HORIZONS

VIRTUAL WORLDS
best practices in education

2016 Proceedings

Celebrate ten years with us...

MARCH 29 – APRIL 1, 2017

We find ourselves on the cusp of a changing technological landscape, including a host of new immersive environments all positioning for the next generation of VR.
We are in a unique position to take stock of where we have come from and how we want to position ourselves for the future.

This is the calm before the storm.
This is the conservation of energy before the metamorphosis.
This is the point in time where we make all the core decisions on who and what we want to be in the future.

VIRTUAL WORLDS
best practices in education

This is our LEGACY.

Your passport to establishing a lasting legacy in virtual worlds starts now.

Join the mail-list at http://vwbpe.org

* Play * Explore * Engage * Immerse * Learn *

Editor's Edifice

The *Journal of Virtual Studies* publishes a special edition once a year for the Virtual Worlds Best Practices in Education conference proceedings. All papers were peer reviewed with the same level of care as journal papers typically are, convening an additional special editorial staff to assist in the process.

This edition has a running **Horizons** theme. It also includes a special feature paper by Dr. Karl Kapp (see "Convergence of Gamification and Virtual Worlds" on page 12), who has authored or co-authored six books including "The Gamification of Learning and Instruction" and its accompanying how-to-book "The Gamification of Learning and Instruction Fieldbook" as well as the book "Learning in 3D" about virtual worlds for instruction. He exemplifies looking toward that horizon and extends the possibilities of engagement in his work, and in his research.

Our peer reviewed papers likewise show such a diversity of enterprise for education across different communities: advocacy, K-12, and higher education. Explore them all. We learn about

- how virtual worlds help develop critical observation and interpretation skills;

- the possibilities in augmented reality for self-directed learning;

- the potential of a virtual fish gallery to teach about marine life and ocean conservation;

- the amazing potential of a science workshop that immerses elementary students in the science;

- the revolution in library sciences to adapt to the new information literacy needs of a new generation;

- a new taxonomy for adult learners immersed in metaphorical patterns of engagement;

- a way to reduce transactional distance through building connectivity in virtual environments; and

- so many other topics too numerous to mention.

We also have a special set of perspective papers written by one person, but collaborated in ideas and thoughts by multiple individuals who attended the networked Quadrivium discussions during the conference. Our authors have thoughtfully compiled information on technology, games and fun, cloud technologies, and identity.

In just over 100 pages, this special edition of JoVS puts the challenge forth to all our future authors: what can you imagine in the horizon?
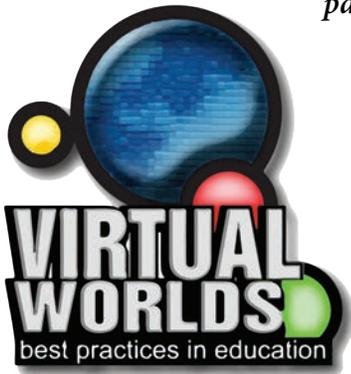
The *Journal of Virtual Studies* is constantly evolving, just like the work of those who can imagine that horizon. We challenge you to share it with us in our next edition on cyclicality (see page 7).

Leticia De Leon
Kevin Feenan
JoVS Managing Editors

TABLE OF CONTENTS

page 8

page 9

page 67

page 79

page 83

page 87

page 92

JoVS Editorial Information

About the Journal
The Journal of Virtual Studies is peer reviewed and open access. It is sponsored by the Rockcliffe University Consortium, and its main aim is to feature work that examine knowledge emergence in virtual spaces, whether they be web 2.0 or 3D applications. We encourage teachers, academics, practitioners, and others engaged in the use of any virtual space for education, research, or training, to submit proposals to the journal.

Focus and Scope
The mission of the Journal of Virtual Studies is to publish theoretical and practical concepts for the application of knowledge within virtual spaces. All methods, including, but not limited to, qualitative, quantitative, field testing, laboratory, meta-analytics, grounded theory, and combinations thereof are welcome. JoVS is interdisciplinary and international in scope. Preference is given to submissions that test, extend, or build either theoretical or practical frameworks dealing with knowledge emergence and virtual sciences outside traditional practice.

Sections
- Perspectives
- Applied Research
- Practical Application
- Cultural Narratives
- In Review

Subscription
JoVS is free and open access. In order to receive publication notices, please register at the website: http://ejournal.urockcliffe.com/index.php/jovs/index.

Author Guidelines
JoVS accepts submissions year round, with publication occurring at the next publication edition for those who get accepted after a blind peer review process.

The submission process is fully online, so that authors must first register in the website.

Papers should be written in APA style, following all formatting as indicated by this style manual. Currently, there are no page limitations to submissions, as long as they fit one of our sections, are well-written, and have full APA style and citation usage.

Submissions should include an abstract (150-200 words) and a separate title page with author(s) information and affiliation.

Copyright

JoVS Call for Papers

Theme: Cyclicality

Stories of the symbolic journey of self-discovery and renewal are all around us. Whether the themes are complex or simplistic in their telling, these stories connect with both children and adults alike. Some of the most poignant are those that involve the concept of cyclicality. Cyclicality exists in many cultures and many contexts.

Consider an ouroboros. This ancient symbol is a representation of a serpent eating its own tail. On the surface, it appears barbaric.

Yet, it represents self-reflexivity and re-creation. This reflexivity abounds in the way we construct professions and personal lives out of experience.

In research and in practice, we demonstrate the cyclicality of reflection and how we sometimes need to adjust old ideas or shift old paradigms to demonstrate more relevant conceptions of the current world.

Our world is changing, and the way we lead demonstrates our ability to look back, move forward, and by guided by the constant need to re-invent ourselves and our profession.

Like the phoenix being reborn from its own ashes, our culture is enriched, feeding back into itself the knowledge, understanding, and wisdom of what came before it.

How does our research demonstrate this type of cyclicality and self-discovery? In what way has this theme guided our practice and made it better?

The *Journal of Virtual Studies* calls for papers that demonstrate the cyclicality of working in virtual spaces. A virtual space is not just three-dimensional. It is a space, which we can share, where knowledge emerges collaboratively and immersively, and where possibility is beyond four simple walls.

Cyclicality is in

- the cloud,
- mobile and wearable tech,
- mmorpg's, and
- persistently immersive environments.

Send us your research, practical application, perspectives, cultural narratives, and reviews of work that demonstrate some aspect of cyclicality
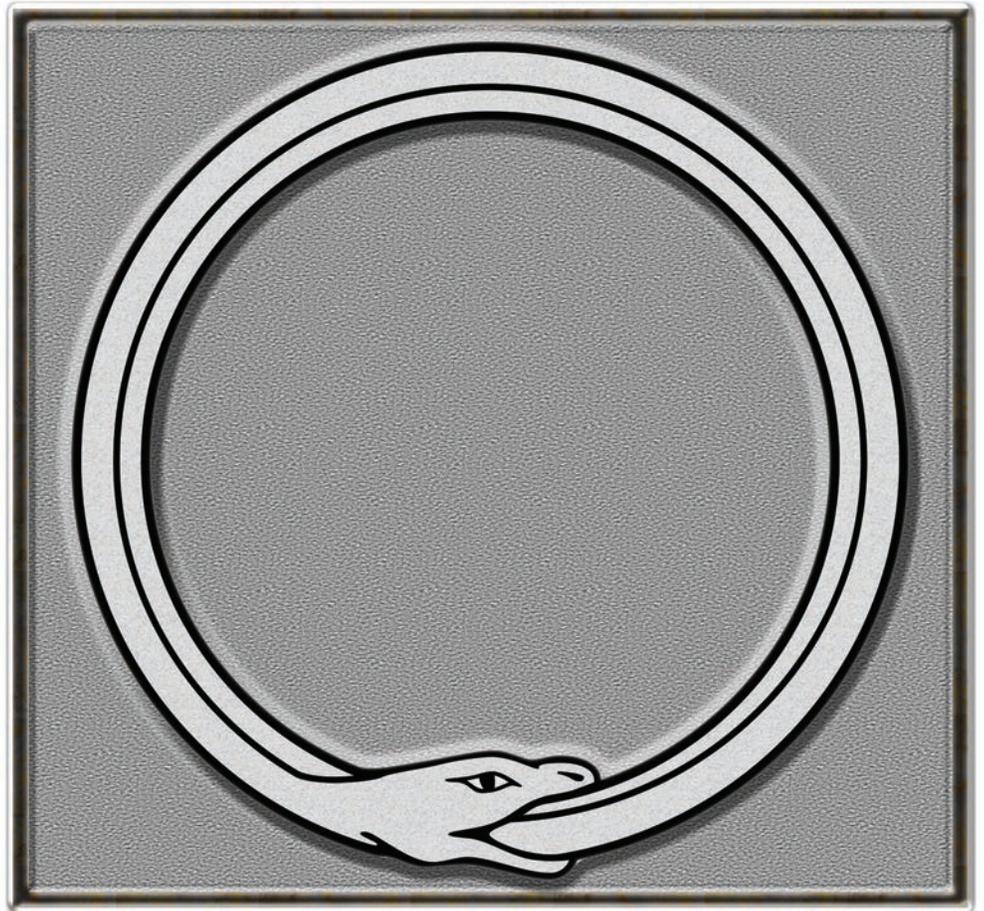
in any type of virtual space: reflection and identity, process, trends, best practice, renewal, reinvention.

Cyclicality bears multiple possibilities, like the ouroboros. Share it with us.

Call for papers to this themed issue ends in June 2016.

Expected Summer 2016 Publication

Journal of Virtual Studies • Vol. 7, No. 1 • ISSN 2155-0107 **7**

THE VIRTUAL WORLDS BEST PRACTICES IN EDUCATION CONFERENCE

Virtual Worlds Best Practices in Education is a global grass-roots community event focusing on education in immersive virtual environments. This open conference is organized by educators, for educators, to provide an opportunity to showcase the learning that takes place in this community of practice. All educators are encouraged to present, attend and take part in this discussion of collaborative deeper learning and co-presence in virtual worlds and games.

On March 9-12, 2016, Virtual Worlds Best Practices in Education convened it's ninth annual conference. The conference has been held in trust for the Educational Community by Rockcliffe University Consortium, who bears the responsibility for the financial, copyright, and infrastructure concerns of the conference. Since its first conference, it has attracted thousands of educators and communities of practice from all over the world with its theme-driven programs.

2016 was Horizons. We explored the horizons and distant shores of possibility as the worlds of virtual reality, technology, mobile, and cloud computing are starting to blend into a rich tapestry of creative scholarship and professional development. Innovative approaches to curriculum design will lead to new methods of pedagogy that will change forever the way we look at educational models in the future.

Our presenters answered that call, and these proceedings are evidence to the diversity, the creativity, and the unparalleled willingness to keep leading the charge where others merely follow.

VWBPE Goals

To the best ability possible, VWBPE provides educational and networking opportunities that are relevant to educational curriculum development utilizing virtual environments and "best practices".

These include the following:

- helping to build community through extension of learning best practices to practical application of those ideas and techniques;

- providing networking opportunities for educators and the communities that help support education; and

- providing access to current innovations, trends, ideas, case studies, and other best practices for educators and the communities that help support education.
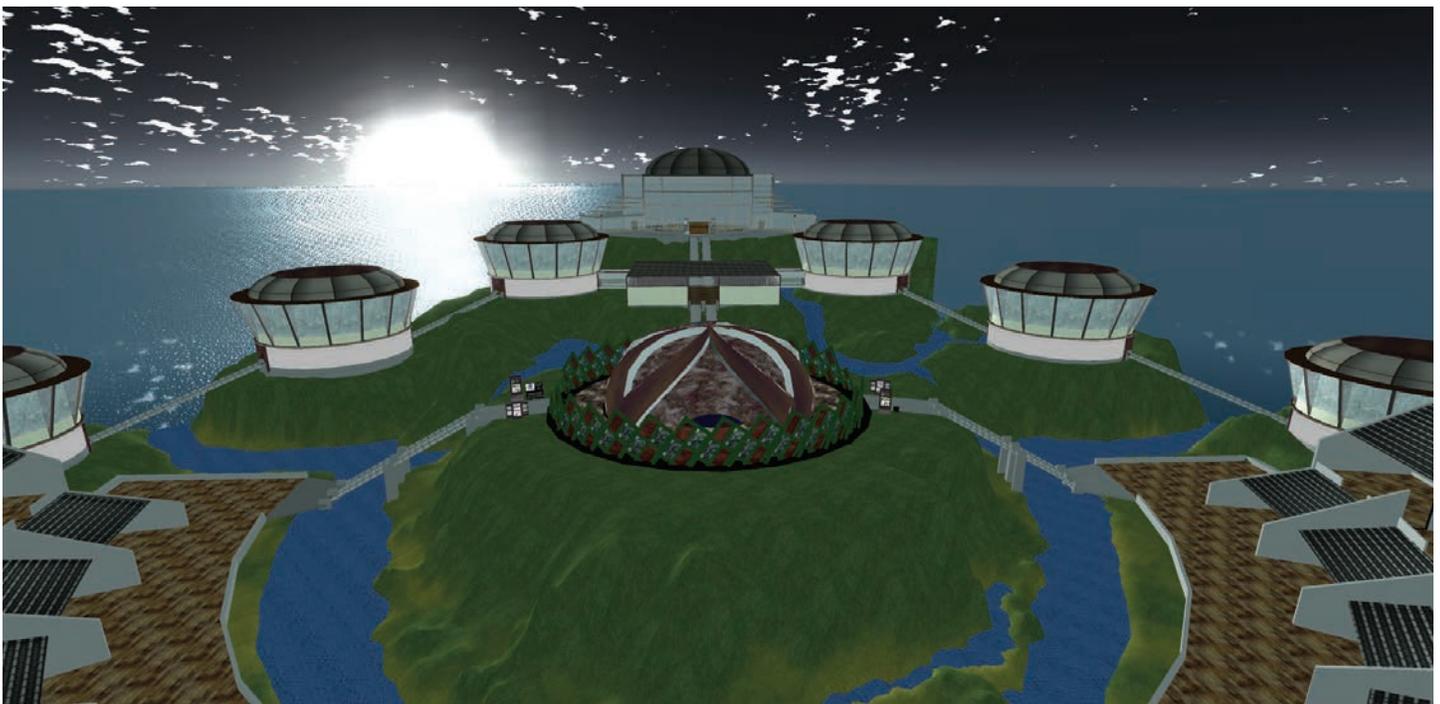
The Thinkerer Award

In 2014, the Virtual Worlds Best Practices in Education Organizational Committee instituted a new personal achievement award to recognize an individual who has provided outstanding service to both the field of education and the virtual world community at large.

The THINKERER AWARD is presented to an individual whose deeds and actions have shown a consistent selfless service towards the promotion of learning, community, educational practices, and who exemplifies the spirit of cooperative development within immersive environments.

Recipients of this award are not simply outstanding professionals in their field. Award recipients must characterize transformational leadership qualities to:

- envision and guide change;

- enhance the motivation, morale, and performance of both peers and pupils;

- promote best practices and continuous improvement; and

- inspire others through their words and actions.

One such individual is ANDREW WHEELOCK, also known to many of us as Spiff Whitfield.

Andrew Wheelock has been an educator for 22 years, working primarily at the elementary school level, and is currently a technology integrator. An imaginative innovator, his LinkedIn profile says, "Welcome to the Department of Wild and Crazy Ideas!"

As Spiff Whitfield, he joined Second Life in 2007. He is dedicated to the promotion of virtual environments to promote learning and excellence in education. In 2008,

Spiff started the group, Virtual Pioneers. This group continues to be successful, with meetings each week for historical tours of SL sims or informal discussions. Part of the success of this group is the collaborative atmosphere, which Spiff promotes by encouraging everyone to be active participants. Spiff also, with Scott Merrick, started the ISTE Virtual Environments Network (formerly SIG-VE), which they continue to be active in.

In 2011 Andy created the Islands of Enlightenment – where he is known as Professor Illuminati. This is an OpenSim immersive learning environment available to educators. He worked with a team of educators and historians to create a model build of the Anne Frank annex, providing a safe environment where students can interact using avatars to fully experience historical content. "A virtual environment enables students to learn in a creative way that promotes higher order thinking," he says on the project website. This project, along with his Heir of the King medieval history project, has been featured in several of Andy's conference presentations, keynotes, and professional articles, helping to promote the use of virtual worlds in education.

Andy has willingly mentored many educators and assisted them with the immersive use of virtual environments. This includes upcoming ISTE Virtual Environments Network chair Mary Howard; Beth O'Connell, who does communications for many virtual worlds education organizations; and educators in his district who learn how to use the Islands of Enlightenment.

Dedicated to the value of virtual environments both for professional development for educators and as valuable learning experiences for young people, Andy selflessly spends countless hours each week working on these projects and networking with people

in all of the virtual environments of which he is a part. He is responsible in large part for the inclusion of virtual environments in ISTE, the international edtech organization. Andy Wheelock exemplifies a strong commitment to the promotion and development of best practices in using virtual environments in education.

It is for all these reasons, and more, that the VWBPE Organizational Committee proudly confirms Andrew Wheelock, our Spiff Whitfield, as the VWBPE 2016 Thinkerer Award recipient.

Peer Reviewed Papers
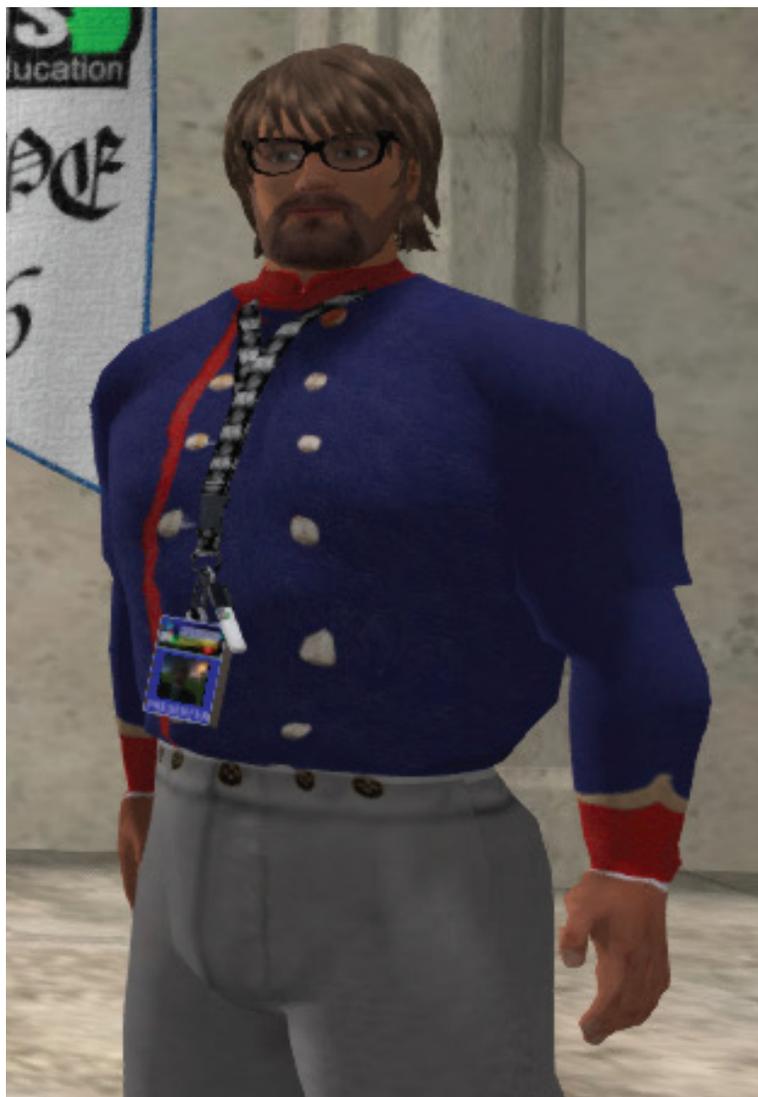
Papers

Featured Paper

Convergence of Gamification and Virtual Worlds

Karl M. Kapp

Games, gamification and game-based learning have entered into the vocabulary of educators, eLearning developers and instructional designers from around the global in the past few years. Games have a seductive force and are seen as a great tool in creating engaging and interactive instruction. But are they effective for learning? What does the research tell us? We'll explore some of the research around games, gamification and virtual worlds while creating links between research and virtual world actions and interactions.

The use of games for learning seems like a good match, but we can't blindly take it for granted. Instead, we need to explore questions to make sure the intuitive link between games, gamification and virtual worlds reaches its full potential. In this keynote, we'll answer questions like: How does one mix virtual world and game-based learning experiences? How should games be integrated into a curriculum? Can attitudes and behavior change result from playing a game in a virtual world? What elements of games can learning designers borrow from game designers? Can flying around as a superhero in a virtual world make you a nicer person?

Discover evidence-based techniques for increasing online engagement, interactivity and, most importantly, learning.

Introduction

Virtual worlds and gamification share many common attributes. Both are have been mislabeled as video game playing, both are frequently written off as frivolous endeavors and not serious tools for teaching and both are often misapplied in learning situations. However, these mischaracterizations don't do justice to either medium and, in fact, combining elements of gamification and virtual worlds makes for a strong instructional combination.

This paper explores the convergence of gamification and virtual worlds and highlights the instructional elements in virtual worlds that lead to learning. It also describes the game elements and gamification techniques inherent in virtual worlds and describes how they can applied to enhance teaching and learning in a virtual world.

What is a Virtual World?

A virtual world allows participants to interact with each other through avatars. Participants can socialize, explore, participate in group activities, create items and trade virtual property and services with one another (Kapp, O'Driscoll, 2010). While modern day virtual worlds may look similar to video games, they do not typically have the goals, point

system or objectives of a video game. They are often open environments where individuals can build and socialize without a specific task to be accomplished.

Virtual world environments have been around since the 1970's (Downey, 2014) and grew in popularity for educational purposes for their early beginnings. By the mid-2000's it was predicted that virtual worlds would soon become mainstream in educational settings throughout the world, it was even stated that "virtual locations will become more common and more mature as the trend continues" (The New Media Consortium, 2007, p. 18). Alas, that was not the case as interest in virtual worlds waned considerably and never reached the widespread adoption as predicted. (Gregory,et. al., 2015).

However, the convergence of gamification and virtual worlds may bring resurgence in the use of virtual worlds as many educators using virtual worlds find them to be important spaces for teaching and learning (Gregory,et. al., 2015).

What is Gamification?

The concept of "gamification" is both relatively new, when compared to the history of virtual worlds, and it is now having its surge in both interest and

usage. The first documented print appearance of the word was in 2008, and the term did not gain widespread recognition or use until late 2010 (Deterding, et. al., 2011; Groh, 2012; Werbach & Hunter, 2012). The term "gamification" captures the idea that certain elements of games can be infused into instructional situations to provide a positive learning outcome without having to create a full blown learning game.

Gamification has been defined as the "process of using game thinking and mechanics to engage audiences and solve problems" (Zichermann, 2010), "using game techniques to make activities more engaging and fun" (Kim, 2011), and "the use of game design elements in non-game contexts" (Deterding et al., 2011, p. 1). From an instructional context, the most relevant definition is one that combines elements from these definitions and defines gamification as "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p. 10).

"Gamification" is a broad term that can be further refined into two types, structural gamification and content gamification.

Structural Gamification

❝Structural gamification is the application of game-elements to propel a learner through content with no alteration or changes to the content" (Kapp, Blair, & Mesch, 2013, p. 224). The content does not become game-like; only the structure around the content does. A common implementation of this type of gamification adopts the scoring elements of video games, such as points, levels, badges, leaderboards, and achievements, and applies them to an educational context (Nicholson, 2012).

Structural gamification's continual, real-time assessment of progress provides important information to both the student and the teacher as students complete portions of content, take quizzes to gauge knowledge acquisition, and move toward the prescribed educational goals. The continual assessment of progress helps identify students' strengths and weaknesses. For example, an instructor employs structural gamification when he or she assigns content to be learned through a daily quiz-type game for two weeks via email or a mobile app. If the learners answer correctly, they earn points and progress toward earning a digital badge. If the learners answer

incorrectly, they are immediately presented with a short instructional piece specifically addressing the question's topic. Questions are repeated at various intervals until the student demonstrates mastery of the topic. The quiz and instruction process takes 30 to 90 seconds each day, at either the beginning or end of the day based on the choice of the student. As the learners progress through the content, the number of questions they have answered correctly is indicated on a leaderboard, enabling them to assess their progress relative to others, or the score can be grouped by teams to allow team-based learning.

