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# Preface

During my days as a student at the University of Toronto, I had the privilege of studying under the well-known media analyst Marshall McLuhan. McLuhan even then was basking in the mild notoriety of coining the term 'Global Village' and of wondering, in wonderfully shaped literary prose, whether literature had seen its day and was precariously teetering towards its end. Technology, by connecting people, was re-tribalizing them, declared McLuhan, and the human future that would result would be sensory, immersive, post-verbal; an outcome he regarded with a fascinated shudder. What would he have thought, I wonder, to see virtual tribes assembling over computer connections as tweets and texting and email inundated the world anew with words?

We cannot know. What we can know for a certainty, however, is that the will to understand and to analyze persists, and that, however extraordinary the technological environments that surround us, the drive to describe, assess, and comprehend is too deeply ingrained in the minds of scholars to stop at even the most startling and innovative new developments. Case in point: this first issue of *The Journal of Virtual Worlds and Education*, the first but assuredly not the last publication to exclusively explore the educational implications of interacting with others in media never known before, through digital masks and personae, on visible yet intangible pixel stages. Whatever directions this new communications medium may ultimately take, we have here a token that scholarly understanding will accompany it; and, perhaps, make the journey just that much more engaging.

Only authors and editors know just how keen an effort is needed to create and publish worthy work. To the editors and authors – and friends – who have given their time and energy to create *this* breakthrough work, I give my thanks, in the expectation that its future readers will do the same.

- Lawrence Belle, Editor-in-Chief

# **Research Papers**

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# THE ATTRIBUTES AND ADVANTAGES OF VIRTUAL WORLDS FOR REAL WORLD TRAINING

by

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### Abstract

While the economic importance of Europe's small and mediumsized enterprises (SME) is widely recognized, their owners and managers lack specific management training and education, which hampers their ability to succeed and develop. The potential of current virtual world technology is interesting in this regard, and we provide a contextual overview of it regarding simulations and apprenticeship training. Afterwards, a reflection is made on which features of this technology are different and innovative, and their potential to cause significant changes in training and education of SME managers.

### Keywords

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Environments, Training, Second Life, VITA, Management Education, SME

### Introduction

Professional and personal lives often go head-to-head. Training and education often get crushed amidst this conflict, and professionals facing serious time and location constraints in terms of availability for attending training and education is an all too typical situation. For this reason, e-learning approaches (in the sense of distance learning) have long been used to help overcome those constraints.

However, the detached and autonomous nature of traditional e-learning is not entirely comfortable for many learners, particularly those with decision-making responsibilities. For instance, heads of small and medium enterprises (SMEs) "exhibit activist and pragmatist learning styles, prefer learning by doing and favour problem-centred approaches that offer flexibility" (NJM European, 2000, p. 3). We thus envision and analyse the opportunity of using new e-learning approaches with virtual worlds in support of active and pragmatist learners, as a way to better provide real world training and education to professionals.

# Researching The Effectiveness Of Virtual Worlds For Training And Education

Traditional web-based on-line environments for e-learning have some allowances for active, pragmatist learning, but typically simply focus on providing learners with information and assignments, and are quite limited regarding simultaneous interaction with teachers/trainers and co-learners. Virtual worlds offer interesting potential in this regard, since they are increasingly being used for learning contexts where students and teachers interact cooperatively, immersed in context-rich situations (e.g., De Lucia et al., 2008; Hetherington et al., 2008).

We are not simply referring to the use of 3D simulations. Virtual simulations have long been used in a large array of education and training scenarios, from flight simulators to surgery practice, and many fields use such tools in support of teaching and learning. A deluge of research work has looked into this kind of tools, by:

• analysing their effects (at the cognitive and behavioural levels, or across other dimensions);

• studying the content of simulations and simulators from various perspectives;

• dissecting the technological and human development methods;

• watching and acting upon pedagogical practices;

• combining several of these perspectives on research and knowledge acquisition.

These various research approaches have provided significant information regarding the full technological-cognitive process of the use of virtual environment simulations for educational purposes. There is now a consensus that the use of simulations within virtual environments is, generally, beneficial to learning procedural knowledge and various theoretical and practical concepts. However, such benefits are not something that is automatically attained or ensured by the plain act of using a simulation for educational purposes: all of the previously-mentioned research approaches have contributed with insights and data on how various factors can negatively impact the educational results of using this kind of tools. Recently, for instance, a group of Austrian researchers (Holzinger, Kickmeier-Rust, Wassertheurer & Hessinger, 2009) compared the learning outcomes of medical students in specific subject matters, between a group that studied with traditional text-based tools, and a group that studied by using a simulator (of the traditional, nonimmersive kind), and found no significant differences. However, they have also compared these two groups with a third group of students. This third group used not just the simulator, but also other study materials and had some support in the use of the simulator. The learning outcomes of this third group were significantly higher than those of the two previous groups, showing that small parallel issues can have a large impact on overall results (ibid.).

This situation is recurrent whenever we look upon the educational use of technology. Indeed, many research efforts analyse technology itself, focusing on its features and potential; but if we seek out research efforts wishing to analyse the educational impact of technology, we typically must navigate across an ocean of studies and efforts that do not take into account the complexity of the different factors in play, and frequently provide contradictory or inconclusive results. It is by looking at research efforts that take different factors into account that we usually find significant advances in the understanding of the educational use of technology.

Focusing specifically on virtual worlds, this is yet another case where one must attend to various distinct internal, external, and procedural factors impacting the use of such these tools, if one wishes to provide a useful contribution to understanding their impact on the educational process.

We don't mean to suggest that research should be all-encompassing or panoramic, quite the contrary: the very fact that these are novel technological platforms recommends that a rich variety of research approaches and strategies is followed, from the more panoramic to those focusing on specific issues; from qualitative to quantitative research, from observational to interventional. Only such a richness and diversity of approaches can increase knowledge broadly. What we mean is that research efforts must not ignore how strongly their results may depend on factors that they may not be directly analysing. That is, we cannot analyse a virtual world in a vacuum if we want to ascertain something about its educational impact: one must take into account the actual content of the virtual world (at the pedagogic and technological levels), the context within which the technology is being used, the constraints of the computer hardware, software and networking, the pedagogical strategy being used, the social and educational context, including cognitive, experiential and emotional dimensions (Castello et al., 2009).

### Learning Management Competences In Virtual Worlds: Simulation Or Reality?

In the previous section, we've mentioned the use of simulations in support of learning; after all, it is the simulation perspective that most readily springs to mind when thinking about the educational use of virtual worlds. And this perspective can be interpreted by resorting to the significant body of research literature on the use and development of educational simulations . However, this is not the single option: in many cases we may experience real situations in virtual worlds, not just simulated ones – and in such cases the simulation perspective gives way to alternatives, such as servicelearning, on-the-job learning, learning traineeship, or apprenticeship learning (henceforth, we'll simply mention "apprenticeship learning" as a shorthand version of these different approaches).

How can one experience a real situation through a virtual world? Firstly, we must clarify which virtual worlds we're talking about. In fact, we could consider a plain text adventure game where the player plays a role as if present within the game, regularly receives textual descriptions of the places where he or she "is," and uses textual or iconic commands to cause changes in the game state – as a virtual world. We can think of any classical game, such as PacMan and many others (where the player controls a virtual character inside a virtual space created by the computer) as being a virtual world. But using this concept in such fashion is confusing, not enlightening. Therefore we add the concepts of multiusers and inter-user communication, thus limiting the concept of virtual world to specific software platforms involving games or social environments where several players and/or users can be "present" and able to communicate amongst themselves. We add the concept of avatar and avatar-mediated interaction, in which the user-controlled avatar interacts with the environment and is affected by it. In this sense, multi-player text adventures are virtual worlds, as would be a multi-player PacMan, as long as players can communicate with each other; but social platforms such as MySpace or Facebook - where several users interact without using avatars to interact with the environment - are not.

This aspect of inter-user, avatar-mediated communication is essential for an understanding of the novel potential of virtual worlds for apprenticeship learning. By using inter-user communication and being aware of the "presence" of avatars at a virtual "location", users can establish common or opposing strategies, and develop efforts – that is, pursue a huge diversity of social endeavours.

Let's suppose that a group of military service people is simultaneously playing a war game. They can go beyond the experience of the game's simulated situations, and experience issues such as communication misunderstandings (and thus realize firsthand the importance of group communication protocols under operational circumstances); the complexities of holding a tactical formation in a context where each person comes across different obstacles, communication issues, constant distractions, visibility issues, etc. This is not a plain simulation, since each member of such a military team is there, active of their own accord. The simulation is providing the contextual aspects, but the reactions and behaviours of siblings in arms are real reactions by real people. This perspective gained wide popularity in the wake of the scientific work of James Gee and his colleagues performing educational research on videogames (e.g., Shaffer, Squire, Halverson & Gee, 2004), and is also studied by several other researchers (for a complementary viewpoint to Gee, see Kirriemuir & McFarlane, 2004).

But it is not only multi-user games in a controlled environment, seen as virtual worlds, that allow one to experience real-life learning situations. That is also possible in more unstructured situations, and a growing number of reports and scientific research efforts have been looking into such situations. For instance, Kurniawan (2008) describes the intergenerational learning occurring between players of World of Warcraft (an aspect that is entirely unrelated to the game elements); Bryant (2006), describes the use of virtual worlds in learning foreign languages live.

But regarding the teaching and learning of competences, are we limited, regarding apprenticeship learning, to leadership and team coordination, as in military situations? Current accounts focus on these cases, (e.g., Reeves & Malone, 2007, for an example related to management) but we will explain how in many situations it is possible, as part of numerous day-to-day activities, to use virtual worlds as a component of those activities, rather than a replacement for them.

### A Sample Application Case: SME Management

Across the 27 members states of the European Union (EU), there are about 19.6 million small and medium-sized enterprises (SME), firms in the non-financial business economy, with up to 250 employees, representing 99.8% of all businesses and 67.1% of the non-financial business economy workforce – about 85 million jobs (2005 Eurostat data, acc. Schmiemann, 2008).

To support the growth and development of existing SMEs and promote the creation of new SMEs, the European Commission (EC) adopted in June 2008 the 'Small Business Act' for Europe, reflecting the EC political will to recognise the central role of SMEs in the EU economy, by providing a comprehensive SME policy framework for the EU and its Member States (European Commission Directorate-General for Enterprise, 2008).

Yet in spite of this role, played by such firms in the European economy, there is a lack of specific training for people heading and/ or managing SMEs, and the training that is available "tends to serve either start-ups or medium sized firms" (NJM European, 2000, p. 4).

Heads of SMEs are clearly professionals facing serious time and location constraints for attending training and education, and the range of competences that they must master is varied and multidisciplinary (Velegrakis et al., 2009). For this reason, and given the economic relevance put forward in the preceding paragraphs, we will use SME management training and education as context for the remainder of this discussion.

# Potential For Blending Apprenticeship Learning And Formal Training

If our statements expressed at the end of the second section hold true, that means that students, trainees, and learners in general can be involved in activities taking place in virtual worlds that are an integral part of other, non-virtual world activities, and therefore be involved in real moments of apprenticeship learning. Many virtual worlds have a significant number of active users, organized as diverse communities (Woodcock, 2008). One can consider the possibility of approaching some of these users/communities as part of a promotional or sales strategy, among other possibilities.

For instance, a group of virtual world users could be invited for a virtual world meeting with a marketing executive, where they would be able to experience the inworld version of a new car model, analyse it and discuss its various features. We can imagine one of those users entering the car, inviting some friends to seat their avatars inside with him or her and drive the car model through a city road or scenic road while discussing it, and then try it with a dog, with a surfboard, with different amounts of luggage, etc. Obviously, involving users in this fashion and collecting data and feedback would require significant planning and marketing expertise, as would being able to follow-up from this virtual activity into changes to product development or later sales approaches, for instance.

Another example would be a situation where a virtual world location is selected to create an alternative interface for e-commerce. For instance, instead of simply seeing jewelry photographs on a Web site, users could visit a virtual store, try out virtual versions of those pieces of jewellery on an avatar and ask friends for opinions; or simply enjoy browsing for items in a spatial arrangement, not simply on a list on a Web page. Several virtual world stores do exist, particularly in the Second Life virtual world, not only for virtual world items but indeed as virtual world interfaces for real-world items (e.g., Tedeschi, 2007). To be successful as a sales outlet, such stores must consider how to establish a relationship with users, both with the communities active within virtual worlds and with other users, some of whom may find it interesting the option to experience a product in this fashion (and therefore providing a competitive advantage by using the virtual store as a service differentiator).

As a final example, businesses can and have used virtual worlds' ability to convey a sense of presence to hold virtual world meetings instead of real-world meetings (e.g., Linden Lab, 2009). In such meetings, only the settings and visual paraphernalia (avatars, virtual location) are related to the virtual world: the content of the discussions, the items on the agenda, the management of the meeting, are all quite real and relevant to day-to-day business operations.

Such activities, where the virtual and real dimensions are naturally intertwined, are examples of how business and management activities in virtual worlds can be immersed in the overall business and management activities of a company – and thus a nice opportunity for apprenticeship learning.

Activities such as those mentioned in the previous paragraphs employ virtual worlds as a medium supporting or complementing business activities, not as an alternative, isolated reality. This opens up a tantalizing possibility: if those virtual worlds are open to any user connected to the Internet (a common situation), then students/ trainers involved in formal training situations can take part in them - and thus be involved in apprenticeship training while their formal training or education is ongoing. They are not taking part in simulated activities, but in real activities! Typically, in physical, realworld situations, this would only be possible if the apprenticeship location would be in the same town or region as the formal training/ education location. But using virtual worlds, learners can be receiving their formal training in any physical location - thus enlarging the number of apprenticeship opportunities available for learners. In this sense, virtual world learning environments empower not only stronger constructivist and connective approaches in learning processes but also the possibility of integrating experiences and contexts (both real and virtual) supporting ubiquitous, social, and multichannel learning.

As businesses increase the number of activities that involve virtual worlds as a place where activities and tasks take place, more

opportunities for this kind of learning will appear. A specific case is that of companies whose main business area is the development of products and/or services specifically for virtual worlds. The University of Trás-os-Montes e Alto Douro (UTAD), a member of the VITA project consortium, cooperates since 2007 with the Beta Technologies consortium, and an agreement was signed allowing UTAD students from computing-related programmes of studies to benefit from traineeships during their second enrolment year (therefore, halfway through their three-year BSc programmes). The students are physically living and attending classes in Vila Real, Northeast Portugal, and use various cooperative software tools to develop the business activities associated with those traineeships. While this consortium is focused on developing spaces and services based on Second Life and Open Simulator virtual world technologies, most of its day-to-day business operations and management processes are also based on these platforms. For instance, coordination meetings between employees, partners, and trainees are held in them, since they are typically located in far apart locations (the consortium offices are in New York and Lisbon, for instance). This allows trainees to proceed with their education in the educational institution that they chose (UTAD), but be part of professional teams and involved with business activities that are global in nature and scope (i.e., not just develop tasks at a distance).

As more businesses and business activities involve virtual world activities as part of daily routines, the greater the number of opportunities to expand training situations to apprenticeship-like contexts, not just simulations. Procedures and concepts can thus be learned in real-life contexts – the actual virtual worlds where they are taking place – not just in isolated training courses.

What about simulations? How do current virtual worlds impact their use?

Despite what we have previously stated, currently (and possibly in the future) simulations will remain the most relevant aspect of virtual world use for learning procedures and providing context for concepts. Examples are becoming commonplace in scientific literature (and also in anecdotal reports, obviously), for different cases: training of Canadian border guards (Hudson & deGast-Kennedy, 2009); clinical practice (Henrichs, Youngblood, Harter & Dev, 2008); fire-response training (Padgett, Strickland, & Coles, 2006).

One must however emphasize that much of what is achieved in such cases is similar to the use of virtual reality in traditional simulation environments. What are, then, the novel opportunities for training found by resorting to a multi-user virtual world, besides team training?

A particularly important aspect of current virtual world technologies is that various platforms enable users to create their own content. Such is the case of Open Croquet/Open Cobalt (Open Cobalt, n.d.), Active Worlds (Activeworlds, n.d.), Second Life (Linden Research, n.d.), and OpenSimulator (OpenSimulator, n.d.), to name a few. Such platforms have been used to develop many educational initiatives, including simulations.

This aspect is relevant because the production of a simulation using software development tools is a resource-intensive process, at the human, and/or financial level. Therefore it is not something that can be applied to any case where a simulation could be useful. Development time is typically quite significant, and this is yet another limitation to the educational use of simulations, since it implies that they need to be planned early enough in the educational process. Normally, it is not possible to create or change a simulation in response to doubts or ideas that came up during a lesson or training session.

And this is precisely the point where we see the larger impact potential for current virtual world technologies: by providing any user with the tools to develop three-dimensional content and various effects (avatar gestures, reactions, automated behaviours, etc.). This allows new cases, contexts, and situations to be created and

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tested in a relatively quick way. While obviously it is not just anything that can be quickly rendered as a simulation, in many cases it is indeed possible: creating a new layout for a restaurant, to see how that would impact the employee's actions or organizing products differently in a warehouse, are just two examples of changes that can be expedited. A factor that cannot be easily automated in these examples is customer's behaviour. But since we are talking about multi-user platforms, we can plan role-playing situations where some trainees act as clients, as clerks or as team coordinators, so that the new situation can be experienced without further delay.

The platforms mentioned above also allow any user with enough expertise to programme behaviours for virtual objects and avatars, and make them interact with external computer systems (for data recording, decision-making, control, etc.). Such programming expertise is the realm of just a few people, but unlike other simulation systems, in virtual world platforms small programming components can be distributed and shared by their authors, using methods simple enough for any user to be able to employ and combine components, and thus expand the number of people that can create and develop educational applications of virtual worlds, automated behaviours, and systems integration.

#### **Final Thoughts**

The current situation as we've described it is one of widespread availability of virtual world platforms that enable groups of users to interact, create, and customize simulations. This prompts a parallel with earlier events: the appearance of the World Wide Web and more recently the dawn of blog-creating tools.

Regarding the Web, while methods of putting information on-line existed previously, suddenly a small subset of skills was enough to achieve it: creating the content itself was the main issue, since network management and systems administration were from then on taken care of by hosting service providers. This enabled the explosive growth in information available on-line, and the consequent drastic change in how that information was used and impacted society.

As for blogs, people had been producing Web pages with journals and forms almost since the Web's beginning for on-line forums, for instance. But once on-line tools were invented, enabling any user to focus just on the tasks of producing text and managing comments and settings, blog creation became much simpler – and indeed the term "blog" appeared. The functional complexity of producing a Web site that was edited regularly, where old information is archived, and where comments are accepted and managed was simplified, reduced to the simpler requirement of using a task-specific tool. The result was also the explosive growth of the number of blogs, of the variety of users producing them and consequently the emergence of novel and diverse ways of making use of this communication tool, and of the impact of blogs in society.

The parallel that we emphasize is clearly that these new tools (virtual worlds) are specifically bringing a similar level of simplification to the process of creating virtual spaces and performing simulations in them. The set of skills and resources that this involves is now significantly smaller than with traditional simulation-creation tools, and therefore we expect a significant increase in the use of simulations in diverse contexts. Will we then witness the emergence of novel and diverse ways to leverage simulations and subsequent impacts in society? This is an enticing possibility.

#### References

Activeworlds. Home of the 3D Internet, Virtual Worlds and Community Chat. April 11, 2009, http://www.activeworlds.com/ Aldrich, C. (2005). *Learning by Doing: A Comprehensive Guide*  *to Simulations, Computer Games,* and Pedagogy in e-Learning and Other Educational Experiences. San Francisco, USA: Pfeiffer.

Bryant, Todd (2006). "Using World of Warcraft and Other MMORPGs to Foster a Targeted, Social, and Cooperative Approach Toward Language Learning," Academic Commons. April 11, 2009, http://www.academiccommons.org/commons/essay/bryant-MMORPGs-for-SLA

Castello, Valentina; Pescuma, Saverio; Sorrentino, Giovanni; Dell'Aiuto, Vittorio; Sancin, Chiara (2009). "Ubiquitous (and) social learning. Where is the potential for innovation?" In *Proceedings of the European Distance and E-Learning Network Annual Conference, Innovation in Learning Communities*, Gdansk, Poland, 10-13 June 2009. Budapest, Hungary: EDEN, Budapest University of Technology and Economics.

De Lucia, Andrea; Francese, Rita; Passero, Ignazio; Tortora, Genoveffa (2008). "Supporting Jigsaw-Based Collaborative Learning in Second Life." In *Proceedings of the 2008 Eighth IEEE International Conference on Advanced Learning Technologies*, pp. 806-808. Washington, DC: IEEE Computer Society.

European Commission Directorate-General for Enterprise (2008). Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: "Think Small First - A Small Business Act for Europe," SEC(2008) 2101, SEC(2008) 2102 [On-line]. May 16, 2009, http://eur-lex.europa.eu/LexUriServ/ LexUriServ.do?uri=CELEX:52008DC0394:EN:NOT

Henrichs, W. L.; Youngblood, P.; Harter, P. M., & Dev, P. (2008). "Simulation for Team Training and Assessment: Case Studies of On-line Training with Virtual Worlds," *World Journal of Surgery*, 32 (2), 161-170.

Hetherington, Robina; Bonar-Law, Janette; Fleet, Tony; Parkinson, Lindy (2008). "Learning in a Multi-User Virtual Environment." In *Proceedings of the 2008 International Conference Visualisation*, Volume IV-VI, pp. 99-105. Washington, DC: IEEE Computer Society.

Holzinger, A., Kickmeier-Rust, M. D., Wassertheurer, S., and Hessinger, M. (2009). "Learning performance with interactive simulations in medical education: Lessons learned from results of learning complex physiological models with the HAEMOdynamics SIMulator." *Computers & Education* 52 (2), 292-301.

Hudson, K.; deGast-Kennedy, K. (2009). "Canadian Border Simulation at Loyalist College," *Journal of Virtual Worlds Research*, 2 (1), 4-11.

Kirriemuir, J. & McFarlane, A. (2004). "Report 8: Literature Review in Games and Learning." Bristol, UK: Futurelab.

Kurniawan, S. H. (2008). "Intergenerational Learning through World of Warcraft." In *Proceedings of the 2008 Second IEEE international Conference on Digital Game and Intelligent Toy Enhanced Learning* (November 17 - 19, 2008), DIGITEL, pp. 98-102. Washington, DC: IEEE Computer Society.

Linden Lab (2009). "How Meeting In Second Life Transformed IBM's Technology Elite Into Virtual World Believers." June 15, 2009. http://secondlifegrid.net.s3.amazonaws.com/docs/Second\_ Life\_Case\_IBM.pdf

Linden Research. Virtual worlds, avatars, 3D chat, on-line meetings - Second Life Official Site. April 11, 2009, http://secondlife.com/

NJM European (2000). "A Study and Analysis of Management Training~Techniques for the Heads of SMEs, Particularly Using the Information and Communication Technologies (ICTs)," Report for the Directorate-General for Enterprise of the European Commission under contract DGENT 99/C/A3/31 S12.128934 [On-line]. May 16, 2009, http://ec.europa.eu/enterprise/entrepreneurship/ support\_measures/training\_education/doc/study\_man-training2. pdf.

Open Cobalt. April 11, 2009, http://www.duke.edu/~julian/

Cobalt/Home.html

OpenSimulator. OpenSim. April 11, 2009, http://opensimulator. org/wiki/Main\_Page

Padgett, L. S.; Strickland, D.; & Coles, C. C. (2006). "Case Study: Using a Virtual Reality Computer Game to Teach Fire Safety Skills to Children Diagnosed with Fetal Alcohol Syndrome," *Journal of Pediatric Psychology*, 31 (1), 65-70.

Reeves, B.; & Malone, T. (2007). *Leadership in Games and at Work: Implications for the Enterprise of Massively Multiplayer Online Role-playing Games.* Palo Alto, USA: Seriousity.

Schmiemann, Manfred (2008). "Enterprises by size class - overview of SMEs in the EU," Eurostat manuscript KS-SF-08-031-EN-N. Luxembourg: Office for Official Publications of the European Communities.

Shaffer, D. W., Squire, K. R., Halverson, R., and Gee, J. P. (2004). "Video games and the future of learning". April 11, 2009, http:// www.academiccolab.org/resources/gappspaper1.pdf

Tedeschi, Bob (2007). "In Second Life, Virtual Storefronts Aim For Tangible Sales," *The New York Times*, June 11, http://www. nytimes.com/2007/06/11/technology/11iht-ecom.1.6087369.html

Velegrakis, George; Rodrigues, Clara; Coelho, Dalila; Varajão, João; Morgado, Leonel; Dominguez, Caroline; Sancín, Chiara; Doppler, Gerhard; Koivusalo, Hillevi; Lakanen, Erja; Haidimoschi, Aura (2009). "Profile of the SME manager - Competences defining the profile of the European entrepreneur." In *Proceedings of CENTERIS* 2009 – Conference on ENTERprise Information Systems, 7-9, October 2009, Ofir, Portugal, ISBN 978-972-669-929-3, pp. 725-726, Vila Real, Portugal: UTAD.

VV.AA. "Pac-Man." In Wikipédia (http://pt.wikipedia.org/wiki/ Pac-Man). April 9, 2009.

Woodcock, Bruce (2008). "An Analysis of MMOG Subscription Growth Version 23.0." June 15, 2009, http://www.mmogchart.com/ analysis-and-conclusions/

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# Teaching Animation in a Virtual Space: The Use of Second Life as An Extended Approach for Teaching Computer Graphics Courses On-line

by

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## Abstract

This paper describes an experimental section of a Computer Science course focusing on animation, offered entirely in the virtual world of Second Life. The goal of the experiment was to discover whether worlds like Second Life could be used effectively to teach computer graphics in a distance-learning environment. The class, which focused on computer animation from a programmer's perspective, provided students the opportunity to explore the fundamental algorithms of animation via lecture and algorithm implementation. Class interactions including lectures, student assessment, and instructor office hours were all conducted in-world. Assignments were completed using the Linden Scripting Language and submitted to the instructor via in-world student demonstrations. The class offers an alternative to traditional course delivery in a physical classroom and shows great possibilities for teaching animation as an on-line offering.

## 1. INTRODUCTION

In recent years, the use of Second Life for education has skyrocketed. A recent study on education in Second Life conducted in 2007 has identified at least 170 institutions of learning with an online presence in Second Life.<sup>1</sup> The New Media Consortium (NMC), an international not-for-profit consortium of learning-focused organizations dedicated to the exploration and use of new media and new technologies, reports a membership of over 250 colleges, universities, and museums.<sup>2</sup>

Courses being offered in Second Life span a diverse range of areas from art to business, design to the humanities, Library Science to filmmaking.<sup>3</sup> In particular, the use of Second Life for distance and on-line learning shows great potential.<sup>4</sup>

Notably absent from this list are courses in the discipline of computer graphics and animation. With respect to virtual worlds in general, and Second Life specifically, computer graphics is somewhat unique in the sense that the software used to connect to and interact in a virtual 3D world is built upon the same algorithms and methods explored in courses in these areas. In addition, teaching the concepts of computer graphics could benefit by the interactivity and collaborative nature that are offered by 3D Virtual Worlds.<sup>5</sup>

In this paper, we describe our experiences in teaching a Computer Science course on the algorithms and techniques of animation entirely in Second Life. Our goals in offering this experimental section are twofold. First, we wished to explore the advantages of using Second Life as a platform for delivery of an on-line computer graphics course. Unlike many courses that use exercises in Second Life to augment instruction in a physical classroom, our goal was to present the entire class in Second Life, comparing student experiences with those who took the same course as a traditional offering given in a physical classroom.

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Secondly, we look to assess the advantages of using a 3D virtual space in the teaching of graphics related content. Since the algorithms to be taught in the course are the same algorithms on which the Second Life system is built, we pose the question as to whether we can leverage the technologies of the 3D world to teach the technologies surrounding motion in 3D worlds. Are there tools that can be built in a 3D environment that will assist in teaching animation concepts, which would be difficult or impossible to build in a physical space?

The remainder of the paper is structured as follows. In Section 2 we provide a background on the use of virtual environments in Computer science and graphics education. Next, in Section 3 we describe the target course for the on-line delivery and how this course is traditionally offered. In Section 4, we describe the on-line delivery as offered in Second Life. This is followed by findings and observations on the on-line course in Section 5 and we conclude with final thoughts in Section 6.

