose of

something is, and what its value is to them, in a way that they might not otherwise. Nonetheless, the situated way in which people learn remains a challenge to recognising and valuing learning. For example, a player of *Waker* asked questions about velocity outside of the game's narrative may not have been able to answer them; they may lack the language necessary, or may even be unaware that they have learnt something about that topic at all. Again, this raises questions about the concepts of learning, transfer and assessment.

The idea of 'model literacy' recurred throughout the discussions. For example – as has been debated in the game studies literature – the game *Civilization* teaches a particular linear view of history. Making people aware that this is just a model – e.g. by critiquing how it was constructed, what was included and what was left out – would help users move beyond simple acceptance of this. This kind of critical consumption – the ability to "read" the models in games and simulations – could then be complemented by critical production. Being able to create and customise environments – modelling – can raise awareness of the decisions taken to create immersive environments. There may well therefore be a useful distinction to be drawn between environments that support authoring and those that do not. It was noted that Arts schools, Architecture and Computer Science courses have all used *Second Life* in this way: as a platform for creating things.

(It was also noted that simplistic distinctions between doing, using, making and practice are problematic, as all users are involved in creating their experiences when they use games, simulations and virtual worlds, making choices about what to do and what to engage with. Nonetheless, this was not seen as the same as designing the environment and/or simulation in the first place, and further, even in this constrained sense, users may not have the language they need to express themselves in the design or use of avatars, resources, and so on.)

Other points that were made include:

- ◆ Games, simulations and virtual worlds may be able to offer multiple routes to engage the learner.
- ◆ In simulations with a tutor, there may well be coaching, challenging and debriefing ongoing throughout the experience.
- ◆ Games and virtual worlds may also be valuable simply because they support repetition. In relation to this, the ability to step in and out (switching between immersion and reflection) is important.
- ◆ It remains valuable to understand how and what people learn through play (e.g. at home), whether or not this helps with the design of education.
- ◆ The uptake of games outside of education does not automatically mean that they will be an appropriate format to use within education too. Furthermore, people may not want games appropriated by education; if they play *because* it's not work, recruiting games to serve educational ends may backfire.
- ◆ Not all games are the same, and it may be inappropriate to talk about them as if they were. (Playing *Tetris* or *Bejewelled* is very different from running a guild in *World of Warcraft*.) Further, taxonomies (of games or

game players) should be treated as descriptions, not used deterministically.

Questions raised by the discussion

The following questions were drawn out as areas that warranted further attention:

- ◆ How can we support learning the topic, rather than the environment/system that is being used?
- ◆ How can we use aspects of immersive environments such as geography, avatar design *etc* to structure learning, not distract and impede?
- ◆ What warrants our claims about the value of games, simulations and virtual worlds to support strategic, complex learning (not "just" skills or teaching)?
- ◆ What can we say about learners' experience? In particular, are learners able to express their experience in an informed way that we can make claims about?
- ◆ Why are some people resistant to the idea of using games to support learning or formal education? (Is such resistance appropriate? If not, what can be done to encourage use?)
- ◆ In what ways do formal curricula and process of material development shape learners' uses of resources?
- ◆ Accessibility and inclusion also need to be considered, not just in terms of tools but also social practices.
- ◆ Since collaboration was not strongly featured in the cases that were presented, it would be useful to see further cases where people build collaborative experiences, and work with learners as co-developers. When is collaboration and/or co-presence important? (In the business training case presented, the scenario cannot work if participants lack the right levels of prior experience, because it relies on them being able to apply this. Team based tasks can also get people to think about why and how they're promoting their views.)
- ◆ What will the impact of new technologies, augmented reality (gaming), *etc* be on 'games and education' research and practice? How will this take us beyond things like simulations in *Second Life*?
- ◆ Sectors like Further Education are already stretched financially; are there ways in which the valuable things about gaming and simulation can be shared (e.g. through open source resources)?
- ◆ The politics of negotiating social interactions in and around games is important; further, this relates to wider concerns around online identity, use of web conferencing, *etc*. Is it worth trying to educate people in how to react to such experiences? (A literacy of game communications.) What are the ethical implications of this?