Content Gamification

❝Content gamification is the application of game elements, game mechanics and game thinking to alter content to make it more game-like" (Kapp et al., 2013, p. 237). A common implementation of this type of gamification adds elements, such as story, mystery, and characters, to content to engage the learner. For example, content gamification could be realized by embedding a series of math problems in a virtual world where the learner is able to walk around the numbers of even manipulate virtual items to determine the correct answer. The goal of immersing the learner using techniques related to content gamification is to leverage the elements of games that are inherent in virtual worlds to positively influence the learner's emotional state and generally enhance motivation and facilitate learning and performance (American Psychological Association Work Group of the Board of Educational Affairs, 1997).

Integrating Gamification and Virtual Worlds

Given the two definitions of gamification, it seems clear that content gamification is the type of gamification most appropriately integrated into virtual worlds. Based on research related to gamification and virtual worlds, the following are recommendations for integrating gamification into a virtual world environment.

The idea behind these recommendations is that once you build a virtual world environment, you may want to gamify the environment to create a place where learners want to visit and engage. Engaging the learners more completely in the virtual world using gamification elements means that the learners will want to spend more time in-world and they will have a better experience. This better experience will translate into increased use

and learning within the virtual world environment and may provide the engagement needed to reverse the current trend away from virtual worlds.

Here is the list of recommendations.

Create a challenge for the student. A challenge is a call to engage in a difficult but achievable task, suggesting uncertain outcomes resulting from one's actions, multiple goals, hidden information, and randomness (Wilson et al., 2009). Challenges have also been shown to be strong motivators in learning (Jones, Valdez, Norakowski, & Rasmussen, 1994; Malone, 1981; Schlechty, 1997). They are correlated with both intrinsic motivation and motivation related to fostering competence and student efficacy (White, 1959). Challenges should be used in the gamification of virtual worlds to initially engage students to start learning a task. Often students who are reluctant to learn content can be persuaded to begin the process by being challenged through the goals they are to achieve in the gamified context.

For example, when a student first enters into the virtual world, give them an explicit challenge that must be accomplished rather than starting with didactic instruction. If you are teaching language skills, challenge them to order food at a restaurant in the virtual world. If you are teaching emergency skills, have them enter the virtual world at the scene of an accident and requirement them to assist. One mistake common in virtual environments is to start the instruction in the same way as one would in the classroom with slides and a bulleted list of learning objectives. Instead, force the learners to confront a challenge and overcome the challenge through activities and collaboration within the virtual world.

Make the virtual world experience goal oriented as opposed to time or duration oriented. Part of most gamified environment is the ability to earn achievements. Achievements can be recognized as a badge, moving from one level to another or some other type of visible recognition of progress or learning. When creating a gamified experience in a virtual world and having the learner earn points for activities or points for badges for achievements, tie the awards and points to goals rather than time or tasks.

In gamification, there are two types of goal orientation: performance orientation and mastery orientation (Blair, 2012). A performance orientation is when students are primarily concerned with other people's assessment of their competence. In contrast, students who have a mastery orientation are concerned more with improving their own proficiency. Students have a predisposition toward performance orientation, and poor gamification tends to push students in that direction. To balance this predisposition, effective gamification in a virtual world should instill a mastery orientation toward goals and provide feedback which points the virtual world learners toward mastery.

Developing students' mastery orientation means that they will more readily accept errors and seek challenging tasks, providing them with the opportunity to develop their competencies (Blair, 2012). Furthermore, when given mastery goals in a virtual world scenario, students will have higher sense of self-efficacy and use more effective strategies. Students given mastery-oriented goals perform better on complex tasks (Winters & Latham, 1996). In short, mastery orientation promotes students' accomplishing their personalized learning goals. To foster mastery orientation, the virtual world environment should support the students with necessary knowledge, information and encouragement while simultaneously requiring them to earn their achievements. Don't make the achievements too easy or simple. For example, don't award points just for logging into a virtual world; instead provide points to the learner when she has accomplished a difficult in-world task related to the learning objective. This can be solving a puzzle or properly following the right procedure or even a flawless speaking of a new phrase in a foreign language.

Deemphasize winning. Often when thinking about gamification in virtual worlds, the main thought is to create some type of competition and while that can be motivating; from a learner perspective it is better to deemphasize winning. For our purposes, competition is when students are "constrained from impeding each other and instead devote the entirety of their attentions to optimizing their own performance" (Crawford, 2003, p. 8). When learners impede each other or employ defensive strategies that subvert the goal of the opponent that can be referred to as "conflict." Conflict needs to be avoided because it does not contribute to learning.

Rather attention can be given to competition. However, the goal of competition must be clearly set into the

process instead of into the results, making it clear that winning or losing is very low in importance compared with learning and improving while competing (Cantador & Conde, 2010).

Create team-based in-world experiences. Consider breaking students into small teams and consider using cooperative games within the virtual world learning environment. In a team-based virtual world environment, students believe they are contributing to a larger purpose than just competing for themselves. While not the case with all students, in any team environment some won't participate or take control which does limit engagement, however, for games a team-based experience can minimizes students' competing directly against one another; the emphasis becomes one of cooperating to make their team better rather than defeating another individual (Garcia & Tor, 2009). Team-based games also allow for a combination of personalization and group learning as well as socialization. This combination provides learners with safe environment in which they can learn at a comfortable pace but still feel as though their learning efforts are contributing to a larger group within the virtual world environment.

Conclusion

The combination of virtual worlds and gamification as learning tools provides a number of ways to move beyond traditional instruction into more immersive and interactive learning experiences. Combining content gamification and virtual world experiences helps to teach and reinforce not only knowledge but also important skills such as problem-solving, collaboration, and communication. Educators would be well served by combining these two phenomena into a cohesive pedagogical approach.

References

American Psychological Association Work Group of the Board of Educational Affairs. (1997). Learner-centered psychological principles: A framework for school reform and redesign. Washington, DC: American Psychological Association.

Blair, L. (2012). Congratulations! Selecting the right in game achievements. In K. M. Kapp (Ed.), The gamification of learning and instruction: Game-based methods and strategies for training and education (pp. 219–238). New York, NY: Pfeiffer.

Cantador, I., & Conde, J. M. (2010, July). Effects of competition in education: A case study in an e-learning environment. Proceedings of the IADIS International Conference e-Learning 2010 (E-Learning 2010). Freiburg, Germany.

Crawford, C. (2003). Chris Crawford on game design. Indianapolis, IN: New Riders Publishing.

Deterding, S., Khaled, R., Nacke, L. E., & Dixon, D. (2011, May). Gamification: Toward a definition. In Proceedings of CHI 2011 Gamification Workshop (pp. 1–4). Vancouver, BC, Canada.

Downey, S. (2014) History of the (Virtual) Worlds, Journal of Technology Studies. Vol. 40 Issue 2, p54-66.

Garcia, S. M., & Tor, A. (2009). The N-effect: More competitors, less competition. Psychological Science, 20(7), 871–877.

Gregory, S., Scutter, S., Jacka, L., McDonald, M., Farley, H., & Newman, C. (2015). Barriers and Enablers to the Use of Virtual Worlds in Higher Education: An Exploration of Educator Perceptions, Attitudes and Experiences. Educational Technology & Society, 18 (1), 3–12.

Groh, F. (2012). Gamification: State of the art definition and utilization. In N. Asaj, B. Konings, M. Poguntke, F. Schaub, B. Wiedersheim, & M. Weber (Eds.), Proceedings of the 4th Seminar on Research Trends in Media Informatics Institute of Media Informatics (pp. 39–46). Ulm, Germany.

Jones, B., Valdez, G., Norakowski, J., & Rasmussen, C. (1994). Designing learning and technology for educational reform. North Central Regional Educational Laboratory. Retrieved from http://www.ncrtec.org/capacity/profile/profwww.htm.

Kapp, K. M. (2012). The gamification of learning and instruction: Case-based methods and strategies for training and education. New York, NY: Pfeiffer.

Kapp, K. M., Blair, L., & Mesch, R. (2013). The gamification of learning and instruction fieldbook: Theory into practice. New York, NY: John Wiley & Sons.

Kapp, K. M. & O'Driscoll, T. (2010). Learning in 3D: Adding a new dimension to enterprise learning and collaboration. San Francisco: Pfeiffer.

Kim, A. J. (2011, March 23). Gamification 101: Designing the player journey [Video file]. Retrieved from http://youtu.be/B0H3ASbnZmc.

Malone, T. (1981). Toward a theory of intrinsically motivating instruction. Cognitive Science, 4, 333–369.

New Media Consortium. (2007). Horizon report: 2007 edition. Retrieved February 29,

2016, from http://www.nmc.org/pdf/2007_Horizon_Report.pdf.

Nicholson, S. (2012, June). A user-centered theoretical framework for meaningful gamification. Paper presented at Games+Learning+Society 8.0, Madison, WI.

Schlechty, P. C. (1997). Inventing better schools: An action plan for educational reform. San Francisco, CA: Jossey-Bass.

Werbach, K., & Hunter, D. (2012). For the win: How game thinking can revolutionize your business. Philadelphia, PA: Wharton Digital Press.

Wilson, K. A., Bedwell, W. L., Lazzara, E. H., Salas, E., Burke, C. S., Estock, J., Orvis, K. L.,Conkey, C. (2009). Relationships between game attributes and learning outcomes: Review and research proposals. Simulation & Gaming, 40, 217–266.

White, R. W. (1959). Motivation reconsidered: The concept of competence. Psychological Review, 66, 297–333.

Winters, D, & Latham, G.P. (1996). The effect of learning versus outcomes goals on simple versus a complex task. Group & Organization Management, 21(2), 213-238.

Zichermann, G. (2010, October 26). Fun is the future: Mastering gamification [Video file]. Retrieved from http://www.youtube.com/watch?v=6O1gNVeaE4g.

An autoethnographic narrative: Teaching visual learning in virtual worlds

Hsiao-Cheng (Sandrine) Han
The University of British Columbia

Virtual worlds are networked environments connected with multiple computers, multiple users, and multiple sets of data (Aukstakalnis, 1991). Virtual worlds are visually presented in a three dimensional realm where social interaction and communication are of primary importance. Users of the virtual world present their virtual selves through customized avatars. In these virtual worlds, residents can also express their creativity by building 3D animated objects and designing 3D environments (Stephen, 2007; Sturken & Cartwright, 2004). This article is an autoethnographic narrative that illustrates the first cycle of an action research project based on a graduate degree course: Visual learning in 3D animated virtual worlds. The research findings clearly show that student experience with viewing and construction in the virtual world supports the development of critical observation and interpretation skills.

"See you guys next week!" I waved to the group of students; they are the VCER (Virtual Commons for Education and Research) team members. I think to myself, "how wonderful they are and how lucky I am. I have a team of students supporting my research!" I will never forget how I met them and how we established this wonderful relationship through the experience of learning in virtual worlds together. My memory flashes back to six months ago.

The very first class (Introduction & Description of Project)

It was the first day of teaching my new graduate course (Visual learning in 3D animated virtual worlds). I was nervous because I did not know what these students' subject areas were or how comfortable they would be with technology. I walked into the classroom, set up my robust computer, looked around at the students with a smile and welcomed them to this class. I introduced virtual worlds to the students: "Virtual worlds are networked environments connected with multiple computers, multiple users, and multiple sets of data" (Aukstakalnis, 1991). I also explained: "Virtual worlds do not include the entire cyber environment connected through the internet. Virtual worlds are visually presented in a three-dimensional (3D) realm,

where social interaction and communication are primarily important. Users of the virtual world present their virtual selves through customized avatars. In these virtual worlds, residents can also express their creativity by building 3D animated objects and designing 3D environments" (Stephen, 2007; Sturken & Cartwright, 2004). I saw the students starting to frown. I took a deep breath and thought that "maybe it is time to know their backgrounds." I braced myself and asked: "Could you please tell me your background? For example: Where you are from? What is your subject area? And how comfortable are you with technology?"

My former student said: "Let me go first. I am Yoko. I'm from Japan. I'm studying art education for my MA degree, and I am not good with technology. The only reason I took this course is because I know the instructor." And she winked at me. I smiled and thanked her for taking this course. Another student started to talk. "I am Lilya, from Ukraine. I am in music education, getting my MEd. I am not a technology person, but I want to learn." I smiled at her, and before I started to talk, another student spoke up, "I am Christine, from Toronto, I got my BFA in visual arts a long time ago. I taught English in Japan for 16 years. I am not very comfortable with technology, but am very interested in visual learning." She winked at Yoko, and I knew they would have a lot

to talk about after class. "I am Kyle, from Ghana. I am studying for my MA in math education. I am interested in technology." I smiled at him, very glad to have one male student in this class. Finally, I looked at the group of five Asian students and asked them to talk. "We are Alisa, Angela, Vivian, Catherine, and Nancy. We are from China, with a background in civic education. We are not good at technology but want to learn."

I thanked them for giving this course a try and promised them if they were faced with any difficulty in technology, I would do my best to assist their learning. I then said,

This is not a course only about technology. But, more importantly, through this course, you will learn how people learn from their vision, how you can use visual learning skills to help your students to learn, and how to become more aware of what you are seeing and learning in the virtual world. Moreover, you will be able to create your own virtual learning space in accordance with visual learning principles.

I saw the students look at me with fright in their eyes, and I tried to comfort them again. "For the final project, you can choose to work in a group," I said. But this reassurance did not seem to be enough. I explained:

In this course, each class will be divided into two parts: theory discussion and practice. In the discussion section, we will learn the new media theory of visual culture, visual literacy, and visual communication. In the practice section, we will learn how to set up a virtual learning space and incorporate visual learning. Therefore, I will walk you through virtual world navigation and creation, and I will help you construct your learning space.

I started showing them virtual worlds and the possibilities of using virtual worlds for education, and I helped them register in one of the virtual worlds: Second Life. At the end of the class period I prayed: "I hope I will see them again next week."

Getting into a virtual world (Background)

When I walked into the classroom the second day, I cheered. "Yes, they are all here! The course content didn't scare them away." I smiled at them and said, "Welcome back! I am glad to see you again. Let's discuss the readings from last week first. What do you think about the possibilities in virtual worlds?" Without a second thought, Christine said, "There are many educational possibilities [that]

can be found in the 3D virtual world. According to Dickey (2005), 'educational MOOs (Multiple User Domains Object Oriented) promote an interactive style of learning, collaboration opportunities, and meaningful engagement across time and space'" (p. 440). Lilya cleared her throat and said, "In addition to communication, another powerful effect of the 3D animated virtual world is visual stimulation. This kind of visually animated environment captures digital native student interest, making them willing to spend more time in the 3D e-learning environment" (Carpenter, 2009; Sweeny, 2009). Yoko followed, "Everything students do in the virtual world can be a learning experience. Learning by doing or learning by seeing fosters self-directed learning" (Garris, Ahlers, & Driskell, 2002; Dewey, 1934). "Very good," I said. "Therefore, today, we are going to get into one of the virtual worlds—Second Life—and observe the visual environment in Second Life."

"S?" Kyle asked, "Why did you choose Second Life? Is that a good place for education at all ages?" I looked at him and felt really happy that he had asked. "There are several virtual worlds that have been adapted as educational environments, for example: World of Warcraft, Minecraft, and Cloud Party," I answered. "And currently, the most well-known virtual world for education is Second Life. In Second Life there are real world institutions as well as institutions that only exist in the virtual world. Second Life is owned by Linden Lab (LL), and users are able to purchase virtual land from LL. However, all data are owned and controlled by LL, and users must pay to upload textures, sounds, and animations." I looked around and understood the students did not really understand it yet. I smiled and said, "I will not tell you if Second Life is a good place for education now. While you are observing in Second Life, try to think of the pros and cons of using Second Life as an educational environment." The students nodded.

During lab time, I led them around Second Life. It was not easy for them to navigate. There were too many new things to learn at the beginning. The students were frustrated. I encouraged them and said, "The frustration you are experiencing is very normal. I couldn't navigate my avatar when I was new to Second Life either. Please remember, practice makes perfect. I know you all can do it!" They looked at me and hardly gave me a smile. I whispered to myself, "I really hope they do give virtual

worlds a chance, so they will be able to open a door to other worlds."

Exciting discussions on virtual world experience

Before class the next week, I did a final check of VCER (Virtual Commons for Education and Research) to make sure the server was working, the registration was open, and everything was good to go, because today was the day my students were going to see VCER. When I walked into the classroom, I found it was not as quiet as in previous weeks. While I was setting up my computer, I tried to listen to what they were talking about. "This is great! They are talking about their virtual experiences!" I was very excited.

"So, from your observation, what do you think about Second Life for education?" I asked. "I went to an elementary school in Second Life," Alisa started. "I saw there were many children running around. The school setting was very much like the real school setting that we went to for observation in Vancouver." Alisa was very excited about it. She continued, "I didn't find a teacher there. I really wanted to ask some questions." Lilya looked at me and said, "I also went to some schools. I saw school buildings; however, I was wondering what kind of subjects could be delivered through Second Life?" "These are great questions," I said. "Currently, Second Life's age requirement is 18. If a student's age is between 13 and 18, his or her legal guardian must read and agree to the Second Life Terms of Service (Second Life, 2013); in other words, Second Life is not for K-12 students." After I finished, Alisa looked surprised and asked, "So, who are those children running around in the school? They looked only about 8 years old." "Most likely they are adult users," I said. "I interviewed a kid avatar in 2010; she told me she wanted to be a child again, and Second Life is the only place she could feel like one." Alisa shook her head and murmured "unbelievable." I turned to Lilya, "You can teach almost all subjects in a virtual world; it only depends on your imagination." "Can we teach piano?" Lilya asked. "Yes, sure!" I said, "if we can develop a script language for a virtual piano, we will be able to do so." Lilya nodded.

"If Second Life is not suitable for K-12 education, why we are learning about Second Life?" Kyle asked. "Very good question," I said. "Yes, Second Life is not good for K-12 education, but in Second Life, we are able to practice visual learning. Moreover, it is a well-developed virtual world where we can see what is possible." Kyle raised his hand again and asked, "So we will create a virtual learning environment and we will not be able to bring in our students?" "Of course you can," I smiled and continued,

There is another kind of virtual world called Open Simulator (OS). This is a virtual world widely used by educators (OpenSimulator, 2013). OS has the same 3D animated virtual environment as Second Life. It is open source software, so any user of OS can install a virtual world on their own computer server. All the OS data are owned and controlled by the server administrator.

I looked around; students were waiting for me to continue. "My research project is to create an Open Sim for education. It is called 'VCER,' Virtual Commons for Education and Research.i VCER is a standaloneii Open Simulator, and the server is located in the UBC IT service. It is a virtual world for educational purposes only and invites educators in K-12 and higher education from around the world to participate with their students." The students nodded, and I continued, "VCER offers the potential of the virtual world but blocks the defects that exist in Second Life because this is a world for education purposes only. Adult content, violence, and money transfers are not allowed. This is a free virtual world for educators to explore. Moreover, educators are encouraged to apply for free land, upload free textures, animations, and sounds, and copy and reuse existing objects. In this world, educators can explore online education in the virtual world, try face-to-face education accompanied by a virtual world environment, and connect online students with face-to-face students to achieve hybrid education." "Really? That is great," said Yoko. "So are we going to use VCER for our education environment?" "Yes," I said. "VCER is ready for you to make it meaningful!" I saw excitement in the students' face. "Let's go to the computer lab now. Today we will apply for a VCER account, and you can start to plan your own learning environment." Before the class ended, I reminded them: "This week, you can choose where you would like to observe in Second Life. But, while you are observing, don't forget to think about what kind of virtual learning environment you would like to make in VCER."

First building experience

Today I was not as worried as in the previous weeks. I happily walked into the classroom and could not wait to hear what they had found in Second Life. "So, how are you doing in Second Life?" I asked. "I can walk better now!" Nancy said. "I have a new outfit now!" Christine said. I felt reassured that they felt more comfortable in Second Life. "Where have you been in Second Life?" I asked. "I flew airplanes!" Vivian shouted. "Me too, I flew airplanes as well," Angela said. "I looked for Ghana and found a place called Africa," Kyle said. "Things there are similar to the place I am from. However, something was just not quite right. I don't know how to explain it." "I had a similar feeling when I was in some Japanese places as well," said Yoko. And she continued, "I looked closer at those places that looked like Japan, but are not really authentic Japanese places, and I realized the reason is in the details." "Can you give us some examples?" I asked. "Sure," Yoko said. "In traditional Japanese architecture, because our buildings have paper windows, the windows cannot be directly exposed to weather. So, the buildings always have eaves to protect those windows. However, the Second Life buildings did not have eaves." "Wow, I came from Asia, but I never noticed those details," I said. "Cultural experiences truly influence how we view and understand objects in the virtual world, don't they?"

"I went to a club and saw many avatars with very strange appearances," Alisa said. I looked at my students with a smile and asked, "Did you have any interaction with people in Second Life? And how do you feel about it?" "I talked with a person and I got a free airplane!" Vivian said. "He was very friendly and very patiently taught me how to fly the airplane." Lilya said, "I met a woman; she showed me around her place and very patiently guided me through every step as well. She was very nice." "I didn't really talk with anyone" Alisa said, "People in the club made me feel uncomfortable." I followed up and asked, "Were you feeling comfortable when you were talking with the other avatars?" Everyone said, "No." I understood this was their very first time making contact with strangers online, and I had never actually taught them how to communicate with people in Second Life. "How do these experiences make you feel?" I asked. "I enjoyed flying an airplane a lot!" Vivian said loudly. "I've always wanted to do it in real life but have never had a chance to." "I felt like flying in the airplane was so real and I really loved it," Angela said. "Actually I have

a question," Yoko said. "Who are the builders?" Kyle followed, "Yes, who are the builders and what are the purposes of building this kind of virtual environment?" I smiled and thought, "Yes, they are starting to think more deeply about virtual environments now." "Let's think about these questions this week and discuss them next time," I said and winked at them.

After a great discussion on virtual worlds and cognitive psychology in visual learning,iii it was time to take these students to the next step: building in the virtual world. Once we were in VCER, I showed them where they could find the handouts and video tutorials I had made. I started introducing the 3D building interface and demonstrating how to create 3D objects. Students found the difficulties of creating 3D objects to be not only remembering how to use each building tool, but also needing to always check each object from 3-dimensional perspectives. "I am exhausted," said Vivian, "but I feel so excited that I made something in 3D!" Nancy told me, "My eyes are tired, my hands are stiff, but I am proud of the chairs I made."

Appreciation of the built virtual world grows (Literature Review)

When I walked into the classroom the next week, the students were sharing their field trip experiences before class started. I guessed it was because the third virtual world assignment was to observe creative and imaginary places in Second Life. I joined their conversation and asked, "So, where have you been?" "Outer space," "Sea World," "Middle Earth," "I don't even know how to describe the place," some of them said. They were very excited and wanted to share what they had seen. I followed with: "What do you feel about these places?" "I was amazed," "I was scared," and "I was confused" were the responses. "After I learned how difficult and how time consuming it is to create in a 3D environment," Lilya said, "I really want to know what the creator wants to communicate with the visitors through the virtual world environment." Christine followed with "Can all visitors understand the meaning intended by virtual world creators?" I looked around and said, "Users of the virtual world actively construct the virtual world as they create avatars, animated virtual objects, and environments (Taylor, Ballengee-Morris, & Carpenter, 2010; Liao, 2010). Virtual world users are like artists creating interactive arts, or like amusement park

owners who make real an imaginary world." I looked around, and the students nodded.

Virtual world users use images and visual objects to influence how other people think and feel. Users influence each other, and re-create their world. Users in the virtual world learn from the images they see unconsciously, and how they understand images may not follow the original meaning the image creator intended. (Han, 2010)

I paused, and continued, "however, no matter what residents see in the virtual realm and what they think images mean, these images will influence how the residents see and think about images in the future" (Burnett, 2004). I was really glad that the questions they asked became more closely aligned with the content of this course: visual culture and visual communication.

After the intense discussion on visual communication in the virtual world, I asked about the designs for their virtual world learning environments. Four students choose to use the virtual world for language education (3 for teaching English, 1 for teaching Japanese), 3 students choose to teach civic education, 1 chose music education, and 1 chose math education. No one wanted to work together as a group, and they all wanted to create their own virtual learning environment. However, they also worried: "Do we need to create everything all by ourselves? Can we use existing objects in VCER?" "Of course you

can," I answered. "Use, modify, change, or create. It is your choice; we don't need to reinvent the wheel in this class." They all looked very relieved, and I believed they all would make wonderful learning environments.