## 2. BACKGROUND

The use of virtual 3D spaces in the teaching of Computer Science and programming concepts is not unprecedented. Classic graphics systems such as Logo / turtle graphics,<sup>6</sup> Karell the Robot,<sup>7</sup> and Alice<sup>8</sup> provide programmatic control of objects within virtual worlds that have been used to provide an effective means of visualizing programming concepts.<sup>9</sup>

The use of Collaborative Virtual Environments (CVE) allow for the exploration of more sophisticated algorithms including those useful in interactions within the worlds themselves. In these systems, some sort of scripting interface to the 3D engine is provided as a means to extend the virtual world in terms of the objects that inhabit the world, the motion of these objects, and the 3D environment in which these objects reside. As previously mentioned, Second Life is one such system embraced by many educators, though others have been developed. For example, MUPPETS,<sup>10</sup> which uses Java as a scripting interface to the world, is a CVE designed specifically for teaching introductory programming concepts. Existing multiplayer games that provide such extensibility (e.g. World of Warcraft) have also been used effectively for educational purposes.<sup>11</sup>

With regard to Computer Graphics education, these types of extendable 3D worlds are significant in that they provide a means to not only define motion, but also, more importantly, customize parameters of the 3D environment (such as lighting, materials, camera position, etc.). Seeing that the 3D environment is built upon the same graphics concepts and algorithms that would be taught in graphics courses, these worlds essentially provide an interactive educational toolkit for experimenting with a 3D graphics system.

## **3. THE COURSE**

"Computer Animation: Algorithm and Techniques" is a course taught annually since 2002 using a traditional classroom delivery and examing the theory and implementation of fundamental animation algorithms from a programmer's perspective. It covers theoretical topics such as quaternion, interpolation, dynamics, numerical integration, articulated figure motion, group motion and explores methods of efficient and effective implementation and integration of these concepts in a working animation system.<sup>12</sup> It is important to note that this is fundamentally a computer science course focusing on algorithm design and development and does not emphasize model building, graphic design, or aesthetics in the 3D world. Although students are encouraged to use their best judgment as to aesthetics, they are not assessed on how "good" their models look. Instead, assessment is based on their algorithm implementation and the resultant motion of simple objects on which these algorithms are applied.

Upon completion of the course students are expected to be able to:

• explain and apply the fundamentals of keyframing and interpolation;

• apply models of motion based on Newtonian Physics to animation;

• describe and compare models of group behavior and apply them to animation;

• apply techniques for animating articulated figures;

• explain the basic principles of motion capture and apply them to an animation application;

• specify, design, implement, and document a large software project related to computer animation.

The course is structured around weekly lectures. Students are required to read, summarize, and discuss seminal papers introducing each topic and then complete a number of programming assignments based on the content presented in lecture. There are five programming assignments, each focusing on one of the areas mentioned in the outcomes: namely animation basics, keyframing, group motion, articulated figure motion / motion capture, and dynamics simulation. The programming assignments are intended to provide students with the opportunity to explore algorithms presented in class through direct implementation of these algorithms. With animation, this approach is especially effective as the student can visually observe the results of his or her implementation by watching an object move in the 3D space controlled by the code. Programming assignments are evaluated via code submission that are compiled, run, and assessed by the instructor off-line. Students are not restricted to any particular language or 3D environment in completing their assignments. The majority of students in past offerings have completed their assignments using C, C++, C#, or Java in conjunction with a 3D graphics API such as OpenGL, DirectX, or XNA.

The course culminates with the presentation of a quarter long project which is chosen by each student and approved at the start of the quarter. These final projects make up the capstone experience for the course and are presented and demonstrated during the final exam period. As with assignments, students are not limited to a particular programming platform in completing their final projects.

### **4. ON-LINE DELIVERY**

The experimental on-line offering of the course was presented entirely and exclusively in Second Life in the Spring of 2009. Eighteen students were enrolled in the class. We utilized our institution's on-line campus in Second Life, which is complete with meeting spaces, classrooms, and a sandbox area for student use. A Web-based course management system is used to manage course materials (e.g. copy of slides, assignment descriptions, etc.) and facilitate asynchronous discussions. All other interactions including lectures, student assessment, and instructor office hours were conducted in-world.

In designing the course for on-line delivery, we were very careful not to change the basic structure of the course. The learning outcomes remain unchanged from the traditional offering and the basic set of deliverables (assignments, readings, lectures, final project) also remained the same. In addition to the Parent text, a book focusing specifically on scripting in Second Life<sup>13</sup> was added to the list of required texts for the course. Other on-line references such as the LSL Portal,<sup>14</sup> which is the official reference guide to the Linden Scripting Language, were linked from the course Web site and referenced extensively in the lectures and assignment descriptions.

## 4.1. LECTURES

Weekly lectures were presented in an in-world amphitheatre that can comfortably hold up to 70 avatars without noticeable lag.



Figure 1a - Amphitheatre during lecture



Figure 1b - Amphitheatre during lecture with video

The amphitheatre contains a screen for the presentation of slides as well as a media player for playing streaming video.

The instructor used voice chat during lectures with student questions, feedback, and other communication done using text chat. Text chat was also used during one-on-one student interaction such as during office hours or for assignment demonstrations.

In order to accommodate deaf and hard of hearing students, the slide screen also includes an area for real time closed captioning of the lecture. Captioning is provided by a Web-based captioning service<sup>15</sup> performed by a human captioner with an SL avatar also resident in the amphitheatre. The captions are streamed over the web and then pulled onto an object within SL using a media texture.



Figure 2 - Real time captioning in-world

Lectures are often augmented with live demonstrations of animation algorithms using objects within the 3D world as props.



*Figure 3a - Demonstration of rotation interpolation.* 



Figure 3b - Demonstration of flocking behavior

The ability to script the motion of objects in the 3D world enables real time illustrations of animation concepts, some which are difficult, if not impossible to demonstrate in a physical space. Figure and videos 3a and 3b show two such demonstrations. In figure 3a, the advantage of using quarternions as a representation for interpolating rotations is demonstrated. In figure 3b, motion resulting from a flocking model<sup>16</sup> is illustrated with the parameters of the model being adjusted in real time.

In the traditional offering of the course, on-line applets are used to illustrate these concepts. Although effective, executing these demos in the same 3D space as the lecture gives the lecture a more interactive feel, as students do not have to switch contexts between different applications during the presentation. In addition, showing the demo in the 3D environment of the lecture allows students to view the demos from whatever perspectives might be most appropriate with this point of view in full control of the student while the demo is underway.

## 4.2. PROGRAMMING ASSIGNMENTS

Completion of programming assignments benefitted the most from use of a 3D environment. In redesigning the assignments component of the course, we were motivated by the magical world of the Harry Potter novels where, in the Hogwarts School of Witchcraft and Wizardry, students were assessed on their assignments by performing a spell or enchantment in the classroom in front of the instructor as well as other students. The students' performance was graded by visual inspection of the object or objects being manipulated in the magical world.

The scripting capabilities within Second Life allowed us to approach the assignments in our offering of the course in a similar manner. Students were asked to code their assignment using

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the Linden Scripting Language, and then apply these scripts on prims in the 3D space. To complete the Harry Potter metaphor, communication with the scripts was performed using text chat allowing the objects controlled by the scripts to be commanded by typed commands; almost as if an avatar was telling an object what to do in the 3D world. Sample submitted code for the initial assignment is given in Code Listing 1. The goal of this assignment was to introduce students to the use of the Linden Scripting Language in making objects move. Students were asked to create a script that allowed one to instruct a prim, via text chat, to move in a simple linear path.

A sandbox area of the island was set up for students to develop, test, and ultimately demonstrate their programming assignments. Grading these assignments involved the student setting up an in-world appointment with the instructor. During this meeting, the student would run his/her script on a prim in the world and both instructor and student would view the results together.



Figure 4a - Student demonstration of a particle system

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Figures and videos 4a and 4b show two such assessment meetings: in the first, a student is illustrating the use of particle systems in creating visual effects. The second shows a student building and moving a hierarchical articulated figure. In this second figure and video, the student avatar is the blue dragon.



Figure 4b - Student demonstration of articulated figure motion

```
vector origPos;
vector curPos;
float lastTime = 0.0;
integer touchme = 0;
default {
    state_entry() {
        origPos = llGetPos();
        curPos = origPos;
    }
    touch start(integer total number ) {
```

```
if (touchme == 0) {
                llSay(0, "Touched. Touch me again to get me
listening");
               touchme = 1;
            }
            else {
               state flying;
            }
        }
    }
    state flying {
        state entry() {
            llSay (0, "I'm listening");
            llListen (111, "", NULL KEY, "");
        }
        listen(integer channel, string name, key id, string
message) {
            if (message == "go") {
                llResetTime();
                lastTime = 0.0;
                llSetTimerEvent (0.001);
            }
        }
        timer() {
            float curTime = llGetTime();
            if (curTime > 5.0) {
                llSetTimerEvent (0.0);
                llSay (0, "I'm done");
                touchme = 0;
                curPos = origPos;
                llSetPos (origPos);
                state default;
            }
            else {
                lastTime = curTime;
                curPos = origPos + curTime * <1, 1, 1>;
                llSetPos (curPos);
            }
        }
    }
```

## 4.3. FINAL EXAM

A final project of the student's choice was still the capstone experience for the class. Rather than using a traditional presentation format as the regular offering of the class, the final exam was set up as a poster session, which was held in the class sandbox area. During the final exam period, as in traditional poster sessions, the class would travel from poster to poster. Each student was given fifteen minutes to explain or demonstrate their project using the poster content as a guide to their presentation. The goal of using this presentation style was to encourage more intimate presentations as well as to provide students with practice on creating academic posters.

Unlike the assignments, students were encouraged, though not required, to complete their final projects using the Linden Scripting Language. Loosening of this requirement for the final allowed for exploration of areas that were best performed using other 3D technologies or that could not be implemented effectively due to the limitations of the LSL. Regardless of the project picked, or the technology used in implementing the project, the student still was required to present their project during the final exam period. Students who implemented their projects outside of Second Life were required to present on video a real-time capture of their project by means of an in-world media player during the final poster session.

Figures and videos 5a and 5b show a sampling of some of the student projects. In figure 5a, a student shows a juggling simulation implemented outside of Second Life using OpenGL. A captured video of the system in action is presented during his in-world presentation. Figure 5b shows a hybrid project where a student was exploring the application of external technologies to objects within Second Life. In this case, the area explored involved facial animation. The in-world facial model is shown side by side with a video showing a facial model created by an external application (in this case, Maya).



Figure 5a - Student presentation of external project



Figure 5b - Student presentation of hybrid project

Figure 5c shows a project implemented and demonstrated entirely in world. In this project, students experimented with

the creation of flexible, cloth-like objects. The elasticity of the objects was demonstrated by shooting balls at the elastic surface from a hand held cannon.



Figure 5c - Student presentation of in-world project



Figure 5d – Interactive rollercoaster simulation

Finally, Figure 5d shows an interactive project where the student built a rollercoaster simulation. During the poster session, other students were not only given the opportunity to view a demo of the system, but were also invited to board the coaster car and experience the simulation first hand as a rider.

## 5. FINDINGS

In this section, we give our observations on the on-line course as offered in the spring of 2009. This offering was advertised and run as an experimental offering of the class to which students self-selected to enroll. Although most students were indeed local and available to meet on the physical campus, the course was run as if it was a distance course. A physical classroom was reserved during the quarter in the case of technical emergencies or network troubles. Thankfully, all of the technical elements of the class ran smoothly, so resorting to the physical classroom was not required. The only time that the class met physically was on the first day of class during which the logistics and parameters of how the course would be run were explained. Even office hours were conducted in-world as the instructor, who was physically on campus, would not accept students in the class in his physical office.

As with all courses, students were asked to fill out an on-line course evaluation at the end of the quarter. Particular questions specifically addressing their experiences in Second Life were added to the regular evaluation form. Observations listed below are based on the results of these evaluations as well as personal communications (both electronic and spoken) that the instructor had with students enrolled in the course.

## 5.1 OVERALL STUDENT IMPRESSIONS

In general, student satisfaction with the course and the delivery in Second Life was high. All but two of the students who completed the evaluation indicated that this was their first exposure to Second Life. Because of this, there was an overall novelty about the 3D world and all the things you can do in it which added to the initial interest in the course. This novelty seemed to keep the students focused as the quarter progressed.

Other than instruction on how to use the Linden Scripting Language, students were given very little guidance or tutorial on Second Life itself. The little introduction that was given involved pointing the students to the virtual classroom and providing a very basic in-world tutorial as supplied by our institution as part of the institution's virtual campus (Figure 6). Otherwise, the students independently had to find their way around the virtual space.



Figure 6 - Orientation area on in-world campus

This was hardly a deterrent, however, as most students indicated that they not only experienced no trouble getting initiated, but ended up exploring areas of Second Life outside of class both in space and capabilities.

Case in point, Figure 7 shows a snapshot of the class taken during the final poster session. Even though no instruction was given, for example, on how to change their appearance, most students showed creativity in defining and the creating the look of their avatars outside of class time. From the evaluations, 78% of the students indicated that they would consider taking another course within Second Life and 72% expressed an interest in returning to Second Life for non-classroom related activities.



Figure 7 - Class snapshot during final exam

## 5.2 LECTURES

As synchronous lectures go, the student experience was as good as in a regular, physical classroom. One challenge for the instructor was to include strategies assuring that students were actually present during lectures and not just their avatar. For example, the class was queried often during lectures for questions and just general acknowledgement of their presence. The on-line demos were especially effective and generated a great deal of interesting conversation and insightful questions, thus indicating that students were not only paying attention, but were also gaining a good grasp of the concepts that the demos were designed to illustrate.

One student wrote in his evaluation:

"I think Second Life is a good substitution for in-class lectures. It allowed me to be in class without actually being on RIT's campus and it provided exactly the same experience I would have gotten in class. I could hear the professor, I could see his slides, we could talk back, etc."

## **5.3 ASSIGNMENTS AND PROJECTS**

The interactive in-world demonstration of the assignments and projects proved to be the biggest advantage over the traditional course delivery as it provided immediate and interactive feedback for the student in an informal and conversational setting. It was not uncommon for students to modify code or adjust program parameters during these sessions, while observing and discussing the effect of the code changes or parameter modification. The previous cycle of code submission, off-line compilation and execution, followed by back and forth e-mail conversations proved to be a long and drawn out process. Very often the student would be left waiting as the instructor or grader tried to catch up on the grading load. The interactive method was found to be far more favorable from both the perspective of students and instructor.

In-world interactions between students were just as rich. On several occasions, the instructor had the opportunity to observe students in the sandbox area the night before an assignment was due. Not only was the sandbox area filled with avatars, but there also seemed to be an overall feeling of comradeship amongst the students as they assisted each other on the project. This assistance came in the form of voice chat, sharing of tips and collaborative model building and script writing. As one student wrote when asked what was one of the advantages of having the class in Second Life: "The high level of interaction I had with other students and the professor and the convenience of being able to have lecture from anywhere."

Finally, using the Linden Scripting Language for assignments not only enabled interactivity but also provided the students with an existing and common 3D infrastructure. This allowed students to focus specifically on the algorithms being taught rather than having to deal with the overhead of building an animation infrastructure of their own.

## 5.4. USE OF LINDEN SCRIPTING LANGUAGE

Despite the advantages presented by the use of in-world scripting, the biggest student complaint of the Second Life experience was the forced use of the Linden Scripting Language in the completion of assignments. The language is provided as a mechanism for defining some basic motion and behavior of objects in Second Life. The course, however, required a more robust programming environment, something, for which the LSL what not designed. As mentioned by one student: "The programming portion seems more difficult because Second Life's scripting engine is difficult to manage and work with."

There are two particular issues with the language mentioned by students and observed by the instructor. The first involved the limited function set provided by the language. Once again, the language was designed for simple, high level scripting, not complex, low-level programming. Very often students had to work around the functionality provided to make their assignments and projects work.

The second issue was one of timing and lag. LSL uses an event-based model where functions are activated as response to an invocation of an event. For procedural animation, object positions, rotations, and attributes need to be modified on a per frame basis in order to achieve smooth motion. The language does provide support for a periodic timer where an event is triggered on a regular basis; however, because of the networked nature of Second Life, each function call within the script introduces a delay. Thus, the actual interval between timer events can be variable based upon the complexity of the response functions invoked by the event. In addition, there is a minimum delay of 0.05 seconds between events. This translates to a maximum of 20 events per second. Though this rate is appropriate for general scripting, it proved much too slow for the frame rate resolution required for the programming assignments.

It should be noted that LSL does provide support for some of the functionality that students were asked to implement in their assignments. For example, Second Life does have a rudimentary and programmable physics engine. It also has a built in particle system generator. For the assignments associated with these concepts, students were given some latitude in using these automated functions, even though in a traditional offering, students would have to build this functionality from scratch. This emphasizes the distinction between building tools for animation and using such tools. Though the goal for the class was for teaching tool building, the scripting language was designed for tool using.

With all this said, although many students found working with the LSL as challenging, it often led to interesting and unique ways of thinking about problems and developing solutions. Having to work within and around the constraints of the LSL language proved to be an exercise in creative problem solving. Though not an intended outcome of the course, it is certainly a welcome one.

## 6. CONCLUSIONS

In this paper we described an experimental offering of a computer science course focusing on the algorithms of a computer animation course. With respect to the goals of the experiment, we did find Second Life to be good platform on which to run a distance course related to graphics and animation. We found that the novelty of the Second Life system and the 3D world kept students engaged. Real time demonstrations were very effective for explaining animation concepts and the interactive demonstration of student assignments was beneficial for both student and instructor alike. It would be interesting to explore how the use of Second Life compares with other on-line methods of synchronous course delivery such as videoconferencing, or tools like Adobe Connect.

The use of the Linden Scripting language for assignments allowed for interactive grading sessions, however, the functionality provided by the language was found to be somewhat limiting given the nature of the course assignments. If we were to run this course again in Second Life, either the assignments would have to be redefined or another method of assignment implementation would have to be employed. One possible option would be to build in a lower level, frame-based interface, into Second Life's open source viewer, SnowGlobe.<sup>17</sup> This approach would have the advantage of maintaining the interactive grading sessions while expanding the capabilities of the scripting language.

We are quite encouraged by the student response to Second Life received during this experimental offering. We plan on offering future graphics courses in Second Life including an introductory computer graphics course in the winter of 2009-2010.

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## References

1 Jennings, Nancy and Collins, Chris."Virtual or Virtually U: Educational Institutions in Second Life." *International Journal of Social Sciences* 2 (2007): 180-187.

2 Anonymous. "About The NMC." *New Media Consortium*. http://www.nmc.org/about (accessed July 8, 2010).

3 Kay, Jo and FitzGerald, Sean. "Second Life in Education: Exploring the Educational Uses of Second Life." http://wiki. jokaydia.com/page/Edu\_SL (accessed July 8, 2010).

4 Ritzema, Tim and Harris, Billy. "The Use of Second Life for Distance Education." *J. Comput. Small Coll.* 23 (June 2008): 110-116.

5 Pan, Z., Zhu, J., Hu, W., Pak Lun, H., and Zhou, X. "Inter-

active learning of CG in networked virtual environments." *Computer Graphics* 29 (Apr. 2005): 273-281.

6 Logo Foundation. "What is Logo?" http://el.media.mit. edu/logo-Foundation/logo/index.html (accessed July 7, 2010).

7 Bergin, J., Stehlik, M., Roberts, J., and Pattis, R. "Karel++: A Gentle Introduction to the Art of Object Oriented Program¬ming." Wiley, 1997.

8 Alice: An Educational Software that Teaches Students Computer Programming in a 3D Environment. http://www.alice. org (accessed July 7, 2010).

9 Rodger, S.H. "Introducing Computer Science Through Animation and Virtual Worlds." *Proceedings of the 33rd SIGCSE Technical Symposium on Computer Science Education* (2002): 186-190.

10 Phelps, A. M., Bierre, K. J., and Parks, D. M. "MUPPETS: multi-user programming pedagogy for enhancing traditional study." *Proceedings of the 4th Conference on Information Technology Curriculum* (New York: ACM (2003): 100-105.

11 El-Nasr, M. S. and Smith, B. K. "Learning Through Game Modding." *Comput. Entertain.* 4, 1 (2006): 7.

12 Parent, Rick. Computer Animation: Algorithm and Techniques, 2nd Edition. San Francisco: Morgan-Kauffmann, 2007.

13 Moore, Dana, Thome, Michael, and Haigh, Dr. Karen. *Scripting Your World: The Official Guide to Second Life Scripting*, John Wiley & Sons, 2008.

14 Linden Lab. "LSL Portal – Second Life Wiki." Second Life Web site. http://wiki.secondlife.com/wiki/LSL\_Portal (accessed July 8, 2010).

15 Caption First. "netCaption Demonstration," Caption First Web Site. http://www.streamtext.net/text.aspx?event=Netcaption Demonstration&chat=false (accessed November 28, 2009).

16 Reynolds, C. W. "Flocks, herds and schools: A distributed behavioral model." *Proceedings of the 14th Annual Conference on* 

*Computer Graphics and Interactive Techniques* Ed. M. C. Stone. SIGGRAPH '87. New York: ACM, 1987, 25-34.

17 Linden Lab, "Snowglobe – Second Life Wiki". Second Life Web Site, http://wiki.secondlife.com/wiki/Snowglobe (accessed July 8, 2010).

# The Use of Virtual Worlds Among People with Disabilities

by

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## Abstract

With their emphasis on 3D graphics and complex interface controls, it would appear that virtual worlds have little to offer people with disabilities. On the contrary, multi-user virtual environments, such as Linden Lab's Second Life platform, serve as a form of augmented reality where users transcend physiological or cognitive challenges to great social and therapeutic benefit. A number of intriguing developments exist within the accessibility sector that make barrier-free access an important aspect of the interaction experience. Examples include haptic input devices for the blind, virtual regions developed according to Universal Design principles, communities dedicated to people with cognitive disorders, the use of the avatar as counselor, and customizable personae that either transcend or represent a disabled person's self-identity. This paper investigates research methods and case studies affiliated with virtual environments, as well as the ways inclusive design removes barriers to access for users with disabilities.

We need to confront the life-killing stereotype that says we're all about suffering. We need to bear witness to our pleasures.<sup>1</sup> – Harriet McBryde Johnson

## Introduction

Virtual worlds are sometimes considered an extrapolation of serious games – a software or hardware player application developed with gaming technology or design principles, intended for use beyond pure entertainment. These programs have been developed and deployed for such purposes as education, marketing, advertisement, workplace training, or health awareness. The main difference between a game and a virtual world is in the objective: game players expect to be confronted with obstacles that are intentionally built into the software, while users of virtual worlds seek to engage and navigate their way through an environment conducive to achieving user-centered goals.

Second Life, a platform created by Linden Lab, is the virtual world that attracts the most attention and name recognition. There are other applications that boast greater numbers of simultaneous users, such as Blizzard's World of Warcraft, which focus more on gameplay than social interaction, as well as multi-user virtual environments that provide tools for peer-to-peer collaboration.

From a standpoint of pure accessibility, it would appear that gaming interfaces and virtual worlds have little to offer people with disabilities. The experience is largely visual in nature, with user interfaces requiring extensive hand/eye coordination to precisely control an avatar's movements. Some applications use non-persistent sound and fading messages to deliver information. For users who are unaccustomed to this level of multitasking, the resulting cognitive load can be topically severe.

A surprising context has emerged from a sometimes over-

looked group of users, however, with a new form of social literacy beginning to take shape. People with a wide range of disabilities – visual impairments, motor skill disorders, degenerative illness, limited mobility, and cognitive difficulties – comprise an ecosystem of individuals for whom these attributes cannot readily be changed. Upon considering the needs of those facing physical, mental or cognitive challenges, what comes to mind by definition is any combination of real or perceived difficulties that may have a limiting effect on people's lives. Inclusive design is the making of allowances for those characteristics that a person cannot readily change; it is in this space where virtual worlds present opportunities for social and therapeutic benefit.

The intention of this study, then, is to serve as a general review and exploration for how people with disabilities seek support, fellowship and engagement through the use of avatardriven 3D environments. Whether by serving as a proxy for a real life context or acting as the conduit to a new social ecosystem, participation in virtual worlds for these users serves as more than a game. Virtual worlds operate as a form of augmented reality, one where it's possible to transform a user's physiological or cognitive challenges into something extraordinary.

## **Types of Virtual World Users**

To fully understand virtual worlds, it's important to recognize how people use gaming software. Users can fall into any of three categories: augmentationists, immersionists, or experimentalists.<sup>2</sup> All have applications of relevance to people with disabilities.

Augmentationists view the virtual world as a means to enhance their real life existence. They use their avatars as extensions of their identities and are more willing to disclose their real life identities to others in-world. Many who conduct business on-line, such as attorneys who practice aspects of virtual law, feel comfortable representing themselves with an avatar which closely resembles their real life appearance.<sup>3</sup> A practical example of an augmentationist would be someone with a physiological disability who chooses to represent him- or herself as authentically as possible. This user will go so far as to outfit his or her avatar with a wheelchair, dark glasses, a guide dog, or other visual attributes signifying a disability.

First-time users tend to start off as pure augmentationists, but they do not remain that way for long.<sup>4</sup> Within a short time, it's possible for a person to become proficient at making choices regarding her or his avatar's appearance and functionality. Some users with disabilities will take advantage of this feature by making the experience easier to navigate. For example, a visually-impaired resident of Second Life may dress her avatar in light colors to make her location on the screen easier to track.

It is at this point that augmentationists become immersionists – people who view virtual worlds as an alternative parallel to their real life existence. These types of users generally keep their real life identities separate from that of their avatars with the intention that the two streams never cross paths. An example of an immersionist might be someone with Asperger's syndrome who exploits the anonymity of virtual worlds to practice social interaction skills.

Some avatars employ drastic means to differentiate their virtual experience from real life. Rather than depict themselves as "broken" with wheelchairs and canes, they choose to discard any attributes common to disability. For people with disabilities that prevent them from engaging such physical activities as walking, running, surfing and dancing, virtual worlds present a unique opportunity for users to take part in these experiences. Interestingly, these case studies have been cited as evidence that augmented rehabilitation therapy helps patients struggling with the loss of a limb. Research demonstrates that the brain's perception to pain can be reduced when it is "tricked" into operating a replicative appendage.<sup>5</sup>

A third group of virtual world users are the experimentalists, who use virtual worlds as a controlled laboratory to conduct training or educational sessions. Experimentalists may take the form of trainers or counselors working with patients dealing with substance abuse, or perhaps someone who seeks to gain empathy by undergoing a simulated experience. The Sacramento Mental Health Center in Second Life provides a virtual replica of their real-world facility, including an authentic representation of a schizophrenic episode. With visual hallucinations and subliminal voices providing an accurate depiction, the site provides visitors an opportunity to experience what someone with schizophrenia may go through.<sup>6</sup>

Virtual therapy is another example of an experimentalist. New Ways is a private practice located in the Sunshine Therapy Garden in Second Life's Hauwai region, sponsored by the Netherlands emotional support organization Sensoor.



*New Ways is a private practice, located in Second Life, that provides free counseling sessions with a virtual therapist.* 

Residents arrive during regularly scheduled hours and discuss with trained volunteers in-world and real life problems.

Although roleplay is prevalent among users of Second Life, some residents do treat their "sessions" as authentic therapy to discuss issues of loneliness, depression or other problems.<sup>7</sup>

There is some evidence that talking to an anonymous counselor via instant messaging helps people to speak more freely than they would during a face-to-face session.<sup>8</sup>

## Universal Design in Virtual Worlds

August 2008 marked the launch of Virtual Ability Island, an environment in Second Life created by the Alliance Library System (ALS) and Virtual Ability, Inc. (VAI). Funded by a grant from the National Library of Medicine, the island provides a place for residents to explore topics related to disability and general wellness.<sup>9</sup>



*The welcome area of the Virtual Ability Island offers flat, wide pathways for avatars in wheelchairs.* 

Virtual Ability Island was designed visually and experien-

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tially in accordance with Universal Design principles. Widely scaled ramps make movement easier for avatars in wheelchairs, bright high-contrast signs are angled to be more easily read by users with visual impairments, and smoothly landscaped walkways ease motor skill fatigue. This makes it easier for first-time users who may have difficulty navigating virtual worlds with a mouse and keyboard. For people who rely on voice recognition software or alternative input devices, objects on the screen can be more precisely controlled.

Creating specification guidelines with Universal Design principles in mind has several benefits. Anything that can make the screen easier to read or the cursor easier to move improves the overall user experience. Game interfaces are frequently designed to accommodate a high level of customization, and accessibility is a component of that architecture.<sup>10</sup>

It's also important to consider the various ways users of virtual worlds approach their respective disability. People who have had an impairment since birth consider it a part of how they perceive themselves, and some prefer to have their avatar appear that way. This augmentationist approach is attractive to those who feel that the appearance of accessibility — such as an avatar depicted with a wheelchair or guide dog — is a critical factor of how people view their disability as an integral part of their identity.

Simon Stevens, owner of a well-known disability consultancy in Coventry, UK, and a Second Life avatar named Simon Walsh, chooses to present himself in-world with a wheelchair. "I don't know how to be non-disabled and I've never wanted to be," he told the Times On-line in March 2008. "It's important that people know; it's part of who I am, plus I'm a disability consultant in Second Life, too, so I've got to look the part."<sup>11</sup> In such cases, the appearance of accessibility is simply a matter of self-respect that is extended to how people interact with their

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environment. For example, a virtual ramp that is too steep may draw criticism from residents who question whether such a ramp would accommodate wheelchair use in real life.