Virtual learning environment: Under construction

❝How are your learning environments going?" was the first thing I asked them today. "It is very strange," Alisa started. "I put everything in place, but it just doesn't look right." "I have the same problem," Angela said, "I couldn't figure why my environment does not

look like what I imagined, so I went back to Second Life and hoped to get some inspiration." Alisa continued, "I didn't go back to Second Life, but I start to look at our real life environment very seriously. I try to figure out how people plant trees, build houses, and try to learn from it." I smiled and was glad that the building process really helped them to consciously observe the environment. "Do you think the theories we discussed in class also helped you when you observed the environment?" I asked. "Absolutely," said Lilya. "When I sat on the bus, I looked out the window and started to analyze how I see the world. I found there are many details that I never noticed before." "I think careful observation is the key to creating a desired atmosphere in virtual world," said Yoko.

Virtual learning environment: Finishing up

Today was the last day that students would work on their virtual learning environment. While I was proud of what they had done so far in the virtual world, I also wondered what kind of problems they might have. "Are you ready for your teaching demonstration yet?" I asked. "It takes a much longer time to refine the virtual learning environment," said Yoko. "While I was thinking how to teach in the virtual environment, I also considered how I can avoid students being distracted by the virtual world." "Good," I said. "So, what can you do to avoid this situation?" "I did more visual research on real world environments," Yoko continued and "am trying to make things look natural so students will not been distracted by unrealistic objects." "Very good," I said. "I learned from Alisa," said Lilya. "I saw she used a birds-eye view to show her environment, and I tried that too."

"Does it help?" I asked. "It sure does," Lilya continued. "I started to use the camera view from different angles to look at my world and find the best angle for teaching." "Great," I smiled, "I am looking forward to seeing your demonstration next week!"

Teaching demonstration (Lessons Learned)

Finally, the day had come when students would demonstrate how they would use their virtual world for education. Students would also peer

evaluate and give feedback on each other's teaching. I was extremely excited. I prepared the computer to record their teaching demonstrations and helped them with hardware preparation. By now, I was pretty comfortable with VCER. In one demonstration after another, I saw so many creative methods to deliver courses in VCER from these students. Yoko's Japanese course was designed completely online within an immersive virtual Japanese environment; we learned not only vocabulary, but also Japanese grammar. Christine's English learning environment was a treasure hunt. We walked and teleported around together and finally found a treasure chest. Lilya's music class incorporated videos and PowerPoint presentations; we learned about many kinds of instruments. Kyle's math class taught students geometric shapes. Through observing virtual architecture and using online assessment tools, learning math became more fun than ever. Catherine's English learning environment was built around finding colored cards on a playground. After the interesting activity, we learned how to say the colors in English. Nancy introduced Christmas in her environment, and even included a Santa who could interact with the students.

Alisa's civic learning center had a role play area for students to experience the feeling of being in someone else's shoes.

"What do you think about teaching in a virtual world?" I asked. "I think the virtual environment does not need to be complicated. A simple environment which provides appropriate information to the course content might be the best virtual educational environment," said Lilya. "Agree," Christine continued. "I think visual signage is essential for a virtual environment. Otherwise we might easily get lost." "Indeed," said Kyle. "I think if we only show a PowerPoint in an environment with loads of possibilities, students might still get bored and lose the meaning of using the virtual world as an educational environment." "Sounds like we learned a lot during this process." I smiled and said, "I am looking forward to seeing your final presentations next time."

Video 1: Teaching demonstration https://www.youtube.com/watch?v=tNkLsY2wNhU

Final presentation (Conclusions and Implications)

This was the last day of the class, and their paper presentations were great. Each student discussed visual learning and the virtual learning environment from their own subject areas. After all presentations were finished, I asked: "What do you think of visual learning in virtual worlds?" Kyle started first: "Visual learning fosters spatial intelligence (Gardner, 1985) and vision is one of the most important senses because humans are strongly attracted to images. Virtual world residents look for realistic appearances in virtual worlds regardless of whether the world is a simulation of a real world environment or an imaginary world." He smiled confidently. I nodded and smiled at him. "In virtual worlds, as Duncum (1999) states, 'instead of losing sight of the real, the real is being transformed into signs and images. Instead of images colonizing reality, reality is transformed'" (p. 306). He was followed by Yoko's

anymore. They are more than my colleagues. They are my very best friends," I thought and could not hide the smile.

"Ding!" an email notification sound brought me back to reality again. It was from the VCER team! When I first started the course, I would never have imagined I would have such a great relationship with these students. I know there are more projects we can do together in the future, and I know the VCER team will always be there for me, and I will always be there for them.

comment, "Because virtual worlds are dominated by an ever-growing variety of images, the role of visual culture in virtual worlds becomes increasingly important" (Mirzoeff, 2005). Christine stated, "When residents spend large amounts of time in virtual worlds, they begin to view the virtual world as reality. Because of influence from the virtual world, many scholars (Duncum, 1999; Sturken & Cartwright, 2004; Woolley, 1992; Mitchell, 2005; Geoffrey, 1994) have started to reconsider what real is and what virtual is." "Very well" I said. "it has been a wonderful term with all of you. Thank you for giving me the chance to learn with you." Our conversation continued one hour after the end of the class time. Before they left, Lilya asked: "S, if you are going to do any research, workshop, or presentation about VCER, please let me know. I will be more than happy to help." I was surprised and excited. All other students followed, "Yes, please let us know. We would love to be part of your research and let people know about VCER and the value of virtual learning environments." I responded with tears in my eyes, "Yes, sure, I will definitely let you know. Thank you!" I really appreciated that I had these wonderful students.

Never ending relationship

After the course ended, I conducted new research and all of the students agreed to be my research participants. We went to several conferences and workshops together to present our findings about learning in virtual worlds. We even presented at the Virtual World Best Practices in Education (VWBPE) and won second place in the best presentation category. The students' teaching demonstration documentary also won third place in the best machinima competition. "They are not my students

References

Aukstakalnis, S. (1991). Silicon mirage: The art and science of virtual reality. Berkeley, CA: Peachpit press.

Barry, A. (1997). Visual intelligence: Perception, image, and manipulation in visual communication. Albany: NY: State University of New York Press.

Burnett, R. (2004). How images think. Cambridge, Massachusetts: The MIT Press.

Carpenter, B. S. (2009). Virtual Worlds as Educational Experience: Living and Learning in Interesting Times. Journal of Virtual Worlds Research, 2(1).

Denis, H. (1989). Applying Semiotic Theory to Educational Technology. Annual meeting of the association for educational communications and technology, 179-190.

Dewey, J. (1934). Art as experience. New York: Penguin.

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

Duncum, P. (1999). A case for an art education of everyday aesthetic experiences. Studies in Art Education, 295-311.

Efland, A. (2002). The cognitive revolution and conceptions of learning. Art and cognition: Integrating the visual arts in the curriculum, pp.52-81. NY: Teachers college press.

Frechette, J. D. (2002). Developing media literacy in cyberspace pedagogy and critical learning for the twenty-first-century classroom. Westport, CT: Praeger.

Gardner, H. (1985). Frames of mind: The theory of multiple intelligences. New York: Basic Books.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. Simulation Gaming. 33. 441-467.

Geoffrey, R. (1994). Media theory: A framework for interdisciplinary conversations. Association for Education in Journalism and Mass Communication, 1-20.

Han, H. C. (2010). Revealing the didactic character of imagery in a 3d animated virtual world. Journal of Virtual Studies, 1(1). pp. 19-24. Retrieved July 29, 2010. from http://ejournal.urockcliffe.com/index.php/JOVS/article/viewFile/2/1

Howe, R. P. (2006). Ethical perspectives in digital image plagiarism. In Griffen, R. E., (Eds.), Imagery and Artistry: Animating the Mind's Eye (pp. 105-114). Loretto, PA: International Visual Literacy Association.

Ichinose, C. (2010). Students' Perceptions when Learning Mathematics Online: A Path Analysis. Journal of the Research Center for Educational Technology. 6(2). 78-93

Jenkins, H. (2008). Convergence Culture: Where Old and New Media Collide. New York University Press.

Lester, J. C., Towns, S. G., Fitzgerald, P. J. (1999). Achieving affective impact: Visual emotive communication in lifelike pedagogical agents. International Journal of Artificial Intelligence in Education. 10, 278-291.

Liao, C. (2010). Avatar as Pedagogy: Critical Strategies for Visual Culture in the Virtual Environment. In R. Sweeny (Ed). Inter/Actions/Inter/Sections: Art Education in a Digital Visual Culture. (pp. 182-189). Reston, VA: National Art Education Association.

Liapis, A., Yannakakis, G. N. & Togelius, J. (2012). Adapting Models of Visual Aesthetics for Personalized Content Creation. IEEE Transactions on computational intelligence and AI in games. 4(3). 213-228.

Mayer, R. E. (2005). Cognitive Theory of Multimedia Learning. The Cambridge handbook of multimedia learning. The Cambridge handbook of multimedia learning. Cambridge University Press: Cambridge, UK.

McFarland, M.C. (2004). Intellectual property, information, and the common good. In Spinello, R. A. & Tavani, H. T. (Eds.), Readings in cyberethics (pp. 294-304). Jones and Bartlett Publishers: Sudbury, MA.

Messaris, P. (2012): Visual "Literacy" in the Digital Age, Review of Communication, 12:2, 101-117

Mirzoeff, N. (2005). The visual culture reader. New York, NY: Routledge.

Mitchell, W. J. (2005). What do pictures want: The lives and loves of images. Chicago: The University of Chicago Press.

Morgan, J. (1992). See what I mean: An introduction to visual communication. New York, NY: Oxford

University Press.

Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. Journal of Asynchronous Learning Networks. 6(1). 21-40.

Semali, L. M. (2002). Transmediation in the classroom: A semiotics-based Media Literacy Framework. NY: Peter Lang.

Smith-Shank, D. (2007). Reflections on semiotics, visual culture, and pedagogy. Semiotica, 223-234.

Stephen, J. (2007). Virtually sacred: The performance of asynchronous cyber-rituals in online spaces. Journal of Computer-Mediated Communication, 1103-1121.

Stoerger, S. (2008). Virtual Worlds, Virtual Literacy: An Educational Exploration. Knowledge quest. 36(3). 50-56.

Sturken, M., & Cartwright, L. (2004). Practices of looking: An introduction to visual culture. Oxford: Oxford University press.

Sweeny, R. W. (2009). Lines of sight in the "Network Society": Simulation, art education, and a digital visual culture. In K. Freedman, Looking Back: Editors' Selections from 50 Years of Studies in Art Education (pp. 219-231). NAEA.

Taylor, P., Ballengee-Morris, C., & Carpenter, S. (2010). Digital visual culture, social networking, and virtual worlds: Second Life and art education. In R. W. Sweeny, Inter/sections/Inter/actions: Art Education in a Digital Visual Culture. Reston, VA: National Art Education Association.

Tyner, K. (1998). Literacy in a digital world: Teaching and learning in the age of information. Mahwah, NJ: LEA.

Weiss, J. (2006). Introduction: Virtual Learning and Learning Virtually. In J. Weiss, J. Nolan, J. Hunsinger, & P. Trifonas, The International handbook of Virtual Learning Environments Volume I. The Netherlands: Springer Dordrecht.

Woolley, B. (1992). Virtual worlds. New York, NY: Penguin.

"Adobe Connect." Adobe. Accessed April 16, 2013. http://www.adobe.com/ca/products/adobeconnect.html

"Second Life." Terms of Service. Accessed September 8, 2013. http://lindenlab.com/tos

"Primitive." Second Life Wiki. Accessed August 23, 2013 http://wiki.secondlife.com/wiki/Primitive

"OpenSimulator" opensimulator.org. Accessed April 16, 2013. http://opensimulator.org/wiki/Main_Page

"Overte Foundation" Overte Foundation. Accessed April 16, 2013. http://www.overte.org/

Notes:

i http://blogs.ubc.ca/educationalvirtualworld/

ii Standalone Open Sim means the OS server is not connect with other Open Sim. Users cannot travel within different OS, and need to register in different OS to access different servers.

iii Through this course, students examine theories of visual learning, which include cognitive psychology in visual learning (Efland, 2002; Mayer, 2005; Barry, 1997), visual literacy (Messaris, 2012; Tyner, 1998; Frechette, 2002;), visual communication (Burnett, 2004; Morgan, 1992; Lester, Towns, Fitzgerald, 1999), new media theory of visual culture (Sturken, & Cartwright, 2004; Stoerger, 2008; Weiss, 2006), semiotics in the virtual world (Semali, 2002; Denis, 1989; Smith-Shank, 2007), and ethics and plagiarism in imagery (Liapis, Yannakakis, & Togelius, 2012; Howe, 2006; McFarland, 2004).

Evidence of Pedagogical and Learner Outcome Improvements Through the Use of Augmented Reality

Judy Bloxham
Learning Technology Consultant, eCom-Scotland

Stephen Wileman
Head of Education and Development, Inventive-Enterprise

The majority of research around the use of Augmented Reality in education has focused on the technical aspects and mechanics of delivery. In doing this the pedagogical value and changes to learners' practice have been ignored. The purpose of this project was to look at how marker based AR could be used in learning and teaching and gather evidence of the effects of the technology on learners.

Following the delivery of an AR workshop for educators in 2012, developments were followed within two organisations. This paper sets out to look at the statistical evidence of changes in learning outcomes, gathered over a three-year period. The pedagogical drivers for the use of Augmented Reality are reviewed in the light of pedagogical theory, and conclusions drawn as to whether expected pedagogical outcomes were realized.

Introduction

This paper sets out to look at how learning, and learning outcomes are affected by the use of marker based Augmented Reality as a teaching tool. The rationale behind the investigation was that there had been little evidence gathered around this. Evidence from several UK college projects will be cited, but the majority will focus on the work of South Staffordshire College over a three-year period, with additional evidence from Shrewsbury College. Within this, we will look at how the general use of Augmented Reality impacted on the colleges, and then how the technology allowed sensitive topics to be delivered effectively.

Drivers for the Research

The majority of work looking at Augmented Reality in education has focused on the platforms and mechanics of delivery; in a few cases there has been anecdotal evidence recorded about the effects on learners, or their reactions to the technology. However, the exploration of actual effects on learning, in terms of improving outcomes or changing pedagogy, was not followed up. From 2012 we set out to redress this and follow through case studies and document evidence of how the technology could enhance learner experiences and outcomes.

In a review of Augmented Reality projects, Luckin and Stanton Fraser reported that "few have been evaluated to any extent, and formal studies are rare: a recent review found that only 8% of work in this area had any formal evaluation" (Luckin & Stanton Fraser, 2011). Examples of this are the University of Exeter's 'Unlocking the Hidden Curriculum' project, whose outcomes focused on the mechanics of the technology, the technological issues, and evaluating the platforms available, rather than educational benefits (Rose, Potter, & Newcombe, 2011). An issue with this lack of statistical data is "learning may not be driven by the pedagogy but more by the AR tools' strengths and weaknesses" (Fitzgerald & al, 2012). However as the technology matures, the way that the end user is able to interact more seamlessly

and naturally is improving, therefore creating less of a technology-centered barrier. Over the years the focus of studies on AR as a teaching tool has still been on the technology and technical delivery. Despite running for over 5 years the Jisc Scarlett project and other Mimas AR projects, have never been evaluated in terms of statistical evidence of change in learner behavior. In November last year, the published evaluations of a project with Manchester University Medical School included "Responses from my students and staff members leading these small group teaching sessions was quite mixed at first, with predictable worries about use of unfamiliar technology and the negative impact this can have if it fails to work, but they've given it a go and it has been easy to access and it's worked well, and they're all pleasantly surprised". This shows outcomes still very focused on mechanics (Jisc, 2015).

Dunlevey et al reported that "while vision-based AR holds enormous potential for educators, there are few current studies on this version of AR" (Dunleavy & Dede, 2014). This study is an attempt to redress this lack of evidence around marker based AR as a learning tool.

The Research

In May 2012, a group of educational practitioners attended the first Jisc RSC Augmented Reality workshop in Wolverhampton. The progress of two of these attendees, and how they implemented AR in their organation was followed over the next three years to gather statistical, and pedagogical, evidence. Several of those who attended were of the opinion that the technology had the potential to be a 'game changer'. At that point in time access to development platforms, and simplicity of creation, had evolved to a point where it wasn't just for the 'expert', this was an important factor in the technology coming of age for the education sector. However at that point "AR [w]as a passive lean back experience" (Papagiannis, 2014). During the period of study the development platforms' capabilities changed significantly from merely allowing overlay to facilitating interaction.

Pedagogical Underpinning

The SAMR model was taken as a template for the use of the technology. SAMR represents how technology can transform learning, each letter of the acronym representing the level of modification of activities. The ultimate goal being 'Redefinition' of tasks "that have been previously inconceivable
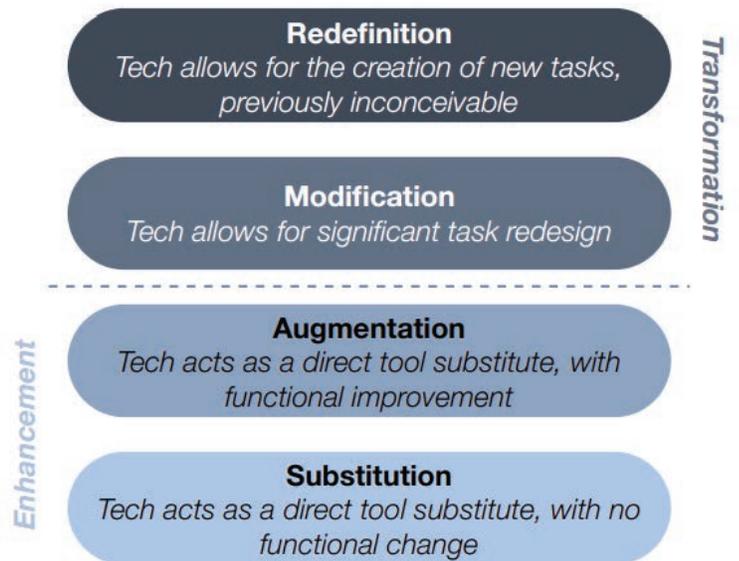
without the technology" (Puendntedura, 2009). AR is a platform with the potential to redefine learning and provide completely new learning experiences that were previously unthinkable.

In terms of pedagogy, both existing theories and emerging ones were considered and possible uses identified. The question to consider was, what can Augmented Reality provide that you can't provide with a PC and hyperlinks?

The Immediacy Of Access To Resources

With a PC you need to log on and then navigate to the resources, whether this be a link, a Google search or a resource on a Virtual Learning Environment (VLE). This can be a long process, and impetus and immediacy can be lost. With some users the temptation to move onto something else during this process can be strong, especially where networks are slow. There is a risk of losing attention and concentration. Providing access through Augmented Reality you can link precisely and directly to resources eliminating the temptation to wander off task. As Luckin and Stanton Fraser said it can, "bridge the learning gap between abstract descriptions and the real world phenomena" (Luckin & Stanton

Fraser, 2011), by having it immediately available, it can underpin experience with theory, at point of need.

Providing Scaffolding

Brunner's theory of scaffolding says it is "the steps taken to reduce the degrees of freedom carrying out some tasks so that the child can concentrate on the difficult skills s/he is in the process of acquiring" (Brunner, 1994). Digital resources can provide this 'scaffolding'. However not every teaching environment has immediate access to a PC, so do we just ignore digital resources in these situations? The number of learners with their own smart devices is increasing (Jisc, 2012), coupled with more institutions providing good WiFi coverage, providing the perfect way to access this digital content from any location. By accepting the BYOD agenda, and welcoming mobile phones into teaching, we can harness the power of Augmented Reality.

Situated Learning

Vygotsky (1978) argued that human consciousness is associated with the use of tools and artifacts. The feelings with those involved in developing AR, were that it could facilitate the use of tools and artifacts, and seamlessly integrate them into the surrounding world. If the most effective learning takes place when it fits into existing cognition, by delivering learning at the point of need, and in context, then we are delivering it more effectively. This also fits in with the learner choice agenda too, making the learning available when they want/need it.

Interactivity And Choice

Augmented Reality can be seen as simply scan and link to one piece of content, be that a web site, a video or other electronic source. The ability to add in interactive choices, even with simple development platforms, transforms the process from being merely passive, to offering the learner a means of exerting choice. Buttons can be included so the learner can choose whether to read information, watch a video, or test their knowledge.

Creating Media Rich Experiences For Learners

We live in a world where rich imagery is all around us; advertising has increased our visual awareness. QR codes are now commonplace elements of signage; just a few years ago people wondered what they were. As digital interaction like this becomes part of our everyday

lives, then there is an expectation for it to pervade every aspect, including education. Augmented Reality gives the possibility of enriching printed material with rich media. It also offers the possibility to facilitate the changing of content, rather than links remaining static, as with a QR code. AR allows us to harness and present learning content; bringing together cloud computing, ubiquitous computing, connectivity and personal, smart devices through "cyberinfrastructure mediation" (Pea, 2008).

Making Resources Inclusive

There is an argument that goes, if everyone can't access the resources via that channel, then it's not a good way to distribute them. However, achieving the truly universally accessible resource, is (probably) impossible. What we need to do instead is provide a range of formats, so anyone accessing them can choose what suits them, whether this be learning preferences or accessibility needs. As Dunlevy et al report, AR "flattens the learning curve necessary for students to develop fluency with this educational tool" (Dunleavy, Dede, & Mitchell, 2008). There are examples where "AR apps are also used to help treat cognitive impairments, learning disabilities and emotional trauma" (Morey, 2016). Where a virtual world was used to assist learners with autism to develop confidence, they found the technology facilitated interaction rather than creating a barrier (Kandalaft, Didehbani, Krawczyk, Allen, & Chapman, 2012)..

Proving Links To The Wider Community

At the ALT conference in 2014, during a long conversation with Professor Diana Laurillard, she argued that all AR was doing was acting as a vehicle for video. However once you recognize the potential of adding interactivity, and the possibilities for linking to social media or other communication, it goes beyond that point. Helen Papagiannis has coined the term 'Amazing Relevance' (Papagiannis, 2013) for the possibilities the technology offers. "AR as an interactive medium enables a pedagogy in which knowledge is grounded in a setting and distributed across a community, rather than isolated within individuals." (Dunleavy, Dede, & Mitchell, 2008)

Facilitating Learners As Makers

"Many teachers feel students never truly arrive at 'understanding,' they are often stuck at 'remembering.'

This means they never reach higher-level thinking." (Phillips, 2013). In terms of Bloom's Taxonomy, creation involves higher order thinking, therefore finding channels where learners can create, actively promotes this higher order thinking. The simplicity of some AR platforms can facilitate learners as makers.

Observation of Effects on General Teaching and Learning

The tutors in the Construction Department were some of the first to take up the technology in South Staffordshire College. They could see how the technology could be applied to, and potentially benefit, the learners. Posters were designed with augmented content to support learning on demand and refresh demonstrations of practical techniques.

Within this learner group the 2013-14 learners were an average, or even slightly below average, level 1 group. Literacy and numeracy capabilities in this level of learner are traditionally low (equivalent to GCSE grades D-G), here five of the group required additional learning support. The use of images and video, rather than textual information meant that resources were easier for them to access.

The tutors, Terry Ramwell and Leigh Jakeman, soon noticed a change in the learners. Within two months of using the technology the following unanticipated changes were noticed:

- Learners became more confident and self directed in their learning.

- Learners were ahead of expected progress by around two to three weeks.

- Learners began to explore rather than waiting to be directed by tutors.

- The Brickwork staff gained a great deal of kudos in the college, as they rose from being the least confident users, to exponents of cutting edge technology.

- The tutors' confidence in using other, more traditional technology, increased. Most notably their use of video. This included improving how they thought about shooting and editing video, to provide the best experience for the learners.

In training activities, the first statistical evidence of change came from the task of breaking a brick. This had always been taught the same way through tutor demonstration, then learners copying this. The usual success rate of learners getting it right the first time was 50-60%. The first year of using AR enhanced poster support, that allowed the learners to recap on demonstrations before attempting the practical activity, was 100% success (Bloxham, Crawford-Thomas, & Wileman, 2013). The following year this was 95%. Possible reasons for this improvement are; the facility for learners to recap easily, and all learners able to see the demo from a consistent view point. Alongside the success of learners, this has implications on cutting down on wasted resources.