Vivian Sobchack, media theorist and film critic, once wrote that "even the most ordinary images find their value, their substance, their impetus, in the agency and investments of our flesh." She was speaking about decorporealization - that point in which a media object, such as a photograph, depicts a persona that is at once representative and interchangeable with our identity of self. The more closely a user can identify with her avatar, the more likely she can transport herself to a context of extraordinary proportion.<sup>12</sup>



*View of the ramps leading to Helen Keller Day in Second Life.* 

Creating a virtual world with Universal Design principles in mind serves as a visual reminder to help users better understand the needs of the disabled. The appearance of accessibility in a physical space, either in a virtual world or in real life, will make a person more likely to use the service and not balk from it. Inclusive behaviors leverage the uniqueness of different viewpoints to cultivate empathy, thus undermining the concept that people with disabilities are societal outsiders.

Universally Designed virtual worlds strengthen the sense of community among both disabled and non-disabled participants. Many users remark "I always wanted a group to understand me," projecting an idealized view that suddenly becomes manifest upon entering in-world. Users with disabilities have the same expectations for accessibility, no matter in what context it appears – digital or physical – and the success of any facility is largely subject to meeting these benchmarks.

# Human-Computer Interaction in Virtual Worlds — Interfaces for the Deaf and Blind

In a 2001 paper, Marc Prensky introduced the concept of digital immigrants and digital natives to better identify new methodologies in education. According to Prensky, there exists a demarcation between present and past generations with respect to their fluency and familiarity with ubiquitous computing. Prensky's paper describes those who have grown up with the Internet, email and multiplayer games to comprise the group called "natives," while others (the "immigrants") must constantly adapt their mental model to compensate.<sup>13</sup> The underlying concept is that digital natives are inherently more comfortable using complex game interfaces and tend to build their social fabric using on-line means.<sup>14</sup>

Inspired by Pensky's ideas, a professional games programmer and research fellow at the University of Sussex named Gareth White devised the term digital outcasts – users who are left behind due to technology that rapidly advances but remains inaccessible.<sup>15</sup> Although Prensky's original concept is open to interpretation, there is statistical evidence of White's postulation. Recent surveys indicate that more than a fifth of casual gamers have a disability,<sup>16</sup> while gaming hardware has not maintained pace with the need to accommodate users with disabilities. Few games support the use of input devices that make affordances for the blind, since this user group is not primarily considered during the game development lifecycle. However, with thousands of dollars spent in the US alone on alternative means of input for the blind, the need for accommodation has gained mainstream visibility within the gaming community.<sup>17</sup>

As part of a study at the University of Sussex, White conducted a series of interviews among blind and visually impaired individuals to identify how they navigate and orient themselves within virtual spaces. The study revealed significant barriers to entry in Second Life, particularly in areas where information was presented graphically rather than with textual equivalents. Many interviewed participants suggested tagging objects with metadata that could be interpretable by screen-readers. Although Linden Lab has released text-to-speech functionality as part of their source code, only a few interface elements provide this interoperability by default.<sup>18</sup>

White's investigations include the development of a haptic interface system, extensible to Second Life, that maps keyboard movements through a Logitech Wingman Strike Force 3D joystick. A haptic interface is a digital input that utilizes a user's sense of touch through a network of embedded sensory perceptors. A few such devices have already entered the consumer marketplace. One example is the Novint Falcon, a 3D touch joystick intended for the consumer market attached to the main body via three motorized arms on hinges. The devices offers players the ability to "hold" or "pick up" in-world objects, with an effect realistic enough to simulate weight and texture, and its use has been investigated as a possible alternative to the keyboard.<sup>19</sup>

These developments have cultivated some exciting research in the ways people with disabilities adapt to 3D graphic environ-
ments, especially for users with low vision who rely on Braille displays and speech-recognition software. Members of an Italian research team have been working with the Second Life source code to create two avatar controls called Blind Walk and Blind Vision, which sense vibrations from objects through a sonar probe. Orientation, proximity and collision benchmarks have been tested with blindfolded users.<sup>20</sup> The use of sound, both synthetic and natural, has also increased the fidelity of 3D spatialization within immersive environments. In 2007 a group of IBM students joined with the National Council for the Blind of Ireland to create a prototype for Active Worlds, an on-line virtual environment similar to Second Life. Making use of 3D audio space, the team developed a suite of tools to help users navigate the world via sound. Text-to-speech functionality reads back any dialog that appears in a text field, and residents are provided audible clues to alert them of nearby objects or approaching avatars.21

You are in Dreamworld North (240,138,22) You don't see anyone around. You don't see any objects around. You are flying. You are in Dreamworld North (240,138,22) noving 5 m towards north I don't understand the verb hello. Type "help" for help. You don't see anyone around. You stopped flying. moving 5 m towards east Chuky Miles whispers, ".)". Chuky Miles whispers, "iliana send me one too". LadyWolf Pawpad whispers, "WOW". Nicky Affa whispers, "roxie can you message me?SL wont let me message u". jade Audeburgh whispers, "yes can i have one too pls" Donatien Goldshark whispers, "can somone delet me off flashback group please". Illianna Pearl whispers, "I dont know where u r". Illianna Pearl whispers, "I dont know where u are". Syko Gothly whispers, "that would be nice for the 95 cars". LadyWolf Pawpad whispers, "me too LOL" Submit

# *TextSL provides a way for blind users to access Second Life using the JAWS screen-reader.*

Virtual world users with hearing impairments may one day

benefit from an IBM platform called SiSi (Say It Sign It), which translates spoken or written words into British Sign Language. SiSi uses speech recognition technology to animate an avatar in real time during chats, speeches and digital broadcasts. The Royal National Institute for Deaf People has endorsed the use of SiSi, and there are plans to integrate translation features into future iterations.<sup>22</sup>

For people who rely on screen-reading software, there are a number of interesting developments currently in execution. An application called TextSL provides the ability to interact with Second Life using the JAWS screen-reader.<sup>23</sup> Information about environments and other avatars is read back to the user in textual format, with additional context in the form of "whispers" and "shouts" to provide greater fidelity to the experience. Also operating in text format is a Web-based ARIA called Virtual Worlds User Interface for the Blind, introduced by a division of IBM called alphaWorks. VWUIB interprets semantic data as text assigned to an avatar's surroundings, served from a centralized repository of attributes populated from the contributions of sighted users.<sup>24</sup>

In the summer of 2009, a coalition of four groups called Virtual Helping Hands (VHH) announced the release of "Max," a virtual guide dog for users of Second Life.

Like a real guide dog, Max helps visually impaired users avoid colliding with objects and other avatars, assists with navigation, reads signs and interprets chat information all by translating metadata using text to speech technology. Employing a keyboard-controlled interface, the prototype gives an avatar owner constant feedback on the immediate surroundings, facilitating not only navigation but also orientation and proximity to items of interest.<sup>25</sup>



"Max" is a virtual guide dog that allows blind Second Life users to navigate environments, objects and other avatars using text-to-speech technology.

Developments such as Max, which are reliant on textual information, bring to mind the importance of textual interoperability across virtual environments (not unlike the assigning of ALT text to Web images). Care must also be taken to ensure that blind users are not deluged with an overabundance of granular details for each object in an environment. Sighted users have the ability to selectively filter visual information, thus employing a degree of cognitive judgment that machines may lack.<sup>26</sup> Designers of virtual environments understand that great digital experiences dissolve into behavior using interfaces that communicate information effectively, without disrupting the natural flow of user interaction.<sup>27</sup>

### People With Cognitive Disabilities

Virtual worlds have found an enthusiastic audience among

people who have difficulty processing memory, experience mild to severe interaction anxiety, have limited attention spans and cannot effectively control their emotions. Through text chatting, avatar gestures or speech-to-text features, users are able to practice a variety of social interactions in virtual worlds. They can take part in a conversation, exercise common etiquette or work on overcoming social awkwardness through an immersionist identity. Perhaps more importantly, people also have the opportunity to meet and discuss their experiences with others.

The Autism Society of America island in Second Life houses an information library, a meeting room, videos, a bulletin board, student artwork and scheduled events. Participation includes group discussions for parents and guardians who are raising a child diagnosed with an autism spectrum disorder (ASD), a term used to define a number of developmental conditions which affect a child's ability to communicate and interact with others. In this instance, the line between immersionists and augmentationists becomes increasingly blurred; this can have a beneficial effect on some virtual world users. One therapist mentions that Second Life provides a safe environment for people with ASD to build the confidence necessary to venture into the real world to test newly-discovered social skills.<sup>28</sup>

Asperger's is a condition that affects people who have highlyfunctional learning skills, but who can sometimes experience difficulty in activities where social interaction is required. Emotional subtleties and body language clues, which other people take for granted in common everyday usage, are sometimes misinterpreted or go completely unnoticed by a person with Aperger's.<sup>29</sup> Researchers from the Center for Brain Health at the University of Texas have conducted brain-imaging and neurocognitive tests on people with Asperger's before and after virtual therapy sessions. Subjects tested after participation demonstrated improvements in social interaction, were less likely to make

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inappropriate comments and gained confidence making connections.<sup>30</sup> Since many with Asperger's do not like to make eye contact with others, they can socialize as immersionists without undergoing the stress of a physical meeting.<sup>31</sup>

One of the risks of using virtual worlds is that people with cognitive disabilities sometimes cannot distinguish between the realms of practice and action. There are sexual and economic aspects to Second Life, for example, that can be dangerous when patients lack the ability to comprehend appropriateness in different situations. Immersionists tend to hide their real-life identities and thus present challenges to trust their intentions. This presents a duality of purpose among users: on the one hand, people can socialize free of risk. On the other, people with devious intentions have the opportunity to exercise a dearth of morality in ways they wouldn't otherwise attempt.

Immersionist users of virtual worlds often cite the buffer of anonymity that protects their identity safely behind the fictitious persona of an avatar. Perhaps it is this buffer that helps people be more honest when speaking to others, or that allows them to open up during a virtual therapy session. Being assured of one's anonymity may cultivate the trust necessary to freely discuss one's troubles and wishes. It is also interesting to note that the difficulties one has in-world often manifest from those in real life, as behavioral traits tend to transfer from one paradigm to the other.

A common thread among those interviewed for this paper was the importance of removing the misconceptions many people have about autism. One parent mentioned that the symptoms and severity of ASD can vary greatly from person to person, and that ASD is often diagnosed as attention-deficit hyperactivity disorder (ADHD). Also of note are the degree to which ASD can affect one's life and resulting outlook. One parent described the struggles her autistic son had with dyslexia, dysgraphia, dyscalculia and femoral anteversion, while another avatar insisted "I am on spectrum, and I like my way of thinking. I think society is what needs to change." Virtual worlds operate as both a community builder and an educational platform, with participants responding to the presence of ASD in deeply personal ways.

#### Finding Community in Virtual Worlds Through Group Activities

There are an increasing number of people suffering from physical injuries who have successfully used virtual worlds as part of rehabilitation therapy, and some credit this technology with helping them reclaim their lives. As discussed earlier, experimentalist researchers are beginning to appreciate the impact that virtual worlds have in helping patients adapt to disability or disease through collaborative sessions. Participants in these group activities then operate as augmentionalists or immersionists, depending on how they chose to self-identify within the virtual world.

Wheelies is a virtual nightclub frequented by people with many forms of disability. Sign-language displays and wheelchairfriendly dances provide a sense of inclusion. Avatars can visit the Accessible Builds demonstration site and preview such items as handicap-friendly avatar housing and life-size board games. GimpGirl provides a valuable resource for women with disabilities as a forum for advocacy and companionship. Among the activities at GimpGirl's Second Life environment are social events, art happenings and outreach sessions. The members of GimpGirl frequently present in public, both in-world and in real life, on topics related to women living with disabilities.

Through the sponsorship of a Boston day-care program called Evergreen, nine adults with cerebral palsy share ownership of a Second Life avatar named Wilde Cunningham. The group members, ranging from 30 to 70 years of age, take turns controlling Wilde as they navigate their in-world lives in parallel. Observers have reported an improvement in the group's confidence after six months of participation,<sup>32</sup> which opens up potential exploration for how the use of virtual worlds transform one's physical existence to something less inhibited and more personally fulfilling. While it is possible that changes in these persons' behavior cannot be solely attributed to their use of Second Life, it does warrant consideration whether such outcomes could have been achieved as quickly without its involvement.

Virtual worlds can play a large part in the recovery process because they provide a forum for meaningful involvement. In real life, people with disabilities sometimes feel isolated and stigmatized by others; there is always a feeling that they are nothing more than a source of aggravation to their families or caregivers, even though they may be highly functional and appreciative within their respective communities. With the degree of autonomy afforded by virtual worlds, users have the opportunity to overcome self-perceptions that may limit their capability.

These scenarios are particularly applicable to those who seek fellowship as a form of recovery. Rehabilitative virtual communities tend to work best when avatar "patients" are permitted to make mistakes, and in such cases the line between augmentationism and immersionism again becomes diffuse. Some users objectify their avatars as a means of distancing themselves, which in some cases can weaken therapies applied in real life; this is an example of how an immersionist approach can have an undesirable consequence.

However, there is equal evidence that viewing oneself rationally and objectively is critical to self-growth,<sup>33</sup> and this is translatable beyond cases of strictly physiological or cognitive disability. For example, one can find an alcohol rehab center in Atlanta fully replicated within Second Life, where the inworld environment and therapists' avatars strongly resemble those in real life. David E. Stone, the center's Chief Technology Officer, has mentioned how this augmentationist tactic serves to enhance dialog among participants; the "on-line disinhibition" allows frustrations to be conveyed more honestly in the digital space and helps patients respond to therapy with greater impact.<sup>34</sup> Virtual worlds thus serve as a point of refuge within which users undergo a self-discovery process, not unlike how people with physiological disabilities choose to represent themselves in-world. The emotional investment of creating an avatar and interacting with other users forms the "buy-in" necessary for some people to more willingly adhere to therapy.

#### **Future Developments**

Virtual world technologies are being increasingly used in business and educational contexts for planning meetings and presentations, which brings to mind issues of accessibility. Virtual worlds are considered a new paradigm in which to operate, and many advocates are just now coming to grips with the challenges and possibilities available to users with disabilities. It is encouraging to see Linden Lab release the source for its client application of Second Life under a GPL license, which allows anyone to extend or modify the code and explore further possibilities with the technology.

With greater interoperability between avatars and platforms, one could argue that virtual environments should be governed by the same design principles as other media. There may come a day when virtual worlds follow the Web Content Accessibility Guidelines (WCAG 2.0) of the W3C, just like text-based websites and other on-line properties. The Dublin Core Metadata Initiative is one possible avenue towards a metadata standard applicable to virtual environments, as are efforts to standardize protocol through the Virtual World Region Agent Protocol (VWRAP) initiative. Also encouraging is the recent support of HTTP-in methods for accessing Second Life objects.<sup>38</sup> As more external services are enabled to transmit and receive data in-world, scripted objects can be more universally and easily interpreted by adaptive devices that rely on text inputs.

### Conclusion

In an article published in the Spring 2009 issue of *Access: The Inclusive Design Journal*, Diane Carr reported on the reaction of the Deaf community when Second Life added a feature enabling verbal interaction via microphone input. The assumption was that voice would now become the "normal" way to converse in-world. Thus was created a controversy between deaf protesters objecting to voice functionality and non-disabled users, who viewed the protesters as "martyrs" requiring "special measures" to cope in Second Life.<sup>39</sup>

Such discussions reinforce the importance of considering the social and cultural factors of accessibility. The difference between virtual worlds and other computer programs is the degree to which users identify with their profile, as well as how fiercely they connect and defend their respective communities of practice. Often these aspects of behavior transcend from the offline world to the virtual. As Carr writes, "We need to consider the expectations and assumptions about disability – or any other aspect of identity – that are carried into virtual worlds from our everyday lives."<sup>40</sup>

While technological innovations are exciting and certainly important, it's necessary to keep in mind the benefit that barrierfree virtual environments provides. There is therapeutic value in distraction and the role it plays as a form of pain management. People with disabilities have the opportunity to escape their bodies, if they so choose, or to celebrate their unique gifts among peers. The art historian Amelia Jones once described a notion of the body as "transcending ... through pure thought—or, more recently, via free-floating Internet subjectivities ... heighten(ing) the tension between subject and object; (putting) into play the new relations of signification produced by the emergence of digital representation."<sup>41</sup>

On returning to the definitions of disability and inclusive design, virtual worlds operate as a new form of self-awareness. Both immersionists and augmentationists seek to transcend limitations through avatar identities, and experimentalists support the environment structure that enables further exploration. Increased attention addressed to the overall accessibility of user interfaces, gaming hardware and screen/sound environments would bring greater benefit (and perhaps more widespread use) among a deserving and appreciative audience.

People unfamiliar with virtual worlds, who have only read about their use through hyperbolic media reports detailing the less savory aspects of Second Life, may ridicule participants for preferring to live in a world of fantasy rather than reality. It should be considered that fantasy is, in and of itself, a Universally Designed entity because it applies to disabled and nondisabled people alike. Everyone dreams about what they cannot do, whether it is the ability to fly in space, wake up in the morning free of pain, or have a conversation with someone other than a home care nurse. The idea of fantasy is as ubiquitous as the technology that supports the pollination of such virtual identities as Facebook profiles, Twitter feeds, blog authorships, YouTube celebrities and Flickr photo albums. Avatars existing in virtual environments are merely another extension for one's manifestation of the self.

For people with disabilities, virtual worlds operate in sym-

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biosis with real life to meld digital and analog realms into one holistic experience. It is an area where the body meets the mind in mutual acceptance, and where digital identities may commingle towards a common purpose or simply exist in solitary activity. The technology is merely an enabler of real world behaviors relieved of actual or self-perceived limitations; people may enter the virtual realm out of curiosity, but they remain for the engagement. It could be interpreted that the computer operates as part of a person's body or mind, and one is reminded of a prediction made in the mid-1990's by the writer Nicholas Negroponte: "Computing is not about computers any more. It is about living."<sup>42</sup>

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#### References

1 Johnson, Harriet McBryde. *Too Late to Die Young: Nearly True Tales from a Life*. New York: Picador, 2006, p. 253.

2 Duranske, Benjamin Tyson. *Virtual Law*. Chicago: ABA Publishing, 2008, p. 20-23.

3 Ibid.

4 Ibid.

5 Ramachandran, Vilayanur S. "On my mind," *Seed* (2006). http://www.seedmagazine.com/news/2006/10/on\_my\_mind\_vs\_ ramachandran.php. Accessed 10 January 2009.

6 Deeley, Laura. "Is This Real Life, Is This Just Fantasy?" *The Times* on-line (2008). http://women.timeson-line.co.uk/tol/life\_

and\_style/women/body\_and\_soul/article1557980.ece. Accessed 30 December 2008.

7 'Sensoor' emotional support. http://sunshinetherapygarden.com/index\_files/. Accessed 10 February 2009.

8 Mollman, Steve. "Avatars In Rehab: Getting Therapy In Virtual Worlds." CNN.com (2008). http://www.cnn.com/2008/ TECH/07/16/db.secondlifetherapy/index.html. Accessed 12 July 2008.

9 Legrand, Roland. "Virtual Ability Island: Introducing People In SL In A Gentle Way." *Mixed Realities* (2008). Accessed from http://www.mixedrealities.com/?p=352. Accessed 16 August 2008

10 Dyck, J., Pinelle, D., Brown, B., and Gutwin, C. "Learning From Games: HCI Design Innovations In Entertainment Software." (2003). http://hci.usask.ca/publications/2003/games-gi03. pdf. Accessed 24 April 2008.

11 Deeley. "Is This Real Life, Is This Just Fantasy?" *The Times* on-line (2008). http://women.timeson-line.co.uk/tol/life\_and\_style/women/body\_and\_soul/article1557980.ece. Accessed 30 December 2008.

12 Jones, Amelia. "Decorporealization." *Sensorium: Embodied Experience, Technology, and Contemporary Art*, ed. Caroline A. Jones. Cambridge: MIT Press. 2006, p. 133.

13 Prensky, Marc. "Digital natives, digital immigrants." (2001). http://www.marcprensky.com/writing/Prensky%20-%20 Digital%20Natives,%20Digital%20Immigrants%20-%20Part1. pdf. Accessed 20 February 2008.

14 Hinton, Andrew. "Clues to the future." (2006). http:// www.inkblurt.com/2006/01/23/ia-summit-2006-clues-to-thefuture/. Accessed 24 April 2008.

15 White, Gareth. "Haptics." *Second Life for the Visually Impaired* (2008). http://blindsecondlife.blogspot.com/2008/01/ haptics.html. Accessed 7 February 2009.

16 Ingham, Tim. "20% Of Casual Gamers Are Disabled." (2008). http://www.casualgaming.biz/news/27527/20-of-casualgamers-are-disabled. Accessed 7 February 2009.

17 White, G., Fitzpatrick, G., and McAllister, G. "Toward Accessible 3D Virtual Environments For The Blind And Visually Impaired." (2008). http://blindsecondlife.blogspot.com/2008/09/ paper-publication.html. Accessed 3 October 2008.

18 *Ibid*.

19 Ibid.

20 De Pascale, M., Mulatto, S., and Prattichizzo, D. "Bringing Haptics To Second Life." SIRSLab (2008). http://sirslab.dii. unisi.it/research/haptic/projects/second\_life\_haptics/. Accessed 3 October 2008.

21 Adams-Spink, Geoff. "Technique Links Words To Signing." *BBC News* on-line (2007). http://news.bbc.co.uk/2/hi/technology/6993326.stm. Accessed 20 May 2008.

22 Ibid.

23 Ibid.

24 Carter, W. S., and Corona, G. D. "Virtual worlds user interface for the blind." (2008). http://services.alphaworks. ibm.com/virtualworlds/?open&S\_TACT=105AGX59&S\_ CMP=GRsite-lnxw07&ca=dgr-lnxw07awvirtualworlds. Accessed 11 December 2008.

25 Linden, Pathfinder. "Beautiful Visions beyond Sight: Guide Dogs and Helen Keller Day in Second Life." (2009). https://blogs.secondlife.com/community/learninginworld/ blog/2009/06/17/beautiful-visions-beyond-sight-guide-dogsand-helen-keller-day-in-second-life. Accessed 30 June 2009.

26 Carter, W. S., and Corona, G. D. "Exploring Methods Of Accessing Virtual Worlds." (2008). http://www.afb.org/afbpress/ pub.asp?DocID=aw090207. Accessed 17 January 2008

27 Dyck, J., Pinelle, D., Brown, B., and Gutwin, C. "Learning From Games: HCI Design Innovations In Entertainment Software." (2003). http://hci.usask.ca/publications/2003/games-gi03. pdf. Accessed 24 April 2008.

28 Deeley. "Is This Real Life, Is This Just Fantasy?" *The Times* on-line (2008). http://women.timeson-line.co.uk/tol/life\_and\_style/women/body\_and\_soul/article1557980.ece. Accessed 30 December 2008.

29 Brady, Jeff. "How 'Second Life' Therapy Helps Asperger's Patients." *WFAA* on-line, (2008). http://www.wfaa.com/shared-content/dws/wfaa/localnews/news8/stories/wfaa080111\_lj\_brady.11fb5bac.html. Accessed 20 May 2008.

30 Stein, Rob. "Limits, Inhibitions Disappear On-Line," *Seattle Times* on-line, (2007). http://seattletimes.nwsource.com/ html/nationworld/2003931084\_netavatar07.html. Accessed 20 May 2008.

31 Phillips, Ashley. "Asperger's Therapy Hits Second Life." *ABC News* on-line, (2007). Available from http://abcnews. go.com/Technology/OnCall/Story?id=4133184. Accessed 29 December 2008.

32 JMB. "Wilde Cunningham: A Heartwarming Story." *Nobody Important*, (2008). http://nobodyimportant-jmb. blogspot.com/2008/10/wilde-cunningham-heartwarming-story. html. Accessed 29 December 2008.

33 Brady. "How 'Second Life' Therapy Helps Asperger's Patients." *WFAA* on-line, (2008). http://www.wfaa.com/sharedcontent/dws/wfaa/localnews/news8/stories/wfaa080111\_lj\_ brady.11fb5bac.html. Accessed 20 May 2008.

34 Mollman. "Avatars In Rehab: Getting Therapy In Virtual Worlds." CNN.com (2008). http://www.cnn.com/2008/ TECH/07/16/db.secondlifetherapy/index.html. Accessed 12 July 2008.

35 Nino, Tatero. "Second Life Objects To Become HTTP-Aware." massively.com, (2009). Available from http://www. massively.com/2009/07/08/second-life-objects-to-become-httpaware/. Accessed 10 July 2009.

36 Carr, Diane. "Virtually Accessible" *Access: the inclusive design journal*, (2009). Available from http://learningfromso-cialworlds.wordpress.com/9-virtually-accessible/. Accessed 16 February 2009.

37 Ibid.

38 Jones. (2006). Decorporealization. In Sensorium: Embodied Experience, Technology, and Contemporary Art, ed. Caroline A. Jones. Cambridge: MIT Press. 133.

39 Negroponte, Nicholas. *Being Digital*. New York: Vintage Books, 2006, p. 101-102.

# Additional Sources:

Anonymous. "Amputees' phantom limbs return in virtual reality. " CNet UK, (2006). http://crave.cnet.co.uk/gamesgear/0,39029441,49285234,00.htm. Accessed 10 January 2009.

Anonymous. "TextSL: A Second Life Client For Visually Impaired And Blind Users." (2008). http://textsl.org/. Accessed 17 January 2009.

Au, J. W. *The Making of Second Life*. New York: Harper Collins Publishers., 2008, p. 198-199.

Guest, T. *Second Lives: A Journey Through Virtual Worlds*. New York: Random House, 2009, p. 9.

McKinney, S., Horspool, A., Willers, R., Safie, O., Richlin, L. "Using Second Life With Learning-Disabled Students In Higher Education." (2008). http://innovateon-line.info/index. php?view=article&id=573. Accessed 2 January 2009.

Schlender, S.. "Second Life Frees Disabled From Restrictions Of Everyday Life. *VOANews*, (2008). http://www.voanews.com/ english/archive/2008-09/2008-09-17-voa24.cfm?CFID=1026978 88

47&CFTOKEN=84288041&jsessionid=66309a659 e148d02f1c22a3a676523531351. Accessed 16 February 2009. Smith, T. "New Life In Cyberspace." *CBS News* on-line,
(2007). http://cbsnews.com/video/watch/?id=3547970n. Accessed 3 October 2008

Additional Information Regarding The Illustrations:

1 New Ways is a private practice, located in Second Life, that provides free counseling sessions with a virtual therapist.

2 TextSL provides a way for blind users to access Second Life using the JAWS screen-reader.

3 View of the ramps leading to Helen Keller Day in Second Life.

4 "Max" is a virtual guide dog that allows blind Second Life users to navigate environments, objects and other avatars using text-to-speech technology.

5 View of bulletin board in the Autism Society of America's island in Second Life. The ASA hosts in-world meetings and events.

6 View of the Autism Society of America's library in Second Life.

7 Wheelies is a nightclub in Second Life frequented by participants with disabilities, who often depict their avatars with wheelchairs and guide dogs.

8 The welcome area of the Virtual Ability Island offers flat, wide pathways for avatars in wheelchairs.

9 Scene from Second Life's Wheelies island. Many avatars meet here to discuss topics of mutual interest, both in-world and in real life.

Screenshot Images from Second Life Taken by the Author.

# Improving the Student Experience – Student Support in Virtual Environments

by

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#### Abstract

This study investigates how the affordances of a virtual world might contribute to the support of students as they begin their studies and placements in Initial Teacher Training. It also attempts to explore and contribute to a field where there is very little research. The sample group consisted of thirty undergraduate students in a Primary Education course at a university in the UK. The group was chosen because of its manageable size (mature students only were eligible), the fact that they would be working together after enrolment, and the fact that their interest in participating in the study during pre-course induction. The size of the sample group equated to roughly 12 percent of the course cohort. The students were invited to attend meetings in a virtual environment during the summer before enrolment to assist them to prepare for the course, complete pre-course tasks and to meet their peers. The same students were then invited to continue to use the meeting place in Second Life (the chosen virtual environment) during their school placements as a source of support while working away from the university. A series of videoed interviews and questionnaires were used to ascertain

how useful participation in the study had been in terms of preparation for the course and helping group members to settle in to their studies and placements. Rich qualitative data was derived from questionnaires, interviews and scrutiny of discussion transcripts. A key element of the research in this area was to act in partnership with our students to identify mutually beneficial ways of working together in Second Life.

#### **Review Of Literature And Research**

Virtual realities have been in existence now for a number of years; however, there is still relatively little activity taking place in terms of documented research into the affordances of Multi User Virtual Environments (MUVEs) for mentoring and even less concerning induction activities making a rigorous examination of peer reviewed literature an almost impossible feat. As the technology itself is constantly adapting, changing and evolving, the few published materials that do exist become outdated very quickly. Information has been gleaned from a variety of sources including conference proceedings, on-line reports, journals and electronic documents. Blogs from educators in Second Life and the Second Life Educators (SLED) list, a great example of ongoing peer debate, have also been invaluable sources of information and inspiration.

In their own literature review the Second Life Educators in the New Zealand (SLENZ) project team investigate, among other things, the attributes of Second Life that led to its 'flexibility to accommodate diverse learning styles' (SLENZ 2008:20). They conclude that it offers opportunities to engage with a wide range of philosophies expecially including theories of behaviourism, constructivism and cognitivism. They also identify and warn of the need for the use of 'established best practice theories' to underpin teaching and learning in Second Life in exactly the same way that they would in face-to-face and other forms of online learning.

Another of the many conclusions that the SLENZ team identify is that both tutors and students need to be competent users of the software in order to benefit fully from the learning. My own experience leads me to believe that this was not necessarily always the case. Where the main objective of the session/activity was focused on communication, only limited skills were required to achieve a satisfactory outcome. In my own study, all but one of the participants were still very new to the technology and although this caused them a little embarrassment at times (getting stuck on top of a table and not being able to sit down when invited to) they were minor issues that were easily dismissed and in some cases even helped to lighten the mood of the meeting. I would conclude that as in all other forms of learning, the level of skills needed is directly related to the context and intended outcomes of the learning.

A report issued by the Eduserv Foundation (2008) would lead us to believe that three quarters of higher education institutions within the UK are using Second Life in some form. They identify that potential for creativity, collaborative opportunities and the strength of social presence were the most commonly cited positive aspects of the resource. However, they also report that the general feeling was that the foremost issue with the use of the virtual world was the time required to become familiar with the use of the software to participate effectively.

Researchers from the University of Kentucky (Antonacci et al, 2007) name the seven major challenges of the use of Second Life as being 'technical issues, support, faculty development, legal issues, mature content, the steep learning curve and cost'. Lofstrom and Nevgi (2007) found that in addition to technical issues and frustrations, students sometimes experienced loneliness and although tutors liked the MUVE they felt that they needed more

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time to use it effectively. Interestingly, their study also identified the differing perceptions of the amount of learning taking place with tutors believing that more was taking place than the students themselves did. Although his work pre-dates Second Life, Annand (1999) also noted that the costs (training, tutors and IT staffing infrastructure) made universities wary of virtual learning environments in general.

In a more recent publication from the Joint Information Systems Committee (JISC) (2008), de Freitas (2008) attempts to begin the process of mapping how virtual worlds are being used for educational purposes and one of the many conclusions is that there are a huge variety of relevant applications which include mentoring, constructing learning activities, exploratory trails, role play and the rehearsal of skills. Again, the need for collaboration, support and an examination of how to use and adapt sound philosophies that underpin traditional educational practices in this unique environment is made very evident in the work.

Mentoring relationships in one form or another have been established for many hundreds of years. For as long as there have been teachers, there is evidence to suggest that both informal and formal mentoring has taken place on a face to face basis. New computer based technologies have provided learning institutions with alternative means of mentoring student teachers and some universities are readily exploring and using a variety of methods for doing this. The use of communication tools in platforms such as Blackboard, Web CT and Moodle are now fairly commonplace in Higher Education institutions. Some of the disadvantages of such systems are that for the most part, such communications tend to be expensive to buy, support predominantly asynchronous communication (although live chat is supported by Web CT) and can be blighted by technical issues and problems for both tutors and students (UTAS, 2006). Levin and Waugh (1998) investigated how existing technologies could support what they term as 'teleapprenticeships' in the contexts of remote practices (1998:1). Importantly, they were able to identify how new technologies were able to offer the move away from the conventional schooling paradigm.

Although the study of educational opportunities in virtual realities is a relatively new phenomenon, distance education has been a proven, established and valid concept for quite a few decades. An inspection of distance learning and educational use of MUVEs reveal many similar features and lessons to be learned from those that have previously studied this methodology.

Holmberg's (1983) 'Guided Didactic Conversation' theory, although dated, is regarded by many as still being highly relevant (Keegan, nd; Mitchell, 1992). Holmberg examines the use of text based communication between teacher and learner and suggests effective procedures for the effective facilitation of learning. The most influential factor in distance learning was recognised as the feeling of a personal relationship between the student and the teacher. He found that learning motivation was significantly affected by the atmosphere, language and friendly conversation kindled between the two parties (Holmberg 1986, 1995). Scrutiny of the transcripts of meetings from the study reveal that participants were very willing to receive, return and promote exactly this kind of discourse through the duration of the on-line meetings.

Another area that needs to be considered when investigating synchronous forms of investigation is the participants' ability to speed type and follow the conversation in the dialogue stream box. This has understandably been identified as a significant issue in previous studies but Bales (2001:2) found that "students' typing skills and their ability to read the screen and to follow the dialogue over different threads of discussion improve with time." As this particular study was held over a limited number of weeks, it is difficult to say if this was in fact enough time for the participants to improve their own typing skills as well as speed reading the transcripts as they appeared on the screen. The entire group had some basic computer skills (a requirement for the course itself) but only one member of the group had ventured into Second Life before. Salt (2005) describes how Second Life can offer far more than conventional e-learning software through the sense of immediacy, shared experiences and the opportunities for emotional closeness. However, he also warns that although it may empower those who are currently marginalised by society because of their physical attributes, those who have limited IT skills will be penalised instead. As the tutor and mentor, I initiated a lot of the conversations and have to agree that my poor typing skills meant that I was constantly looking at the keyboard resulting in my attention being temporarily taken away from the transcript and therefore literally losing the plot!

To ensure that we are fully prepared for and able to work in these new and constantly changing environments, it is crucial that Higher Education and especially ITT providers begin to explore and disseminate examples of good practice in order to fully exploit exciting opportunities for all those involved in education.

The subtitle of an article written by Macleod (2008:1) investigating the potential for Second Life as a venue for future academic conferences states 'It's cheap, environmentally friendly and not nearly as weird as you might think'. Therein lie some powerful truths that in today's political and financial climate we cannot afford to ignore. Although the author himself does not arrive at any solid conclusions, he is happy to acknowledge that universities are going to suffer from the same financial squeeze as everybody else and that we must look for alternative ways of using technology to continue to support our students as well as our own professional development. Linden Lab (makers of Second Life) inform us that there are about 5,000 educators already involved with Second Life and there are many websites and mailing lists set up to support those who have already spotted the potential for this learning environment. Education UK Island is virtual home to a growing number of UK based Higher Education institutions and conferences are held there on a regular basis. Attendees can go along and converse with colleagues from all over the world from the comfort of their own homes, leaving a carbon free footprint as they go.

# Background

There is evidence to suggest that pre-entry induction is essential to get students off to a good start when they begin university (National Audit Office, 2007).

This study investigated the use of the MUVE 'Second Life' as a successful means of creating an on-line support and mentoring system for a group of trainee teachers before and during their first year of the BA in Primary Education course.

Using a virtual world to host summer school and mentoring type activities has considerable advantages in that the participants do not need to be in the same physical or geographical location and therefore costs could be kept to an absolute minimum. Those who are able to use the software (including the relevant members of the university staff) can do so from the comfort of their own homes and access the virtual world for meetings at times that are conducive to their own personal lifestyle.

It was hoped that students involved in the study would start to identify with their peers as well as members of the wider team at university to make the initial bonds essential to eliminate feelings of isolation at the beginning of their chosen course and also while away from university on placement. Specific activities

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were planned into the sessions to foster a sense of community and collegiality. It was also anticipated that students who had any specific needs or worries could receive reassurance and begin to have these issues addressed as quickly as possible. General and non-personal information gleaned from the on-line sessions was also of value to course leaders when planning face-to-face sessions throughout the academic year.

The affordances of both the chosen software and the designated meeting place could be considered to be key to the outcomes of the study. Gibson (1977, 1979) introduced the term 'affordances', defining the concept as 'action possibilities' directly related to the environment. This terminology was then appropriated by Norman (1988) whose use of the word 'affordance' was perhaps more relational. In her examination of 'What does electronic conferencing afford distance education?', Barnes (2000) concluded that through the concept of affordance it is shown that both benefits and limitations for interaction exist for real and virtual meetings.

Detailed guidance on how to access the software and create an avatar was given to the sample group at a pre-induction day. Those who chose to participate did so completely voluntarily and were advised that they could attend any or all of the arranged meetings as they pleased.

Second Life was the chosen MUVE for this study as it offers many of the features required to meet the needs of the participants of the study in terms of availability, support and cost (the software required is free of charge). Although there are a range of alternative virtual worlds for exploration, Second Life stands out amongst the others because of its visually dynamic and stimulating interface. Importantly, its design is such that it promotes collaborative activity and this is perhaps why it seems to be of great interest to teachers and educators. The use of the 'avatar' as a representative of the learner negates opportunities for age, race

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and gender discrimination and opens the doors for creativity and freedom of expression through physical appearance. Interestingly, a recent survey by the New Media Consortium (2008) found that far more users chose to make their avatars resemble themselves in real life (45%) than to make them look quite different (26%).

For the purposes of this project, a virtual office was set up on 'Education Island UK' which is an area in Second Life that is owned by Leeds University. We were given permission to use the office space and to decorate it as we pleased.



Education Island UK

The island also offers accommodation to several other universities and educational institutions which makes it an interesting place in its own right. The fact that the island is fairly quiet and mostly inhabited by other students and tutors was another reason for choosing this location.

The office was designed by Alan Hook who was a team

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member. Pictures of the home campus were arranged around the walls and soft furnishings such as bean bag chairs and cushions were provided as seating. Flowers were planted in containers and hot virtual coffee provided on a low level coffee table. The intention was to create a relaxed learning environment that would be user friendly and inviting. Some of the sessions were held on the large green common land that is a shared environment on the island. This allowed for the use of rather large resources that were used in some of the sessions and also meant that students who wished to 'talk' more privately could move away from the group to do so.



Inside the Base Office

During the pre-induction period the students were invited to attend six meetings (each meeting was repeated at an alternative time later in the week for those who could not attend the first or who wanted further information). Each meeting lasted about an 100

hour but was determined by the number of questions or comments made by the students. A schedule for the meetings during the summer months was sent to the students so that they could choose which meetings they wished to attend at times that would be convenient to them. Various tutors, support staff and a newly qualified teacher who had recently completed the course, were asked to join in with sessions to enhance and widen the experience. During placement periods, students were invited to 'dropin' sessions on Thursday evenings.

This case study was based on qualitative enquiry, with data being collected from several sources including chat transcripts, student journals, questionnaires and semi-structured interviews. The size of the sample group precluded the conclusive and accurate use of quantitative research methods, but those qualitative methods chosen were selected to give opportunities for richness and depth in participant responses which would better illustrate individual reaction and opinion against the study objectives. Individual interviews provided openings to drill down and explore personal preferences and barriers to learning.

Transcripts were collected after each of the meetings for analysis. Where students gave interesting or unexpected answers to questions, these were pursued by follow-up questions during individual private interviews in an attempt to fully understand the participant's thinking.

Within Second Life a resource tool called 'The Opinionator' was also utilised.

This is a physical manifestation of the Likert Social graphing tool and was bought from its creator (Entropy Hax IW, 2008) for a small fee. It is made of defined areas that the avatar moves into to indicate a preference and consequentially a pie chart is created in the centre of the model with the number of people and the percentage being displayed.



The Opinionator

This tool was used to gain information from the group relating to a whole range of issues. It was also useful for the participants to see that other members of the group were experiencing similar feelings to their own and thus helped to eliminate feelings of isolation and establish common ground. The Opinionator was also used to decide on more frivolous matters such as where the group should meet up for lunch on the first day of term! Apart from its obvious practical and visual attraction, this tool was also useful in establishing group opinions quickly and effectively. Screen capture software was used to save the results which could then be used for analysis.

# **Key Findings**

The initial student survey revealed that all of the students who were present at the initial pre-induction meeting were interested in the project presentation. Fourteen members of the group had not heard of Second Life before the presentation and only one member had actually accessed the MUVE before the project began.

All of the participants saw value in the project and the response was fairly typical when students were asked if they found the meetings useful.

A significant finding was that just over half of the group had experienced problems accessing Second Life on their home computers and this resulted in many of them being unable to attend meetings on a regular basis (some came along when they had access to a computer that did not belong to them). Only seven members of the group reported that they did not experience any problems. After one of the initial face-to-face teaching sessions with the whole group after enrolment, some students were very anxious to point out that they actually felt 'disadvantaged' because they were unable to join in and felt very anxious that they had missed out on an important opportunity. It would seem that this is a universal issue where similar MUVEs are used (Levin 2008).

Even after the software was successfully downloaded and running, some students experienced a range of technical problems which impeded the flow of the meetings on occasions. 'Flow' is very important to the experience in any virtual environment as it enhances the feeling of immersion. The theory of 'immersion' in relation to virtual reality has been examined by Adams (2004) who separates immersion into three categories (tactical, strategic and narrative) and Björk & Holopainen (2004) who employ similar categories naming them sensory-motoric immersion, cognitive immersion and emotional immersion and then describe three others (spatial, psychological and sensory immersions). Of these definitions most students found that they could identify with feelings of spatial and sensory immersion in the sense that they felt as if they had 'really attended a meeting' and consequently felt a unity of time and space with the virtual environment in which we held the discussions. This was reflected both in the transcripts as well as in interviews.

Milder issues ranged from internet connections dropping out (avatars then appear to fall asleep or disappear altogether) or issues of time 'lag' which meant that some avatars were very slow in appearing or text talk became out of sync.

Personal observation as well as comments from participant interviews show that there is an initial very steep learning curve associated with this kind of software technology. Some colleagues who had kindly volunteered to participate in the study found themselves unable to progress beyond the initial stages as they struggled to manage the technology.

Most of the pre-induction support meetings were well attended although numbers fluctuated depending on the topic of discussion. The placement support visits were not so well populated. Data analysis shows that students did not feel the need for support as much as the year progressed. This was because they were largely supporting themselves through other social networking technologies (Facebook and Twitter) but also because of the nature of the placement (mostly blocks of two-day visits) which meant that students were not away from the university for long periods of time. The largest number of students attended placement support meetings during the first two weeks of placement as they experienced initial concerns or were unsure of their role in the classroom.

Examination of the transcripts and interviews show that the choice of venue worked well for the purposes of the study. A potential disadvantage of the designated meeting place was a lack of privacy. Although care was taken to select what was believed to be an appropriate setting, we could not be sure that the group might attract unwelcome attention from other avatars. Fortunately it proved that these fears were unfounded and although the group were approached by non- group members on a couple of occasions, the avatars left the group of their own accord quite quickly when they realised that a private conversation was being conducted. The fact that nearly all participants chose to wear special group tee shirts acted as an indicator to other avatars that a private meeting was taking place as well as lending a sense of group identity to the wearers. Transcripts and student surveys gave no indication that group members felt inhibited by a lack of privacy. Where participants expressed a need to discuss more private matters they were taken to a non-public area or were encouraged to use alternative forms of communication such as email or telephone.

Examination of the transcripts revealed that group members were extremely welcoming and friendly towards newcomers joining meetings. They were very keen to establish which other students had child care responsibilities or had part-time jobs. When questioned about this trend during individual interviews, trainees agreed that they were looking for common ground on which to establish the new relationship.

The use of 'real' forenames at meetings was important so that group members were able to feel that they were meeting the person behind the avatar and it also meant that when meeting in real life, students could make links to previous conversations in meetings. It was clear that although most students seemed happy and comfortable within the virtual environment, it was important to them to continually establish links with the real world, too.

All of the participating students found that the experiences had given them a shared commonality and it is highly indicative that the MUVE had indeed facilitated feelings of belonging and sense of community. In questionnaires this was described as 'bonding' in some cases. Additionally all of the participants agreed that worries or concerns regarding the course and placements were addressed through the meetings. They also found it

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useful to learn that they were not alone in their fears.

These positive responses are significant in terms of using this MUVE as a tool to continue this work in future.

It was interesting that students identified that the virtual environment encouraged them to ask questions that they might not have done in a face-to-face situation. This is particularly useful if we wish students to address real concerns and worries.

Many of the students had personalised their avatars beyond the given default representations that they had been given on arrival in the virtual environment. The ease in facilitating such changes meant that the students had more ownership of their avatar and could consequentially feel more identification with its embodiment. Some students chose to add items of interest (for example one student had a parrot on his shoulder) which not only attracted attention to themselves but also made it easy for other students to identify them as well as ask initial ice breaking type questions. The fact that students had manipulated their default avatar is also indicative of the fact that they saw the avatar as being a virtual representation of themselves. They 'cared' about how the other students perceived them and this highlights how immersive the experience can be.

# **Conclusions and Recommendations**

This study has illuminated many positive attributes of the MUVE Second Life which facilitated successful student support activity. While the attributes and affordances of virtual meetings are perhaps different from those of face-to-face meetings in real life, they were validated by the participants' perceptions. Further research is recommended to investigate the nature of the differences between the two approaches.

Second Life seems to offer students something over and above other forms of support via Web 2.0 technologies in that

it is more of a holistic experience. Students and tutors felt as though they were attending a 'real' meeting and the many interesting occurrences (students standing on the coffee table or appearing without hair etc...) just added to the atmosphere and sense of fun. This also gave students common experiences to refer to when they did meet face-to-face for the first time after the on-line meetings. Some students referred to the whole experience as being 'an ice breaker' that took the fear factor away from starting both university and placements.

Although some universities have invested large amounts of money in complex designs (some replicating the exact university building) in addition to the buying and renting of land in Second Life, it is entirely possible to hold successful meetings in carefully selected public locations for little or no additional cost at all. Students can actually benefit through interactions with non-participatory avatars in public places (students from other institutions, speakers of other languages, support officers etc...) and the possibilities of interacting with public design features such as interactive gardens, information points and galleries may help to engender a sense of togetherness.

However, the technical issues regarding access to Second Life software cannot be ignored. If students have access to relatively new computers this does not necessarily mean that their hardware will meet the minimum specification requirements. Equal opportunities regarding these issues must be considered and some students could argue that they are being actively disadvantaged by lack of access.

Even when issues regarding access to the platform have been resolved, we still have to consider the steep learning curve that faces participants when they first enter the virtual world of Second Life. For those users who are familiar with games that use avatars or who are particularly confident users of ICTs this might not be a problem, but for many others, perhaps the majority, it is.

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Good support is therefore essential for all participants, including colleagues, in overcoming learning and technical barriers when they first use the software.

The use of 'text talk' meant that transcripts of the meetings could be used as part of the research data but also meant that communication was slowed to the pace of the participants typing abilities. 'Voice' communication technology is now available for use in Second Life and if used with care (so that avatars do not talk 'over' each other) might facilitate better communication as less time would be spent following scripts in order to contribute to group discussion .

Another serious issue that needs to be further addressed is that of student security and university liability. Bugejar (2007) points out we must beware of new technologies that might leave universities and even individual tutors at risk of prosecution. We need to ensure that we advise and prepare all prospective participants for entry into an on-line world that has just as many vices as the real world in which they live. Warnings and disclaimers made by Linden Lab should be taken seriously and best practices should prepare both tutors and students for this new learning environment in the same way that they would be prepared for other unfamiliar environments such as study abroad and voluntary work.

To conclude, the project proved to be successful enough to encourage many of the student participants to ask if they can support those students who will be joining the project in the next academic year. At their suggestion they attended the pre-induction meeting for these new students to introduce themselves and to advise them of the advantages of participation. They have also agreed to support these students as they find their way around the new environment and to be on-line mentors in Second Life. Additionally, these students have recently attended conferences to support tutors who were presenting the results of the project and overcame their understandable nerves to address the conference to talk about their experiences and also assist in workshops on the topic area. Perhaps these actions speak for themselves and are the richest source of data of all.

#### References

Adams, E. "Postmodernism And The Three Types Of Immersion," (2004). http://www.designersnotebook.com/Columns/063\_Postmodernism/063\_postmodernism.htm (HTML). Gamasutra http://en.wikipedia.org/wiki/Gamasutra. http:// designersnotebook.com/Columns/063\_Postmodernism/063\_ postmodernism.htm. Accessed on-line 10.07.09.

Annand, D. "The Problem Of Computer Conferencing For Distance-Based Universities," Open Learning, 14:3. *Journal of Distance Education*, Routledge, 1999. http://dx.doi. org/10.1080/0268051990140307 Accessed on-line 12.10.10.

Antonacci, D.M., Thomas, D., Gerald, S., Lamoureux, E., Hollingsworth, R.,& Noakes, N. "Teaching And Learning Experiences In A User-Created Virtual World," (2007). http://www. educause.edu/ir/library/pdf/EDU07269C.pdf. Accessed on-line 12.02.10.

Bales, J. "What's In A MOO For Primary Students' On-Line Learning?" (2001). http://www.usq.edu.au/electpub/e-jist/docs/ Vol5\_No2/Bales%20-%20Final.pdf. Accessed on-line11.10.10.Hi

Barnes, S.B. "What Does Electronic Conferencing Afford Distance Education?" *Distance Education*, 2000. 21, 2, 235-247.

Jörk, S. & Holopainen, J. *Patterns In Game Design*. Charles River Media, 2004. http://books.google.com/ books?id=IFQfyODK4wAC. Accessed on-line 11.07.10.

Bugeja, M. J. "Distractions In The Wireless Classroom," *Chronicle of Higher Education*, vol. 53, no. 21, January 26, 2007,
рр. С1-С4.

Eduserv Foundation. "A Snapshot Of UK HE And FE Developments In Second Life," (2008). http://www.eduserv.org.uk/ research/sl/uksnapshot052008. Accessed 17.07.2010.

de Freitas, S. "Serious Virtual Worlds - A Scoping Study," (2008). JISC. Serious Games Institute.

Gibson, J. "The Theory Of Affordances. Perceiving, Acting, And Knowing," (1977). Robert Shaw and John Bransford, Eds., NJ: Lawrence Erlbaum Associates.

Holmberg, B. "Theory And Practice Of Distance Education," London & New York: Routledge, 1995.

Keegan, D. "Didactic Analysis Of Distance Training In The European Union," no date. *Distance Education International*, http://www.fernuni-hagen.de/ZIFF/v2-ch41.htm Accessed on-line14.12.10.

Levin, J., & Waugh, M. "Teaching Teleapprenticeships: Electronic network based educational frameworks for improving teacher education. Interactive Learning Environments," 1998, 6(1-2): p. 39-58.

Levine, K. "RE: [SLED] Student Engagement And Retention." (November 20, 2008). Published to 'SL Educators' (educators@lists.secondlife.com).

Löfström, E. and Nevgi, A. "From Strategic Planning To Meaningful Learning: Diverse Perspectives On The Development Of Web-Based Teaching And Learning In Higher Education." *British Journal of Educational Technology*, 2007, 38 (2), p. 312–324.

Macleod, D. "Second Life: Is This The Future Of The Academic Conference?" (2008). http://www.guardian.co.uk/education/mortarboard/2008/nov/11/highereducation-secondlife Accessed on-line 16.11.10.

Mitchell, I. "Guided Didactic Conversation: The Use Of Holmberg's Concept In Higher Education." V. P. GmbH, *Theory*  And Methodology. Distance Education As Two-Way Communication: Essays In Honour Of Boerje Holmberg. G.E. Ortner, K. Graff and H. Wilmersdoerfer, Eds., 1992.

National Audit Office. "Staying The Course: The Retention Of Students On Higher Education Courses," London: The Stationary Office, 2007.

New Media Consortium. "Spring Survey: Educators in Second Life," (2008). http://www.nmc.org/pdf/2008-sl-survey.pdf Accessed on-line 16.02.10.

Norman, D. A. *The Psychology of Everyday Things*. New York: Basic Books, 1988.

Salt, B. (2005). "International Study Circles," *E-learning And Democracy: Critical Perspectives On The Promise Of Global Distance Education*, A. A. Chellman-Carr, Ed. Sage Publications, Newbury Park, 2005, p.101-114.

Salt, B,. Atkins, C. and Blackall, L. "Engaging With Second Life: Real Education In A Virtual World," *SLENZ Literature Review*, 2008. Accessed on-line 13.07.2010.

University of Tasmania. "Is Web CT Vista Accessible?" http://www.utas.edu.au/accessibility/webct/is\_webct\_accessible. html. Accessed on-line 2.01.10.

# PARTICIPATION AT THE PERIPHERY: BOUNDARY-CROSSING COMPETENCE IN MASSIVELY-MULTIPLAYER On-Line GAMES

by

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## ABSTRACT

This article focuses on moments of boundary-crossing that players of massively-multiplayer on-line games (MMOGs) encounter, where boundary is seen as the border that individuals have to cross in order to participate in the community. Dana Walker and Honorine Nocon define "boundary-crossing competence" as "the ability, within a given context, to (a) understand and negotiate the meanings, through the use of material and symbolic artifacts and (b) to understand and negotiate the meanings, through engagement with others, of the practices of a group and of the roles of individuals therein" (2007, 180). Boundarycrossing competence implies an understanding of the practices on both sides of the boundary and the knowledge of how to get from one side to the other. This article presents data from an ethnographic study gathered over a two-year period from a group of Asian adolescent English language learners (ELLs) whose out-of-school literacy practices consisted of playing MMOGs. Kurt Squire (2008) notes that players from different cultural backgrounds can sometimes interpret the same game in very different ways. Consequently, this particular group was selected for this study to draw attention to how participants from different linguistic, cultural and socioeconomic backgrounds engage with MMOGs. As such, the article addresses the questions: How do they learn about and acquire boundary-crossing competence? What kinds of challenges do these players encounter during moments of boundary-crossing? How do they succeed (or fail) at resolving these challenges?

MOGs and virtual worlds have become increasingly popular domains of research for educators, many of whom argue that these environments provide players with opportunities to engage with a constellation of literacy practices (Wenger 1998), such as on-line discussions, digital film production, fan-fiction writing, and other user-generated content (Steinkuehler 2004, 2007; Black 2008). These "new" literacy practices tend to involve participatory forms of learning that challenge traditional, authoritative learning practices commonly found in schools (Lankshear and Knobel 2007). Some of the concerns over the disconnection between in-school and out-of-school literacies are that the students who have access to new literacy practices will find in-school learning irrelevant and uninteresting, and the students who do not have access to new literacy practices will be further marginalized if they do not have the opportunity to acquire skills needed for the post-industrial world (Gee, Hull, and Lankshear 1996; Gee 2004; Lankshear and Knobel 2006). However, researchers have also noted that access and participation cannot be alleviated simply by providing physical access to equipment and software (Alvermann 2008; Jenkins 2006). In addition, new technologies entail new forms of interaction that do not always fit in with a traditional schooling environment. Kevin Leander (2007), for example, argues that the misalignment between the social practices of traditional classrooms (where participation tends to center on the teacher) and new literacies (where participation is distributed and collaborative) creates problems for

teachers and administrators who expect new technologies to be subservient to the dominant, school-based practices. In his study, he shows that even though the students were well-equipped with laptops provided by the school, technology integration still failed because the social uses of the technology did not fit into the school's culture of learning.

While virtual worlds may have the potential to improve and transform how people learn and communicate, research must also address the social practices of virtual worlds, how interaction occurs, and how it evolves over time. Access to virtual worlds cannot be taken for granted. As Gillian Andrews (2008) notes, users of MMOGs and virtual worlds have to be able to afford the financial cost of participation, which include not only cost of the software and monthly fees but also the cost of equipment, Internet access fees, and other costs that often do not get addressed in research. The commercial success of virtual worlds such as World of Warcraft and Second Life have made them popular sites for research, but left many other virtual worlds underrepresented in the literature. Furthermore, previous research on MMOGs tends to focus more on what players do with the game, and seldom discuss how access is achieved, maintained, challenged, and even denied.