At the end of the year there was substantial evidence of learning improvement through exam results. The previous year's cohort had achieved a 74% success rate, this was fairly normal for the college. The 2013-14 cohort, however, achieved 89% success. This was remarkable in the improvement and the college achievements were also above national benchmark (83%) on this course for the first time (Bloxham, Crawford-Thomas, & Wileman, 2013).

Similar engagement has been observed at Shrewsbury College. Their Ofsted (English government body for monitoring educational standards) inspection in 2014 noted "college staff have made very good progress in pioneering the use of an innovative application of "augmented reality" software … for the promotion and extension of learning outside of the classroom." In a follow up best practice case study by Ofsted, they comment "The strong focus on developing teachers' ICT skills and their use of emerging technologies has helped increase the development of learners' ICT and independent learning skills" (Ofsted, 2015).

Shrewsbury College have noticed improvements in learner retention since introducing AR as part of their learning experiences.

- Engineering +2.9%

- Motor vehicle +13.1%

- English and Maths +18.1%

- Access +9.9%

- Hair and beauty +7.7%

The college's new Education course has 100% retention. This course uses AR to educate teachers, and includes

practical experience of how to make use of the technology in their own practice (Shrewsbury College, 2014).

Pedagogical Observations

The Immediacy Of Access To Resources

Learner access to just-in-time resources in South Staffordshire College's brickwork area certainly backs up how useful this can be. There was immediacy of access, and access on demand, allowing learners to work at their own pace.

Providing Scaffolding

Kendal College's Living Learning Plumbing (Kendal College, 2013), facilitated the delivery of video through AR into plumbing workshop areas. "Central to the situated learning perspective is belief that learning is embedded within, determined by, and inseparable from a particular physical and cultural setting." (Dunleavy, Dede, & Mitchell, 2008).

Situated Learning

In the two examples above delivering resources into a workshop shows the value of supporting learning in situ.

Interactivity And Choice

This was used very effectively by Hopwood Hall College with their Sports Science students (Bloxham, 2014). The links can be to social media, a blog, Twitter, Facebook or Pinterest, thereby providing a portal that stimulates social interaction. In terms of current marketing terminology this is a "lean forward experience" (Neilsen, 2008), i.e. the participant is encouraged to actively engage with content to alter or change its outcome.

Creating Media Rich Experiences For Learners

Feedback from a Floristry student at South Staffordshire College backed up the value of providing resources through rich media. "I can still practice skills at home if I miss a class and I can continue to develop my skills independently without a tutor. I find it easier to understand one of the videos for revision of practical tasks rather than reading notes" (Bloxham, Learning Provider Examples, 2013). Providing resources in alternative formats can aid access especially for learners with lower cognitive skills.

Making Resources Inclusive

The Myerscough College poster Motorsport Hazards, provides British Sign Language feedback for deaf learners. Another example from South Staffordshire College, provides an augmented escape plan for SLDD learners. A poster in the rooms used by the learners, alerts them to the fire alarm procedure, then a first person point of view video shows them the route out of the building to the muster point.

Proving Links To The Wider Community

South Staffordshire College worked with Litchfield Cathedral to provide interactive posters for Holy Writ Week 2015. These provided a 'virtual exhibition' alongside the physical one, widening access to the display of religious calligraphy.

Facilitating Learners As Makers

At Myerscough College learners were involved in a project to produce an AR calendar as part of an entrepreneurship module. The learners said they found it engaging and motivating, and the tutor found it met all required learning outcomes more effectively than previous assessment on that module (Bloxham, 2014).

Delivery of Sensitive Topics: Mental Health Awareness

Stephen Wileman at South Staffordshire College, recognized the potential to use AR to deliver sensitive topics, and better engage learners with these. Stephen partnered with Rethink Mental Illness, a national charity that supports mental health issues, to develop resources aimed at the 16-18 age group. Using Rethink's professionally produced videos; he created a series of AR posters. The posters were placed around the college buildings as part of a mental health awareness initiative.

Around 1 in 4 people (Rethink Mental Illness, 2008) will suffer mental health issues in their lifetime, many of these are in the 16-18 age group. This means raising awareness in this age group is an important consideration. For mental health cases, early intervention can help reduce years of suffering and the need for prolonged support.

The posters were designed to enable learners to access information about mental health issues discretely, and the public display of the posters increased general acceptance of the subject matter. Alongside providing video information the posters facilitated links to further

information on the main Rethink site and links to the college self referral support system.

Again there was statistical evidence that the use of AR had helped to engage learners in the target age group. 562 learners were referred to the College mentoring team, and as a result, 272 were referred for safeguarding support (Wileman, 2015). Of these, a significant number of those referrals related to: self-harm (42% increase), suicidal tendencies, threats or attempts at suicide (8% increase), and other diagnosed mental health concerns (58% increase).

This shows increased awareness by both staff and learners based upon the mental health campaign through AR. Many learners and staff expressed that sharing information via AR, and facilitating wider communication, which they said was unobtrusive, engaging and instant, was the reason for the increase in self-referral. It also helped staff identify the symptoms of some of their learners and from that referring them to specialist help. The delivery medium allowed content to be standardised across geographically separated campuses. The high quality content was appropriate, and generated by experts in the field.

Conclusions

Augmented Reality can make a difference to learners, both in terms of engagement, motivation and improving results and retention of learners. The expected pedagogical imperatives were observed in practice, justifying initial ideas, and this was further validated by the retention and achievement data from both South Staffordshire College and Shrewsbury College. Dunleavy and Dede felt that there was scope to engage learners in familiar settings and leverage the capabilities of their own technology (Dunleavy & Dede, 2014). The findings of this study concur with this. The learning curve for both staff and students was suitably shallow so that embedding the technology required little effort other than through visual promotion.

Alongside the expected outcomes there were several unexpected ones. These included:

- The improved engagement of staff with technology to the point of motivating them to up-skill.

- Successful repurposing of existing materials.

The extension and transformation of learning spaces, to

"meet various teaching objectives across the curriculum" (Dunleavy, Dede, & Mitchell, 2008).

The improvement of learner confidence thus enabling them to begin engaging with self-directed learning.

Whilst the statistics are from only two colleges, these are geographically separated, with differing learner profiles. Additional anecdotal evidence was drawn from other colleges, again geographically removed, with differing learner profiles. Generally it is difficult to attribute any changes in behavior specifically to technological interventions, however, we feel in this case, that there is substantial evidence that the observed statistics are predominantly as a result of the introduction of Augmented Reality.

Bibliography

Bloxham, J. (2014, Apr). Hopwood 1. YouTube.

Bloxham, J. (2013). Learning Provider Examples. Retrieved from Augmented Reality : https://sites.google.com/a/jiscadvance.ac.uk/augmented-reality/rsc-nw-examples/learning-provider-examples

Bloxham, J. (2014, Apr). Myerscough College's Augmented Reality Calendar. UK: YouTube.

Bloxham, J., Crawford-Thomas, A., & Wileman, S. (2013). Immersive Learning Experiences through Augmented Reality. Advancing Education , 2481.

Brunner, J. (1994). Language In Educational Practice. In J. Bourne (Ed.), Thinking Through Primary Practice. Abingdon, UK: Routledge.

Dunleavy, M., & Dede, C. (2014). Augmented reality teaching and learning. In J. Spector, M. Merrill, J. Elen, & M. Bishop, The handbook of research for educational communications and technology (4th ed) (pp. 735-745). USA: Springer.

Dunleavy, M., Dede, C., & Mitchell, R. (2008). Affordances and limitations of immersive participatory augmented reality simulations for teaching and learning. 18, 7-22.

Fitzgerald, E., & al, e. (2012). Augmented reality and mobile learning: the state of the art . Augmented reality and mobile learning: the state of the art (pp. 62-69). Helsinki: 11th World Conference on Mobile and Contextual Learning (mLearn 2012) .

Jisc. (2015, Nov). Augmented reality enhances learning at Manchester Medical School. Retrieved Nov 2015, from Jisc Blog: https://www.jisc.ac.uk/podcasts/augmented-reality-enhances-learning-at-manchester-medical-school-30-nov-2015

Jisc. (2012, Nov). Mobile Devices Outnumber Computers. Retrieved Dec 2014, from Jisc Involve: http://jiscrsc.jiscinvolve.org/wp/2012/11/mobile-devices-outnumber-computers/

Kandalaft, M., Didehbani, N., Krawczyk, D., Allen, T., & Chapman, S. (2012, May). Virtual reality social cognition training for young adults with high-functioning autism. j Autism Dev Disord .

Kendal College. (2013). Living Learning Plumbing. Kendal.

Luckin, R., & Stanton Fraser, D. (2011). Limitless or Pointless AR. Retrieved 12 2015, from Knowledge Illusion: knowledgeillusion.files.wordpress.com/2012/02/limitlessorpointlessarpaper2011ijtel.pdf

Neilsen, J. (2008). Writing style for print v web. Retrieved Jan 2016, from useit.com: www.useit.com/alertbox/print-vs-online-content.html

Ofsted. (2015, Jan). Shrewsbury College: Augmented Reality. Retrieved 2016, from Ofsted Research and Analysis: https://www.gov.uk/government/publications/augmented-reality-shrewsbury-college

Papagiannis, H. (2013). AR Redefined as Amazing Relevance. Augmented World Expo. AWE.

Papagiannis, H. (2014). Working towards defining an aesthetics of augmented reality: A medium in transition. Convergence: The iNternational Journal of Research into New Media Technologies , 20 (1), 33-40.

Pea, R. (2008). Fostering learning in the networked world. Becta's Research Conference 2008: Exploring technology-enabled change in education. Sheffield: Becta.

Phillips, D. (2013, Jan). Learning by Creating: Turning Bloom's on Its Head. Retrieved Jan 2016, from Tech Smith: http://blogs.techsmith.com/for-educators/blooms-learning-by-creating/

Puendntedura, R. (2009). TPCK and SAMR Models for Enhancing Technology Integration. As we may Teach: Educational Technology, from Theroy Into Pracice . iTunes.

Rethink Mental Illness. (2008). Mental Health Statistics: Facts. (R. M. Illness, Producer) Retrieved Feb 2015, from Time to Change: http://www.time-to-change.org.uk/mental-health-statistics-facts

Rose, S., Potter, D., & Newcombe, M. (2011). Augmented Reality: A review of available Augmented Reality Packages and evaluation of their potential use in an educational context, Exeter University. Retrieved 2013, from Exeter University blogs: http://blogs.exeter.ac.uk/augmentedreality/blog/2010/11/16/review-of-available- augmented-reality-packages/

Shrewsbury College. (2014). The College in Your Pocket. AoC Annual Conference. London: AoC.

Vygotsky, L. (1978). Mind and Society: the development of higher mental processes. Cambridge, CA, USA:

Harvard University Press.

Wileman, S. (2015). Supporting Mental Health Awareness Through Augmented Reality. Jisc Digifest 2015. Birmingham: Jisc.

Additional Resources

AR as an educational tool and examples to try out

sites.google.com/site/ar2teach/

NAACE paper there may be a link in the original submission but they have shifted things round on the site just recently https://t.co/U4AAHEnOUk

Fish4Knowlege: a Virtual World Exhibition Space for a Large Collaborative Project

Yun-Heh Chen-Burger
Computer Science, Heriot-Watt University

Austin Tate
Artificial Intelligence Applications Institute, University of Edinburgh
and Virtual University of Edinburgh (Vue)

In this presentation, we will talk about how we came to build our Fish4Knowledge (F4K) Gallery and an Underwater Aquarium, what we have provided in the aquarium and how it is relevant to our research work. The F4K gallery and its underwater aquarium is an experimental outreach platform to showcase the scientific work that we have carried out in a large collaborative international project. We will also talk about the issues that we have faced when using virtual worlds such as Second Life and OpenSimulator for educational outreach.

Introduction

The technologies for 3D interactive environments for multiple simultaneous users are quite advanced and virtual environments are widely used in many areas, including gaming, movies, animation, design, engineering, health and safety testing, informational, educational and multi-media applications. As the Fish4Knowledge project [1][2][3] has an important visual aspect to show marine life observations, it was a natural and useful step to be able to use such media to communicate the Fish4Knowledge project results, in addition to traditional academic outlets, such as web sites, scientific conferences and journal publications.

Among several 3D virtual world environments, we chose initially to build our project exhibition in a virtual exhibition gallery in Second Life (SL) for several reasons. One of the project partners, the University of Edinburgh, already owned virtual land in SL. On this land, there is the well-established Virtual University of Edinburgh (Vue), sponsored and presented by several schools and institutes within the university, including the School of Informatics, Information Services, e-Learning, Business School, Veterinary Medicine, Social and Political Sciences and Alumni Services, etc. In addition, on a part of this virtual land, some of the distance learning courses are supported directly through the Vue facilities. Interested readers are directed to http://vue.ed.ac.uk for more details of the Virtual University of Edinburgh.

The University of Edinburgh, at the time of consideration, already had a long history of SL deployment and its virtual land is well populated and used. It was therefore useful for F4K to build its virtual gallery as a part of Vue. Furthermore, and probably more importantly, is the fact that SL allows its users to relatively easily develop and program its environment. That was essential for us, as we planned to provide a tailored 3D environment to suit our needs.

As a result, we initially selected Second Life as the experimental platform to host our F4K 3D Virtual Gallery. We were also able to secure a plot of virtual land within Vue to build our gallery. Following this initial successful effort in Second Life, we replicated and built the F4K Gallery using the OpenSimulator platform, on the OpenVue grid.

Purpose of the Fish4Knowledge Virtual World Exhibition

What distinguishes this 3D virtual project demonstration area from our other standard project (Internet-based) web sites is that the

project demonstration is intended to be fun, interactive and educational. It is not just for academics, but also for everyone who has an interest in marine life and ocean conservation. We intended to use this virtual

platform to attract younger people and their educators who have an interest in using computing technologies for educational purposes to get them curious about our work and marine research in general.

The Fish4Knowledge virtual exhibition gallery is situated at a beauty spot by a lagoon at the heart of the Vue virtual world facilities. In this gallery, visitors are able to "walk" leisurely around our virtual building, via their avatars, to read about our project work and watch our underwater fish monitoring movies that were recorded at our observation sites. They are able to learn and be entertained in a beautiful surreal environment where the sunset

is reflected by the nearby lagoon shining through the large floor-to-ceiling glass window walls. Alternatively, visitors can choose to visit our gallery on starry nights, or at any other times of the (virtual) day to enjoy the shimming sea waves. Figure 1 shows the front of the F4K virtual gallery.

Fish4Knowledge Virtual World Gallery – Ground Level

Upon arriving at the ground level exhibition hall, the visitors can "sit" on our comfy virtual sofas to enjoy the surrounding or walk around our scientific posters to view them. They can interact with or meet others there; or arrange to meet project representatives to talk about the project and its results. Figure 2 shows the ground level project exhibit area.

Once a poster is selected for viewing, the visitor can click on it to open a web page with more details of that exhibit. Currently, there are about a dozen scientific project posters on display, with topics ranging from high performance computing, video and image processing, human-computer interactions, marine biology and intelligent scientific analysis workflow programs.

On the left hand side of Figure 2, one can see a media screen displaying a looped marine life video that was captured under the coastal sea off the South of Taiwan. This video is an example of the videos that the Fish4Knowledge team process.

Fish4Knowledge Virtual World Gallery – Underwater Aquarium

In one corner of the F4K gallery, as shown in Figure 3, there is a passageway that leads visitors down to an underwater virtual aquarium. We call this

The OpenSimulator-based "Openvue" (Open Virtual University of Edinburgh) grid [4] and the easily accessible "OSGrid" [5] have replicas of the F4K gallery. The F4K project page at http://www.aiai.ed.ac.uk/project/f4k provides URLs to access to the F4K galleries and their underwater aquariums on OpenSim. An "OpenSim Archive" (OAR) file has also been created to support the replication of such facilities.

underwater aquarium the "Virtual Fish Lab". Here we exhibit example fish that we observe in real life. Some of our virtual fish are interactive and will react in different ways when stumbled upon or interacted with. Our virtual fish will "talk" to visitors about their lives, via some simple conversational skills.

Figure 4 shows the interior of the underwater level. On this lower level, there is a "porthole" style media screen again displaying a looped marine life video that was captured in the coastal sea off South Taiwan and is meant to show the type of a video imagery that have been captured and processed by the Fish4Knowledge Team.

Fish4Knowledge Virtual World Gallery in Virtual Reality
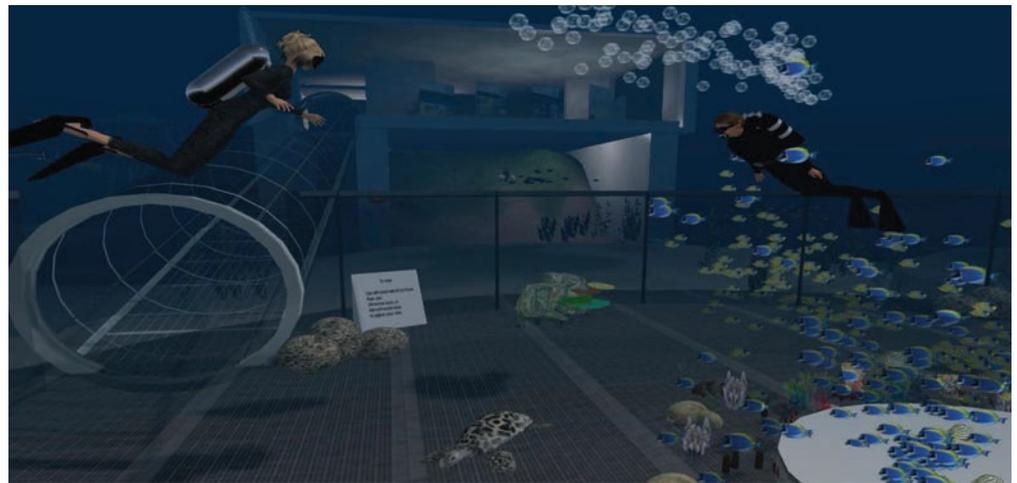
Fish4Knowledge Virtual World Gallery in OpenSimulator

The recent development of Virtual Reality (VR) Head Mounted Displays (HMDs) such as the Oculus Rift has opened up the possibility of more immersive experiences in facilities such as the F4K gallery and underwater aquarium. Virtual World viewers such as CtrlAltStudio [6] support 3D stereoscopic and VR HMD rendering as shown in Figure 5. Such interesting new technologies provide our visitors with a fresh way of exploring the gallery and our surreal underwater aquarium.

Issues Encountered in the Development of the F4K Virtual

World Facilities

The central design idea of the underwater virtual aquarium is to provide a fun, interactive and educational space that gives its visitors a "surreal" experience - in that visitors can "walk about", "touch" things, interact with objects or "talk" with virtual fish. When there is more than one visitor in this space, people can choose to share their experiences through Second Life and OpenSimulator's live voice and text-chat facilities. When appropriate, the Fish4Knowledge team has run events and can hold future exhibition events where project works are presented. This learning experience is intended to be different from those provided by conventional publications, web sites and 2D media.

What we have encountered are the difficulty of introducing new users to the complexities of the viewer interface, especially when they lack any game playing experience or have lower power computers. Voice set up can be especially difficult.

We have also found that the promotion of the facility to the potential community of interest is difficult even with the various social interaction mechanisms used by virtual worlds like Second Life and the OpenSimulator community. One problem was also the age limitations set for Second Life users which meant that we could not attract primary and secondary school children to our site. Nevertheless, our real-life project had attracted many marine scientists and enthusiasts' interests that we continue to receive feedback. If possible, we plan to create follow-up projects, when we will consider how to enhance our current set up in the virtual world to encourage more participants.

Useful Web Resources

Detail of the Fish4Knowledge project can be found at http://fish4knowledge.eu

Access to the Fish4Knowledge Virtual World Gallery and Aquarium in Second Life and OpenSimulator can be obtained via http://www.aiai.ed.ac.uk/project/f4k/

Acknowledgements

References

[1] B. J. Boom, P. X. Huang, C. Spampinato, S. Palazzo, J. He, C. Beyan, E. Beauxis-Aussalet, J. van Ossenbruggen, G. Nadarajan, J. Y. Chen-Burger, D. Giordano, L. Hardman, F.-P. Lin, R. B. Fisher: "Camera Surveillance for Monitoring and Analysis of Fish Populations", Proc. Int. Workshop on Visual Observation and Analysis of Animal and Insect Behavior (VAIB), in conjunction with ICPR, Tsukuba, Japan, November 2012.

[2] Gayathri Nadarajan, Yun-Heh Chen-Burger, Bob Fisher: "Semantics and Planning Based Workflow Composition for Video Processing". Journal of Grid Computing, special issue on scientific workflows, 2013.

[3] Fisher R. B., Chen-Burger, Y-H., Giordano, D., Hardman, L. and Lin, F.P. (eds.) (2015) "Fish4Knowledge: Collecting and Analyzing Massive Coral Reef Fish Video Data", October 2015, Intelligent Systems Reference Library, Springer.

[4] Openvue, the Open Virtual University of Edinburgh – http://vue.ed.ac.uk/openvue [5] OSGrid, http://osgrid.org

[6] CtrlAltStudio Viewer – http://ctrlaltstudio.com

Lesson learned from a Grade 7 virtual world science workshop

Hsiao-Cheng (Sandrine) Han
The University of British Columbia

When rethinking virtual worlds as an educational concept, virtual worlds become not just the delivery system but the learning spaces (Burbules, 2006). This study addresses the research question: How do young students interact within a virtual learning environment? This study used the research method of participatory observational. In this article I listed out the lessons I learned from the workshop. I divided them into five sections, including technology preparation, diverse cultural backgrounds, avatar differentiation, volunteer training, and teaching and learning in the virtual world. Based on this case study, I believe educators who wanting to use the virtual world for education need to know the students' possible skill level, and their prior knowledge with the course content. Educators need to know the possibilities of the virtual world and be able to envision how the course will proceed.

Introduction

With the improvement of technology, more and more k-12 teachers are using advanced technology for teaching different subject areas (Kumpulainen, Mikkola, & Jaatinen, 2014; Wang, Chen, & Lin, 2014; Yang, 2014; Beckman, Bennett, & Lockyer, 2014; Owen-Jackson, 2015; Kay, 2014). The virtual world is one of the advanced technologies currently used in the field of education (Abbattista, Calefato, De Lucia, Francese, Lanubile, Passero, 2009; Burbules, 2006; Chen, Slau, & Nah, 2008; Dickey, 2005a, 2005b; Han, 2013; Han, 2011). Much research has focused on using the virtual world for education, and this research has shown that using virtual worlds in education can increase student motivation for learning (Garris, Ahlers, & Driskell, 2002).

This research is a participatory observational case study of teaching grade 7 science students in a virtual world environment. The research question is: How do young students interact within a virtual learning environment?

Literature review

Virtual worlds are visualized three dimensional (3D) computer interfaces. Virtual worlds provide better quality graphical environment user interfaces than other computer generated online interfaces (Loeffler & Anderson, 1994; Nussli & Oh, 2014). The virtual world is unlike other media in that it does not rely on a series of predetermined points of view. Residents of a virtual world can move around, and the visual representation of the virtual world is determined by that movement (Loeffler & Anderson). Virtual worlds are the natural extension of 2D technologies (Traub, 1994); residents can interact with other residents as they do in the real world.

In the virtual worlds of Second Life, Active World, and Open Sim, residents can create their own 3D avatars, build their own visual environments, and have their own visually virtual movements (Manovich, 2001). The border of the real world and the virtual world is defined by the "production, reproduction and imagination" of virtual world users (p. 120). Lemke (1993) states that the virtual world reminds us that we are not "just organisms, we are organisms constituted by our interactions with our environments, and increasingly those environments are artificial" (p. 13). The formula Sollisch (2007) suggests is "suspension of disbelief + time = reality." In virtual worlds, we are not just interacting with machines, we interact with people through machines. Therefore, we are cyborgs (Harasim, 2006). "The cyborg is a condensed image of both imagination and material

reality, the two joined centers structure any possibility of historical transformation" (p. 120). Because of the visual incentive, virtual worlds have become a new field for education, and online learning has tremendously benefitted from them (Loeffler & Anderson, 1994).

When rethinking virtual worlds as an educational concept, virtual worlds become not just the delivery system but the learning spaces (Burbules, 2006). This rethinking helps us recognize these "learning places as potential sites of collaboration and communities of learners, and not just individual achievement [, as well as] recognizing that the face-to-face classroom, as it is currently constituted, is by no means necessarily more humane or authentic than alternative learning spaces" (p. 54). Learning activities in the virtual world allow students to interact with information from a first person perspective (Dickey, 2005a). However, as Lindlif and Shatzer (1998) state, "meanings are embodied in practice" (Taylor & Carpenter, 2005). Compared with learning activities using a minds-on approach, students can use hands-on practice to uncover more layers of meaning from their conscious doing. As Traub (1994) states, behavioral change is caused by interaction, in which external events support the internal learning processes, within specifically defined environments.

One of the virtual worlds, Open Simulator, is valued by educators because it creates an educational environment only controlled by its administrators and only occupied by its participants (Pellas, Konstantinou, Georgiou, Malliarakis, & Kazanidis, 2014). All student interactions and chat records can be retrieved for data analysis of student behaviour. In addition, not like other hard coded educational games, Open Sim is organic software that can be changed at anytime. That is to say, whenever part of the content needs to be changed or improved, this can be easily done. Since the Open Sim server is maintained by educators, all users' online activities can be retrieved. Cyber bullying and inappropriate, violent, or sexual behaviour can be monitored by educators. If inappropriate behavior appears, users are able to report it, and educators are able to ban or report the related account. Use of the virtual world for education is a topic of interest today. This research created a science laboratory in the Open Simulator of Virtual Commons for Education and Research (VCER).

Research method

This study addresses the research question: How do young students interact within a virtual learning environment? This study used the research method of participatory observational case study. Observational case studies focus on how observational data can be used to answer research questions.

"Observational studies are common in most fields that study the effects of treatments or policies on people" (Rosenbaum, 2002, p. vii). Participant observation is useful "with small groups, for events/processes that take a reasonable short time, for activities that are accessible to observers, when your prime motivation is find out what is going on, and when you are not short of time." (Robson, 2005, p. 315). One of the most important observation models is Spradley's (1980) model of observation, which addressed "space, actor, activity, object, act, event, time, goal, and feelings" (p. 78).

"Case studies can be used to accomplish various aims: to provide description, test theory, or generate theory" (Eisenhardt, 1989, p. 535). According to Stake (1995), "case study is the study of the peculiarity and complexity of a single case, coming to understand its activity within important circumstances" (p. xi). There are different types of case study. In this case, the researcher used community study. This is the "study of one or more local communities. [It] describes and analyses the pattern of, and relations between, main aspects of community life. [It is] commonly descriptive, but may explore specific issues or be used in theory testing" (Robson, 2005, p. 181).

As Shank (2006) states, "participant observation occurs when we enter a setting and become involved in two ways. First of all, we are acting as observers. Second, we are attempting to 'work our way' into these settings as active participants" (p. 59). In this research, the researcher is the observer, as well as the creator, designer, and assistant of the virtual class. As Bogdan and Biklen (2007) note, the "foci in organizational studies typically are the following: A particular place in the organization, a specific group of people, and some activity of the school" (p. 60). This research focused on the activity of the specific student group who used the virtual world to learn science.

Introduction to the project

I, the researcher of this project, am the administrator of the Virtual Commons for Education and Research (VCER). VCER is a virtual world open to all educators around the world who would like to use it for education. The server for VCER is located at the University of British Columbia and is maintained by my start-up funding.

In early December 2013, one doctoral student, Sunny (pseudonym), approached to me and told me she intended to use a virtual world for teaching a science workshop. I knew from previous experience that Sunny looked at the virtual world critically, and was not a fan of virtual world. I was surprised but also glad she wanted to give the virtual world a try.

Sunny told me she was in contact with a local elementary school and wanted to have a 3-day science workshop with the students (27 third grade students, 13 boys and 14 girls) in February 2014. She wanted to use the virtual world to teach science, specifically chemistry, in a one-day class. She also told me there would be 6 volunteers to assist with this project. Since Sunny had no experience in the virtual world, I taught her and one of the volunteers a basic virtual world browser setup, basic navigation, and basic creation. I showed her the online video tutorials and handouts as well.

Technical detail and virtual environment construction

The Virtual Commons for Education and Research (VCER) is a standalone Open Simulator (Opensimulator, 2015) hosted on a virtual server at UBC IT with
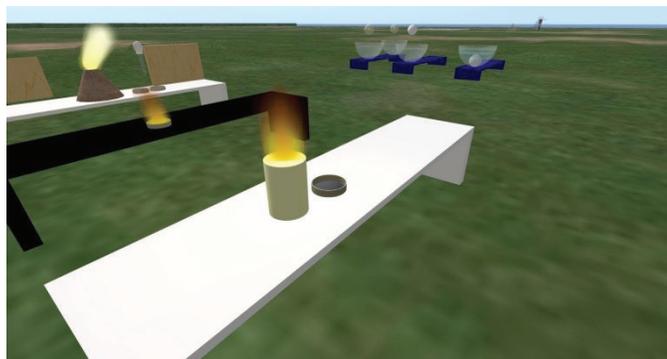
exceed 20.2 Since there were 27 students with unknown previous experience using a virtual world, I suggested putting students in groups of 2 using the same avatar. I created 8 boy avatars and 8 girl avatars with identical outfits and appearances for this workshop.

In our following emails, we discussed the best kinds of science projects for students to do in the virtual world and the possibilities of applying these projects. I rejected some science projects proposed by Sunny, not because of their applicability in the virtual world, but because I believe that, if students are able to do the same project in a real classroom setting with a hands-on experience, they should have the hands-on experience. Therefore, our final decision was to use 6 experiments: 3 associated with fire or an explosive possibility, and 3 using acid solutions. The experiments included improvised fireworks, fire without matches, volcanic eruptions, egg floating and sinking, eggshell dissolving, and egg enlarging and shrinking.

Since Sunny was creating objects and learning about the virtual world from different student avatars, I needed to open all building restrictions to all avatars for her to be able to move, copy, and modify the things I created.

Creating simulated science experiments in the virtual world requires multiple virtual world skills: building, texturing, and scripting. Sunny was willing to spend the time and effort to create the simulated experiments. However, due to lack of time and experience, Sunny was not able to construct the experiments. Therefore,
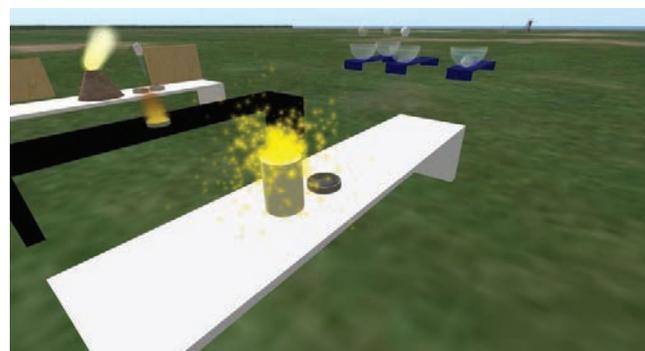
Windows 2008 R2 Operation System, Dual 2.2 GHz Intel Xeon(R)E6-2660 CUP and 4096 MB Memory. In the VCER, currently there are 32 regions, with 177 registered users.1 From previous workshop experience, I knew maximum number of online users should not

I constructed the virtual objects for simulation, and a professional programmer helped us write scripts to make the simulations work. After the experiments were set, I did not double check with Sunny regarding the course content because I believed that, given her

experience as a science teacher, she would be able to

lead the workshop.

The day of virtual workshop: Observational case study

Students arrived in UBC early in the morning, and did several hands-on experiments in the real world science lab. I restarted the server early in the morning looking for a stable server. At 11 o'clock, I went to the computer lab, praying for improvement of the technical problem. After I arrived in the lab, Sunny told me there was a technical problem and she was not able to login. While I was trying to resolve the problem, the fire alarm
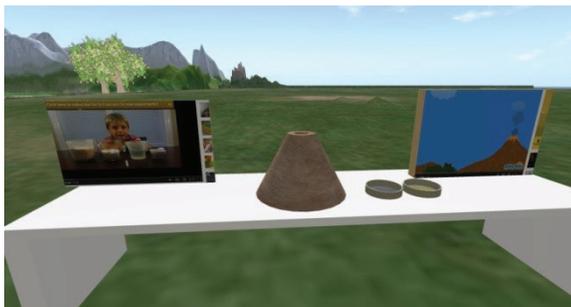
sounded. We all had to evacuate the building. Using wireless internet and my notebook computer, I tested the system and found I was able to login to the virtual world without a problem. About 15 minutes later, we were allowed to go back to the building; however, all the students were also now entering the lab. I quickly logged into all 16 accounts for students and tried logging in to my own account at the teacher's station.

When students arrived, I noticed that they did not look like the third grade students Sunny had described to me months ago. They looked much more mature. It was also obvious that these students were coming from diverse

cultural backgrounds. The first thing one of the students

said when entering the computer lab was "Wow, what is this? It looks like Mine Craft! Cool!" After they all were seated, I noticed my own avatar was not able to access the virtual experiment laboratory region with the students. While I tried to enter the virtual experiment laboratory, I suggested that Sunny let the students know what they would be doing in the virtual experiment laboratory today. After I re-logged into my account, I finally was able to reach the virtual experiment laboratory and show the students what they would be doing in the area.

In my previous experience, it takes about two hours for

adult learners to learn how to navigate their avatars in the virtual world. Prior the workshop, I told Sunny it might take about 30 minutes for younger students to learn how to navigate their avatar and interact with the objects. However, before I joined the students in the virtual experiment laboratory, surprisingly, without any instruction, all students were able to walk and fly around, interact with objects, communicate with each other using their avatar names with a public text chat function, and even modify objects. I was stunned. I saw students greeting each other, teaching each other, and learning from each other. They were clicking around

to see what would happen. Some of the students found a website opened on their computer (http://blogs.ubc.
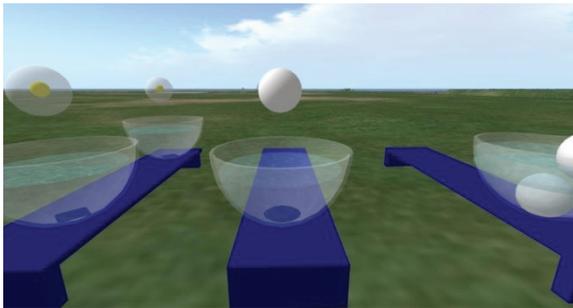
ca/educationalvirtualworld/) with tutorials on how to navigate and build in the virtual world. They had started to watch the tutorial video and apply what they learned in the virtual world. Because students wanted to do different things with their avatars, the whole class became one learning organism as they learned from and taught each other. I hoped to observe more on how they were interacting within a virtual learning environment; however, since their goal in this class was not modifying their avatars and creating virtual objects, I had to ask them to stop doing so.

When I saw that the six volunteers were not guiding the students, I asked them why. Some of them told me that this was their very first time seeing the virtual world, and they were amazed. One group of student complained to me that they had been logged out of their account more than one time; I then noticed that the volunteers were trying to use that same account to experience the world.

We planned to have one volunteer undertake 3 avatars (6 students) to use the virtual experiment learning stations. However, since the volunteers were not trained, the students were not doing what we had planned for them to do. Many students were trying to use the same experiment learning stations at the same time. Because the experiments needed time to work and reset, as in a real world laboratory, when more than one avatar clicked on the same experiment learning station, the experiment would not work. The students couldn't understand what was going on and why the experiment was not working correctly. They soon got bored, and started traveling around the virtual world, modifying their avatars, or creating virtual objects.

At 12 o'clock Sunny told me it was time for them to have

lunch. The students had, by themselves, learned how to send private messages to me to thank me and say
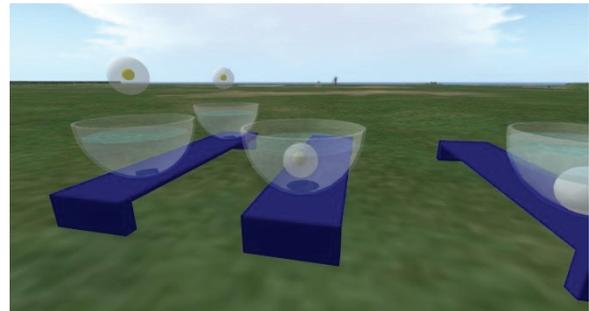

goodbye. Before they left, some of the students said this was fun and some asked if it was possible for them to get into the virtual world by themselves from home.

After the workshop I talked with Sunny and learned these were Grade 7 students, ages 12 and 13. She said she planned to teach the volunteers what to do and how to do everything prior the workshop, from 11:00 to 11:30. However, we were evacuated from the building during that time period.

Discussion

This was my first time observing younger age students interact within a virtual learning environment. My previous experience has been with adult learners, from undergraduate students to professors (Han, 2015a; Han, 2015b). Even though the entire workshop was only 45 minutes long, it provided me with intriguing data and experience.

Due to a fire alarm evacuation, Sunny was not prepared to teach students how to navigate and interact in the virtual world. However, in less than five minutes, all students learned to use the arrow keys to control their avatars, and some students even learned to fly. They spread the word on how they navigated their own avatars and made the learning curve seem to be not a problem. In ten minutes, some students were able to create objects in the virtual world. They were excited and started to be creative. However, because the purpose of the lesson was for them to conduct a science experiment, I needed to stop them from their self-directed exploration of the virtual world and was not able to see what else might happen.

Below are the lessons I learned from the workshop. I

divided them into five sections, including technology preparation, diverse cultural backgrounds, avatar differentiation, volunteer training, and teaching and learning in the virtual world.

Technology preparation

1. Land and object must be set to eliminate the potential to create/modify. Since Sunny was using student accounts to create virtual experiment objects, I did not close any of the functions on the virtual land. However, using student accounts to create these was not a wise decision. Teachers and students should have different permissions in the virtual world. Only with different permissions will students be prevented from changing, modifying, or deleting what the teacher has set up.

2. Access to other lands need to be banned. Students were able to, in a very short time and without guidance, control and navigate their avatars. They found they were able to fly, and started to travel to other regions in the virtual world. Since the virtual world is expansive and attractive to many students, restricting students' travel abilities will help them focus on their mission and goal in the virtual world.

3. Seventeen users in one region was a heavy load for the region's capability. For the Open Sim server, the maximum number of online users is 20. However, when 17 users came to the same region, the region load became very heavy. To solve this problem, teachers can create learning stations in different regions. In this way, students will not cluster in the same place.

Diverse cultural backgrounds

In this class, students had very diverse cultural backgrounds. One of the biggest concerns from the classroom teacher was that some of the students were very quiet in the real world class. Also, because students in the class were divided into different language groups, they had very little connection with other language groups even though all the students were able to use English to communicate with each other.

In the virtual world, students greeted to each other and tried to understand who the avatar was and where they were located in the computer lab. Since all avatars looked the same, girls might use boy avatars and vice versa. The students were interested in each other and

wanted to chat with each other and get to know each other.

This might be a one time event in the virtual learning environment. Students might get back to their language group after they realize who is controlling which avatar. However, since typing in English could be easier than typing in their mother language, virtual learning environments might prevent division between the divided language groups.

Avatar differentiation

Since all the avatars looked the same, some students tried to make their avatar look different in order to be recognized by other students. Without guidance, some students learned to change their avatar's appearance in as little as twenty minutes. One of them made his avatar's hair purple. He announced to the class: "I am the purple haired one!" And some of the students started to change their avatars' other characteristics. They also asked me about the possibility of changing their avatars' outfits. At this point, avatar modification was not an expression of identity. The students were exploring what could be done with the avatar, as well as exploring ways to be recognized by their fellow students.

Volunteer training

This project included volunteers to assist with the process. However, most of the volunteers were not trained. To be able to assist students, volunteers must know the basics of the virtual world. Volunteers should also know the basic idea of the lesson. Virtual world learning in science is actually very similar to real world laboratory experiments; teachers or tutors need to be with the students and need to explain the experiment. If there is no other instruction, the virtual environment needs to provide written directions or teaching videos so students can follow the process and learn from it.

Teaching and learning in the virtual world

Teaching and learning in the virtual world are actually not easier than in the real world. Preparation for teaching in the virtual world may even take longer than in the real world. Educators wanting to use the virtual world for education need to know the students' possible skill level in virtual world, as well as their prior knowledge and level of familiarity with the course content. Educators need to know the possibilities of the virtual world and be able to envision how the course will proceed.

Sunny is a passionate educator. Prior this project, she had very little experience in the virtual world. During the process, it was not easy for her to envision what could be achieved in the virtual world and why she wanted to use the virtual world for certain projects. Because this was Sunny's research project,3 I acted as a consultant. I did not ask for her lesson plan or for her goal in using the virtual world. From the participatory observation, I found several important issues that should be noted for future education in the virtual world.

Virtual world lesson planning should be as solid as real world lesson planning. We can use the virtual world as a real classroom; students can do big group and small group discussions and collaborations. However, students need guidelines to know what they should do, just as in the real world classroom. Imagine a science classroom with experiment materials on a lab table; without guidance, most students would put the materials together to see what would happen without knowing the reasons. A similar situation can be imagined in the virtual world. If experiment equipment is set up and ready for use, but students are given no instruction and all they do is click on the virtual lab materials, then the students would not understand why they were doing the activity. Guidelines are necessary for students to learn. And these guidelines should be included in the lesson plan.

Study sheets, a follow-up quiz, or a discussion make the activity more meaningful. Because virtual world education can be immersive, it becomes very important to assess student learning. When students know to expect a study sheet, quiz, or virtual world discussion after the lab activity, they may pay closer attention to what they are learning in the virtual world instead of just being entertained by the environment.

Students ask about the possibility of doing things, but did not ask how to do things. From my previous experiences, adult learners like to ask how to do things instead of reading a tutorial handout or watching a tutorial video themselves. However, in this case study, the young students were self-directed learners. It was very interesting to see how these young students asked questions. They did not want me to show them how to do certain things; instead, they asked me the possibility of doing things. While volunteers left the VCER website4 open on each computer, students found the tutorials and started to learn from them. It is worthwhile to do more research on how young students learn a new technology.

Conclusion

For me, the virtual world should not replace real world classrooms, and the virtual world can be used as a teaching aid for real world education. There are many possibilities in the virtual world for education. Based on this participatory observation case study, I think educators who wanting to use the virtual world for education need to know the students' possible skill level, and their prior knowledge with the course content. Educators need to know the possibilities of the virtual world and be able to envision how the course will proceed.

References

Abbattista, F., Calefato, F., De Lucia, A., Francese, R., Lanubile, F., Passero, I., & Tortora, G. (2009, August). Virtual worlds: Do we really need the third dimension to support collaborative learning?. In Workshop on Virtual Worlds for Academic, Organizational, and Life–Long Learning.

Beckman, K., Bennett, S., & Lockyer, L. (2014, June). Reconceptualizing technology as a social tool: a secondary school student case study. In World Conference on Educational Multimedia, Hypermedia and Telecommunications(Vol. 2014, No. 1, pp. 1554-1559).

Bogdan, R. C., & Biklen, S. K. (2007). Qualitative research for education: An introduction to theory and methods. NY: Pearson Education.

Burbules, N. C. (2006). Rethinking the virtual. In The international handbook of virtual learning environments (pp. 37-58). Springer Netherlands.

Chen, X. F., Slau, K., & Nah, F. F. H. (2008). Adoption of 3-D virtual worlds for education. ICIS 2008 Proceedings, 113.

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

Dickey, M. D. (2005b). Engaging by design: How engagement strategies in popular computer and video games can inform instructional design. Educational Technology Research and Development, 53(2), 67-83.

Eisenhardt, K. M. (1989). Building theories from case study research. Academy of management review, 14(4), 532-550.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. Simulation & gaming, 33(4), 441-467.

Han, H. C. (2011). Second Life, a 3-D animated virtual world: An alternative platform for (art) education. Art education, 64(4), 41.

Han, H. C. (2013). Teaching visual learning through virtual world viewing, creating, and teaching experiences: Why we need a virtual world for education? IPTEL conference, UBC.

Han, H. C. (2015a). Gamified pedagogy: From gaming theory to create a self-motivated learning environment in studio art. Studies in Art Education.

Han, H. C. (2015b). Teaching Visual Learning through Virtual World Experiences: Why Do We Need a Virtual World for Art Education? Art Education. Art Education.

Harasim, L. (2006). A history of e-learning: Shift happened. In The international handbook of virtual learning environments (pp. 59-94). Springer Netherlands.

Kay, R. (2014). Exploring the use of web-based learning tools in secondary school classrooms. Interactive Learning Environments, 22(1), 67-83.

Kumpulainen, K., Mikkola, A., & Jaatinen, A. M. (2014). The chronotopes of technology-mediated creative learning practices in an elementary school community. Learning, Media and Technology, 39(1), 53-74.

Lemke, J. L. (1993). Education, Cyberspace, and Change [Serial Article Online]. Electronic Journal on Virtual Culture, 1(1), n1.

Lindlif, T. R. & Shatzer, M. J. (1998) Media ethnography in virtual space: Strategies, limits, and possibilities. Journal of Broadcasting and Electronic Media, 42(2), Spring, 170–189

Loeffler, C., & Anderson, T. (1994). The virtual reality casebook. John Wiley & Sons, Inc..

Manovich, L. (2001). The language of new media. MIT press.

Merriam, S. B. (1998). Qualitative research and case study applications in education. San Francisco, CA: Jossey-Bass.

Nussli, N., & Oh, K. (2014). The Components of Effective Teacher Training in the Use of Three-Dimensional Immersive Virtual Worlds for Learning and Instruction Purposes: A Literature Review. Journal of Technology and Teacher Education, 22(2), 213-241.

Opensimulator, (2015). http://opensimulator.org/wiki/Main_Page

Owen-Jackson, G. (Ed.). (2015). Learning to teach design and technology in the secondary school: a companion to school experience. Routledge.

Pellas, N., Konstantinou, N., Georgiou, G., Malliarakis,

C., & Kazanidis, I. (2014, July). Utilizing a Serious Game via Open Sim Standalone Server and Scratch4OS for Introductory Programming Courses in Secondary Education: Their Effect on Student Engagement. In Advanced Learning Technologies (ICALT), 2014 IEEE 14th International Conference on (pp. 699-700). IEEE.

Robson, C. (2002). Real world research: A resource for social scientists and practitioner-research. Malden, MA: Blackwell.

Rosenbaum, P. R. (2002). Observational studies (pp. 1-17). Springer New York.

Shank, G. D. (2006). Qualitative research: A personal skills approach. Upper Saddle River: NJ: Pearson Education.

Sollisch, J. (2007). In Second Life, no jail time for fictional crime. Science Monitor.

Spradley, J. P. (1980). Participant observation. New York: Holt, Rinehart and Winston.

Stake, R. E. (1995). The art of case study research. Thousand Oaks, CA: Sage.

Taylor, P.G, & Carpenter II, S. (2005). Hypertextual "Uncovering" in Art Education. Journal of Educational Multimedia and Hypermedia, 14(1), 25-37.

Traub, D. (1994). The promise of virtual reality for learning. In Loeffler, C. E. & Anderson, T. (eds), The Virtual Reality Casebook. Van Nostrand Reinhold. New York.

Wang, H. S., Chen, Y. T., & Lin, C. H. (2014). The learning benefits of using eye trackers to enhance the geospatial abilities of elementary school students. British Journal of Educational Technology, 45(2), 340-355.

Yang, K. H. (2014). The WebQuest model effects on mathematics curriculum learning in elementary school students. Computers & Education, 72, 158-166.

(Endnotes)

1   As if July 11, 2015.

2   In 2013 July, my VCER team and I hosted a workshop introducing the VCER. There were about 25 participants, and while everyone was trying to register an account, the server was overloaded. I needed to restart the server to stabilize it.

3   Sunny's full research project includes in class lecture, real laboratory experiment, and virtual world experiment.

4   There are many tutorials on how to do things in virtual world can be found in VCER website. http://blogs.ubc.ca/educationalvirtualworld/

Future Libraries: Will You Checkout a Virtual Reality Head Mounted Display?