## **Boundaries in Communities of Practice**

The notion of boundary-crossing implies the existence of a community with some sort of gatekeeping mechanism that one has to traverse in order to become a legitimate member of that community. This article situates its inquiry in Jean Lave and Etienne Wenger's (1991) notion of communities of practice, which has often been invoked in studies that focus on learning between novices and experts (Bransford, Brown, and Cocking 2000; Steinkuehler 2004; Varenne 2007; Gee 2003; Hung 2007). 114

Lave and Wenger's notion of legitimate peripheral participation (LPP) suggests that meaningful participation in a community often depends on who has access to the right resources and who decides what activities count as legitimate forms of participation. Their definition of LPP is an integral part of their notion of communities of practice, where newcomers gain membership into different communities through forms of participation that are deemed "legitimate" by the expert members. LPP was not meant to describe only good or successful learning, but all contexts of learning. Lave and Wenger argue that "[LPP] is not itself an educational form, much less a pedagogical strategy or a learning technique. It is an analytical viewpoint on learning, a way of understanding learning" (1991, 40). These communities of practice change over time as the community's relationship to its resources change, and as newcomers become experts and redefine what constitutes legitimate participation. Lave and Wenger point out that membership in the community does not require "co-presence, a well-defined identifiable group, or socially visible boundaries" (1991, 98) and that participation is not merely about engaging in the right activities but also with having access to the right resources. They suggest that "[h]egemony over resources for learning and alienation from full participation are inherent in the shaping of legitimacy and peripherality of participation in its historical realizations. It would be useful to understand better how these relations generate characteristically interstitial communities of practice and truncate possibilities of identities of mastery" (Lave and Wenger 1991, 42). Virtual worlds represent a particularly interesting example of how changing resources can alter a community of practice. Before broadband access became widespread, people relied on dial-up connections to go on the Internet. These connections were typically slow and unstable. As broadband access expanded and technology advanced, virtual worlds became more sophisticated, and as wireless access became more widespread, virtual worlds became portable. Participation in virtual worlds involves access to a shared activity instead of simply a shared space where a particular activity occurs. People who are involved with virtual worlds do not need to share the same physical space (although they sometimes do).

Since members of any community of practice change over time, so do the activities that are considered legitimate participation. Thus, it is important to pay attention to the role of time from both the point of view of the individuals and the community of practice as a unit. How individuals define legitimate participation may not always be congruent with how the majority members define it, thus there is constant tension and re-negotiation of what constitutes participation.

## Sites of Inquiry and Participants

I met with a group of Asian adolescent video-game players in New York City over a two-year period. These participants were part of a larger ethnographic study of Asian adolescents playing video-games after school. For this article, I focus on three in particular-Kevin, Andrew, and Lien (all names are pseudonyms)-because of their specific interest in MMOGs. (While other players were also avid video-game players, they were mostly into other genres of games, and, as such, are not part of our discussion). The participants in the study were new Asian immigrants taking English as a Second Language (ESL) classes in New York City high schools. I met them all through a community center dedicated to helping Asian immigrants transition to society. Andrew and Kevin also knew each other from school, while Lien attended a different school. All three spoke primarily Cantonese, but were also relatively fluent in Mandarin. During our interactions, I communicated with them in Cantonese, unless there were phrases I had to clarify in Mandarin. The

data comes primarily from field notes taken during participant observations and informal interviews (Bernard 2002; Spradley 1980). In order to study their lived experiences, I followed them to the sites where they chose to play their games, which included Internet cafés in Chinatown, their homes, as well as a videogame research lab located at my institution. I tried to meet with the participants consistently, about once a week after their school day, for a duration of three to four hours per session.

The social practices described in this article serve as comparative case studies (Yin 2003) to demonstrate how play can be significantly different, even among players with apparently similar backgrounds. It also sheds light on the social practices of MMOGs underrepresented in research as well as the struggles that players go through to gain access and acquire boundarycrossing competence. With these participants, I was particularly interested in the connections between their onscreen and offscreen identities. Studies of MMOGs often focus on onscreen identities exclusively, without paying attention to how their offscreen lives can shape their onscreen interactions. A consistent theme that emerged from my observations was the effort they spent on organizing access and participation to their MMOGs. This involved finding the right people, location, and time to accommodate everyone's schedules and priorities. These decisions provided insights on how these adolescents delineated the nature of their shared activity, and thus, what constituted boundaries of their practice. This delineation influenced the games they chose to play, the methods they used to gain access, and the types of interaction they engaged in while playing.

Andrew and Kevin were interested in finding games that fit into their social relationships. In the beginning, their community included, first and foremost, one another as well as any other friend who was interested in playing with them. They spent most of their time after school at Internet cafés, where the net-

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worked computers allowed them to play in the same space. For this group, the social interaction around them was just as important as the game itself, if not more so, as they took time to plan opportunities to meet, and treated the companionship of friends around them as part of the shared activity in the community of practice. Consequently, once they selected the game to play, it became more difficult for new players to join in because these novices would have trouble keeping up with their activity in the game.

Lien attended a different school, and his choice of game was not affected by what his friends from school were playing. Although he spent most of the time playing alone on his computer, Lien did interact with people he met through the game, and did his best to work around their schedules. Overall, Lien did seem more of a solitary player, and went through most of the game's campaigns on his own. Playing alone meant that physical location was less of an issue for Lien, as he possessed his own laptop and was able to play anywhere with an Internet connection. For Andrew and Kevin, who lived and attended school in different boroughs of New York City, location was more of a concern. Since the Internet cafés were located between their homes and school, they became the preferred locations to play, and the MMOG became a shared activity that bridged their school and family lives both socially and geographically.

Lien's schedule was more flexible because he was playing on his own, although he was interacting with some people on-line who were in other parts of the world, and thus in a different time zone. Since he often played from home, he had to share his computer with his family members whenever they needed to use it. Andrew and Kevin found it slightly easier to arrange time to play while school was in session. They rode on the subway together after school and usually stayed at the Internet cafés until 9 PM, after which they would head home together. During the summer, scheduling became more of a problem, as they had to find summer jobs, thus putting them on different schedules. Moreover, when the school resumed, they had to prepare for high-stakes testing (i.e. the New York Regents exam) and college entrance exams, thus also cutting into their availability.

The decisions these players made regarding the community of practice can be considered their way of delineating the boundaries of the activity. In other words, these were the aspects of the shared activity that were important to these specific players, and while other MMOG players might have different arrangements, the importance of these decisions suggests that the same MMOGs are not the same to different players who play under different circumstances. Participation in a community changes over time.

Stages	Main Activities
I – Delineating the boundaries	<ul> <li>Deciding which MMOG appeals to your style</li> <li>Deciding which MMOGs you can afford</li> <li>Deciding who you want to play with</li> </ul>
II – Acquiring access (Peripheral participation)	<ul><li>Understanding what it means to participate</li><li>Maintaining access to resources</li></ul>
III – Maintaining boundaries (Full participation)	<ul> <li>Engaging in activities that keep you within the community</li> <li>Deciding relationship with potential participants outside the boundary</li> </ul>
Exiting the community	<ul> <li>Outgrowing the needs or interests in the community or losing access</li> <li>Deciding whether to join another MMOG</li> </ul>

Table 1. Stages of Participation in a MMOG as a Community of Practice

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Table 1 summarizes the stages observed as the participants of the study moved through their virtual community, and serves as a broad illustration of how participation in a MMOG evolves over time. Communities are dynamic entities, and activities undergo continual change as new members enter and old members leave. Lave and Wenger (1991) note the need to study how access to resources and mediating technologies in terms of their roles in acting as gatekeeper to participation. In the early stages, when a player is still learning about the community, much of the participation has to do with having the resources that facilitate access and understanding the nature of the activity. Over time, once access has been stabilized, participation focuses more on what counts as legitimate participation. Exiting the community is not listed as a fourth stage because it is a trajectory that can occur between any of the stages. As the examples that follow illustrate, players can abandon access voluntarily or involuntarily for any number of reasons. Sometimes it can be because they lose interest in the MMOG because some aspect of their "real life" needs to take priority (e.g. exams, school schedules), or because they are locked out by the community.

#### Stage One: Delineating the Boundaries

It is easy to overlook the fact that many people have to struggle for resources that are needed to gain access to virtual worlds. Sophisticated MMOGs such as World of Warcraft require computers equipped with adequate amounts of RAM (typically 1-2 gigabytes), high-speed Internet access, powerful processors, and graphic cards to process the 3D images. The price of such machines, not to mention the monthly fees for the game and Internet access can be forbidding to many families. For my three focal participants, these kinds of games were not options. Instead, Andrew and Kevin selected a free MMOG called Drag120

onraja. Despite its relatively low technical requirements, Kevin's home computer was not adequately equipped for this game. This gave Andrew and Kevin even more incentive to play at Internet cafés because Kevin would frequently get disconnected from the game whenever he played from home. Playing away from home also meant that they were spared the frequent interruptions from parents and siblings. Lien, on the other hand, had a laptop that was equipped to handle most games, but his family did not want to pay for broadband, so his dial-up connection restricted his choice as well because most complex MMOGs require higher Internet bandwidths. Furthermore, since he was sharing his computer and phone line with the rest of his family, his access to MMOGs was often interrupted when someone needed to use the computer or phone line.

Their socioeconomic identities also influenced their relationships with one another, specifically in shaping which actions were legitimate within their activity system. Kevin often teased Andrew by calling him the "rich kid" because his family was in a better financial position. When Andrew decided to spend money on virtual goods for his avatar, Kevin mocked him for "being stupid," even though he also admired the equipment that Andrew bought. These purchases were rare, because, if Andrew was to continue buying more equipment for his avatar, this would have put him and Kevin on a different footing, and thus disrupt their relationships with one another and with the game. Since their shared participation was central to this activity, Andrew chose not to give his avatar unfair advantages. In addition, they were able to defuse any potential tension by sharing avatars, a point I return to later in the article.

Players were also influenced by the cultural representation of the game. Andrew and Kevin's MMOG, Dragonraja, is an interesting example because it is based on a book series of the same name, written by Korean author Lee Yeongdo (Wikipedia 2009). Both the book and the MMOG are set in a world that resembles Lord of the Rings, with character classes such as wizards, archers, priests, and warriors. Lien, on the other hand, preferred MMOGs from Asia that reflected the Chinese literary genre called wuxia. (Many readers might know this genre through the 2000 Ang Lee film, *Crouching Tiger, Hidden Dragon*.) Most, if not all, adolescents growing up in China, Hong Kong, and Taiwan would be familiar with the wuxia genre, owing to its near ubiquitous existence in books, comics, television, film, and, of course, videogames. Interestingly, the actual theme of these MMOGs did not seem to make a significant impact on the gameplay itself, as these games share similar kinds of activities – fighting monsters, gaining experience, joining guilds, purchasing goods, leveling up, and so on – thus some of the learning can easily be transferred from one MMOG to another.

## **Stage Two: Acquiring Access**

Although Dragonraja supports multiple languages, its common language—or lingua franca—is English. Since Andrew and Kevin were ELLs, being in the same physical location made communication easier, as it allowed them to shout across the room instead of typing it in the chat channel. When they encountered other players on-line, many of whom also appeared to be ELL, they had to resort to English. However, these barriers did not prevent them from staying with Dragonraja, even though they could have selected another game that would allow them to communicate in Chinese more easily.

Lien, however, had slightly different issues with access, even though he possessed a fairly well equipped laptop and interacted with primarily Chinese-speaking players. In the two years I observed him, he had to switch MMOGs several times. The first game I observed him play was Dreams of Journey to the West (meng huan xi you) - a MMOG inspired by the Chinese folktale Journey to the West. After playing for a year, someone hacked into his account and drained the resources he had accumulated. Out of frustration, he told me that he decided to switch to another game - called Demi-Gods and Semi-Devils (tian long ba bu), a Hong Kong-based MMOG inspired by the wuxia series of novels of the same name. However, like many MMOGs, Demi-Gods needed players to register an account, and the game distributor (www.gameone.com) required a personal identification number to verify the identity of the user. After registration, the account generates a security code that lets users log into their game. Lien was able to register through someone living in Hong Kong, but after playing a few months, someone hacked into his account again. Since each account is connected to a unique personal identification number, not only was he locked out of the account, he was unable to use the same identification number to re-register a new account.

His problems did not end there.

Lien got a new laptop a year after I met him. This was a treasured purchase that he nicknamed his "wife." Since he was more familiar with the Windows XP interface, he asked a friend to install an interface overlay to make his Windows Vista resemble the Windows XP interface. Unfortunately, this created some compatibility issues, as his drivers failed to load when the laptop was turned on. This meant that his audio devices and dial-up connection would not work, and since he connected through dial-up from home, this barred him from connecting to the Internet altogether. Furthermore, Lien was also unaware of the risks of viruses and other malware, and as his laptop was not protected with antivirus software, it was soon infected by malware that gradually slowed his system. I was able to help him get rid of the malware, but in order to get rid of the incompatibility issues, his laptop had to be restored to factory conditions. Lien, once

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again, found himself at the periphery, because even though his laptop was still under warranty, technical support by phone was only available in English and Spanish. In the end, I was able to contact technical support on his behalf and get his laptop fixed.

Lien did devise some innovative ways to acquire boundarycrossing competence on his own. He was relatively adept at searching through on-line discussion boards for codes to gain access to games or solutions to puzzles within the games. Since he often played on his own, he depended more on the on-line communities for support. However, this support was useful insofar as it was in Chinese. With technical problems that required a more advanced understanding of how operating systems and drivers work, the on-line support was less useful (and occasionally misleading). Lien's case demonstrates that ELLs, at least in the United States, sometimes have to acquire additional boundary-crossing competences before they can participate in virtual worlds. These challenges might not be issues for people who have the linguistic resources to use technical support or search for solutions on-line, but for ELLs, these challenges can serve as real barriers to access. Researchers have noted that access to participation is a complex issue that goes beyond having ownership of resources (Jenkins 2006; Alvermann 2008) and Lien's case demonstrates that many hidden constraints impede the path to fuller participation.

### **Stage Three: Maintaining Boundaries**

In discussing onscreen and offscreen identities, I draw on Lave and Wenger's definition as well as James Paul Gee's (2004) notion of "shape-shifting portfolio people" and Hervé Varenne and Ray McDermott's (1998) notion of "self." Lave and Wenger (1991) see identity as an integral part of becoming a member of a community of practice, as the individual goes from being a newcomer to an old-timer through participation. Gee discusses identities in terms of "shape-shifting portfolio people" (2004, 105), or Millennials (Howe and Strauss 2000), whose diverse life experiences enable them to redesign their identities according to the requirements of the situation. Gee (2004) uses Wan Shun Eva Lam's (2000) study of an ELL, Almon, as an example. Almon, who was labeled as a low-achiever in school, escaped his stigmatized status by engaging with people on-line, where he gained not only friends and respect but also skills in communicating and expressing himself in English as well as demonstrating his expert knowledge of an Asian pop icon. Lam shows that Almon is able to design his on-line identity as an imagined self, distinct from his real-life personality. "Shape-shifting" can be seen as a form of boundary-crossing competence that allows individuals to balance between different identities, depending on which side of the boundary they are on. In Lam's study, Almon was able to demonstrate the competence of being an ELL on the Internet and gain the respect and support of others on-line who appreciated his knowledge of popular culture. Consequently, through his interactions with these people, he was able to acquire competence in English over time as well. Varenne and McDermott (1998) conceive of "self" in a slightly different manner. They described Adam, a young boy labeled with a learning disability (LD), whose "self" changed when he is in different contexts. At school, his LD status was made visible through a battery of tests and assessments that served to categorize students into successes and failures. At other times, such as when he was telling a story or playing basketball, his LD status and its associated stigma disappeared, and he became just another child. Varenne and McDermott argue that Adam's status as a child with LD was defined by his cultural conditions, which brought out different facets of his self on different occasions. Adam might not be a good reader but this did not stop him from going about his everyday activities. It

was only when he was asked to publicize his knowledge or skills when his LD reared its head.

At the risk of oversimplification, I suggest that these theories of identity/self articulate different facets of the same concept, each taking a unique but related perspective on how one's life trajectories and circumstances affect one's identities. These diverse perspectives are needed to analyze the complex ways that identities shift constantly in MMOGs, both in the short-term (e.g. over the course of one game session) and in the long-term (e.g. over the course of a year or more).

Part of how players manage their onscreen identities in virtual worlds depends on how the game is designed. These three participants all invited me to join them in their game as a player. Typically, when players go through a quest together, the experience points earned through a successful quest is divided equally among the players. Dragonraja does not allow advanced players (i.e. players with a high level of experience points) to share their experience points with novices. This design is likely implemented to prevent novices from leveling-up rapidly by tagging along with experts on advanced quests, and forces novices to start at a slower pace. Andrew and Kevin had to create new avatars with no experience levels in order to accommodate me in the game. Shadowing Lien was less problematic but also less interactive because he was used to playing alone.

When playing together, Andrew and Kevin had their own accounts and avatars when playing Dragonraja. However, occasionally, with the other's permission, they exchanged avatars. When one was in control of the other's avatar, they agreed not to modify the avatar without the owner's permission. This form of play changed their relationship with their avatars, and made their avatars into shared entities instead of personal belongings or unique identifiers. It also required them to act more as a spokesperson than as an owner when they were in control of someone else's avatar. The fact that they shared avatars also shaped their relationships with their own avatars as well as their gameplay because it meant that resources and rewards became communal property.

This multiplicity of identities is even more salient in Lien's case. While playing Dreams of Journey to the West, Lien signed on to as many as four different avatars simultaneously. Owing to the relatively low-technology requirements of the game, he was able to open up several game windows at the same time. He did not have a vested interest in all of these avatars, but since each avatar can carry a limited number of items with them at any given time, Lien created additional ones to serve as storage units for any items he could not accommodate. He was able to keep track of all of these separate avatars at the same time, sending some off to battles while managing the others on the side. Typically, he was not paying particular attention to any of the avatars, because some of them were on "auto-pilot"; that is, he set them to keep repeating an activity (e.g. gathering treasure) until it was completed. On top of all this multitasking, he was often also watching a downloaded movie or television show on a separate window on his laptop, so his attentional focus was constantly shifting (Lankshear and Knobel 2002; Lemke 2007). In addition, two of Lien's avatars were male and two were female. The other players he encountered often demonstrated that they were aware that the avatar might not necessarily reflect the actual gender of the person in control; when a male avatar approached one of his female avatars to discern whether Lien was a female player, Lien would give an ambiguous response (e.g. "Maybe," or "What do you think?") and play along with the situation. Lien explained that they were "hunting for wives," and that there were certain benefits when two avatars get married, such as the sharing of resources. In other words, this was a pragmatic move that had less to do with the literal gender identity of the avatar and more

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with what the game allows through its rules. Lien and his fellow players demonstrated an understanding of how avatars are used in MMOGs. When Lien encountered a familiar avatar, he would usually ask "Are you the player (ni shi ben ren)?"; or, in other words "Do you own this avatar?" This question reflected the awareness that players sometimes hired others to control their avatar in order to increase their experience and resources when they were unable to play in person. If he discovers that an avatar is not controlled by the actual player who created him/her, Lien would end the conversation, knowing that any interaction at this time would not really count towards their relationship.

The players' ability to "shape-shift" their identities reflects that they possessed a sophisticated understanding of boundarycrossing competence and were able to switch relatively seamlessly between their onscreen and offscreen identities. They had to negotiate their identities with other players in other spaces and decide, for example, whether it matters that Lien's female avatar was not controlled by a female player. In the context of the game, it did not matter whether the avatar's gender reflected the player's. Using Varenne and McDermott (1998), we can see that these multiplicities are determined by the conditions set by the rules of the game—such as rules regarding whether players can use multiple avatars simultaneously and whether avatars are allowed to get married (and if so, what happens)-as well as cultural conditions—such as the practice of hiring others to level-up your avatar. Andrew and Kevin also shared resources, but they managed to pool their resources by sharing avatars.

### **Discussion and Implications**

The aim of this paper is to look at participation in virtual worlds in terms of the boundary-crossing competence needed for individuals to be able to access and participate in these communities of practice. The participants in the study were ELLs and from a lower socioeconomic background, and thus, were not able to afford the sophisticated virtual worlds such as World of Warcraft. Consequently, their interaction revealed a new set of competences required for them to achieve and maintain access to the MMOGs they were involved in. Their interaction with the virtual worlds also depended on the community they delineated for themselves. On the surface, it may seem that Andrew, Kevin, and Lien shared many similar characteristics in terms of their cultural and linguistic backgrounds and their preference of playing MMOGs. However, the analysis here suggests that the way players choose to define their community—in other words, how they play and who they play with—can radically change their trajectories through the community of practice. In Andrew and Kevin's case, being able to play in the same game in a shared physical space was a significant part of their activity, whereas for Lien, it was not. Technological constraints affected all of them but at different points in time, and some of them had constraints that others did not have to face. Lien was free to purchase virtual goods because it did not have any impact on his social relationship, whereas Kevin and Andrew had to be more cautious about how much they use the offscreen resources to boost their onscreen identities.

Andrew's and Kevin's relationships to their MMOG centered primarily on their friendship. Over time, this created an additional boundary that others who wished to play with them had to cross. For example, when one of their friends from their class (also an Asian immigrant with the same linguistic background) wanted to join their game at a later stage, he was not welcome because of the game's design of preventing novices and experts from sharing experience. Over time, these boundaries became stronger due to the efforts Andrew and Kevin invested in their avatars. While time strengthened the bond Andrew and Kevin had to their MMOG, it had a counter effect in Lien's case, especially when he got locked out of the game; the more time he invested in a game, the more frustrated he became when he was denied access.

The findings suggest that physical space can also transform the social use of MMOGs. Andrew and Kevin felt that their shared activity became a different event when they had to play from a distance, as it not only affected how they communicated, it also barred them from looking over at one another's screen or shouting across the room. The space of the Internet café also reduced their concerns regarding technological requirements, as the computers at the Internet cafés were equipped to handle their games. The technical expertise of the Internet café owners meant that Andrew and Kevin did not have to worry about issues such as viruses and malware. Lien, however, who had access to the equipment, also had to bear the burden of ensuring that the context of the physical space (e.g. phone lines, family sharing, etc.), the technical requirements of the game, his access to resources, and his own know-how of technology were adequate. Lien's predicament with his laptop might not have been a problem for someone with the linguistic access to the available resources, and his case shows how those lacking the linguistic or cultural or socioeconomic background can be locked out of these literacy practices.

There is considerable interest in the potential of using virtual worlds and video-games for educational purposes. One of the key arguments is that the forms of learning that occur in these new media spaces are more relevant to today's society than the traditional forms of learning seen in schools (Gee 2004). However, the precise learning process on a moment-by-moment basis remains unknown, and further qualitative studies are needed to verify how interaction occurs among different cultural groups (Squire 2008) and whether learning transfers to other contexts (Squire 2002, 2006). There may be learning principles in virtual worlds that would enrich traditional educational institutions, but there are broader issues that researchers need to take into account. The findings revealed here suggest a darker side of participation in virtual worlds that has to do with unequal access to resources and technical skills. It could be that those who wish to incorporate virtual worlds into education would have to teach novices about fundamental boundary-crossing competences, such as how to maintain their hardware and how to effectively ask for help on their own.

Learning to acquire any kind of competence is a struggle of sorts, and acquiring boundary-crossing competence is no different. While researchers point out that participation in virtual worlds gives players access to a constellation of literacy practices (Steinkuehler 2007), the exact make-up of these constellations vary according to players' backgrounds and access to resources. These literacy practices, such as creating user-generated content (i.e. fan-made videos, fiction, art), have boundaries of their own. This is evident in Lien's case when he went on-line to look for support in forums, which were only useful to the extent that he could understand them linguistically and technically. Even then, there continued to be pitfalls that led him to malware or down blind alleys. As Lave and Wenger (1991) point out, participation in a community of practice is about learning trajectories (or "trajectories of participation" in their terms), and these trajectories are unique for each individual or group as they pass through these communities. Those with the right backgrounds and easy access are likely to have more control over these trajectories, while those with less access face more challenges and have less control.

However, it is important to remember that, although Andrew, Kevin and Lien faced challenges to access, they were all able to eventually join a MMOG, and the types of learning

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they achieved once they were able to participate did resemble the newer forms of literacy that Gee (2004) described as part of the new post-industrial work environment. In order for Andrew and Kevin to share avatars, they had to have a fair amount of trust and cooperation between one another, resembling Gee's description of project-based collaboration, resource sharing, and distributed learning. Lien's navigation of his multiple identities demonstrates his ability to shift between various identities and resources and his ability to multitask and spread his attentional focus. These are skills that are more difficult for schools to teach because it requires the learner to interact directly with tools and knowledge within their environments, and not as abstract and decontextualized topics.

Boundary-crossing competence is a complicated but crucial aspect of one's involvement in any community of practice and an integral aspect of LPP. This competence is arguably the primary prerequisite to join any community of practice because we cannot participate in a community without knowing its boundaries and how to cross them in the first place. In our eagerness to study virtual worlds, we must not forget that access to these worlds can be challenging for some players. Understanding how access is achieved, what resources are needed, and how they are maintained over time can help us better understand the social practices of users from diverse backgrounds. The players discussed in his article demonstrate that they learn about and acquire their boundary-crossing competences through confrontations with obstacles, which can be social, technical, and/or financial in nature. Much also depends on how they choose to play, and whether their social relationships take priority over the game or vice versa. More research would have to be conducted on a broader group of players to see if they confront additional obstacles. Understanding these obstacles can help us learn how to redesign these communities to make them more accessible

to a wider range of people. Researchers have already noted the importance of studying the relationship between onscreen and offscreen identities (Ito 2008; Stevens, Satwicz, and McCarthy 2008). These studies suggest studying virtual worlds without understanding their offscreen "real" lives only tells us part of the story. As research on virtual worlds moves forward, we will have to attain a more comprehensive picture of how interactions in these worlds unfold, using more diverse research methods, participants, genres, and social contexts.

# References

Alvermann, Donna E. "Why Bother Theorizing Adolescents' On-Line Literacies For Classroom Practice And Research?" *Journal of Adolescent & Adult Literacy* 52 (1):8-19, 2008.

Andrews, Gillian. "Gameplay, Gender, And Socioeconomic Status In Two American High Schools." *E-Learning* 5 (2):199-213, 2008.

Bernard, H. Russell. *Research methods in anthropology: Qualitative and quantitative approaches.* 3rd ed. Walnut Creek, CA: AltaMira Press, 2002.

Black, Rebecca W. *Adolescents And On-Line Fan Fiction*. New York: Peter Lang, 2008.

Bransford, John, Ann L. Brown, and Rodney R. Cocking, Eds. *How People Learn: Brain, Mind, Experience, And School.* Washington, D.C.: National Academy Press, 2008.

Gee, James Paul. *What Video Games Have To Teach Us About Learning And Literacy.* New York: Palgrave Macmillan, 2003.

———. Situated Language And Learning: A Critique Of Traditional Schooling. New York: Routledge, 2004.

Gee, James Paul, Glynda Hull, and Colin Lankshear. The

New Work Order. Boulder: Westview Press, Inc., 1996.

Howe, Neil, and William Strauss. *Millennials Rising: The Next Great Generation*. New York: Vintage Books, 2000.

Hung, Aaron Chia Yuan. "Video Games In Context: An ethnographic study of situated meaning-making practices of Asian immigrant adolescents in New York City." *Proceedings of the Third International Conference of the Digital Game Research Association*, edited by A. Baba. Tokyo: JAPAX, 2007.

Ito, Mizuko. "Education Vs. Entertainment: A cultural history of children's software." *The Ecology Of Games*, K. Salen, Ed., Cambridge, MA: The MIT Press, 2008.

Jenkins, Henry. "Confronting The Challenges Of Participatory Culture: Media education for the 21st century (Part two)," October 23 2006 [cited June 24th 2009]. Available from http:// www.henryjenkins.org/2006/10/confronting\_the\_challenges\_ of\_1.html.

Lam, Wan Shun Eva. "L2 Literacy And The Design Of The Self: A case study of a teenager writing on the Internet." *TESOL Quarterly* 34 (3):457-482, 2000.

Lankshear, Colin, and Michele Knobel. "Do We Have Your Attention? New literacies, digital technologies, and the education of adolescents." *Adolescents And Literacies In A Digital World*, D. E. Alvermann, Ed.. New York: Peter Lang, 2002.

———. *New Literacies: Changing knowledge in the classroom.* 2nd ed. New York: Open University Press, 2006..

———. "Sampling 'The New' In New Literacies." *A New Literacies Sampler*, C. Lankshear and M. Knobel, Ed. New York: Peter Lang, 2007.

Lave, Jean, and Etienne Wenger. *Situated Learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press,1991.

Leander, Kevin M. " 'You Won't Be Needing Your Laptops Today': Wired bodies in the wireless classroom." *A New Litera*- *cies Sampler*, C. Lankshear and M. Knobel, Eds. New York: Peter Lang, 2007.

Lemke, Jay L. "Video Epistemology In- And Outside The Box: Traversing attentional spaces." *Video Research In The Learning Sciences*, R. Goldman, S. Barron, S. Derry and R. Pea, Eds. Mahwah, NJ: LEA, 2007.

Spradley, James P. *Participant Observation*. New York: Holt, Rinehart and Winston, 1980.

Squire, Kurt. "Cultural Framing Of Computer/Video Games." *Game Studies* 1, 2002. http://www.gamestudies. org/0102/squire/.

———. "From Content To Context: Videogames as designed experience." *Educational Researcher* 35 (8):19-29, 2006.

———. "Open-Ended Video Games: A model for developing learning for the interactive age." In *The Ecology Of Games*, K. Salen, Ed.. Cambridge, MA: The MIT Press, 2008.