Valerie Hill
Texas Woman's University, Lewisville ISD (retired)

Suzette Lewis
University of Washington

Through a brief summary of the evolution of library technology leading to the adoption of virtual worlds within librarianship, this article predicts the use of virtual reality (VR) systems and head mounted displays (HMD's) within libraries through examples of virtual world simulation and discusses the future potential for library services and information delivery. Librarians began utilizing virtual world simulation, particularly in Second Life, in 2006 and continue exploring uses for virtual reality in library communities both physical and virtual. Purposes of virtual reality include education, entertainment, and a combination of the two (or edutainment). Although the cost of higher-end VR systems have historically placed them out of the range of many individuals, competing devices like Oculus Rift, Samsung Gear VR, Valve HTC Vive and Google Cardboard assure us affordability and accessibility. And while most VR systems are targeted for use within gaming platforms, educators are starting to utilize virtual reality for simulation of curriculum related topics and the Horizon Report (NMC, 2015) predicts continued expansion of wearable technologies in the next five years.

1. Introduction

Librarians have been in the forefront of exploring new formats and technology trends for decades. Online catalogs, live virtual reference, mobile devices, ebooks, and immersive simulations in virtual worlds are examples of the exploration of librarians in digital spaces with the goal of providing best content and services to library patrons on a global scale. Moving toward the future, librarians find it only natural to investigate emerging virtual reality tools such as head mounted displays (virtual reality headsets) from companies such as Oculus Rift. Exactly how virtual reality will evolve into everyday life remains to be seen. But one thing is certain; librarians won't be shy about offering new innovation to patrons of all ages in physical, virtual or augmented worlds.

2. Background: A Summary of the Evolution of Library Technology Trends

Libraries have been evolving through technology for centuries. From ancient manuscripts to online databases, libraries have continued to store and retrieve information in numerous formats over time. The card catalog began with the first catalog in France in 1791 (Hopkins, 1991) and evolved to computerized text-based mainframe catalogs and to web-based online catalogs with metadata shared across the globe. The current move toward a "semantic web" utilizes (SEO) search engine optimization with continued evolution in information technology. Breeding suggests, "The general idea involves delivering web pages in a way that includes structures so that other computers can discern the meaning of objects in addition to the coding used to present the page for human consumption" (Breeding, 2014, p.25).

Printed materials, ancient manuscripts and artifacts were once the primary materials housed in libraries, but the future may present resources not yet imagined. The role of the acquisition librarian, to find the best possible materials in the highest possible quality for a particular community, will be challenging in the future as more user-generated content is available instantly in ever-changing formats and user-generated content is constantly uploaded to the Internet.

Thomas (2012) illustrates an increased use of mobile devices in libraries with services such as "text a librarian" stating,

"A mobile strategy should encompass the broadest range of library services, like those mentioned—mobile

Web sites, online catalogs, reference services, access to collections—and more: community information, events and programs, room reservations, course materials, and a full suite of patron account management features, such as renewals, holds, fine payments, virtual bookshelf, and self-checkout (Thomas, 2012, p. 134).

The majority of adults in the US now owns a smart phone (Pew Research Center, 2015) and expects instant access to information. The smart phone or mobile device meets those expectations and provides web-based content but information seekers often want a larger screen for other audiovisual materials, such as movies or ebooks.

Adopting new formats is not without concerns and disadvantages. For example, ebooks raise issues about digital rights management (DRM), copyright, and privacy. Brahme states, "An additional concern about the various ebook platforms and DRM is that such software can allow publishers to collect information about user reading habits and specific titles borrowed. This violates a fundamental tenet among library professionals: protection of readers' privacy" (Brahme et al., 2012, p.21). Virtual world content and 3D simulations raise the same issues, especially when users create content inside proprietary spaces.

Augmented reality now gives users a mixed reality experience by providing links to video, images, and information and embedding them within "trigger images". High school librarian Mulch describes using augmented reality through an app called Aurasma, as a different way to deliver library orientation at the beginning of a course. He described, "Instead of my voice I imagined our students hearing and, more importantly, seeing like magic on an iPad screen their fellow students and teachers showing them around the library" (Mulch, .2014, p. 51).

Gannt and Woodland examined over 75 virtual libraries, in the virtual world of Second Life (SL). The researchers believe, "Building on the experiments and successes we have documented in SL, we are confident that libraries and information space will be created in new virtual environments" (Gannt and Woodland, 2012, p. 138).

Hill and Lee conducted exploratory research within Second Life to examine potential for librarianship and found the immersive learning experiences created and curated by librarians include book discussions, historical simulation, virtual field trips, author studies,

genre studies, exhibits and special events. Fourteen different immersive learning tools for education and libraries were documented within the virtual world (Hill and Lee, 2009).

A study on collaboration and knowledge sharing across distance documented 95% of students feeling positive about the learning experience. The study suggests, "the interactive 3D environment within Second Life promotes learner-centered teaching by enabling learning to be more engaging, fun and interesting, thus increasing students' motivation to learn and develop their abilities to acquire relevant problem solving skills and knowledge (Rahim, 2013, p.1.)

Another study addressed learning outcomes for students with lower spatial abilities in the subject of chemistry. The researchers said, "For a critical chemistry topic, the 3-D nature of molecules, our study showed that working in 3-D environments like SL can significantly improve the performance of students who need help the most – the students with lower spatial abilities (Merchant et al, 2013, p. 588). Evidence provided by these studies suggests a need for librarians to utilize immersive learning in acquisition of resources for their communities.

Librarians are exploring and building collections in numerous other virtual worlds. The Association for College and Research Libraries (ACRL) Virtual World Interest Group sponsored "grid hops" to several other virtual worlds to visit libraries, including Inworldz, Jokaydia, and Kitely (Hill and Meister, 2013). To date, educators are more active and familiar with Second Life than other virtual worlds, but the evolution of the semantic web and web-based virtual worlds, such as those created with Unity 3D may give other platforms a rise in popularity. As of this writing, a new web-based virtual library called InfoQuest is being built in Reaction Grid-Jibe, using Unity 3D, with a grand opening to be announced (InfoQuest, 2015).

Although virtual world simulations, in platforms like Second Life, immerse the individual in a 3D space, the computer interface stands between the user and the environment. When VR (virtual reality) systems and HMDs become readily available, the layer between the environment and the user may disappear, as one's body becomes "the mouse". Over twenty years ago, William Winn said, "… Interacting with a computer through

an interface is a third-person experience. Even though we may master the keyboard or mouse to a level of skill where we use them automatically, the information the machine presents always requires reflection before we respond to it, is always objective, usually comes from someone other than ourselves, and precludes interactivity on the basis of natural behavior" (Winn, 1993, p. 3).

Once VR removes the interface layer, virtual experiences will become truly first person. Winn explains, "Immersive VR allows us to create from our experiences the kind of knowledge that has hitherto been accessible only through direct experience of the world, never through computer interfaces, desktop VR, or any of the third-person experiences that predominate in school" (Winn, 1993, p. 3). Winn's imaginative view of the future is about to become a reality. Numerous virtual reality companies (such as Oculus Rift and Valve) are currently putting gestures, hand motion, and thumb/forefinger tracking into VR systems.

3. Virtual Reality Potential in Libraries

A recent demonstration of a head mounted display (HMD) at the Australian Library and Information Association, held in Sydney, Australia, was predominantly librarian-led and well-attended. A husband and wife team, Michael and Constance Wiebrands shared potential uses for librarians, such as providing virtual experiences in the library. Both advantages and disadvantages were discussed. For example, Michael said, "Libraries could also use them to allow clients to build content with the device for other tools, for example, 3D printers" (Lewis, 2015, p. 28).

Lewis mentions that a disadvantage to the use of HMD's is motion-induced nausea caused by latency, or "lag time" between user head motion and updated display (in developer kit HMDs). However, this issue has largely been eliminated in the past year for the latest consumer version HMDs, as long as the software does not include unnecessary latency inducing features (Iribe, 2014).

Uses of virtual reality in the future include whatever simulation one might imagine. Because natural laws do not necessarily apply, virtual experiences

may defy gravity and create experiences beyond the physical. Whether realistic or fantastic, VR systems offer potentially educational experiences. Imagine the following two scenarios.

4.1 VR Scenario 1

You are a high school physics teacher planning a unit on electricity and magnetism, and you want to have a

lab session where your students will use an HMD to visualize difficult mathematical concepts in this subject area. You do an online search and discover there are many VR apps that claim to reference either electricity or magnetism, but you have no way to find out which of them are going to cover the content you need. Fortunately, your librarian has experience searching for educational VR apps, has evaluated apps, and has already acquired a number of popular apps for the district's virtual library. Within minutes you put on an HMD recommended by the librarian for the particular app (depending on the level of interaction in the content, the VR system may change), and try out the top three apps suggested for your lesson. One of the apps is ideal for the task, visually representing the mathematical ideas in a fun experiential way. You are excited because you know that your students will not only be engaged, but that they will learn "through personal experience" with the VR app. You decide to buy the app and you check out a classroom set of HMDs and the appropriate hand-tracking input devices for the next day.

4.2 VR Scenario 2

You are a mother of three and going back to school to get your AA degree at your local community college. You have always found history to be dull, and now are struggling with your Western Civilization course, a requirement for graduation. Your friend tells you about the new virtual reality devices and learning experiences at the campus library, and suggests you go ask for some help. The librarian is delighted to show you the many VR titles related to history and western civilization and suggests a few for you to try over the weekend. Before you know it, you're not reading about places across time and space, but you are experiencing them! You are there and then—standing on the unblemished historical terrain, walking through the ancient buildings, able to interact with the environment. You see how people lived—are living! You pick up objects, examine them closely, and turn around and see others are there with you, sharing in your adventure. You feel your heart pound rapidly as soldiers on horses ride past, kicking up dust in your face. Where will you go next? Let the learning begin!

5. Considerations

Careful consideration about the target audience and purpose of virtual reality simulations will be imperative to librarians and educators. The allocation of funds for libraries and classrooms is always limited and educators often find technology tools out of date quickly. Librarians are experts in multi-media formats and can help match content to media devices of various types.

Evaluation of content has become a critical element of information literacy and librarians are best qualified to promote critical evaluation through professional advocacy and through educational communities, such as Common Sense Media (CSM, 2015). Digital citizenship includes a personal responsibility for evaluating input from multiple formats. Librarians advocate information literacy and digital citizenship for all age groups.

6. Future Directions

6.1 Virtual Communities

Libraries have a rich tradition, which is viewed mostly from the perspective of the physical world: beautiful wood tables and shelves with reading lamps. As global digital participatory culture has brought information to our fingertips on mobile devices, libraries have embraced new spaces including the Internet, augmented reality, and virtual worlds. In the past, libraries were viewed as a community center or hub of information for a particular city or group. The idea of "shared space" and community center is still important, although our communities are now often virtual or digital. The "sense of presence" shared in a virtual environment may fill the need humans have for community. Distance is no longer relevant, yet community may be more important than ever since, as Sherry Turkle points out, we are often isolated behind our technology tools.

6.2 Makerspace (in 3D)

Libraries have embraced the DIY (Do it Yourself) movement and "makerspaces" are popping up in libraries across the globe. The idea of collaborative constructivist learning is not new, but has become widely recognized as powerful in all spaces: physical, virtual, and augmented. The use of 3D virtual reality as a learning tool will likely continue to evolve and VR systems (or HMDs) may play a role in utilizing those spaces.

Conclusion

The Information Age has revolutionized not only libraries but also access to information around the world with real-time content sites like Twitter or live news apps. Libraries may not look the same or offer the same types of materials, but librarians (humans who can prioritize information needs beyond hyperlinked metadata hits) are needed more than ever before in history. The future of education (and possibly civilization) depends upon information literacy in an age of information overload.

During the age of "the book", when print was at the top of the information hierarchy, a good librarian could recommend the perfect reading material for a particular reader. Today's librarian must understand that life may be physical, virtual, or augmented. The implications of virtual reality on libraries, education, and our human day to day life is difficult to predict; however, VR systems will soon be on the market and consumers will be offered content for a wide array of interests.

Utilizing the best of technology will include all formats from print to electronic, digital and 3D. This merge of formats (sometimes called transliteracy or multiple literacies) will impact history perhaps more than the Gutenberg printing press. An imperative underlying concept should be the foundation for the shift of realities: People are more important than innovative technology tools. Respect for information professionals (librarians) and the services they provide to help select, evaluate, acquire, circulate, weed and share resources in all formats will ensure a future where human knowledge, understanding, and compassion are revered.

References

Brahme, M., Delich, P., and Hellman, E. (2012). Three Perspectives on Independent Ebook Adoption in Academic Libraries. Computers in Libraries. 32(7). 16-22.

Breeding, M. (2014). The Systems Librarians, Enhancing Discovery Through Better Exposure. Computers in Libraries. 34(8), 24-26.

Ganntt, J.T., and Woodland, J.R. (2013). Libraries in Second Life: Linking Collections, Clients, and Communities in a Virtual World. Journal of Web Librarianship, 7(2), 123-141.

Hill, V. & Lee, H. J. (2009), Libraries and immersive learning environments unite in second life. Library Hi Tech 27, (3): 338-56.

Hill, V. & Meister, M. (2013), Virtual worlds and libraries. College & Research Libraries News, 74(1), 43-47.

Hopkins, J. (1992). The 1791 French Cataloging Code and the Origins of the Card Catalog. Libraries and Culture, 27(4), 378-404.

InfoQuest. (2015). Infoquest: Worlds to Explore and Experience, Your 3D Learning Resource. Retrieved from http://www.infoquest.spruz.com/.

Iribe, B. (2014). Oculus Connect Keynote. Los Angeles, CA. Retrieved from https://www.youtube.com/watch?v=1xeK8zUXAvQ.

Lewis, R. (2015). Virtual Reality: Soon to Become Mainstream in Libraries? (cover story) Information Today. 32(4), 1-29.

Merchant, Z., Goetz, E.T., Keeney-Kennicutt, W., Cifuentes, L., Kwok, O., and Davis, T.J. (2013). Exploring 3-D Virtual Reality Technology for Spatial Ability and Chemistry Achievement. Journal of ComputerAssisted Learning. 29(6). 579-590.

Moorefield-Lang, H. (2015). Libraries and the Rift. Knowledge Quest. 43(5). 76-77.

Mulch, B. E. (2014). The Systems Librarian, Enhancing Discovery Through Better Exposure. Knowledge Quest, 42(4), 50-53.

New Media Consortium. (2015). The Horizon Report. Retrieved from http://www.nmc.org/publication/nmc-horizon-report-2015-higher-education-edition/.

Pew Research Center. (2015). Mobile Technology Fact Sheet. Retrieved from http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet/.

Rahim, N.A. (2013). Collaboration and Knowledge Sharing Using 3D Virtual Worlds on Second Life. Education For Information, 30(1), 1-40.

Thomas, L.C. (2012). Next Step Mobile: Strategy, Services, and PRM. Journal of Web Librarianship. 6(2). 133-135.

Turkle, S. (2011). "Alone together: Why we expect more from technology and less from each other". New York: Basic Books.

Winn, W. (1993). A Conceptual Basis for Educational Applications of Virtual Reality. Human Interface Technology Laboratory, University of Washington. Retrieved from

http://www.hitl.washington.edu/research/education/winn/winn-paper.html~

Andragons: The Shape of Learning

William Krebs

Lorraine Storry Mockford

John Lester

Software that features a spatial 3D view emerged in 2003 and has been used by educators to convey learning in a richer way than lecture supported by slides, but this approach has not kept pace with the growth of the game industry that also uses 3D engines. Instructional designers who hope to do better using 3D environments compared to lecture may benefit from understanding research data regarding which 3D approaches work best so they can include successful practices and avoid known failures. Such data is difficult to classify without an underlying model to describe similar approaches. This paper begins a taxonomy that can be used to classify spatial instructional designs in order to facilitate future research.

I. Introduction

Commercial software such as Second Life™ by Linden Lab has been used by educators to create new ways to better deliver instruction. Since 2003 when Second Life began, similar platforms have been used for similar purpose, such as Open Simulator, AvayaLive engage™, Terf™, VenueGen™, and others. Sococo™ retains a spatial floorplan metaphor, but simplifies the environment with a flat top down view. But regardless of the engine used, there are some similarities between designs that may give instructional designers a head start in their work. By having a list of types of builds, they can use best practices, avoid mistakes, and have a basis to conduct and compare research metrics on the success of their design. The richness of these platforms could lead to infinite design possibilities, but some general categories emerge. This allows classification of groups of designs. Educators can then apply a veneer or 'skin' to complete their build while still knowing the underlying properties of the basic structure.

This paper does not present data on the merits of any design, rather it explores an educational best practice which seeks to match the learning objective with the design. What is first missing is a way to describe the designs. This paper does introduce a system or taxonomy to describe such designs. While 3D models can be used for many ventures, this system focuses on those that may be used for teaching both children and adults. Malaguzzi described the concept of 'the third teacher' to highlight the environment per se as an important aspect in the trio of teacher, student, environment (cited in Edwards et al, 1998). This is a primary tenet of Reggio Emilia practice in early childhood education. Increasingly, the significance of the environment provides a foundation for the design of learning spaces.

Knowles (1968) describes "andragogy" as the theory of adult learning. Combining this with the Greek word "polygon" derives the term "andragons", which this paper defines as "Shapes used for instructional venues", specifically within 3D learning environments. These shapes represent exterior, interior or floorplans, their audio and visual content,and their interactive properties, but generalize their final visual details such as color and texture. The andragons may be more or less realistic and always immersive. The definition is broadened to include shapes for both adults and children.

II. Background

Virtual learning environments and virtual worlds for education have been in use for more than a decade. How do we decide which learning activities to use with students? Which of these learning activities best suit the learning objectives of our courses and programs?

To answer these questions, let's look at physical teaching and learning environments. The role of well designed physical learning spaces in the teaching and learning process is gaining considerable attention. A recent infographic published by International Society for Technology in Education (ISTE) for USC Rossier School of Education provides clear connections between classroom design principles and student engagement and success (Manni, 2016). Tuecke (2012) explores the role of physical space in group facilitation in "The Architecture of Participation", International Association of Facilitators Handbook, drawing many of the same conclusions found in the ISTE infographic with respect to room layout, wall color, light, and the use of technology. Intent, focus, and interaction are the guiding principles in determining the physical features of the learning environment.

What then of virtual learning spaces? A key question asked by Minocha and Mount (2009) was how should 3D learning spaces be designed for student engagement? Should they be realistic or immersive? They approached this from the perspective of game usability principles (Isbister & Schaffer, 2008): immersion, fun, flow, playfulness, choreography, and engagement. We consider this to be necessary but not sufficient to explore the effective use of andragons. Previous studies of the use of virtual learning environments have focused more on the preparation of the participants for success and the theoretical concepts underlying virtual learning environment design (Minocha & Mount, 2009). Using the andragon concept to address the question of student engagement allows us to provide practical application for instructional design, provided that the game usability principles are followed.

How do we choose the andragon to use? Constructivist practices like backward design that start with the learning objective in designing learning would enable matching the andragon to the instance. Darvasi (2008) and McMinn (2009) provide an overview of constructivist design principles for use in 3D virtual learning environments.

Kapp & O'Driscoll (2009) describe seven sensibilities of virtual interactive environments (VIEs). These include a sense of self, death of distance, power of presence, sense of space and scale, capability to co-create, pervasiveness of practice, and enrichment of experience. These differ from and compliment andragons in that they define properties of the virtual world as a whole, including digital representations of participants, or avatars. This can be used to consider how avatars will relate to the andragons selected or designed. The book also describes eleven learning archetypes: Avatar Persona, Role Play, Scavenger Hunt, Guided Tour, Operational Application, Conceptual Orienteering, Critical Incident, Co-Creation, Small Group Work, Group Forums, and Social Networking. The word 'archetype' refers not to the visual structures, but rather the educational model and approach. This is a useful compliment to andragons because it can define the structure of the lesson. By contrast, the andragon can support those goals. For example, an instructional designer may select "Scavenger Hunt" as a cognitive model for a lesson, but it could be implemented in a "factory" andragon. If these learning archetypes were the software of a course design, then the andragon would be a template for the hardware blueprint.

Saleeb and Dafaulas (cited Hinrichs & Wankel, 2012) coin a term to address design for learning called "Architectural Evolution of E-learning Virtual Worlds" (AEEVW). They consider key factors of build including architectural style (modern, Greek, etc), Wall design, external environment, seating, window styles, internal dimensions, Roof and ceiling design, floor design, circulation, internal elements, and entrance design. These useful factors compliment andragons in that andragons may be considered larger more abstract categories, these AEEVW factors fall in the middle echelon of the design space, and more detailed artistic and technical design factors are described by writings focused on the lowest level details of building as presented by Cudworth (2014). In addition, "The VR Book" by Jerald (2016) also adds design consideration for use with stereoscopic virtual reality hardware such as the Oculus Rift.

This paper will next present a catalog of observed patterns of andragons that can be used to select the

learning shape that best fits the learning objective.

III. Toward a Catalog of Observed Patterns

A hierarchy can be used to classify virtual elements. Online tools may be simple screenshare programs, web cameras, teleconference software, or in this case, spatial builds. The term 'spatial' is used because many andragons can be constructed from a flat or top down view program, such as Sococo. Many andragons are implemented in 3D tools such as Open Simulator, but that is not always necessary to create the logical pattern needed. The following diagram illustrates the subclasses of these environments in UML 2.0 notation (Rumbaugh, et al, 2004), with the subject
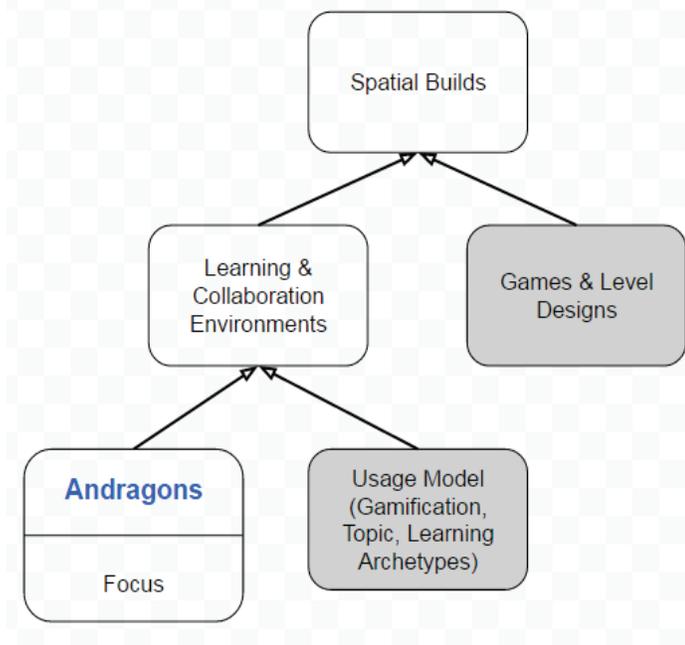
andragons appearing at the bottom left.

Though designs may contain many features, it can be useful to classify them by their main focus. The focus attribute reflects is an attribute of each andragon. Major focus categories can include

- Social Focus
- Process Focus
- Object Focus
- Metaphor Focus
- Transport Focus

Within each category there are common patterns grouped under the name of an andragon. Within one andragon there may be many implementations with different visual details (Cudworth, 2014), though they will share the general properties.

Social Focus

A ndragons with a social focus are designed to facilitate interaction between people. They may have a metaphor and contain objects, but they primary purpose relates to people.

- Campfire Center of focus - ring topology implies equality of participants. Fire implies security. Ambient noise may also root attention to the space.
- Thinktank Opens mind to novel ideas. An underwater build may add an element of metaphor, or be used to further expand participants open thinking.
- Stage Directs attention to a speaker or panel, or group of speakers
- Clusters Tables in the round can direct attention to peers small groups. Physical classrooms often use breakout tables with 6 participants with either circular tables, or rectangular tables placed together. The "Gypsy decks" tool does this, and also allows the clusters to move together or to their own location.

Process Focus

S hapes with a process focus feature constructs in their design to convey an order of steps or choices of steps. Many builds have paths that direct visitors, but process focused andragons feature the order, flow, and direction as a key part of their lesson.

- Factory Implies ordered workflow
- Hopscotch Makes it clear who is speaking, who is next, and the agenda for their speaking segment
- Pair Station Bring interaction focus to two people and one shared object
- Courtroom Shows role by seating - observer, facilitator, pro / con, active assessors
- Simulation Metics, data, and interactive challenges presented to the learner, with or without agency (an avatar)

- Roleplay Setting Learners are able to use Agency in addition to simulation to learn the lesson

Metaphor

A metaphor can be applied to other categories such as social or process, but some designs rely primarily on the metaphor.