Steinkuehler, Constance. "Learning In Massively Multiplayer On-Line games." *Proceedings of the Sixth International Conference of the Learning Sciences*, Y. B. Kafai, W. A. Sandoval, N. Enyedy, A. S. Nixon and F. Herrera, Eds. Mahwah: Erlbaum, 2004.

———. "Massively Multiplayer On-Line Gaming As A Constellation Of Literacy Practices." *E-learning* 4 (3):297-318, 2007.

Stevens, Reed, Tom Satwicz, and Laurie McCarthy. "In-Game, In-Room, In-World: Reconnecting video game play to the rest of kids' lives." *The Ecology Of Games*, K. Salen, Ed. Cambridge, MA: The MIT Press, 2008.

Varenne, Hervé. "Difficult Collective Deliberations: Anthropological notes toward a theory of education." *Teachers College Record* 109 (7):1559-1588, 2007.

Varenne, Hervé, and Ray McDermott. *Successful failure: The school America builds*. Boulder, CO: Westview Press, 1998.

Walker, Dana, and Honorine Nocon. "Boundary-Crossing Competence: Theoretical considerations and educational design." Mind, Culture, and Activity 14 (3):178-195, 2007.

Wenger, Etienne. *Communities Of Practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press, 1998. Wikipedia. Dragon Raja. 2009 (cited April 19 2009). http://

en.wikipedia.org/wiki/Dragon\_Raja.

Yin, Robert K. *Case Study Research: Design and methods*. 3rd edition, *Applied Social Research Methods* series. Thousand Oaks: Sage Publications, 2003.

# Framing Second Life for Use in Higher Education: An Analysis of EDUCAUSE Review and The Chronicle of Higher Education

by

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### Abstract

This study employed a framing analysis to examine articles from The Chronicle of Higher Education and EDUCAUSE Review related to the use of Second Life in academia. Four main frames were identified: exploration, growth, overcoming challenges, and level of endorsement or rejection. Additionally, subframes were identified in the exploration and endorsement/rejection main frames. Discussion of the results focuses on the overall perception of Second Life in higher education and implications for the future.

A s Web 2.0 technologies emerge as viable options for use in higher education, their current usefulness and future potential

requires close evaluation. Web 2.0 is a term used to refer to interactive, user-centered on-line technology in which the line between creator and consumer is blurred.<sup>1</sup> Currently, these technologies, which include social networking, blogs, wikis, podcasts, mash-ups, and virtual worlds, are being considered for their prospective utility in forming more participatory learning environments from which all students may benefit. Distance students may especially benefit from improvement of their traditionally low rates of interaction between instructors and learners.<sup>2</sup>

By providing nearly universal access, these new technologies can also now reach diverse learners with different learning modalities as well as create equal opportunities for the special needs of students.<sup>3</sup> Additionally, they offer the potential to enhance understanding of diverse perspectives on a given issue via student discussion and exploration.<sup>4</sup>

Virtual worlds offer a combination of a video game interface with social connections. They may look less like the traditional platform for higher education but more like the platform modern students expect. Second Life, the leading user created on-line virtual world, is gaining a great deal of ground in the interactive learning environment discussion. Therefore, it becomes important to examine how educational institutions perceive the effectiveness and potential of Second Life's application to academia.

At least 170 academic institutions of varying size and location across the globe currently have a presence in Second Life.<sup>5</sup> This technology is being explored across a large number of disciplines including architecture, English as a second language, physics, engineering, law, science and space, and computer science and engineering.<sup>6</sup> As education professionals consider its use, they can gain valuable insight from the rich diversity and perspectives of many disciplines, not just select areas of study or certain types of institutions. However, discovering the educational uses of Second Life from media coverage would be a challenge. Even though universities have been making use of Second Life since 2004 as an educational platform, this fact has received very little notice among the major media. In a recent analysis of news coverage of new media technologies including social networking sites and virtual worlds, Davis, Yang, Petersen, Ritzenthaler, and Bustam found that out of nearly 500 articles reviewed, only four made any mention of educational uses in virtual worlds and social networking sites.<sup>7</sup> Domestically, using Second Life as an educational tool remains completely below the popular press radar.

With a lack of educational coverage in the news, educationally focused publications such as EDUCAUSE Review and The Chronicle of Higher Education may serve as the resources through which future educators who plan to use Second Life can understand what the current capabilities of Second Life are, what drawbacks may be encountered through implementation of Second Life, or whether Second Life may be useful at all in certain educational environments.

In order to explore this, the researchers gathered all the articles from EDUCAUSE Review and The Chronicle of Higher Education between June 2005 and October 2008 that focus on Second Life's use in higher education. Framing analysis was used to determine how these major academic resources portray the use of Second Life to date. The analysis is useful in determining how the frames define problems, diagnose causes, make moral judgments, and suggest remedies.<sup>8</sup> Overall, this study provides an important step in understanding the developing perspective of higher education on the integration of this new technology.

#### Literature Review

Second Life became available to the public in 2003, and

quickly became one of the leaders in the area of 3-D on-line virtual environments.<sup>9</sup> Although the platform for Second Life was initially conceived and created by Phillip Rosedale and his San Francisco-based company, Linden Lab, by making the environment "open source," the virtual world encouraged its "residents" to create the surroundings for themselves.<sup>10</sup> Almost all of the current structures and objects in Second Life were made by its 13 million residents, using functions native to the program or by importing from outside sources. The building feature of the virtual environment can provide many opportunities for academic instructors that are not available in the real world.<sup>11</sup> In addition to allowing students to build objects from their own imagination, they can explore virtual representations of Dante's Inferno, Elizabethan England, or travel through the eye of a hurricane.<sup>12</sup>

#### Strengths and Weaknesses of Second Life as an Educational Tool

Bronack, Riedl, and Tashner found that the use of Second Life as an educational tool has helped teachers interact with students "in more fluid and natural ways."<sup>13</sup> It also allows students to interact with their virtual environment. Likewise, Cheal suggests that the use of virtual world programs in education is "not only inevitable as part of the evolution of teaching and learning, but a positive development," as it fosters active, experiential learning.<sup>14</sup> However, using Second Life as a virtual venue for traditional lectures is likely to be unpopular and ineffective with students, she says, as the format of Second Life promises interactivity and not the passive nature of lectures. Making use of the unique opportunities for creation and interaction, on the other hand, is both popular and facilitates higher-level learning.

In a survey comparing identical courses taught using traditional face-to-face methods versus Second Life, Lester and King found that students in both courses reported "they enjoyed the experience, and they appeared to learn the information on a comparable basis."<sup>16</sup> In a survey of higher education instructors from fifteen countries and twenty-five different academic disciplines who had experience using Second Life as an educational tool, Bowers, Ragas, and Neely found that, overall, respondents were satisfied with the technology and perceived it to have a positive impact on student learning. Nearly ninety-four percent of the respondents indicated that they intended to use the program in future classes.<sup>17</sup>

Some of the criticisms of Second Life are logistical ones. Educators have complained that slow connections and server crashes impede learning and that the requisite computer requirements mean more cost for institutions.<sup>18</sup> Similarly, Anthes notes that some educators have found Second Life to have a steep learning curve for both students and teachers that requires extensive time learning the program before being able to use it.<sup>19</sup> Additionally, bad behavior such as disruption and virtual violence, known as "griefing," has caused some educators to stay away from using Second Life as an education tool.<sup>20</sup> For example, disruptive guests have been known to show up in class, on occasion unclothed.<sup>21</sup> An even more concerning instance of griefing occurred in May 2007, shortly after the shootings on the real world Virginia Tech campus, when a virtual gunman began shooting visitors on the Ohio University's Second Life campus. No avatar was physically or virtually hurt or killed; however, the potential psychological impacts forced the university to temporarily close its island in Second Life.<sup>22</sup> Other educators have expressed concern over the challenge implementing Second Life in their curriculum would pose to visually impaired students.<sup>23</sup>

# Framing

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A framing analysis of appropriate articles was chosen as the

best method to better understand how Second Life is being presented to instructors in higher education. According to Reese's working definition: "Frames are organizing principles that are socially shared and persistent over time, that work symbolically to meaningfully structure the social world."<sup>24</sup> From this perspective, frames offer a set of consistent yet abstract guidelines by which members of a society can make sense of the world around them. Hertog and McLeod suggest that while frames contain principles to organize our social world, they "are more than just principles."<sup>25</sup> Frames, they argue, are structures in and of themselves filled with the content of concepts as well as the rules governing the relationships between these concepts.

However, any given experience or phenomenon can be framed in different ways by different people, giving it a unique meaning. Indeed, the underlying power and premise of framing theory is it proposes that any social issue can be viewed from multiple perspectives with different implications for various values.<sup>26</sup>

With respect to studying media representations of issues, Tankard suggests that the study of media framing offers a productive alternative to the old dichotomous paradigm of objectivity.<sup>27</sup> Instead of understanding media presentations merely in terms of favorable versus unfavorable, Tankard argues that framing allows for a more complex analysis of emotional and cognitive factors. Moreover, "framing recognizes the ability of a text – or a media presentation – to define a situation, to define the issues, and to set the terms of a debate."<sup>28</sup>

# **Research Questions**

As higher education professionals grapple to find effective uses of new technology, a review of the literature suggests that there is a need to examine how Second Life is being presented to them in its potential as an educational tool. The corporate pitch from Linden Lab poses a great deal of positive potential for the educational uses of Second Life, but this does little in the way of offering postsecondary instructors an objective evaluation of the technology. Because this discussion is absent from the popular press, such coverage seems to be isolated to higher education trade press publications like EDUCAUSE Review and The Chronicle of Higher Education. Existing research has suggested both strengths and weaknesses for educational uses of Web 2.0 technology in general, and virtual world programs like Second Life specifically. A framing analysis offers an effective way to examine how these considerations play out in the higher education trade press. Based on the literature review, the following two research questions drove this study:

RQ1: How have EDUCAUSE Review and The Chronicle of Higher Education framed the use of Second Life as an educational tool? What terms and phrases have been used to describe the technology and what themes emerge?

RQ2: How, specifically, have these publications framed the potential benefits and detriments of using Second Life as an educational tool? Has it been presented in a primarily positive, negative, or neutral light?

## Methods

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This study used a framing analysis to acquire a better understanding of how the higher education trade press approaches the use of Second Life as an educational tool. The framing analysis method provided a procedure through which the researchers could identify commonalities in the discussion and see how the discussion has been shaped to this point through the domi-

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nant frames. For a new technology like Second Life, this kind of research is necessary to see how frames guide potential social understanding and debate of Second Life's potential.<sup>29</sup>

The Chronicle of Higher Education was the first publication chosen for analysis due to its high readership rate among academics. Close to 80,000 academics subscribe to the print version of The Chronicle, with more than one million unique visitors to the Web site every month.<sup>30</sup> EDUCAUSE Review was chosen for its more technological perspective on higher education, although it reaches a large academic audience as well. The nonprofit EDU-CAUSE association has members from more than 2,200 colleges, universities, and educational organizations.<sup>31</sup> Together these publications represent large forums for discussions of issues in higher education and the role technology plays in those issues. While all articles analyzed appeared originally in a print format, the versions used for analysis in this study were viewed directly from the publications' Web sites. It is possible that the print versions included some additional graphic elements not present in the on-line versions of the articles, but otherwise the print and on-line versions appeared to be very similar.

All articles from The Chronicle of Higher Education and EDUCAUSE Review that were primarily about Second Life as an instructional tool were used in this study. Articles from The Chronicle of Higher Education were found by searching the publication's Web site (http://www.chronicle.com). The researchers used the search terms "Second Life virtual world" to find articles covering the Second Life program specifically. The search resulted in twenty-two articles that directly addressed the use of Second Life in higher education. Four of these articles were found in the Chronicle Careers section, sixteen were found in the Information Technology section, and two were found in the Letters to the Editor section. Articles that gave only a passing mention of the program in relation to another central story topic were excluded. For example, an article profiling Henry Jenkins, an MIT professor, included a single sentence stating that young designers had created an avatar that looked like Jenkins for the purposes of his participating in a panel discussion in Teen Second Life.<sup>32</sup> Articles such as these, which had no direct relevance to the research topic at hand, were not included in the framing analysis.

In order to find the EDUCAUSE Review articles the researchers searched the EDUCAUSE Web site (http://www. educause.edu) with the same search terms as used when searching The Chronicle of Higher Education. The search was modified to display only articles found in the EDUCAUSE Review since EDUCAUSE's other publication, EDUCAUSE Quarterly, is a peer-reviewed journal, not an education news publication. Following the same selection process used for The Chronicle of Higher Education, articles were eliminated if the article only mentioned Second Life in passing. This resulted in twenty articles that met the criteria.

Thus, the searches produced a universe of forty-two articles, which were analyzed in this study using the frame analysis method. A coding sheet and guide were first developed to help the researchers consistently analyze specific elements of each article. For example, headlines, leads, graphic elements, sources, and other text elements were all explicitly specified to bring greater detail to the frames. The researchers simultaneously coded two random articles from each publication until agreement was reached about the emergent categories of frames and their underlying properties. Then each researcher independently coded all thirty-eight remaining articles. Following this independent coding, we compiled and compared the results using the document-posting feature of a Google group. We then met to discuss the emergent frames and their properties. Frames were collapsed into the most contrasting and parsimonious categories

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for the greatest explanatory power. Finally, the frequencies of the individual frames were recorded.

### Results

The final sample (n=42) included twenty articles from EDUCAUSE Review and twenty-two from The Chronicle of Higher Education. The mean word count for all the articles was 1524 with the longest article having 5080 words and the shortest having 143. EDUCAUSE Review articles were longer on the whole, averaging 2181 words compared to a 928-word average for articles from The Chronicle of Higher Education.

The oldest article was a Chronicle article from June 2005; however, most of the articles came from 2007 and 2008. Eighteen of the twenty EDUCAUSE Review articles came from the September/October 2008 issue focused on virtual worlds. There were no more than two articles from any issue of The Chronicle. Fifteen of the twenty-two Chronicle articles were presented in the Information Technology section with the rest coming from the Chronicle Careers, Letters to the Editor, or The Chronicle Review sections. The EDUCAUSE Review articles were written by a variety of instructors, administrators, and technology professionals. Ten of the Chronicle articles were written by Andrea Foster, who is one of the Chronicle's Information Technology journalists. The rest of the Chronicle's articles came from instructors and administrators, or provided no information on the author's profession.

Through examination of the articles, the presence of key terms and phrases identified four main frames: exploration, growth, overcoming challenges, and level of endorsement or rejection. The exploration and growth frames addressed the study's first research question, while the overcoming challenges and level of endorsement frames addressed the second research question. The exploration frame demonstrated that new possibilities offered by Second Life, coupled with the virtual nature of the program, influenced the discussion of its application in higher education to be presented as a discovery process. Students, teachers, researchers, administrators and others involved in academe were often presented as exploring the value of Second Life both figuratively (i.e., through consideration and design of new uses for Second Life in higher education), as well as literally (i.e., avatars interact with the virtual environment to discover new sights, sounds, etc.). Within the exploration frame there were three sub-frames: pedagogical exploration, logistical exploration, and scholarly exploration. The growth frame revealed an increase in the popularity of Second Life, both in and outside the context of higher education, as well as the expansion of the virtual landmass in Second Life since it was created.

The frame of overcoming challenges revealed that there are common and significant obstacles to the effective use of Second Life for higher education purposes. These obstacles were at times presented with specific case examples of strategies that did or did not effectively overcome these challenges, while at other times these obstacles simply served as a point of discussion that needed to be addressed by anyone seeking to utilize Second Life in higher education. There were also three levels of endorsement for the use of Second Life in higher education. Green light stood for a strong endorsement. Yellow light stood for a cautious endorsement. Red light stood for a non-endorsement or rejection. The Appendix shows the frequencies of the frames and sub-frames within the articles examined.

## Exploration

The most dominant frame that emerged in examining these articles was one of exploration. Throughout the articles in both publications, this frame was evidenced by key terms and phrases

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like "explore," "exploration," "frontiers," "discovery," "pioneers," "immersed," "innovative," "first foray," and "SL grand experiment." The overarching perspective regarding the use of Second Life in higher education was one of testing the waters and discovering how it will most effectively serve the needs and goals of academic institutions. However, within this general context of exploration, distinct sub-frames were found that detailed the ways in which Second Life was being applied and discussed in higher education. Specifically, these sub-frames were pedagogical exploration, scholarly exploration, and logistical exploration.

## **Pedagogical Exploration**

Pedagogical exploration was the most common form of the exploration frame found in the articles examined. This sub-frame appeared in sixty-four percent (n=27) of all articles, including twenty-six percent (n=11) of the headlines, and forty-three percent (n=18) of article leads. This sub-frame was used to consider the applications of Second Life for the purposes of enhancing student learning and was identified by key terms such as "teaching," "learning," "students," and "pedagogy." The concept of pedagogical exploration manifested itself in a variety of ways. In some cases, Second Life was discussed in regards to its potential to increase "interactivity" and "social learning" for students. One article highlighted possible uses of Second Life and other Web 2.0 technologies in community college teaching. The article paraphrased a quotation from an e-learning solutions executive at Adobe Systems Inc.: "By connecting users to on-line communities... those services provide more memorable learning experiences than students may get from entrenched, less-interactive technologies."33 Other key terms and phrases that demonstrated the social and interactive potential of Second Life included "involvement," "enable dialogue," "participation," "engaging," and

"community."

Along with the social interactive possibilities of Second Life, the sub-frame of pedagogical exploration also manifested as the potential for students to interact with the virtual environment. Some instructors were exploring ways to offer field trips to virtual re-creations of ancient Egyptian tombs, the Sistine Chapel, or the Galapagos Islands. In an article titled, "Genome Island," Mary Anne Clark, a biology professor at Texas Wesleyan University, describes a virtual landscape built in Second Life to teach students about genetics by allowing them to conduct various experiments: "Virtual worlds offer the opportunity to eliminate the lecture/lab boundary by immersing students in an environment to be investigated. At Genome Island, that environment is populated with cats and chromosomes, flowers and fruit flies, mice and mixollamas (mythical creatures that started to be hippos but mutated somewhere along the way), each of which responds to a touch by acting out some principle of genetics."34

This idea of pedagogical exploration as environmental interaction extended to the notion that virtual worlds offer students new opportunities to create their own content. Key terms and phrases that demonstrated this creation idea were "create," "content creators," "design," "build," "develop," "construct," and "production." The idea of virtual creation as a way to enhance student learning was discussed often in reference to specific cases where instructors applied Second Life in courses ranging from architecture, to astronomy, to music.

## **Scholarly Exploration**

A second way the exploration frame was manifested was within the context of scholarly exploration. The sub-frame of scholarly exploration appeared in twenty-one percent (n=9) of the articles, including ten percent (n=4) of the headlines and

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twelve percent (n=5) of the article leads. Many of the articles examined suggested the existence of new opportunities for academics to conduct research in and about the virtual world. In an article discussing the virtual presence of the University of Kansas Medical Center, Chris Collins states, "It's almost unfortunate that we talk and think about virtual worlds as a kind of 'technology' application rather than as an exciting new laboratory, or as a giant sandbox to test new theories, or as a way to step into our collective and individual imaginations in a manner that we have never been able to do before."<sup>35</sup>

An opinion article discussed how researchers are examining the concept of "virtual tribalism" in on-line communities like Second Life. Other key terms and phrases that demonstrated scholarly exploration included "experiment," "research," "manipulated," "virtual ethnography," and "growing number of scholars who see virtuality as something to study."

## **Logistical Exploration**

The third sub-frame of exploration that appeared in the articles was logistical exploration. This sub-frame appeared in twenty-six percent of all articles, including five percent (n=2) of the headlines and five percent (n=2) of the article leads. The logistical-exploration frame indicated ways in which educational institutions could use Second Life to address issues of infrastructure, budgeting, and operations. Some articles discussed logistical exploration in terms of fostering "real-world activism" among potential university donors, encouraging civic engagement between students and their surrounding communities, and introducing prospective students to the university through virtual campus tours.

Chris Collins discussed ways that virtual worlds like Second Life could be used to better address the logistical needs of higher education: "In addition, higher education institutions can benefit from many of the same cost-saving techniques as businesses by leveraging the collaborative capabilities of virtual worlds for conducting the 'business' of education. From enabling internal collaboration and planning meetings to providing student services on a virtual campus, virtual worlds hold enormous promise for providing a platform for faculty, staff, and students to interact in an environment that can be entirely flexible to accommodate different needs."<sup>36</sup>

Key terms and phrases that evidenced themselves regarding logistical exploration were "professional functions," "philanthropy," "student recruitment," "retention," "support the core functions," "growing global demand for higher education," and "cash-strapped administrators."

### Growth

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Another frame that showed up consistently was growth. This frame appeared in twenty-four percent (n=10) of all articles, including seven percent (n=3) of the article leads. The growth frame identified ways in which Second Life continues to grow in areas of content and membership, as well as uses and usability. Keywords for this frame included "progressed more rapidly," "explosion," "broad adoption," "attracted recent attention," and "growing popularity." While not as prevalent as some of the other frames, growth was found to be an important piece in many of the articles, providing a look at the status of this technology's popularity and functionality.

## **Overcoming Challenges**

Another dominant frame revealed in the articles referenced the challenges involved in the use of virtual worlds in educational settings. The overcoming-challenges frame appeared in seventy-one percent (n=30) of all articles, including fourteen percent (n=6) of the headlines and fourteen percent (n=6) of the article leads. When discussing challenges, they were frequently framed in the context of overcoming challenges such as the cost and potential savings of using technology, the investment of time and training required to operate in a virtual world and its resulting productivity, and the need and resources available to protect students from potentially harmful exposure to sexual content or the on-line hacking known as "griefing." One article claimed the challenges of operating in the virtual world fell into four major categories: "perceptual, technical, operational, and pedagogical."<sup>37</sup>

For example, when discussing the challenges of digital technologies and specifically the use of Second Life, articles contained key words and phrases such as "technical problems," "frequently crashes," "harder to use," and "waste of time." Other challenges discussed were the ease or difficulty of use of virtual worlds and the potential legal liabilities of using Second Life in a university setting. While several of the articles raised these challenges as reasons to stay out of Second Life, others pointed to the solutions to these problems and why it was important to consider overcoming these challenges.

One of the clear contexts within which the overcomingchallenges frame was presented was the perceived risks to students as well as to the universities using Second Life as an educational learning environment. Example keywords and phrases that emerged to reveal this context included, "playground for sexual experimentation," "legal liabilities," "sexual harassment," "accountability," "assault," "legal and ethical complaints," "institutional liability," and "murder." Michael J. Bugeja, who was especially critical and guarded about the risks of using Second Life in the university setting, offered a warning rather than a solution 152

when he stated, "You as an educator have the right and the obligation to use academic principles to explore harassment issues in the for-profit tech world now imbedded in academe."<sup>38</sup>

While some universities appear to struggle with how to control student behavior, access, and ownership, the balance between control and creativity was also apparent in the frame of overcoming challenges in numerous articles. Sarah Robbins-Bell from Ball State University remarked in an article, "An instructor cannot have total control of a learning space while allowing true, open participation from students in a virtual world."<sup>39</sup>

Also represented were a number of enthusiastic educators who were encouraged to overcome the challenges of moving into the virtual realm. Cynthia Calongne, a professor of computer science at Colorado Technical University addressed the difficulties of helping students master their fear and uncertainty in the virtual world in order to function in it. She asserted, "mistakes are great opportunities for learning."<sup>40</sup> She also concluded that working through the challenges of navigating the virtual world was worth the outcome.

Do the benefits outweigh the risks associated with venturing into a virtual educational platform? For me, the virtual world is my preferred learning and teaching environment... All of us are studying how to leverage the benefits of learning in a virtual world in order to assist our students in today's educational frontiers.<sup>41</sup>

## **Endorsement Levels**

One of the most important frames identified in the articles reviewed in EDUCAUSE Review and in The Chronicle of Higher Education was that of endorsement or non-endorsement. We found this scale was most appropriately identified as "greenlight" or "yellow-light" endorsement, or "red-light" rejection. This analogy reflected the idea that a green light means "go," or the articles would suggest that Second Life is a powerful and positive tool for educational purposes; a yellow light means "caution," or recommends that educators and administrators carefully consider the opportunities as well as the potential risks, challenges, and liabilities of working in Second Life before investing time and resources in creating a virtual presence for their institution; and a red light is a clear rejection of the virtual world, suggesting that the interested administrator or educator simply stop – look no further – as they believe the risks outweigh the benefits.

## "Green-light" Endorsement – Enthusiastic

The largest percentage of articles that revealed an endorsement-level frame offered green-light endorsement as a subframe. A green-light endorsement was found in forty-eight percent (n=20) of all articles, including five percent (n=2) of the headlines. We categorized green-light endorsement as those articles that used terms such as "simple," "rewarding," "lively, engaging and rich," "stimulating, creative landscapes," "resulting in a great benefit," "great potential," "powerful," "enriching," "encourages interaction and collaboration," "effective teaching environment," and "impressed."

Green-light endorsement was also seen in many key phrases: "plan to keep using Second Life," "experiences that are harder to simulate in the campus-based and on-line classrooms," and "my preferred learning and teaching environment." These phrases also typically framed Second Life as a unique and powerful way to provide a learning experience for students that could not be replicated in the real world. Phrases such as "a dramatic experiment, but cannot be done live in most undergraduate laboratories," "persistent world offers persistent learning opportunities," "a step toward more authentic learning for all students," "educators have limitless options," and that using Second Life can "turn passive, knowledge-receiving students into active, knowledgemaking students" are clearly positive endorsements of the use of Second Life as an educational tool. In one article that discussed the use of Second Life to create and explore the Galapagos Island, an information technologist and a professor explained the use of the 3-D virtual world as a learning environment.

Faculty can share research, create 3-D models and data visualizations, and hold virtual seminars that can be attended by students and the public even if they can't visit the physical University of Cincinnati campus or the real Galapagos Islands.<sup>42</sup>

## "Yellow-light" Endorsement - Guarded

Not all sources were equally enthusiastic, however. A subframe of yellow-light endorsement was found in twenty-six percent (n=11) of all articles, including seven percent (n=3) of the headlines and five percent (n=2) of the article leads. Yellowlight endorsement reflected the idea that there may be some value to university use of Second Life, but still the authors or sources found reasons to remain cautious in exploring its use. Key phrases in this sub-frame included, "holds promise," "cursory interest," "examine the role," "one possible approach," and "further discussion." These terms typically encouraged further exploration of the use of Second Life, but without offering a clear endorsement. Other articles that fell in the yellow-light subframe covered both the positives and the negatives of Second Life use in education, leaving the final determination to the reader.

## Red-Light Rejection - Go No Further

A small number of articles in this sample were unquestion-

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ably against the use of Second Life as an educational tool. A subframe of red-light rejection was found in twelve percent (n=5) of all the articles, including two percent (n=1) of the headlines and two percent (n=1) of the article leads. These articles used key words and phrases such as "empty-handed," "accomplish nothing," "complain," "can't take this seriously," "frustrated," "wary," and "patience is wearing thin" when discussing the outcomes already experienced in educational efforts to use Second Life. These terms were typically aligned with costs and complications of the technology, the concerns of risks and liabilities including exposure to sexually explicit material and lack of control, and the lack of visual quality as compared to a real life experience.

There were specifically two articles that strongly discouraged the use of Second Life. The first article featured many references to successful uses of Second Life, but, towards the end contained a section called "Second Life: Second Thoughts and Doubts." In reference to a virtual re-creation of the Sistine Chapel mentioned earlier in the article, an art historian remarked that the "campus looks cartoonish because the frescoes' colors and textures are off" and that "art historians can't take this seriously." The same article warned that professors were wary due to "sexually oriented regions," and a "free sex-orgy room," which they claimed were the "most popular places in Second Life."<sup>43</sup>

The second article warns of the legal liabilities for college administrators: "We have enough trouble dealing with violence, assault, and sexual harassment in the real world, but few of us – even campus lawyers – know how the law applies in virtual realms vended by companies whose service terms often conflict with due process in academe."<sup>44</sup>

Although there were strong statements offered regarding the risks of using virtual environments in the higher education classroom, the majority remained optimistic and encouraging. For instance, phrases such as "we need to learn to embrace more participatory pedagogy" and "virtual worlds and other social media require educators to embrace conversation and participation" reveal a call to action to explore the potential of the participatory nature of the "interactive" and "immersive" 3-D virtual world.

Perhaps the most powerful "green-light" statement given regarding the challenges of using Second Life in education came from an article by Sarah Robbins-Bell of Ball State University: "Educators and educational institutions need to understand that virtual worlds, like other social media, are here to stay and that these exciting forms of media are not a threat to formal education. The genuine conversation and participation that virtual worlds encourage is a step toward more authentic learning for all students."<sup>45</sup>

## Discussion

Through a framing analysis of two major educational trade publications, The Chronicle of Higher Education and EDU-CAUSE Review, we identified several frames that were consistently present in the discussion of Second Life's use in higher education. These frames provide a deeper understanding of the challenges and successes of previous attempts to integrate Second Life into instruction. More importantly, the frames provide a foundation through which instructors can evaluate the utility of Second Life to their specific needs as well as the various factors that must be considered should they choose to adopt Second Life as part of their instruction.