- Globe Theatre   A stage andragon framed as a historical theatre, such as the Globe theatre to feature Shakespeare's works

- Broadcasting Studio   Imparts tacit role knowledge between moderator, panelist, and audience

- Arena   A build that conveys the the knowledge that a group of observers will observe

- Kitchen, or restaurant Diner   Customer station, order entry window, cold storage, in progress counter, and hot working on now.

- 1800s classroom Many builds could use a layout to direct attention to a speaker. A build that does so but also retains the visual metaphor of a traditional classroom would fall into this category. An abstract build that still seats participants so their attention is directed could be classified as having primarily social focus

- Broadcasting Studio   Imparts tacit role knowledge between moderator, panelist, and audience

Transport Focus

A ndragons with a transport focus are intended to to help the participate choose between and move to new areas.

- Holodeck Switch between environments

- Nexus   Shows options to travel to other builds. A train station is a nexus design overlaid with a metaphor

Object Focus

Some andragons focus more on object. These are placed or manipulated in the chosen environment.

- Gallery   Allows participants to choose direction and placement of attention. This may be laid out in many ways. A circular view may look like an arena, but may not convey the same behavioral cues as an arena used for as a metaphor for a venue for competition.

- Mall   Contains sub venues and allows participants to exercise self direction. The location of the sub venues may also convey additional meaning.

- Library   Information is presented spatially for browsing, and a searchable catalog is at hand.

- Gestalt field   A place to facilitate creation and description of objects to trigger new views in the participants using Gestalt theory. An example of this approach can be found in the Octagon by Niela Miller of PeopleSystems Potential.

IV. Observations

A ndragons can affect learners through many channels. These include

- Mood

- Size and Perspective

- Body Position

- Sound

- Focus

- Active view range

- Passive View Range

- Illumination

- Direction and Flow

They may also contain builds and items to implement their larger focus patterns: objects, workflow, and metaphor. They will also need to consider accessibility, security and privacy choices.

Agency

T he learning archetypes presented in the book "Learning in 3D" (Kapp & O'Driscoll, 2009) describe a concept called "Agency". On the surface, this seem just a translation for "Avatar" - or a digital cursor representing one's person or camera. Though it appears to be a separate subject, it can be included as an integral part of the andragon. A 'wardrobe' room may have people dress before entering

the space. What people where may be used to fit their learning, or even trigger "The Proteus Effect" (Yee & Bailenson, 2007) where how they dress modifies their behavior. It can also be critical to supporting a larger role-play venue, such as the 1920's Berlin simulation.

Designing for biology: Designing for how your brain works

There are some innate or subconscious behaviors that can be taken into account when selecting or designing a learning environment.

"Anchoring" defines the mind's ability to navigate as space based on remembered cues. A familiar landmark may help people remember and navigate a space. Sound can be an important psycho-spatial cue, and may trigger anchoring. "Rooting", on the other hand, describes the familiarity people develop over time with a space. To measure its effect try removing a space and seeing if it's loss is felt.

The environment may help people remember. Events can be recalled with the assistance of a spatial context in which they were formed.

Andragons are not static. They may feature programmatic interactivity. But they can also use the affordances of the virtual 3D space to allow learners to move. This can be done on 3 levels, ranging from facial expression, to hand gestures, to gross motor movement of walking about the space. This placement of one's avatar or body is significant both in physical and virtual spaces. Sitting close to someone has social meaning. Too close feels uncomfortable both in physical and virtual settings. Distance can be used to isolate group chat or spatial sound, and also imparts social cues about involvement. Position can also include angle. Facing someone has a different social context than sitting side by side. But not only the position, but also the sense of motion is important. Moving objects and people can attract attention than static ones.

Designing for culture - Designing to take advantage of cultural touchstones

One of the difficult decisions to face in virtual classroom design is how much of the of the physical metaphor to retain. People know how to behave when they see seating and tables in different configurations, but in a virtual space do people really need to sit? Will they place anything on the table before them? One extreme would be to design for the purely abstract. The other would be to emulate the look of familiar physical objects. The selection on that range may balance distraction with familiarity in terms of perception. But it may also introduce technical factors the influence computational demands. Organizing information has retained the metaphor of a folder even though digital spaces no longer requires paper. Selection and design of spaces can exclude, simplify, or exclude similar analogies, but should do so after conscious deliberation.

V. Conclusion: Beyond the Horizon

The taxonomy system presented here may serve researchers and designers as a foundation for advancing their selection and evaluation of effective ways to use 3D spatial environments for education. Future work could also describe not just the shape of the solution (or venue design), but also describe the shape of the problem, task, or lesson (shape of task). It can also focus more on interactive programmability of these environments, or how they change over time, rather than the initial layout.

Follow on work can benefit in several ways. First, research data and results can be associated with categories in this taxonomy. Best practices (and anti-patterns) can be organized and retrieved using these categories. The list of known designs may serve to generate ideas or inspiration for new or derivative builds. And finally, new designs and practices can be added to the catalog over time.

Bibliography

Aldrich, C. (2009, September 17). The complete guide to simulations and serious games: how the most valuable content will be created in the age beyond Gutenberg to Google. Pfeiffer.

Blascovich, J., & Bailenson, J. (2011, April 5). Infinite reality: Avatars, eternal life, new worlds, and the dawn of the virtual revolution. HarperCollins e-books.

Cudworth, A. L. (2014). Virtual world design. CRC Press.

Daily, M., Howard, M., Jerald, J., Lee, C., Martin, K., McInnes, D., & Tinker, P. (2000, September). Distributed design review in virtual environments. In Proceedings of the Third International Conference on Collaborative Virtual Environments (pp. 57-63). ACM.

Darvasi, Paul. (2008). The page was edited by Sean McMinn (2009) "3D Virtual Learning Environments". Retrieved from http://etec.ctlt.ubc.ca/510wiki/3D_Virtual_Learning_Environments

Dawley, L. (2009). Social network knowledge construction: emerging virtual world pedagogy. On the Horizon, 17(2), 109-121.

Dawley, L. (2007). The tools for successful online teaching. Information Science Publishing.

Edwards, C., Forman, G., & Gandini, L. (Eds.) (1998). The hundred languages of children: The Reggio Emilia approach to early childhood education - Advanced Reflections. Norwood, NJ: Ablex Publishing

Erlandson, B. E., Nelson, B. C., & Savenye, W. C. (2010). Collaboration modality, cognitive load, and science inquiry learning in virtual inquiry environments. Educational Technology Research and Development, 58(6), 693-710.

Falconer, L. (2013). Situated learning in virtual simulations: Researching the authentic dimension in virtual worlds. Journal of Interactive Learning Research, 24(3), 285-300.

Gibson, D., Aldrich, C., & Prensky, M. (2007). Games and simulations in online learning: Research and development frameworks. Information Science Publishing.

Hinrichs, R., & Wankel, C. (2011, October 3). Transforming virtual world learning (R. Hinrichs & C. Wankel) (Vol. 4). Emerald Group Publishing.

Heiphetz, A., & Woodill, G. (2010). Training and Collaboration with Virtual Worlds: How to Create Cost-Saving, Efficient and Engaging Programs.

Hinrichs, R. J., & Wankel, C. (2012, February 15). Engaging the avatar: new frontiers in immersive education. Iap.

Isbister, K. & Schaffer, N. (2008). Game Usability: Advancing the Player Experience. CRC.

Jerald, J. (2016). The VR Book, Human-Centered Design for Virtual Reality. ACM Books.

Kapp, K. M., & O'Driscoll, T. (2009). Learning in 3D: Adding a new dimension to enterprise learning and collaboration. Pfeiffer.

Knowles, M. S. (1968). Andragogy, not pedagogy. Adult Leadership, 16(10), 350–352, 386.

Manno, M.(2-16). Infographic: Design engaging learning spaces. Retrieved from https://www.iste.org/explore/articleDetail?articleid=650&category=In-the-classroom&article=Infographic%3a+Design+engaging+learning+spaces

Minocha, S. & Mount, N. (2009). Design of Learning Spaces in 3D Multi-user Virtual Environments (DELVE). JISC. Retrieved from http://www.webarchive.org.uk/wayback/archive/20090624223307/http://www.jisc.ac.uk/whatwedo/programmes/elearningltig/delve.aspx

Nelson, B. C., & Erlandson, B. E. (2012, May). Design for learning in virtual worlds. Routledge.Design for E-Learning in Virtual Worlds. Melson & Erlandson

Rumbaugh, J., Jacobson, I., & Booch, G. (2004). Unified Modeling Language Reference Manual, The. Pearson Higher Education.

Scopes, L. J. (2009). Learning Archetypes as tools of Cybergogy for a 3D Educational Landscape: A structure for eTeaching in Second Life (Doctoral dissertation, University of Southampton).

Sheldon, L. (2012). The Multiplayer Classroom: designing coursework as a game. Course Technology.

Tuecke, S. (2012). The architecture of participation (Chapter 5), in Schuman, S. (Ed.). (2012). The IAF handbook of group facilitation: Best practices from the leading organization in facilitation (Vol. 1). John Wiley

& Sons.

Tufte, Edward R, and PR Graves-Morris. (1983). The visual display of quantitative information. Cheshire, CT: Graphics press.

Tufte, Edward R, and E Weise Moeller. (1997). Visual explanations: images and quantities, evidence and narrative. Cheshire, CT: Graphics Press.

Tufte, Edward R. (1991). Envisioning information. Optometry & Vision Science 68.4: 322-324.

Tufte, Edward R. (2006). Beautiful evidence. Cheshire, CT: Graphics Press.

Yee, N., & Bailenson, J. (2007). The Proteus effect: The effect of transformed self-representation on behavior. Human communication research, 33(3), 271-290.

A Student Panel on Virtual Worlds and Transactional Distance in Higher Education Online Courses

Rebecca Adams
University of New Mexico

The six person student panel who have taken fully online courses, will share their experience, insights, and ideas. They will include their experiences learning in a Virtual World environment, as well as address issues of Transactional Distance and Community of Inquiry and how their experiences helped them draw conclusions about best practices that can address common challenges in the online environment.

Keywords: distance learning, virtual worlds, communities of inquiry, transactional distance

Introduction

I was first introduced to Virtual Worlds when working for a statewide educational grant project teaching teachers how to use technology in education. My first reaction was that it was strange, odd and frankly, a little weird. Sitting with a group of educators, our presenter shared Second Life with us. We watched as her avatar walked around a beautiful landscape and over to an overlook of an ocean. As she talked to us about how Second Life worked, another avatar walked over and bumped into her. Now I know that was someone who was new and was not being threatening at all, but at the time, it completely reinforce my initial feeling that this was not something that would be valuable for an educational experience. Next, the presenter whisked her avatar over to her virtual home, sat down on a virtual pillow and took a pose that looked like she was meditating. The presenter shared with us that she found this helpful while she was working in real life. She felt more peaceful when her avatar was meditating. Nothing she said changed my first impression, but I trusted our presenter. She was a highly regarded colleague, so I remained curious as to why this phenomenal educator would value this strange game.

After our workshop, I returned to my office and introduced this to my lead Instructional Designer. We made avatars and attended a concert that was being streamed into Second Life from a highly regarded Institution. A fortuitous coincidence for us was that a student sitting with us at the event in Second Life shared that her mother was one of the musicians playing that evening. Our avatars sat together in Second Life and enjoyed hearing her excitement in being able to attend her mother's orchestra while actually being hundreds of miles away from her. By the time the event was over we both had grown to know and become friends with this very interesting young woman. We had made our first friend in Second Life.

A few weeks later, I walked into my husband's home office and saw his avatar dancing at a club in Second Life. It was evident he had spent some time changing his avatar to be something he related to. He had purchased clothes and shoes and seemed to be having a nice time. This surprised me because we had asked him to get an avatar and join us at the streamed concert, but he had not been interested. Because I was in the last months of my dissertation, he had long evenings at home trying to let me work. While looking for something to do, he tried Second Life. Because he was a musician in his youth, he became fascinated by the number of musical artists in Second Life. He found it interesting they played from their kitchens and dens streaming into the Second

Life clubs and concerts. He had always wanted to visit Australia, and thanks to Second Life, he found a lovely pub had made friends. Friends that lived in Australia and had built this area in Second Life to celebrate their way of life.

I began to see the possibilities of this environment as being less a strange game. The connections between people were clearly there. Being a distance educator, I found the opportunity to have personal connections though this medium overcame my initial concerns.

Background and Theory

My responsibilities are as a director and educator teaching and supporting the theory and practice of eLearning at our University. Because of my role, I am always looking for better approaches to bridge the transactional distance of students and faculty in online environments. We had been supporting the use of all tools noted by Anderson (2008) for education media (pp. 56-57). Part of our work is to understand best practices to support teaching and learning in an online environment.

Garrison & Anderson's (2003) research in online learning and Community of Inquiry informed our practice. "Facilitating discourse for the purpose of constructing meaning and confirming understanding is more than being a guide on the side or a sage on the stage. To make it work first requires a climate that will precipitate and sustain participation and reflective discussion" (p. 84). The Community of Inquiry approach was being used by our online courses with many tools, including our Learning Management System. My new observations were a climate in Virtual Worlds that could encourage participation and reflective discussion.

Moore & Kearsley (2012) described the concept of the educational transaction. It began with John Dewey (1938) and was further developed by Boyd and Apps (1980). Moore & Kearsley suggested, "What we call distance education is the interplay between people who are teachers and learners in environments that have the special character of being separate from one another" (p, 209). They described the Theory of Transactional Distance as "Distance is not simply a matter of geographic distance, but is a pedagogical phenomenon. What is important is the effect between learnings and teachers, on the design of courses and on

the organization of human and technological resources" (p. 209). Transactional Distance is a phenomenon that must be addressed in distance education. Finding ways to minimize it is very important to finding best practice approaches.

Moore & Kearsley (2012) connect Transactional Distance and Vygotsky's (1978) idea of the zone of proximal development. They found that students "enter a community of shared discourse as novices and, supported by a teacher (or other more competent person), primarily through their growing competence in using the tool of language, progressively take charge of their own learning" (p. 211). Their conclusion is dialogue is of critical value to the learning transaction. Finding ways to support dialog is critical to teaching and learning for distance education. There are many technology tools that have been developed for this purpose.

Supporting this was research reported by Moore & Kearsley (2012) regarding the interaction between teachers and learners, and learners and learners. Significant to that were Lee and Gibson (2003) who found in a study of adult learners who took a computer-mediated course that "instructors should encourage dialogue, allow for structural flexibility, encourage critical reflection and permit students to take on some degree of control" (p. 217). Also cited was Pruitt's (2005) study of students in three delivery modalities who found "dialogue, structure and learner autonomy to be significant in predicting self-ratings of performance" (p. 217).

Communities of Inquiry and Transactional Distance were significant challenges in distance education. Finding environments and tools to address these are critical to the success of distance programs.

Description of Project

With these authors guiding us, it seemed natural to keep looking for tools that would help students and instructors minimize the transactional distance that occurs in online learning. Virtual Worlds were mentioned in Moore & Kearsley's (2011) work, but no recommendations were made. "By 2010 respondents of an NMC survey reported that they believed that they were beginning to find pragmatic and effective ways to use virtual worlds" (p. 82). We were

members of the New Media Consortium (NMC) and had attended several conferences in Second Life. All these experiences were supporting us moving students into Virtual Worlds to see if there was any benefit for their educational experience.

It seemed to be something we should, at the very least, introduce our students to. I introduced students to Second Life in two courses. The first was a pre-service teacher undergraduate course, Microcomputers in the Classroom offered in the fall of 2010 and later in a graduate course Theory and Practice of eLearning in 2011. We found the students had a very steep learning curve and so we only went in a couple of times each semester. They seemed fascinated but also, similar to my first impression, they seemed a bit reluctant to explore the possibilities. However, there were always one or two students who found it fascinating. During those first few courses, two students let me know that they went in on their own, after our introduction and joined communities in areas of their interest.

This kept me fascinated by the level of connection that they found and mirrored my husband's experience. Beginning in 2013, we offered a summer 8-week course, "Exploring Virtual Worlds." This was a student-centered, hands on course where students were given more time to explore Virtual Worlds in teaching and learning. They met experts, learn to build and built a final project that required them to create a learning environment in Second Life.

The following fall, two students from that class also took the fall Theory and Practice of eLearning. This course had a required biweekly synchronous session. The first session was led by the instructor, to model using online synchronous approaches.

These sessions, both in Web Conferencing and in Second Life, were sessions set up to support learning concepts having to do with eLearning Theory and Practice, such as Student Support, Instructor Training, Multimedia, and Evaluation. The synchronous sessions occured at the end of a two-week module after students did selected readings and discussed concepts asynchronously. Students applied their learning to a group distance education project problem that culminated at the end of the semester. The synchronous sessions were used to model best practices while they practiced and discussed what they had learned. This included activities such as deciding on the three most important problems students face or making a multimedia example of a short lesson. Each activity directly supported the learning for that two-week module.

For the last 4 to 5 sessions the students took turns leading the sessions. For the next two fall semesters, I gave the students the choice of using Web Conferencing or Second Life for their sessions. One group led the session and they made the choice. Both had been used once by the instructor with the students.

For the past two semesters, the students have chosen Second Life for all sessions, rather than Web Conferencing. Students reported more discourse, interaction, and engagement when synchronous meetings were held in Second Life. They shared that they felt their avatars represented who they were and enhanced their creativity and expression. They felt a deeper connection to the other students as well as the instructor. Geographical distance disappeared and social presence increased which enhanced their learning opportunity. They reported that they felt like were "really there" with their classmates. There was more participation, they looked forward to getting together, trust increased and they felt valued because they could be seen, as well as heard. One said it helped them "embrace the learning" and "it was fun!"

Lessons Learned

This proposal is for a Student Panel to discuss what their experience was and why they believe the groups chose Second Life for their required sessions. They will share why many of them are interested in exploring the possibly Virtual Worlds have for their future endeavors in teaching and training.

This past semester I acquired a set of class avatars and set them up ahead of time. Each student was loaned an avatar for the semester. This was to minimize the amount of time it took on the first day of class to get them in Second Life. I believe this was a very positive step, as there were still challenges and frustrations, but the amount of time we had to work together was spent on the students learning to navigate, accept items and change their appearance to feel comfortable. This also satisfied a University concern that students were not being required to sign a Terms of Service Agreement with an outside entity.

We believe that our experience reflects the theories of Communities of Inquiry and Transactional Distance. Students have shared that they learned more, were more connected to their peers and were able to feel like they were all together when in Second Life. They felt that way in spite of the challenges, such as low bandwidth. Students had technical issues, as they do with Web Conferencing. There was a very high learning curve to feel comfortable in Second Life. Yet, each session had 100% participation, except for one session when one student had a conflicting event they had to attend for their work. In previous courses, students would often miss a Web Conferencing session or come late. In these courses, students that were traveling logged in from their hotel. Students that had work or school commitments worked them around our synchronous times and showed up every session. This has not been the case with Web Conferencing. This may be coincidence, but it was significantly different from my experiences in the past when I used the same techniques to schedule the sessions.

Student participation and student satisfaction are the components we can report. Other studies support our findings. There is more formal study warranted to make any generalizations.

Conclusions and Implications

Based on our experience and what the students report, we believe that meeting in Second Life lowered the Transactional Distance between instructor and student as well as students and students. We believe that students felt more connection and thus, more responsibility, for their groups/peers. Students said that, in spite of the challenges of the Virtual World, they enjoyed moving their avatars around, sitting next to the other students and having virtual boards, items, and environments to help them learn.

We feel the implications are broad. If we can find an environment that can lessen Transactional Distance in online courses, we feel both the students and instructors will be more satisfied and learning can be more effective. There are many challenges remaining with adoption, finances, experience and expertise.

This student panel will answer the questions:

1. What were the challenges you faced as a student in a Virtual World learning environment?

2. Why do you believe the groups chose Second Life rather than Web Conferencing to meet?

3. How do you feel this environment enhanced your learning?

4. How do you feel your experience reflects on Transactional Distance and Communities of Inquiry in online courses?

5. What do you believe are the challenges and possibilities?

They will also take questions from the audience.

References

Anderson, T. (2008). Athabasca University Press - The Theory and Practice of Online Learning. Athabasca. Retrieved 17 January 2016, from http://www.aupress.ca/index.php/books/120146

Boyd, R., & Apps, J. (1980). Redefining the discipline of adult education. San Francisco: Jossey-Bass.

Dewey, J. (1938). Experience and education. New York: Macmillan.

Garrison, D. (2011). E-learning in the 21st century (2nd ed., p. 84). New York: RoutledgeFalmer.

Garrison, D., & Anderson, T. (2003). E-learning in the 21st century (p. 84). London: RoutledgeFalmer.

Lee, J., & Gibson, C. (2003). Developing Self-Direction in an Online Course through Computer-Mediated Interaction. American Journal Of Distance Education, 17(3), 173-187. http://dx.doi.org/10.1207/s15389286ajde1703_4

Moore, M., & Kearsley, G. (2012). Distance education: A systems view of online learning (p. 209). Belmont, CA.: Wadsworth Cengage Learning.

Pruitt, D. (2005). Transactional distance and learner autonomy as predictors of student performance in distance learning courses delivered by three modalities (Ph.D.). Tulane University.

Vygotsky, L., & Cole, M. (1978). Mind in society (p. 211). Cambridge: Harvard University Press.

Author Note

Rebecca Adams, Extended Learning, University of New Mexico.

Rebecca Adams is the Director of Faculty Services and Online Course Development, University of New Mexico and an Instructor, Organization, Information and Learning Sciences, University of New Mexico.

Correspondence concerning this article should be addressed to Rebecca Adams, Extended Learning, University of New Mexico, Albuquerque, NM 87131-0001. Contact: reada321@unm.edu

QUADRIVIUM PAPERS

QUADRIVIUM PAPERS

Technology on the Horizon

Facilitator and Author: Marie Vans

Introduction of Quadrivium topic

The Technology on the Horizon quadrivium focused mostly on technology that is currently available or close to available for use in or with Virtual Worlds, but that is not quite integrated in a way that educators can use off the shelf. Questions were put to the audience about six different technologies, including Occulus Rift, 3D printing and scanning, use of mobile devices, internet of things, wearable devices, and very realistic (as in clone copies of people) avatars. There was good discussion on most of the six subjects, and the very lively interaction was only slightly interrupted by a momentary loss of voice across the VWBPE venue. This paper will cover the main points including best practices, potentials pitfalls, recommendations, and conclusions.

Overview of the Main Topics or Ideas brought up

Several questions were put out for discussion. The first was about virtual reality in virtual worlds. It was mentioned that the Occulus Rift "bundle" will be released in April at a cost of $1,500.00. The audience was asked about what still needed to be done to make the experience fully immersive. The second question was about the use of 3 dimensional (3D) scanning and 3D printing as part of the on boarding/off-boarding of content in virtual worlds. The idea that 3D scanning puts more complex content creation into the hands of users and 3D printing allows virtual items to be materially realized was mentioned by the facilitator. She also mentioned that children are already doing this with Minecraft and systems like the new HP Sprout that comes with 3D scanning. The question that was put to the audience for discussion was about the value of this scan-print or print-scan workflow to virtual world's content creators.

The third question related to the merging of real life and virtual worlds. In Gartner's (2015) top 10 Strategic Technology Trends for 2015, the technologies of "Computing Everywhere" (or mobile) plus Internet of Things (which provides data with services) plus 3D printing (for content creation), was specifically mentioned. The question the audience was asked to talk about was, "how can virtual worlds use the combination of these technologies to improve user experience?" The next question had to do with wearable tech, which is currently focused on fitness (think Fitbit) and communication. The question that the audience was asked was, "How can virtual worlds utilize smart sensors for a more realistic immersion experience?"

The fifth question generated a great deal of discussion amongst the participants and was focused on the idea that some organizations, such as The Future Group (Takahashi, 2015), are working on allowing users to "Step into their screens". The way they are approaching this involves work on more realistic avatars, including a clone of yourself. The question discussed was whether or not users of virtual worlds really want avatars to look exactly the same as the person behind the avatar? Finally, we touched on mobile virtual worlds experiences. This question was asked to discover what people might really want to do with virtual worlds on mobile devices.