Considerations of Second Life's growth in terms of users, usability, and content were important to many of those involved in discussing Second Life in higher education. Among the articles that exhibited the growth frame, many stressed the penetration of this technology into the general public as a reason for adapting it to use in higher education. Others discussed the

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improvements in usability as increasing the technology's viability as an educational tool. One of the interesting factors of growth in Second Life content is that it is user-generated. Several educators believe this offers a unique opportunity for constructive learning and see Second Life as a way to encourage deeper involvement in the learning process. Second Life's position as a young technology opens it up to analysis of growth and it is clear that its potential growth will continue to be a factor in determining its future in higher education.

The exploration frame employed in the discussion of Second Life's application to higher education shows that academics are considering and making use of the technology's potential in a variety of innovative ways. Many educators are making use of the virtual environment for its instructional and pedagogical possibilities. Second Life's use is moving beyond simply providing a novel way to conduct distance education. Instructors are finding that the technology offers a wide range of social, participatory, and creative opportunities for students, and many instructors are forging the way to discover how they can capitalize on these opportunities to meet their unique classroom goals.

Likewise, researchers are finding the virtual world to be a rich environment for study. Interactions among avatars provide many opportunities for scholarship in sociology, psychology, anthropology, and a host of other disciplines. Similarly, the opportunity to simulate physical space and events provides natural sciences and service-oriented disciplines a chance to test practice and theories in ways that could be impractical in the real world. Some in higher education, including administrators, also see logistical possibilities to improve institutional efforts like student outreach, alumni outreach, and donor outreach. Others are exploring cost-saving opportunities through virtual conferencing or expanded distance education.

While the overall tone of educators exploring Second Life

is enthusiastic, no journey into uncharted territory is without challenges. The exploration of Second Life is often discussed in anecdotal terms of the successes and failures for educators who used the technology in their work. Within the exploration frame, the collective account of higher education personnel who have applied Second Life in their work reads much like a frontier journal. These pioneering educators provide a chronicled account of their adventures, their struggles, their successes, their mishaps, and the people they have met along the way.

Seventy-one percent of the articles examined in this study featured some content regarding the challenges instructors and institutions face when attempting to use Second Life for educational purposes. One of the challenges most commonly cited was the concern of exposing students to the uncontrolled environment with potential psychological or legal consequences. The potential risk of exposure to virtual sexual content, harassment, assault, or violence are not uncommon in the public areas of Second Life where there are currently few regulations on behaviors, especially in "mature" areas on the Second Life grid. Of note, the concerns regarding these issues as covered in the articles typically originated from legal counsel or administrators rather than instructors or professors.

Additional challenges most commonly discussed in the articles reviewed were the technical shortcomings of the 3-D environment that was prone to "crashing" with some regularity and limited graphics software compatibility, especially in the earliest years. Likewise, there is a somewhat steep learning curve when first entering Second Life. For other academicians working in Second Life, combating the resistance to change and to the emerging technology from colleagues who are already technologically challenged was also discussed on numerous occasions.

Regardless of the multitude of challenges faced, the theme that most consistently emerged was that of overcoming these

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challenges. While a few authors saw these obstacles as insurmountable, most of the articles reported on these problems in the context of being solvable. A number of articles offered solutions and case examples that revealed effective security measures and supportive learning methodologies that have either already been developed or are being developed that will help educators successfully navigate the virtual classroom.

The frame of overcoming challenges was also evident in the final frames identified in this analysis, which were frames of endorsement or non-endorsement. We identified these frames on a scale of red-light rejection, yellow-light (guarded), or greenlight (enthusiastic) endorsement. Forty-eight percent of the articles offered overall enthusiastic endorsement of using Second Life for educational purposes, while twenty-six percent found the virtual world to offer merit but with cautionary measures recommended. The smallest sub-frame revealed in the study was rejection, with twelve percent of the articles discouraging the use of Second Life in an academic setting.

Of the articles that rejected the use of Second Life, some found the costs of time and technology not worth the investment. However, one of the strongest rejections was written by a legal counsel of a university, concerned primarily with the potential litigious risks created by the issues of virtual harassment and assault. To date, no legal precedent has been set for many of the questions of privacy or psychological damages in a virtual realm. However, these are issues that cannot be ignored and universities, as well as corporations, will need to address them as greater numbers of campuses and businesses enter the "metaverse."

To that end, the yellow-light endorsement represented those opinions that found positive potential use of Second Life in an academic setting, but urged those interested to proceed with caution. Otherwise, the articles may simply have pointed out both the strengths and weaknesses of the 3-D virtual environment without making any specific conclusion.

Finally, the green-light endorsement sub-frame was the most dominant of the endorsement frames. The articles that framed Second Life in a positive light were not only most frequent, but they were also enthusiastically supportive and encouraged others to explore the immersive and interactive virtual world as a powerful learning tool. These articles consistently used terms such as "stimulating," "engaging," or "enriching," and found the creative and collaborative nature of the medium to provide rich potential for teaching and learning.

## Limitations

As may be expected when studying a new or emerging technology, the most significant limitation of this study was the small amount of media coverage. Likewise, the outcomes of using Second Life for educational purposes have only just begun to be reported.

An additional limitation of this study was the challenge of using strictly on-line versions of both The Chronicle of Higher Education and EDUCAUSE Review. On-line publications are typically formatted for the Web reader and Internet connections requiring small file sizes, limited graphics, and limited or no sense of placement within the context of a publication. In other words, what may have been considered priority placement in print cannot be replicated on-line as pages are typically found by keyword searches rather than flipping through pages. Likewise, photographs and graphic images aren't always uploaded to the on-line versions of the publications; therefore, frames that may be identified in print visual images will not necessarily translate to an on-line publication. Studying the print publications may reveal additional frames.

It should also be noted that one particular piece from

The Chronicle of Higher Education, titled "After Frustrations In Second Life, Colleges Look To New Virtual Worlds,"46 elicited quite a response from the Second Life community. This article was published after our analysis was conducted and was not included in our results or discussion. It pointed out many of Second Life's shortcomings and concerns over its future use in education. It also cited many other upstart virtual worlds that the author felt may be the next home for virtual world education. Perhaps more interesting than the article itself, were the comments posted below the web version of the article. They consisted of a large number of Second Life educators providing examples of successful forays into Second Life education. Articles and comments such as these can serve to bring the debate over Second Life as an educational tool to the forefront and show that publications like those analyzed in this article provide an important forum for discussion of emerging technologies and practices in education.

## Conclusions

There is still a great deal to learn about how Second Life can benefit higher education. The findings of this study are valuable in establishing areas of possibilities and concerns for the potential of Second Life's use. Future studies may look to examine a larger sample of publications including popular press and educational technology trade press as the media coverage of Second Life increases. The student perspective on integration of Second Life is also important and deserves to be researched more thoroughly.

The research presented in this paper analyzed the discussion of using Second Life in higher education. Overall, this technology was positively received in the articles examined. When challenges were discussed, they were presented as part of the adoption process of new technology, and viewed as problems to be solved as opposed to preventing adoption. The dominant presence of the exploration frame suggests that Second Life is both a new technology with much to be examined and a tool that can encourage the exploratory aspects of the learning process. As is common among new technologies, Second Life appears to be in a largely experimental phase. What sets Second Life apart from other new technologies is that the experimental phase may never end. Exploration of possibilities may be limited only by learning's greatest resource, imagination.

## References

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1 J.M. Manness, "Library 2.0 Theory: Web 2.0 and Its Implications for Libraries," *Webology* 3, no. 2, (2006), http://www. webology.ir/2006/v3n2/a25.html.

2 Annalee Newitz, "Your Second Life Is Ready," *Popular Science*, September 2006.

3 R.W. White and W.P. Gronefin, "Enhanced Learning in an Introduction to Sociology Course," *Assessment Update: Progress, Trends and Practices in Higher Education* 16 (2004): 1-13.

4 L. Bennett, "Guidelines for Using Technology in the Social Studies Classroom," *The Social Studies* 1 (2005): 38-40.

5 Nancy Jennings and Chris Collins, "Virtual or Virtually U: Educational Institutions in Second Life," *International Journal of Social Sciences* 2, no. 3 (2008): 180-86.

6 Cynthia Calongne and Jeff Hiles, "Blended Realities: A Virtual Tour of Education in Second Life," (2007), http://edumuve. com/blended/BlendedRealitiesCalongneHiles.pdf.

7 D. Davis, Y. Yang, K. Peterson, G. Ritzenthaler, and T. Bustam, *A Content Analysis of U.S. Newspaper Coverage of Social* 

*Network Sites and Virtual Worlds from 2005-2007*, Gainesville, FL: University of Florida (2008).

8 R.M. Entman, "Towards Clarification of a Fractured Paradigm," Journal of Communication 43 (1993): 51-58.

9 Second Life. "What Is Second Life?" http://secondlife.com/ whatis.

10 David Kirkpatrick, "It's Not a Game," Fortune 2 (2007).

11 David M. Antonacci and Nellie Modaress, "Second Life: The Educational Possibilities of a Massively Multiplayer Virtual World (MMVV)," *Educause Connect* (2005), http://connect.educause.edu/library/abstract/SecondLifeTheEducati/43821; Second Life, "What Is Second Life?" http://secondlife.com/whatis.

12 P. Galagan, "Second That," T+D 62, no. 2 (2006): 34-37; L. Graves, "A Second Life for Higher Ed," *U.S. News & World Report* 144, no. 2 (2008): 49-50.

13 Stephen Bronack, Richard Riedl, and John Tashner, "Learning in the Zone: A Social Constructivist Framework for Distance Education in a 3-Dimensional Virtual World," *Interactive Learning Environments* 14, no. 3 (2006): 230.

14 Catheryn Cheal, "Second Life: Hype or Hyperlearning?" *On the Horizon* 15 (2007): 207.

15 Ibid.

16 P. Lester and C. King, "Analog Vs. Digital Instruction and Learning: Teaching within First and Second Life Environments," *Association for Education in Journalism and Mass Communication Conference Proceedings* (Chicago, 2008): 22

17 K.W. Bowers, M.W. Ragas, and J.C. Neely, "Assessing the Value of Virtual Worlds for Post-Secondary Instructors: A Survey of Innovators, Early Adopters and the Early Majority in Second Life," *International Journal of Humanities and Social Sciences* 3 (2009): 40-50.

18 A. Trotter, "Educators Get a Second Life," *Education Week*, no. 42 (2008).

19 Gary Anthes, "Second Life: Is There Any There There?" *Computerworld* (December, 2007).

20 Jeremy Kemp and Daniel Livingstone, "Putting a Second Life 'Metaverse' Skin on Learning Management Systems, "*Proceedings of the Second Life education workshop at the Second Life Community Convention*, Daniel Livingstone and Jeremy Kemp, Eds. (University of Paisley, UK, 2006), 13-18.

21 D. Stott, "Learning the Second Way," BMJ, no. 7630 (2007), http://www.bmj.com/cgi/content/extract/335/7630/1122.

22 W.J. Au, "What Is Second Life," *Second Fest* (2008), http://www.guardian.co.uk/secondfest/story/0,,2100568,00.html.

23 Kemp, "Putting a Second Life."

24 S.D. Reese, "Prologue-Framing Public Life: A Bridging Model for Media Research," in *Framing Public Life: Perspectives on Media and Our Understanding of the Social World*, S.D. Reese, O.H. Gandy, and A.E. Grant, Eds. (Mahway, NJ: Lawrence Erlbaum Associates, 2001), 11.

25 J.K. Hertog and D.M. McLeod, "A Multiperspectival Approach to Framing Analysis: A Field Guide," in *Framing Public Life: Perspectives on Media and Our Understanding of the Social World*, S.D. Reese, O.H. Gandy, and A.E. Grant, Eds. (Mahway, NJ: Lawrence Erlbaum Associates, 2001), 140.

26 D. Chong and J.N. Druckman, "Framing Theory," *Annual Review of Political Science* 10 (2007): 103-26.

27 J.W. Tankard, "The Empirical Approach to the Study of Media Framing," in *Framing Public Life: Perspectives on Media and Our Understanding of the Social World*, S.D. Reese, O.H. Gandy, and A.E. Grant, Eds. (Mahway, NJ: Lawrence Erlbaum Associates, 2001), 95-106.

28 Ibid., 96

29 Hertog and McLeod, "A Multiperspectival Approach."

30 The Chronicle of Higher Education, "About the Chronicle," http://chronicle.com/help/about.htm.

164

31 EDUCAUSE, "About Educause," http://www.educause. edu/about/16006.

32 J.R. Young, "The Mud-Wrestling Media Maven from Mit," *The Chronicle of Higher Education: The Academic Life*, September 14, 2007, http://chronicle.com/weekly/v54/i03/03b02001.htm.

33 A.L. Foster and B. Read, "Community-College Professors Grapple With Web Trends," *The Chronicle of Higher Education*, November 3, 2006, http://chronicle.com/article/Community-College-Professors/32242/.

34 M.A. Clark, "Genome Island," *EDUCAUSE Review* 43 no. 5 (2008), http://www.educause.edu/EDUCAUSE+Review/EDU-CAUSEReviewMagazineVolume43/GenomeIsland/163176.

35 C. Collins, "Looking to the Future: Higher Education in the Metaverse," *EDUCAUSE Review* 43 no. 5 (2008), http://www. educause.edu/EDUCAUSE%2BReview/EDUCAUSEReviewMagazineVolume43/LookingtotheFutureHigherEducat/163164.

36 Ibid.

37 A.J. Kelton, "Virtual Worlds? 'Outlook Good," *EDU-CAUSE Review* 43 no. 5 (2008), http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume43/VirtualWorldsOutlookGood/163161.

38 M.J. Bugeja, "Second Thoughts About Second Life," *The Chronicle of Higher Education: Chronicle Careers*, September 14, 2007, http://chronicle.com/jobs/news/2007/09/2007091401c/ careers.html.

39 S. Robbins-Bell, "Higher Education as Virtual Conversation," *EDUCAUSE Review* 43 no. 5 (2008), http://www.educause. edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume43/HigherEducationasVirtualConver/163162.

40. C. Calongne, "Educational Frontiers: Learning in a Virtual World," *EDUCAUSE Review* 43 no. 5 (2008),

http://www.educause.edu/EDUCAUSE+Review/EDU-CAUSEReviewMagazineVolume43/EducationalFrontiers-

Learningin/163163.

41 *Ibid*.

166

42 C. Collins and R.W. Millard, "Galapagos Islands in Second Life," *EDUCAUSE Review* 43 no. 5 (2008), http://www. educause.edu/EDUCAUSE%2BReview/EDUCAUSEReviewMagazineVolume43/GalapagosIslandsinSecondLife/163177.

43 A. L. Foster, "Professor Avatar," *The Chronicle of Higher Education*, September 21, 2007, http://chronicle.com/article/ Professor-Avatar/30018.

44 M.J. Bugeja, "Second Thoughts About Second Life," *The Chronicle of Higher Education: Chronicle Careers*, September 14, 2007, http://chronicle.com/jobs/news/2007/09/2007091401c/ careers.html.

45 S. Robbins-Bell, "Higher Education as Virtual Conversation," *EDUCAUSE Review* 43 no. 5 (2008), http://www.educause. edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume43/HigherEducationasVirtualConver/163162.

46 J.R. Young, "After Frustrations in Second Life, Colleges Look to New Virtual Worlds," *The Chronicle of Higher Education*, February 14, 2010, http://chronicle.com/article/After-Frustrations-in-Second/64137/

## Appendix

Frame	Percent of articles (n=number of articles)
Overcoming Challenges	71% (n=30)
Pedagogical Exploration	64% (n=27)
Green-light Endorsement	48% (n=20)
Logistical Exploration	26% (n=11)
Yellow-light Endorsement	26% (n=11)
Growth	24% (n=10)
Scholarly Exploration	21% (n=9)
Red-light Rejection	12% (n=5)

# **Additional Papers**

## I, AVATAR JVWE Interview: Mark Stephen Meadows

## Sarah Higley, Interviewer JVWE

Mark Stephen Meadows can truly be called a New Media polymath. Trained in the humanities—painting, writing, and philosophy—he has gained world renown for his work in interactive media that merges the fine arts with digital technology.



He has long been interested in artificial intelligence, natural language processing and 3D multi-user environments, helping to design one of the earliest such environments, along with Virtual Reality Mark-Up Language (VRML).

Widely traveled, he has exhibited, taught and conducted research in France, Holland, Ceylon and Iraq; founded the Internet and VR company "Construct";

and is recipient of awards from Ars Electronica and Cooper-Hewitt National Design Museum among many others.

He is the author of Pause & Effect: The Art of Interactive Narrative (2002); Tea Time with Terrorists: A Motorcycle Journey into the Heart of Sri Lanka's Civil War (2010); We Robot: Skywalker's Hand, Blade Runners, Iron Man, Slutbots, and How Fiction Became Fact (forthcoming in 2010); and I, Avatar: The Culture and Consequences of Having a Second Life (2008), a memoir of his experiences as "Pighed," exploring and socializing with other SL residents and designing and building unusually beautiful objects inworld.

The photos, all taken by Mark himself, "were taken in the spirit of Edward Weston's Western America photos" which feature the "new frontier, faces of those frontierspeople." This is especially appropriate for a book about a world Meadows compares to early Los Angeles.

Visit his page at http://www.markmeadows.com/

JVWE: What drew you into interactive and immersive media in the first place? And as an artist, what are their advantages for you?

MSM: Of course, technology and art have always been linked, whether it was camera obscuras and mirrors, or 3D rendering technologies and digital photography. So for me it was just a natural step in a normal direction. I still paint, as the tool always influences the work, but I try to combine media, like pencil plus computer, when I can.

The advantages technology gives an artist today mostly amount to speed. I can produce multiple renderings of the same face from different directions in 3D faster than I can if I do it using cell frame animations. I can hit Ctrl-Z in Photoshop faster than I can scratch lead off a paper with my eraser. So technology first helps me as it shrinks time. But more specifically, interactive and immersive media help me shrink space. I can trade work, experiences, conversations and art with people more easily in immersive environments, just as with the phone, or Skype, say. But, unfortunately, when we all use the same tool our work ends up looking weirdly similar, so I prefer pencil and pen to anything that includes a hard drive and a processor.

JVWE: The focus of the JVWE is education and virtual worlds. On the site for Mediamatic, Karen Van Es quotes your February 2008 talk, "Avatars as Self Portraits" (http://www.mediamatic.net/page/32199/en). If "exhibitionism, voyeurism, money and love" are motives for indulging either in Facebook or in a virtual world, how do you think these motives can be put to good use pedagogically? The traditional way that leaves the student feeling less than empowered, bored and trapped in a classroom where the teacher lectures seems to be on the way out. How could virtual education be "on the way in"?

MSM: Marshall McLuhan once wrote: "Anyone who tries to make a distinction between education and entertainment doesn't know the first thing about either."

Virtual worlds, social systems, and on-line games give us what we need in our daily life. Positive reinforcement, exploration, invention, close social interaction, fun, the ability to learn quickly in directions that interest us are all important to a healthy psychology. So it's not that we're addicted to games any more than we are addicted to water—we need what games give us, and so people use them often. Games and virtual worlds are supplementing something we're not getting from our daily diet of experiences, and much of that has to do with the kind of reinforcement, rewards, and risks we get for our behavior in games. More specifically, exhibitionism, voyeurism, money, and love are all, like positive reinforcement, big motivators. They're foundations to modern society's structure and in many cases those foundations don't need to be moved to be used. Students who are given the chance to exhibit their work, to view other students' work, to (perhaps) earn money, and to gain social interaction with other students who have similar interests might all be encouraged as methods for teaching. Virtual worlds and on-line interaction allow this.

Ultimately, making things fun and allowing a cycle of contribution, investment, and interest is key to getting people involved in learning. If we're not gaining, taking risks, exploring, and having fun, then learning is just memorization. I think the best teacher on this is Michel de Montaigne in his essay "The Education of Children." Though he wrote it in the 1500s, it's still on top today.

JVWE: We know from your book I, Avatar that you were an excellent listener and observer. Were you ever involved in any conduct that felt like teaching in your adventures in Second Life? Did you teach? (To build, to script, to survive, to cope...)?

MSM: Well, yes, and often. Much of the SL social structure was built around mutual education. We needed to spend time educating one another as colleagues and collaborators and in doing this we gained a bit of social credit which could later lead to fun work, or being invited to give a "talk" somewhere (usually in a kind of virtual amphitheater). What was great about this was the economy of intellect, in which it wasn't a hierarchical structure of professor and students, but a world in which all students were professors, and vice versa. The pleasure of teaching, after all, goes away if we're not also learning as we do it.

JVWE: To what extent do you think Second Life presents too steep a learning curve for the average user? There was quite a brouhaha over Jeffrey Young's February 4th article in The Chronicle of Higher Education ("After Frustrations In Second Life, Colleges Look To New Virtual Worlds": http://ow.ly/17Z6k). Likewise, Second Life's stated goals for their revised version 2.0/2.1 has stirred up controversy among advanced users as Linden Lab prepares to shift to a browser-based system (http://lindenlab.com/ pressroom/releases/06\_09\_10) and to court the Facebook user. Many resent the simpler and yet more intrusive interface (which hides or complicates more advanced commands), but it may potentially aid teaching with its development of "media on a prim." Despite the changes being made, do you think this could provide us with an even more powerful and accessible teaching tool?

MSM: Second Life and Facebook both came out roughly in the same year. One did great. The other seems to have faded into the caves and basements of geeks and coders. One of the main things that differentiate Second Life from Facebook is the nature of the interface. SL is 3D, Facebook is 2D. They are both social systems that create narratives around your avatar (be it a profile or a 3D, moveable image) and both of them are oriented around social interaction. But Facebook is far, far simpler and therefore more accessible. Secondly, in Facebook, you are supposed to connect with people you already know.

Not so in SL, where you meet people who are wearing masks, or could be from anywhere. This means that when people enter Second Life they are (1) unskilled in manipulating it and (2) don't know anyone. By contrast, Facebook brings you what you need and you just have to find people you know. So this is part of why Facebook has become so popular and Second Life was and is less successful at accommodating early and late adopter crowds. Young's criticisms were typical. "Wah! I can't move! I don't know anyone here!" (Logging off.) "That's enough for me! There's freaks in there!" And it came from a typically unsuccessful experience with what is a complicated system.

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Both parties have some valuable points of view, but ultimately it lies with the system designers to make something people can use, can understand, and can easily enjoy. And, from there, people can build. The key thing is that there is a choice you either offer ubiquity and ease of use to a large audience, with a lower level of entry and generally lower functionality, or else you offer specialization with a steeper and generally more difficult learning curve. The interface, for either FB or SL (with or without "media on a prim"), is going to be key to the product's acceptance, and anyone seriously involved in education or entertainment needs to be clear on the importance of it. Interface makes or breaks any virtual world.

JVWE: Is it "bad" (as many claim) that students might be exposed to sexual content, violence or griefing on Second Life? Or better to protect them in an Open Source? Some defenders assert that one of the advantages of SL over a closed simulation is that there is a wider world beyond the walls of the virtual classroom that can help train students in self-discipline. After all, students go off campus occasionally. Isn't a VW safer?

MSM: It depends on the kid and it depends on the parent and it depends on who is on the other end of a sex chat and why. But personally, I'd rather have my own kids learn via virtual sex than learn via real sex. Good and bad? I have no clue, especially in a world like ours, where different cultures allow different ages for legal sex, yet all of those cultures are linked via the Internet.

With that said, physical risk may be secondary to psychological risk, and the chances we have of learning in an environment that gives us confidence is more important than having access to everything. I've seen distasteful things that have left a permanent impression on my mind, and that is what informed me about what to avoid. I'm glad I wasn't shielded from them, too.

JVWE: Should an educator give her students **I**, Avatar as an introduction to Second Life? We know that the book is not about Second Life education, per se, but a discourse on the philosophical issues raised by adopting an avatar in a virtual environment. Would you consider your book of use to the student uncertain about taking a class conducted in SL? Or to a teacher uncertain about teaching one?

MSM: I wrote the book as I have written my books (*Tea Time*, 2010; *We*, *Robot*, 2010) on interviewing terrorists or robots. I went and lived in that world, and brought back lessons, so that other people would not have to. In that case, yes, I think it serves as a good foundation for most anything relating to avatars and virtual worlds. The only reason not to read the book before teaching the class is because the teacher may decide to work in SL rather than the school where they are teaching.

JVWE: You are quoted by Van Es as making a distinction between games and virtual worlds, asserting that while a game emphasizes rules, virtual worlds represent "roles." What role would you counsel teachers to take in Second Life with respect to their students?

MSM: Teachers? I mean, the agreed context is what defines the role between people, and it's something that's agreed to and practiced. So the teacher can be anything provided the students are interested in learning. Maybe the simplest place to start looking is at the architecture the avatars are surrounded by. If it's a shiny spaceship with books on the wall then the roles are different from it being a disco sex-club.

JVWE: You made this distinction in early 2008. Would you now revise your identification (on page twenty-four of I, Avatar) of Second Life as a "game"? What is your broader sense of "game"?

MSM: I think of SL as a virtual world, rather than a game. However, as for that labyrinthine word "game," I can't do more than set a foot in there, but I *can* say that it is closely linked to learning. A game might just be a method of learning with positive feedback. I know I learned more from programming via video games than I did in programming classes.

JVWE: You've spoken of the "mask," the persona. This is probably a loaded question, understood mainly by academics that have strong feelings about "presence," "appearance" and "authority." Artists, writers, builders may have other feelings. And then again there are the sciences versus the humanities, the postmodern critics versus the ESL teachers, and on and on.

MSM: Yes, and I think that it merits repeating that masks have only recently come to represent something that covers us up. Functionally, a mask shows what is underneath psychologically. We have to remember that in virtual worlds, always.

JVWE: Speaking of masks, then, and the need to create one, what do you think is the major hurdle that the average person must overcome in seeing Second Life or other virtual worlds as an important arena not only for business or social interaction, but for self-development, self-expression and self-knowledge? MSM: Themselves. When you enter these worlds you are simply asked to pick an identity. That's very hard to invent.

JVWE: You have really only one paragraph in I, Avatar (in a chapter titled "How Avatars Affect the Real World") where you address the impact of education on Second Life (p. 70). You mention notable teachers like Noam Chomsky and Laurence Lessig who have "made guest appearances in... old-school, Socratic-style presentations." Educators today find that importing old school methods (desks, white boards) are essentially unproductive in virtual worlds. How could architecture and role-playing make use of this medium more effectively in teaching environments? Were you to write your book today, would you expand it to include a chapter just on education?

MSM: Oh, sure. More than that, even. First, I prefer to abstract education from the classroom, and note that it surrounds us. We can learn from dead crabs on a beach, from traffic patterns we see from a rooftop, from specks of food on the kitchen floor. A good teacher is more a tour guide than a standup performer.

So we can find great things to learn everywhere, and in virtual worlds, this is certainly the case as well. I don't understand why desks need to be built in a virtual classroom, when coral shoals underwater or clouds up high could also be used. But let me step back a bit and ask, "Why do students sit around and stare at a teacher in a virtual world when they could be staring at the topic being learned?" Which is more interesting for students, staring at a teacher drawing a crab and labeling it on the chalkboard, or finding one on a beach and dismantling it personally? Which experience will create stronger memories? The model The Journal of Virtual Worlds and Education

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of the lecturer/listener should be investigated, since, to put it simply, it's usually pretty boring.

If we must have lecturers, let's make them interesting and inexpensive. I would like to see a system in which autonomous avatars are available, at any time, for all students, to answer questions and to reply to comments, to offer new material and to guide, on a general level, student inquiries. Then the student has time to do what he or she enjoys, what rewards them, and occasional meetings (or "classes") can be held so that the teacher can refine this work and offer new insights.

I'm suggesting we have robots for teaching assistants, and that this be done via virtual worlds. I have worked for over fifteen years on this concept of autonomous avatars. In short I have spent most of my life developing conversational systems that allow a personality to be distilled into a kind of advanced "chatbot" so we can now take the writing of an author and make that interactive. Platonic dialogues take on a whole new twist. We can distill what Lincoln said and make it interactive. We can now create non-player characters customized to individual students. I've started two companies that do this, and have worked with teams of up to 30 people on this research, so I would love to see it implemented some day and hope someone invites me and my crew to work with them on a project of this sort.

JVWE: That is an amazing concept! We look forward to seeing the results of such an experiment, and perhaps your discussion of it in your forthcoming book, We, Robot. One final question: what are your thoughts about the notion that creating one's avatar may alter how one is perceived (and how one perceives others) in a virtual classroom? Do you believe the ability to mask one's identity, or the opportunity for creative expression of self, provide for a positive learning outcome? Or will we find students organizing themselves into identity groups, much as we do today in real life settings—i.e. furries with furries, Goths with Goths, and so on. Do you anticipate a social hierarchy based on appearance?

MSM: I think both—all—of these are happening, and are the case. The Internet and virtual worlds are an explosion. Some of us spend time moving in one direction, others in the opposite direction, some at the fringes are moving fast, some in the center move more slowly. But we all share some common sense of change, and of how we cannot stay where we are, and this puts us all in the same boat.

Change, and the accelerating rate of change, is what we share in common these days. And that means that we need to allow creativity, flexibility, and experimentation, and to allow culture and custom to emerge in groups naturally, with reason and kindness, and re-invent our traditions, as civilizations have always done. Herodotus did more or less the same thing I did in Second Life (only without the war). He traveled around, documented what was going on, and pointed out that cultures begin and fade, that identities rise and fall, and that ultimately this dialogue is what creates civilization. Just like Los Angeles in the 1930s, these virtual-world fringe cities are full of people establishing methods of living and interaction and education. And how we now approach education is, again, a dialogue that has been blown wide open.

## **Bridging Community Boundaries**

by

Margaret Corbit Cornell University

In March 2009, more than 60 people gathered for two days to share their experiences in designing and using on-line multiuser virtual worlds for Science, Technology, Engineering and Mathematics (STEM) learning. The objective of the NSF-funded workshop, Taxonomy of Virtual Worlds for Education, was to bring together a group of practitioners (especially teachers and students), researchers, and technology providers to brainstorm the ideal virtual world software system(s) for STEM learning. In general, the software options were already varied and extensive. According to the Federation of American Scientists' Virtual Worlds Wiki, there were seventy products and projects as of February 25, 2008. And the numbers are constantly growing. In November of 2009, the site listed 160 worlds. And the Wiki has evolved into an Almanac (http://vworld.fas.org/wiki/Main\_Page).

Many efforts are underway to encourage open standards for the 3D Internet, and interoperability among these various systems. Most of these initiatives seek an educational revolution from the top down. Now is also the time to engage the educators, to set realistic goals, and to identify the next steps that will support classroom reform. The goal of the Taxonomy of Virtual Worlds for Education workshop was to ensure that the next phase in the evolution of the medium be informed from the beginning by this user community. There has been very little communication across user communities for different environ-
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ments. Each educational program has chosen its environment based on solid and serious decisions. Considerations include look and feel, richness of affordances, privacy, ownership of content, access to servers, demand on user hardware, and bandwidth, to name but a few. Thus participants were recruited across platforms and from among experienced students, educators, educational program providers, evaluators, and technology researchers. Each contributed her or his own perspective.

Educators have found from experience that each system has both attractive and unattractive features when considered for use in educational settings. This workshop was intended specifically to flesh out the landscape of educational virtual world applications. What would the ideal system for educational applications look like? In particular, what are the best ways to manage tasks specific to education? Social interaction, student assessment, teacher support and development? Additional issues included access, usability, software/server architecture, intellectual property, user identity and security, and more.

Educational users and researchers have created plugins and devised workarounds for the shortcomings of each environment. Each of these represents a feature that could be incorporated into next-generation platforms, or designed as interoperable plugins. This approach will necessarily also inform industry and open source developers, and identify a second tier of tools (yet to be developed) that can be designed for cross-platform interoperability. These tools will include applications to support educators' assessments, evaluation of inworld activities, and cataloguing of available "learning objects". Hopefully, the workshop discussions will help inform the development of the next generation of systems for education.

Over the course of the two-day workshop, the group reached consensus on the need for useful resources for educators wishing to integrate this new medium into their programs and on a baseline list of priority features for decision makers. However, a specific, structured taxonomy remained beyond the capacity of the communities participating, for a number of reasons outlined at the end of this report.

### Stakeholder Communities

As stated previously, we wanted to ensure that we engaged a diverse community in the discussion. To this end, we recruited actively and successfully across the various groups of stakeholders. The organizing committee thus represented the K12, research, and developers' communities. Nearly sixty people participated in the workshop. Many of the participants have played many roles over their careers, from developer to researcher to hands-on educator, and thus potentially represented more than one stakeholder group. In an informal survey, at least one third of the participants indicated that they had at least ten years experience in the medium. Most have experience with more than one platform.

The following stakeholder groups were recruited from and represented in the workshop community:

• Developers of open source and proprietary software environments (7 platforms)

• Researchers involved in developing and evaluating educational applications (21 participants)

• Educators actively engaged in virtual world programs at levels from elementary through high school—several of these programs also engage college level students—for both formal and informal settings (10 participants)

• Individuals in the other (O) category include: information technologists concerned with repository development, archiving, and modularity; museum educators; and other experts in the field (12 participants) • Young persons with firsthand experience using virtual worlds (9 participants)

• Parents of youth program participants. (1 participant)

### **Preliminary Work**

In preparation for the workshop, the organizers worked to identify a list of features, affordances, and capabilities derived from across the spectrum of systems available, and then tried to create a multidimensional matrix and/or suite of matrices that could be used by STEM educators as they search for appropriate software solutions. Ideally, we hoped to create a taxonomy that can be used as a tool for this decision making process. We consulted with information scientists and a statistician to identify in advance to help design a flexible system to use for this purpose. We based our initial compilation of features on the 2008 structure of the FAS Virtual World Almanac (then known as the Virtual World Wiki).

At the peak of our preparatory discussions, we had 107 features and struggled to come up with the best terminology for identifying them. Should we identify them as features, properties, characteristics? And how do we organize them into a meaningful structure? While we presented a preliminary structure, much of the workshop discussion was dedicated to refining this in a way that was meaningful to the group—a necessary step in building consensus.

Registered adult participants were asked to participate in an on-line survey that asked them to rank sixty-six selected properties in terms of their importance to the educational use of virtual worlds. Thirty-five participants (75% of the non-student participants) completed the pre-workshop survey. In the initial survey, we grouped properties into categories: security, communication, social management, navigation, and creativity. Participants were The Journal of Virtual Worlds and Education

asked to rank each property on a five-point scale from essential to not important.

Only one property, the ability to work offline, was not ranked as very important or essential by at least 50% of respondents. Therefore all properties presented seemed to have significant buy-in from the survey participants. Properties supporting creativity stood out as important in the preliminary survey results. The security property that stood out in voting was the ability to assign a unique user ID. User management tools and standard chat and avatar properties scored highly. Keyword search, and a navigation property poorly supported by existing systems, also received a high ranking.

Respondents to the preliminary survey were also invited to suggest additional properties. Nearly all of the properties suggested by the respondents were related to object reuse/interoperability and system management—for example, text-to-speech capabilities, the potential for managing integrated identity (allowing the user to maintain his or her identity across worlds and Web 2.0 applications), and the concept of whether a platform supported multiple clients (for desktop, handheld, and so on). The categories used in this preliminary survey informed the conversation during the workshop.

#### Workshop Sessions

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Workshop sessions focused on technologies (virtual world platforms) first, and then educational applications of these technologies.

Activities rotated from brief introductory talks in plenary session to hands-on computer lab demonstration sessions (Zoos), followed by small group breakout discussions and summary plenary discussions and presentations.

### Virtual World Platforms: Introductions and Zoo

The first day focused on a variety of virtual world technologies. Presenters included:

- Rick Noll, ActiveWorlds
- James Bower, Whyville
- (Ryan McDougall, realXtend, was unable to attend)
- Bruce Damer, Digitalspace
- Nicole Yankelovich, Wonderland
- Julian Lombardi, Open Cobalt
- James Sink, Avatar-Reality

Afternoon breakout sessions each included a representative mix of adult participants. (Based on input from the adults responsible for the various youth participants, we provided them with alternative options on which they would report at the final session.) Leaders began by discussing the various platforms in terms of the properties included in the preliminary surveys and then moved more deeply into discussion of the purpose and goals of the workshop and how to prioritize efforts. Breakout Group reports informed the evolution of the discussion of the taxonomy.

The voices of the stakeholders show clearly in the notes from the first round of breakout discussions as they shared their concerns, expressed concrete needs, and began to identify key issues of a classification system.

In reports from group leader's extracts, the following general points emerged:

"The question is no longer 'Can we do this?' but 'What tools do we need to do it well?"

The participants came "to see real faces with real names and talk across platforms—to maximize ROI, learn about assessment,

and drive discussion from the users."

They identified three prime reasons to create a taxonomy or classification:

1. "To understand a specific virtual world without having to use it for several months."

2. "To select a virtual world for a specific purpose."

3. "To make informed comparisons from the users' perspective."

### Assessment and Research Tool Presentations

A dinner panel on Day One focused on the issue of assessment and the development of useful approaches for both research and classroom applications. This discussion informed the exploration of educational applications using virtual worlds on the second day. Panelists included:

- Jennifer Wofford, Moderator, Cornell University
- Sasha Barab, Indiana University
- Diane Jass Ketelhut, Temple University
- Cathy Norton-Barker, Cornell University
- Devan Rosen, University of Hawaii

### **Educational Applications: Introduction and Zoo**

The second day of the workshop began with exploration of many STEM education projects that leverage the platforms demonstrated on Day One. Presenters included:

- Sasha Barab, Quest Atlantis
- Ray Ferrer, NYHOS SciFair
- Yasmin Kafai, Whyville
- Diane Jass Ketelhut, River City and SAVE Science

- Suzanne Kolodziej, SciCentr
- Lorraine Parker, WITS
- Dick Reidl, AET Zone
- Michele Roper, Discover Babylon
- Rob Rothfarb, Exploratorium
- Peggy Sheehy, Teen Grid

#### **Building Consensus**

At the beginning of the workshop, the organizers charged the group with devising a useful descriptive structure through which potential users could work to identify the appropriate tool and/or platform for their application. Initially, each stakeholder group came to the discussion with its own bias. In the breakout plenary discussions, the group began to focus on the educator as the end user for the taxonomy. The preliminary list of properties was posted in the plenary meeting room, and participants were encouraged to consider it during breaks and group discussion. In response to community input, the organizers revised the list and broke it down into a higher level list of items (11 and "other").

At the mid-day break on Day Two, all participants were asked to prioritize these features through voting. Participants were each allowed to self-identify with one of three stakeholder groups: Developers, Higher Ed Researchers/Program Designers/Other, and Educators. Each participant was given ten stickers with which to vote on the important heuristic features that emerged from plenary sessions. Voting was a requirement prior to receiving lunch.

#### **Final Plenary Session**

The final plenary session included reports from the second session of the breakout groups and reflections from three youth

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groups. The youth groups had been supported throughout the program by volunteer adults, encouraging them to document, participate in, and reflect on the proceedings.

Reports from the breakout groups moved from issues of platform and technology to educational applications and tools. All three groups shared concerns about:

• Interoperability and reusability of existing and future content

• Archiving and metadata of "learning objects"

- Useful tools for educators to access these resources
- The importance of training and support for educators

• The importance of engaging educators in the early stages of technology development

• The potential for identifying exemplary content, curricula, and systems to serve as general design models

• The tension between the interests of the proprietary platforms and the need for such efforts

Finally, two groups expressed concern that the workshop was US-centric in a field that is truly global. (It should be noted that representatives of both Habbo Hotel and realXtend, European virtual world developers, were registered, but dropped out at the last minute; but also that, unfortunately, the community in Asia was not approached.)

### Out of the Mouth of Babes

During the final plenary session, teens from Global Kids presented recorded interview with workshop participants and shared their reflections. They made the excellent point that the different stakeholder groups were all saying the same thing in different ways and needed to learn to listen to each other. This is the major outcome of the workshop. The graphic below shows the overall results from the voting that took place earlier in the

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day. The need for "community" topped the list for all voters.

Overall, fifty-nine individuals cast 587 votes: 150 by developers, 180 by educators, and 257 by the researcher/other group. Voters were encouraged to load a property if they felt it was important and/or not receiving attention.



This is a very small sample and a very informal, certainly unscientific, survey. However, the graph does seem to suggest disconnects across groups. Developers, who create the medium, do not seem to feel that "presence" is important. Is this because they don't understand the use of the term? Researchers appear to be more concerned about "security" than the developers. Is this a reflection of the pressure to comply with IRB requirements, or does it reflect a disparity in belief in our ability to provide secure environments?

#### Reflections

All participants at the final plenary session agreed by show of hands that a follow-up workshop in one year would be a good idea, and that they would be interested in attending. There was some discussion about the Rochester Institute of Technology hosting a follow-up event. Such an event could focus on the gaps identified in the voting, with each stakeholder group giving presentations and leading discussion. For example, researchers could open and support a discussion on the concept of "presence".

Another valuable outcome of the workshop was the recommendation to continue to work with a group-defined set of properties so as to facilitate discussion across disciplines. It is clear the properties used to describe virtual worlds should be grouped and weighted in the order identified for each audience in the initial configuration of the tool by audience. Users should have the capability to select or eliminate properties and to make them "more or less important" in a simple way. Platforms should be described separately from applications and the educators should be allowed to determine which applications will be considered educational. (The list should remain inclusive). Participants called for brief overview descriptions of any virtual world incorporated into the tool system.

The FAS has agreed to incorporate the results of the discussion into the evolution of the Virtual Worlds Almanac. However, the lack of data remains a major challenge. Without data any tool is useless. For example, on November 24, 2009, FAS listed 160 virtual worlds. Land ownership is a topic or feature of an environment that has received a good deal of attention over time. Of the 160 worlds listed, there was data on this property for only 24 of the world systems. People are excited to list the latest entry into the realm of virtual worlds but seem less willing to take the time or do the research to provide complete data on that entry. How do we motivate people to contribute data and keep the tool up to date? Can and should the research community take on this task?

# Sim Review: Eagle Island

by

## Marcia Owens Kloepper

Auburn University, Auburn, Alabama

### Ed Zweiacher,

Redlands Community College, El Reno, Oklahoma

### Pat Curtis

Auburn University, Auburn, Alabama

### Amanda Evert Redlands Community College, El Reno, Oklahoma

It is very difficult, if not impossible, to schedule real-life food processing facility tours. The design for Eagle Island is to provide a richer and more engaging learning experience than traditional brick and mortar campus settings can provide. Eagle Island can share space, provide interaction in real-time and be available around the clock for global accessibility. The Island has been built based on actual facilities, with creative liberties taken.

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Auburn University (AU), in Alabama, has a designated Department of Poultry Science. Redlands Community College (RCC), in El Reno, Oklahoma, has an innovative animal science program but no poultry. Collaboration between the two institutions has given RCC students an opportunity to learn about the poultry industry virtually. RCC utilizes Eagle Island to augment classroom presentations and and encourage critical thinking.



The footprint of the Microlab is based upon an active research lab at AU. You can learn about Food Safety, Recalls and alert information here. Have you ever wondered just what E. coli, or Salmonella bacterium look like? "Eduboards" provide some information about these and a virtual microscope provides a glimpse of bacterium. Eagle Island provides visitors with a free virtual lab coat to keep and wear whenever you choose. The Processing Facility shows the complexity of engineering that is needed by the industry for safe and proper delivery to your retail store. Signs are placed throughout this area to describe each step.

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Did you know that in real-world facilities, federal inspectors are on-site, ensuring the food meets government mandates and laws? A systematic approach to the identification, evaluation, and control of food safety hazards exists. Hazard Analysis and Critical Control Point (HACCP) is a way to document the analysis and control of biological, chemical and physical hazards from raw material production to the finished product.

Because no two processing facilities are identical, creative liberties were taken to depict a processing line. Have you ever wondered about what happens on the inside of a hen that enables her to lay an egg? The Virtual Chicken Amphitheater shows the video: *Virtual Chicken: Phase 1, The Female Reproductive Tract of a Hen.* Created at AU, this anatomically-correct educational resource was created by a USDA HEC grant, number 2003-38411-13479. Scientists and scholars provided expert information from a teaching point of view, and technical professionals used technology to create this tool for end-user accuracy.

The Virtual Chicken Museum compliments the movie. These are larger-than-life three dimensional models of the oviduct and various stages of the development of the egg. The museum is amazing to see for all its educational value, but also for the efforts that have gone into this project by the technical developers and the faculty and staff involved.

Virtual worlds would not be complete without some way to link to web resources outside. Platforms with signboards share URLs that can be accessed from a browser window. Those sites included on the platforms support the purpose of Eagle Island. LOI Hall—Landmarks of Interest—allows us to showcase other Second Life places that compliment Eagle Island.

Our Beach was specifically added because we all need to get away every now and then, and serves as a nice setting for some casual, informal, yet academic discussions. Gathering and conversing is encouraged on Eagle Island. It has meeting spaces available to anyone, anytime.

MrE's Lodge has already hosted some lively discussions between RCC and AU. It is here that MrE is moderator and host to his RCC students, and faculty and technical professionals from AU.

A visit to the Red Roof Dawghouse will enable you to view the poultry processing video. This is the work of a professor from a third university. It is with permission and in his honor that the "Dawghouse" was built.



*The Eagle Sculpture on the southwest corner of the island is a clear landmark for the wide and spacious Welcome Area.* 

The Egg Processing Facility is based upon an actual eggbreaking business in the Eastern United States. It shows incoming flats of eggs, their transfer, and the movement of the flats into the washing, candling and quality-check room. You probably know how to break one egg at a time. Have you ever thought about how hundreds of eggs are mechanically broken? The virtual egg-breaking room highlights the way this is done at a very high speed.

Institutions across the United States continue to do research on providing safe, wholesome and high quality products. Hence buildings here are called the Research Unit, not "The Farm". The buildings have been modeled after actual poultry houses. Generally they are surrounded by dense forest or high berm for biosecurity reasons.

Eagle Island is a Second Life environment geared to educate visitors about food production activities and processes from farm to fork, in ways that make visitors feel comfortable, that allows them to move about the space as they wish, and that provides them with information about farming and food safety in a unique and easily accessible way.

Learn more about Eagle Island at http://slurl.com/secondlife/ Eagle%20Island/232/18/28. You can also see a YouTube video on the Island at http://www.youtube.com/watch?v=DRI-0BU8gb0.

## RIT Island Teaching Projects: Spring 2008/2009

by

### Katie MacDonald

Rochester Institute of Technology

On-line Learning has sponsored a variety of teaching projects on RIT Island throughout the 2008/2009 academic year. These projects have ranged from using the facilities already available on the island—for example, the amphitheater and learning pods—to creating a specialized educational environment in Second Life for a specific class activity. These projects are both large and small in scale, depending on the activity. On-line Learning has provided development support for certain projects and those can be found on the back half of RIT Island, in the Fields of Innovation area.

#### **Teaching Projects**

#### Multi-Threaded Client/Server Chat Visualization

The purpose of this project is to visualize multi-threaded client/server communications. The demo allows students to visualize the sequence of events, so as to better understand the code involved. In the basic mode, the student is introduced to how the demo works, and they focus purely on the interaction between the clients and the server. In the advanced mode, the student can make the connection between the action that is occurring and the code that corresponds to that action. The project allows students to pinpoint the exact piece of the code that they may be having trouble with, in order to





correct their own client/server chat program.

This project was developed in collaboration with Professor Michael Floeser for Information Technology and was used in the Java Programming III course (20083.4002.219.02/70).

**Computer Animation And Algorithms** 

The purpose of this project was to investigate the possibility of teaching a course in computer animation within a virtual world, where the students could see live demonstrations of the concepts they would be learning, as well as practice the skills required in homework assignments in their own sandbox area. This allowed the students to apply the knowledge from the course directly in hands-on activities in Second Life. This project was developed in collaboration with Professor Joe Geigel from Computer Science and was used in the Computer Animation and Algorithms course (20083.4003.572.39).

#### **Major Survey Findings**

• 83 percent of students had little to no previous experience using Second Life prior to the start of the course.

• 63 percent of the students were satisfied with the Multithreaded Client/Server Chat activity in the course overall.

• 90 percent of the students in the Computer Animation and Algorithms course were satisfied with the use of Second Life overall.

One student commented, "The best thing I liked about SL is that it made all assignments and projects easy and applicable in a real-time rendering environment," in reference to the use of Second Life in the Computer Animation & Algorithms course.

Another student commented, "This was actually the best educational use of SL I have yet seen. Professor Floeser had a complex presentation that essentially used SL as a fancy whiteboard for explaining concepts," in regards to the use of Second Life in the Java Programming course.

### Student Survey Results

The students enrolled in both the Java Programming III course and the Computer Animation and Algorithms course were each surveyed following their use of Second Life. Of the fifty-nine students in these courses, eighteen responded to the



survey, which is a thirty-one percent response rate.

The initial demographic questions on the survey showed the students who participated in these courses were from a variety of year levels at RIT. The largest percentage was fourth year students, but this group was not much larger than the relatively evenly distributed percentages from other years.

Some of the students who choose the 'Other' option noted that they were graduate students. These students would be considered either sixth or seventh year students. All of the students in these two courses were hearing. Initially there was a deaf/ hard-of-hearing student enrolled in the Computer Animation and Algorithms course, but the student dropped the course early



in the quarter due to other commitments. The dropping of the

course was unrelated to the use of Second Life.

Because of the enrollment of this student in the course, even for a short period, On-line Learning prototyped and successfully implement a solution for live captioning within Second Life to be used for lecture situations.



Eighty-three percent of the students had little to no previ-

ous experience with Second Life prior to the start of the class. A small group had more than one year of previous experience with Second Life.

#### Java Programming III Likert Question Review

Similar to previous survey results from this course, a large number of responses received for the Likert scale questions on this survey were, "Not Applicable." This is true even for questions that could apply to all students taking a course using Second Life in any way. This may be the result of students not engaging in Second Life activity during the course, but instead only watching it being used by the instructor for demonstration purposes in the class.

From the responses that were received from students in this course, thirty-eight percent expected to have a steep learning curve when they began to use Second Life, but only twenty-five percent reported having technical problems. This supports the idea that Second Life seems more difficult to use than it really is. Sixty-three percent of respondents thought the orientation area on RIT island was helpful to them when they were first learning to use Second Life, and fifty percent found Second Life to be an easy tool to use.

The student-instructor interaction or student-student interaction did not seem to be improved by the use of Second Life in this course. Most students responded "Not Applicable" to the questions, "I interacted with the instructor more than I do in most courses because of the use of Second Life," "I interacted with other students in the course more than I do in most courses because of the use of Second Life," and "I know my classmates better than I do in most courses because of the use of Second Life." Each of these questions received the same responses, fifty percent responding "Not Applicable," while the rest split evenly between "Agree" and "Disagree."

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Even though the interaction in the course was not improved by the use of Second Life, the activity did seem to help students learn the concepts that were being explained. Thirty-eight percent of students disagreed that they spent more time than normal on the activity because it was done in Second Life. Thirty-eight percent also felt more engaged in the activities in Second Life and sixty-three percent said the on-line interactions in Second Life helped them learn more. Fifty percent of respondents agreed that the addition of the Second Life activity improved their learning experience, and helped them to better understand the concepts being covered. Overall, sixty-three percent of respondents were satisfied with the use of Second Life in the course, and seventy-five percent said they would take another course in the future where Second Life was used.

### Computer Animation & Algorithms Likert Question Review

Differing from the responses to other courses, the majority of students in this course disagreed that they expected Second Life to have a steep learning curve (60%). Sixty percent found the orientation area on RIT Island to be helpful, and Second Life an easy tool to use.

Since these students have a strong technical background, most did not encounter technical problems when using Second Life. Sixty percent of students agreed the interaction between students and the instructor seemed to be increased with the use of Second Life in this course. However, the amount of interaction between students in the course was split evenly. Fifty percent agreed it was more than in most courses and the other fifty percent disagreed with the statement. The engagement involved with the Second Life activity also seemed to be split evenly between



those that agree and disagree.

Fifty percent of students agreed and fifty disagreed that they spent more time than necessary completing assignments because of the use of Second Life. This question is significant for this course specifically because the students were pushing the limitations of the built-in scripting language in Second Life with the animation techniques they were implementing in class assignments and projects. The nature of the course and their projects for some students caused more difficulty when completed within Second Life. Some students decided to complete class assignments outside of the Second Life platform because of these limitations and therefore were required to create short videos of their work that could be displayed inworld for the class to see. Depending on the student this could have greatly affected their



responses to this question.

Seventy percent of respondents agreed that the on-line interactions in Second Life helped them to learn more. Similarly, sixty percent said the addition of Second Life activities improved their learning experience, and fifty percent said the activities helped them to better understand the content that was being covered.

Overall, ninety percent of respondents were satisfied with the use of Second Life in the course. This response along with the other responses received clearly shows that the incorporation of Second Life into this course was very beneficial for the students. Eighty percent of respondents said they would take another course using Second Life and seventy percent said they would return to RIT Island outside of class requirements.

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Two additional questions were asked of students in this course because of the specific activities that took place within Second Life. First, students were asked if they thought the RIT Amphitheater area was a good place to hold class lectures in Second Life. Ninety percent of the comments were happy with the location for lectures. A few of the positive comments included:

• "Yes, the slides were visible and I could hear the instructor ..."

• "Yes it was a good place to hold lectures."

• "Yes, it was very convenient."

Other responses included:

• "... I would prefer pre-recorded lectures rather than having to attend class at a specific time"

• "Yes, but some security against griefers might be a good idea to implement"

• "It seems strictly worse than a real classroom because it has everything a normal class would have but it's in Second Life"

Some of these comments refer to an incident during one of the lectures where another avatar was disruptive to the class.

For the first time at RIT, live captioning was provided for some of the lectures held in Second Life for this course. This was initially coordinated because a deaf/hard-of-hearing student was enrolled in the course. The student dropped the course very early in the quarter; however, On-line Learning still wanted to know what the students thought of the quality of the tool and how it added to the lecture. Therefore, students were asked if they found the live captioning to be helpful to them during the class. Sixtyseven percent responded that it was helpful to them, including these comments:

• "I am a hearing student so I didn't really need them. Occasionally they would help if I missed a sentence or two."

"To some extent, yes. But I didn't need it."

Other students found the captions to be unnecessary since they were not deaf or hard-of-hearing. One commented that the quality of the captioning could be improved:

"It was a big glitchy and could be improved"

### Computer Animation & Algorithms Likert Question Results

#### **Open-Ended** Questions

Below are responses to open-ended questions by all respondents. However the categories of responses were broken up by the respective courses since the uses of Second Life were so different between the two situations. Students were asked what aspects of the activities performed in Second Life they liked best.

Eighteen percent of the responses liked the use of Second Life in the Java Programming class because it helped them visualize concepts they were learning. Thirty-five percent of the responses commented that the environment of Second Life itself was a good place to offer the Computer Animation and Algorithms course. Students were also asked what portions of the activity in Second Life could be improved upon for future versions of the course.





Thirty-one percent of students in the Computer Animation and Algorithms course commented that the limitations that they faced using the built-in scripting language in Second Life (Linden Scripting Language) should be addressed for future versions of the course. Twenty-three percent of the respondents in the Java Programming course had generally negative comments about the use of Second Life, but did not provide specific details



on what could be improved.

Students were also asked if they felt anything was missing from RIT Island that they would like to see developed in the future.

Twenty-five percent of students responded that they were happy with the island in its current state. Another twenty-five percent mentioned ideas that related to more sandbox areas on the island.

The students in both courses were asked as well whether they had encountered inappropriate behavior on the RIT island. Unfortunately, we can see that a small group of students did experience this type of activity during their time on the island. There were two acts of griefing during the quarter that affected each of the courses one time. The griefing activity was the same type of disruption in both situations, so we believe it was carried out by the same individual. The incidents did not require the class activity to end unacceptably, but caused a distraction for



both the students and the instructors.

### **Faculty Survey Results**

Both of the faculty teaching in Second Life this quarter were asked to respond to a short set of questions regarding their experiences teaching in a virtual world. Professor Joe Geigel noted, "most of the students were pretty excited" when they found out the course was going to involve Second Life. He also mentioned that his course was listed in a way that students knew at the time of enrollment that the course was going to be using Second Life. 210 The Journal of Virtual Worlds and Education

Therefore, some students who might have been be more cautious about using Second Life may not have enrolled in the course.

When asked about how engaged students were with the class activities in Second Life, he noted, "there was a novelty around doing stuff in Second Life which contributed to a sense of engagement." Second Life allowed Professor Geigel to "do inworld [demonstrations] that would be difficult or impossible to do in a physical classroom." This specific component of the class is highly valued by both the professor and the students in the course. Says Professor Geigel, "I feel that the ability to augment lectures with these demos really enhanced the learning." He also mentioned that the interaction between instructor and student, and between students themselves, was improved in Second Life because it "allowed for immediate feedback on projects and assignments which were demonstrated by students inworld."

The main limitation of teaching this course in Second Life was not related to the delivery of content, but to the technical backbone of Second Life, the Linden Scripting Language (LSL), which students were using in their projects and assignments. If Professor Geigel were to offer this course in the future, he "would have to redesign the assignments to work better with LSL."

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