Best practices

Project-based learning came up during the discussion on Occulus Rift. Just having the technology doesn't mean it will get learners engaged. Making sure that interaction and tasks have meaning to the users is important for immersion, regardless of whether virtual reality technology is used or not. It is the sense of presence that determines whether people are really fully immersed. During the

discussion on 3D print workflows, several participants knew of someone who already took 3D models from Second Life and exported them to create 3D printed objects in the physical world. It was mentioned that it is simply a matter of exporting a Second Life linkset as a DAE mesh, which can then be printed on a 3D printer. Most participants agreed, however, that there is more useful to scan an object in 3D and import it into a 3D environment. There was some discussion on use of 3D printing for prosthetics, but it was unclear what the application would be for virtual worlds. Minecraft was also discussed in the 3D context and most thought the idea of scanning in objects for use in Minecraft a great way to get kids interested in STEM activities.

Challenges

The cost of Occulus Rift seemed to be the main drawback for people. It can quickly become expensive for any reasonable size class of students, based on current prices. For those whose students are already experimenting with the Occulus, setting up or Occulus-ready systems and software seems to be major challenges. The fact that the virtual reality headset is tethered to the computer and still needs a keyboard is problematic because once a person is fully immersed, the keyboard can't be seen. A related issue is that when users currently use the interface for virtual worlds, the use of menus and clicking on things to build in the world need to be rethought in order to make the experience more natural. During the Internet of Things (IOT) discussion, most felt that the mobility aspect of virtual worlds was not very useful. Apparently, there have been some applications for running virtual worlds on mobile devices, but they are not widely used. The idea of augmented-reality, wherein the mobile device can recognize things in the physical world and augment the experience with additional, related material was brought up briefly.

Recommendations

There were many recommendations for virtual reality equipment, such as the Occulus Rift. Many ideas focused on what was needed to enhance the experience including surround or stereo sound, olfactory sense, haptics, the ability for avatars to reflect the facial expressions of the person behind the avatar, and even telekinetic abilities. Another idea

was that while being fully immersed, there still needs to be a "window" into the physical world, perhaps as a small window on the screen of the display. Most of the discussion on IOT was centered on how sensors could be used for visually or hearing impaired people. One interesting idea was having sensors that would automatically send sound to a transcription service for the hearing impaired. Another idea was an improvement to the way current tools works for the visually impaired using sensors to help them feel their way around the virtual world.

Probably the topic that generated the liveliest discussion was on the idea of having an avatar look exactly the same as the owner in the physical world. Most people agreed that they would not want to look like themselves in virtual worlds. The reasons were varied from security issues (not wanting to compromise their identity in real life), to feeling better about the way they look in virtual worlds than in the physical world, to not wanting others to know that they need a cane with which to move around. Some talked about the need to have different personas depending on what they were in-world to do. So, for example, they might have one avatar for business events, such as the VWBPE conference, but another one for going out and partying with friends. One deviation from the idea that we should not look like our avatars was brought up around the area of education and other situations where there is a need for authentication.

Additional Ideas Discussed

The idea of 3rd person versus 1st person perspectives for avatars came up briefly during the discussion on Occulus Rift. For some, the 3rd person view does not change their perception of being immersed, while for others, the 1st person is preferred. Both can be experienced in most virtual worlds, but how might this change when people are fully immersed with the headset and perhaps haptic gloves? An article link pasted into chat provided a way for the participants to learn more about the topic. This article gives perspectives by three important Virtual Reality thinkers about whether they believed that VR would become huge in 2016 once Facebook releases the consumer version of Occulus Rift (Sung, 2015). An interesting application of the IOT discussion used cameras along a boardwalk during a real-life hurricane allowed people to experience the hurricane without being put in the

kind of danger they might have experienced otherwise.

Interestingly, the discussion on the merging of physical and virtual worlds led right into the discussion on wearable technologies. As part of the wearable technologies discussion, the topic of artificial intelligence (AI) came up. The main question was whether virtual worlds already have AI components working in the form of bots and recommendation engines. Some people felt that because a script can react to different situations it was AI, while others did not. There are some basic AI capabilities available, but so far still nothing that could pass the Turing test.

Conclusions

The quadrivium was well attended with a lot of interaction with the audience. The issue with the voice program shutting down at the start of the event slowed things down a bit as everyone took to chat. Even when voice came back, most preferred to use chat rather than voice. Technology on the Horizon seems to be an interesting topic for many VWBPE attendees, but the topic that generated the most interaction was about whether one would like to have their avatar look like they do in the physical world. There was another quadrivium about avatars and identity during the conference, but I believe the discussion here touched on different aspects than the later quadrivium. In addition, there might also be some interest in the use of 3D scanning to more easily bring new content in-world, and a workshop or quadrivium on this subject could be considered for next year.

References

FreeWee. (2016). Cross World Art Creation: Silas Merlin. FreeWee's Laboratory. Retrieved from: http://freeweeling.com/blog/2016/03/cross-world-art-creation-silas-merlin/, Accessed March 13, 2016.

Gartner. (2015). Gartner's Top 10 Strategic Technology Trends for 2015. Smarter with Gartner. Retrieved from http://www.gartner.com/smarterwithgartner/gartners-top-10-strategic-technology-trends-for-2015/, Accessed March 12, 2016.

Sung, D. (2015). Virtual reality realism: Why 2016 might not be VR's big year. Wareable Tech for your connected self. Retrieved from http://www.wareable.com/vr/is-2016-the-year-vr-goes-mainstream, Accessed March 13, 2016.

Takahashi, D. (2015) A virtual, interactive game show is coming to prime time in 2016. Venture Beat. Retrieved from http://venturebeat.com/2015/04/10/the-future-group-plans-to-insert-you-into-virtual-worlds-for-interactive-game-shows-exclusive/, Accessed March 12, 2016.

Spectrum of the Self

Facilitator and Author: Dauna Kiser/Ghaelen D'Lareh (Avatar)

Introduction of Quadrivium topic

This paper is a summary of the Quadrivium discussion "Spectrum of the Self in VR" for the Virtual Worlds Best Practices in Education Conference of 2016. The focus of the discussion centered on an individual's sense and expression of identity in virtual reality and virtual worlds. A quick search of Google yields tens of thousands of blogs, articles, white papers, and more; a similar quick search of Slideshare or any research university database also yields thousands of articles and many books. Researchers can agree that the spectrum of identity spreads across the landscape of our physical world; the emergence of virtual spaces, including virtual worlds, has increased our access to a multitude of new colors in this spectrum. In this Quadrivium discussion, we examined the characteristics of virtual reality and virtual worlds that allow us an insight into our concept of self and how it can influence learning and understanding. Given the vastness of the subject, we were only able to begin an exploration of the notion of identity as the self that we are - and create - in relation to virtual world immersion and our interaction with others while we are in those worlds.

Overview of the Main Topics

Time allowed for two main questions. The first asked whether an individual would choose to modify the virtual representation of themselves upon entering a virtual world and identify with that representation. If so, why and to what extent? The second question asked whether we should try to look like our physical selves and how this would affect our sense of self and our interactions with others in a virtual environment.

The discussion ranged widely, but five main topics emerged:

1. Whether identity is linked to the appearance of one's in-world representation (avatar) and whether there can be one or many identities.

2. The ability to explore various facets of self through the modification of one's avatar (one or more times). Whether strength of self affects the degree of avatar variation from the physical world.

3. A specific sense of freedom associated with the ability to modify the appearance of one's avatar in any virtual environment (one or more times).

4. Thoughts on creating sameness in real world-to-virtual world avatar expression. This includes physical world facial appearance pasted onto one's avatar in a virtual world, and requirements for avatar appearances (in-world dress code).

5. The immersive experience within a virtual world and whether it is affected by the modification of the appearance of a default avatar. This includes interactions with others also in the world.

Main Topics Expanded

Audience members agreed that in the physical world, we have one main appearance that can be only slightly modified in comparison to the extent to which we can modify virtual avatars. There was also agreement that most people choose to modify the default avatar representation upon entering any given virtual environment - even if this change is slight or subtle. Finally, the purpose for entering a virtual world might have a dominant effect on the degree of avatar customization, but there still is some degree of customization. Increased identification with a virtual avatar increases one's virtual presence and immediacy within the surroundings. Therefore, we can accept that a persona's virtual identity is linked to the appearance of

the avatar, at least to some extent.

There was general agreement that a person in the physical world could identify with different avatars or variations on an avatar appearance. Most agreed that some difference between our physical selves and avatar representation is usual when entering a virtual world. Age was the most mentioned change - in both directions, although child avatars exist (these merited their own category of discussion). Hairstyle and color, skin color, gender, musculature, shape of limbs, and style or amount of clothing were also most often changed. Beyond that, the discussion intensified again over the topic of non-human avatars - wide variations in appearance and shape were generally accepted for role-playing (perceived as in a play), but less accepted for actual self-identification.

The most intense discussion emerged over the creating of an avatar that diverged considerably from the adult, humanoid, representation. There was discomfort expressed in the audience about representing one's self with an avatar that a physical (adult) human could not become (animal, child, mythological creature, plant). The specific types of avatars under the most discussion were furries, tinies, and child avatars - with the greatest emphasis given to the difference between them and the significance of those differences. The notion of community came into play here. People who identified with similar avatar shapes often formed communities that seemed to attract conformity but that are made up of a variety of identities and personalities. An interesting aspect of this part of the discussion was the tension between attempts to place varieties of these types into further categories and resistance to further (or any) categorization.

The argument for wide variations in avatar appearance related to the very differences that exist between the virtual and physical worlds. A body-shape change in the physical world takes more effort and risk than in a virtual world. Virtual environments allowed people to explore various facets of the self far more easily through the non-permanent modification of their avatars. Inworld, a person could explore hidden aspects of their personality, try out how they would feel about a different body shape or attribute, even explore wearing non-human avatar shapes. In fact, the array of shapes and species of avatars allowed for vastly different personality expression. Some audience members felt more comfortable in social situations when represented by or identified with a non-human avatar. They allowed themselves to be more playful, emotional, talkative, or affectionate (or the reverse). Avatars might be created according to a person's feelings rather than the way they think they look. Voice attributes were also mentioned as part of one's identity that were fair game for modification (through the use of software).

Here, the strength of a person's physical world self might com into play. Some audience members expressed discomfort with a non-human avatar because their physical world appearance could not become non-human. Some acknowledged that they accepted changes in the appearance of others only to a certain degree or in certain situations. Others stated they accepted any and all varieties of avatar shapes.

The third topic is related to this. Several audience members expressed a sense of freedom and creative expression when constructing an avatar to match their identity. Sometimes the resulting avatar affected this identity in turn. Some felt they now had permission for their inner self to emerge, a lessening of inhibitions, or a stretching of themselves in their expressiveness. Inhibitions in the physical world seemed related to the sense of freedom in the virtual world; a person who feels inhibited is more likely to also feel more freedom in the virtual world.

An interesting aspect of this topic melds into the fourth main topic and involved enforced sameness or conformity in avatar appearance modification. Few audience members supported the idea that we should 'paste our face' onto our avatar, except in very specific situations and with very clearly explained rationale. Another intense part of the discussion surrounded objections or defenses regarding avatar dress codes. Regions or businesses might dictated or recommended a specific type of avatar or style of dress. Both the ratings system (general, moderate, adult) and community preferences determined to what extent avatars were expected to conform to protocols. There were valid reasons both for objecting and enforcing - freedom of expression (self?) balanced with safety, respect, or the preferences of a specific owner or community. An important question emerged here: Should anyone with any appearance expect to be allowed anywhere for any

reason?

The fifth topic addressed whether immersion and engagement in the virtual environment increased as a result of avatar modification. Some thought that immersion increased because a greater identification with the online persona allows an individual one way to commit to a role. Immersive identity can be seen as role-playing, but is not necessarily the case. The identity an individual adopts may be another facet of their personality that fits the environment more readily or enables the individual to test personality expressions in a way they could not in the physical world. In the same way words in different languages cannot be completely translated into only one, different avatar types carry meanings that might be specific to that representation. The simple act of changing clothes increases one's ability to fit into a variety of situations - a historically-themed situation in the morning and a futuristic space situation in the afternoon.

Elaboration of Ideas that Fit a "Best Practices" Category

While the discussion did not directly treat the topic of best practices, some ideas surfaced that would fit that label.

More discussion is warranted in this area, and in the understanding of the way people create the virtual representation they identify with. Most audience members agreed that in education and professions, various external factors may determine the extent to which one modifies their avatar. This includes the age of students, perception of the instructor's appearance as representing the institution, the institutions' own dress code, and the type of activity (social, professional, classroom, historical or themed).

For an educator, several audience members suggested finding out how the institution or school would view a particular avatar representation arriving in the classroom or the event. It would be wise also to think about whether the audience or student group would view such an avatar as professional or credible. The specific types of avatars mentioned were child avatars and non-human avatars.   An important aspect of this is to think about how one represents the institution and to balance that with avatar expression. Some universities have turned away from both Second Life and Opensimulator

because the appearance of professional educators in public situations has been both embarrassing and inappropriate.

Effective Identity Construction can benefit students and educators in understanding their individual self.   One way is to push the boundaries of gender so the individual can gain experience in living as the other gender (or genderless). Games were mentioned that facilitate this: Metroid, Nintendo's Animal Crossing are just two.

A final suggestion made sense, regardless of the appearance of the avatar that we identify with. Remember there are real people behind the avatars. Remind students, children, and some adults.

Elaboration of Ideas that Fit a Potential Pitfalls Category

There are many pitfalls in the area of self identification in virtual worlds. Several emerged during the discussion and are mentioned in the topics area of this report. They and others will be summarized here:

Requiring conformity of avatar appearance without a strong rationale and explanation may alienate those who need the community, class, group services, or similar. There will likely always be individuals who object, but a clear rationale will serve as a point of conversation.

Generalization and Othering out of discomfort or fear of the unknown. The notion that an avatar of a shape or dress makes us uncomfortable and is not one of us is most often a visceral or emotional reaction to their appearance. The other is then excluded not only from the group but from tolerance, respect, compassion, warmth, or similar. Othering is based on judgement of an avatar's appearance before the avatar's actions can either confirm or negate expectations. As in the physical world, othering is widespread and most often subconscious. Education and self-awareness can help alleviate this.

Gender biases in virtual worlds or games. Female avatars in action games are often sexualized or objectified and players who represent themselves with female characters are subject to misogynistic and sexist attitudes/actions by male players/avatars. In many ways, violence against women is as widespread (or more so) in virtual environments as in the physical world.

Education, gender-swapping, and policies protecting all individuals can help in decreasing this kind of situation.

Elaboration of Ideas that Fit a "Recommendations" Category

Allow choice, even if the parameters require some conformity. Be clear about the requirements and the rationale behind them. For the individual - try to understand that rationale.

Realize that we evaluate virtual worlds according to life in the physical world, which includes laws of physicality and learned traditions. Children are more accepting of the variations in the way their teachers might look in the virtual world. Our perceptions depend somewhat on our developed perceptions of the way the world should be around us, even in the virtual world. Get to know the group who will view the avatar, and perhaps discuss non-traditional appearances for the instructor or group leader before implementing the change.

The topic of permanence in avatar appearance merits its own discussion. The nature of avatar appearance change can take place rapidly and can be undone as rapidly. We discussed how identity changes when appearance changes, but did not touch on the topic of the impermanence of virtual appearance. An interesting question might be - do people change their avatars because they can change them again or change them back to a former appearance?

Elaboration of any other Main Ideas Discussed

The rules set out by Linden Labs for Second Life child avatars merits its own discussion, but it should be mentioned the perception of an avatar as a member of a vulnerable group (child avatars) seemed as strong in our discussion as in the physical world. The apparent prejudice against child avatars is not in fact a prejudice, but the result (disallowing child avatars in a region) of a cause (sexualization of child avatars by a small minority) and effect (Linden Lab strongly enforces a rule that no child avatars are allowed around adult activity).

Conclusions

The newness of virtual worlds give us an opportunity to observe human acceptance and toleration of the other whom we do not understand. It also challenges us to dig deeper into the biases we hold dear for appropriate or normalized human behavior. Many of the objections to certain avatars, or by certain avatars mirror our physical world debates over clothing or body beautification. It is clear that avatar customization provides individuals with a larger tool set for creativity and personal expression in their appearance. It is also clear that many individuals feel more closely identified with their virtual avatar after customization than with their physical appearance, which they may not be able to change.

At the same time, this freedom of expression meets a barrier in certain situations. Some scenarios that restrict avatar appearances by enforcing codes and some allow very little avatar customization. Others welcome any and all shapes, sizes, and expressions of the physical person behind the avatar. Because humans moved parts of themselves into virtual worlds as fast as virtual worlds came into being, it is difficult to know whether the purpose of virtual worlds was for extending the physical world or for providing a canvas on which to create at will. It is premature to conclude either way, and in fact, our discussion demonstrated that identity is so individualized that the only conclusive statement possible is that virtual environments only enhance the already complex human interactions with others and with the larger world around us.

Motivational Reality of Fun in Games

Facilitator and Author: Peggy Daniels Lee

Session Description

With game based and gamification of education, more attention is being paid to the psychology of fun and what motivates us to engage. This Quadrivium discussion focused on the convergence of tools and learning and how "fun gameplay" influences student behaviours and helps them overcome challenges in understanding. What can you say about fun and motivation? What are some best practices and examples? Research? Potential pitfalls?

Introduction

Key terms emerge when one reads the description of this Quadrivium session: Psychology of Fun...Games...Motivation...Convergence of Tools and Learning....Gameplay...Student behaviors... Understanding. Edward Castronova, Professor of Media at Indiana University specializes in the study of games, technology and society. He frequently talks about the Psychology of Fun...and the fact that good games engage us in two motivational aspects: Appetitive and Aversive. We continue to be drawn to a game that allows us to experience them both...kill the dragon in a beautiful forest, for example. Castronova also talks about the concept of Flow...first coined by Mihaly Csikszentmihalyi. When a person is in the flow channel, you're activating the Appetitive and Aversive motivations. As one participant in this session said, "an optimal state of experience". So we began our discussion with the concept of flow, and how we provide engaging experiences to our students. An informative discussion ensued.

Overview

This section describes the key topics that came out of the one-hour session. These concepts are Gamification, the use of commercial vs. originally-designed games, and the integration of gamification with Learning Management Systems.

Gamification: for some educators, gamification is new. For others, some form of games have been a part of their pedagogy for many years. Adding gamification elements to courses leads to students enjoying the experience and learning "without realizing that they are learning". Story-based scenarios through immersive experiences; problem-based learning and fictional scenarios were layered on the learning outcomes to create experiences that not only improved student learning; but gave the faculty member the opportunity to assess that learning. One of the most interesting concepts from this discussion was the idea of unstructured play or pure play/learning. During a discussion of how to get students to stop playing the game, one participant said that he provided an alternative platform (Tender's RUC server) for pure play/learning. This gives his students an outlet for "unstructured play". Many of us had not considered this idea.

Participants were experimenting with everything from addition of gamification elements (e.g., leveling and awards) to the games as an activity within their courses.

Commercial vs. Original Games: Some participants used existing games such as Minecraft to teach Agile (Adults in Minecraft https://drive.google.com/file/d/0B0gE6hnv-693MEc2bk93VnkycWM/view?usp=sharing) , World of Warcraft (http://www.warcraft.com/) for language and literacy of adolescents; Ingress for Project Management (https://www.ingress.com) and commercial games created publishers: Practice Operations (http://www.mhpractice.com); Littlefield Technologies (http://www.

littlefield.responsive.net/demo/littlefield.html); and the Global Supply Chain Management Game (https://cb.hbsp.harvard.edu/cbmp/product/6107-HTM-ENG), all used in various business courses.

Other participants created their own games: 1) fermt, in which students optimize antibiotic fermentation, and is on an Opensim prim (Graham Mills in Kitely); and 2) Hinatore, which is a literacy game, in Kitely (https://akoaotearoa.ac.nz/literacy-game-virtual-world). The goal is to identify gaps in the learner's literacy and numeracy. Fermt students play around various parameters to vary duration of growth and production phases with the goal of balancing profit and level of production. We concluded that the purpose, goal and resources available determine which game to use. It is definitely not a "one size fits all" situation. There appear to be as many different games and gamification elements as there are people who are working with learners.

Integration of Gamification in Learning Management Systems (LMS): The popularity of games in education has given rise to a movement to integrate gamification elements into LMS's. Blackboard is looking at this and one person reported that D2L (Desire to Learn) is integrating gaming and gamification elements as well.

Wealth of Resources Available: The References page at the end of this paper lists just ten books and articles that is representative of the wealth of resources available for anyone interested in using games in education, business, mental health, government, or other pursuits. A search of Google Scholar yields about 14,600 books and articles between 2007 and 2016. It is a topic that much has been and will be written about for years to come as we seek ways to engage learners at every level. There are also an increasing number of high quality builders and scripters available who can help educators achieve their goals.

Best Practices

There was a lively discussion of what works and what didn't as participants shared their best practices. All agreed that games should be fun and not too complex. Games such as World of Warcraft and Pirates of the Burning Sea were mentioned as games that could be too complex for some learners, causing the fun factor as well as the learning to be diminished.

The use of stories and fictional scenarios as the basis for gamification elements was also prevalent. Stories build on the learner's imagination and stores/fictional scenarios can be based on the specific course topic. Participants reported that student enjoyed these types of gamification elements and reported that they learned a lot. These elements worked at the intrinsic motivation level.

The use of points, leveling and leaderboards (extrinsically-motivating elements) were used in concert with stories and fictional scenarios. A great example is the Hinatore game which is "set in the environment of pre-European New Zealand with elements of Maori mythology. Teams face a "journey" toward an ultimate "treasure", where tasks need to be completed at various points…. It can be adapted to teach any subject content." (Quote from Briarmelle Quintessa, session participant).

Recommendations

Although specific recommendations were not discussed explicitly, it was clear that the participants had specific ideas about how games should be used in curricula as well as how they can be improved:

- Use original or free games where possible; although commercial ones can be helpful for some applications.

- Learn enough scripting and building to try to develop your own games.

- Find and collaborate with a very good building/scripter if you can't build your own games.

- Use games in-world as they create an immersive experience.

- Encourage the Learning Management System developers to incorporate gamification elements and improve the instructional side of their platforms.

Conclusion

As we talked about games, we also talked about tools and their convergence with pedagogy. In fact, when games are generally discussed with regard to virtual worlds and spaces, the tools/platforms are an integral part of the discussion. One participant pointed out that "new technologies like Opensim give educators the opportunity to get together and CREATE (participant's emphasis) new learning systems not just

buy them from corporations." Different platforms give educators the flexibility to do other things, such as the antibiotic fermentation game in Opensim. Another pointed out that "in-world the games/simulation are inherently multi-user – that gives options and richness." Another agreed, saying that "it also creates an immersion into the experience."

In the final analysis, the learning outcomes drive the games, tools and the pedagogy. The only limitation is the creativity and imagination of the educator and his or her learners.

References

Games:

Global Supply Chain Management Game: https://cb.hbsp.harvard.edu/cbmp/product/6107-HTM-ENG

Hinatore: https://akoaotearoa.ac.nz/ako-hub/ako-aotearoa-northern-hub/resources/pages/instructions-using-game

Ingress: https://www.ingress.com/ (available on Google play and Apple's App Store)

Littlefield Technologies: http://www.littlefield.responsive.net/demo/littlefield.html

Minecraft: https://minecraft.net/

Pirates of the Burning Sea: http://portalusgames.com/potbs/

Practice Operations: http://www.mhpractice.com

World of Warcraft: https://us.battle.net/account/creation/wow/signup/

Articles and Books:

Castronova, Edward, Synthetic Worlds, University of Chicago Press (2005).

Castronova, Edward, Exodus to the Virtual World, Palgrave Macmillan (2007).

Chou, Yu-Kai, Actionable Gamification: Beyond Points, Badges, and Leaderboards, self-published (2014-15).

Csikszentmihalyi, Mihaly, Flow: The Psychology of Optimal Experience, HarperCollins (1990).

Hearns, Merle, Literacy Game in a virtual world, August 2014, Northern Regional Hub project Fund, Ako Aotearoa, New Zeland. https://akoaotearoa.ac.nz/literacy-game-virtual-world

Kapp, Karl M., The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education, John Wiley & Sons (2012).

Marczewski, Andzej, Gamification: A Simple Introduction & a Bit More, self-published (2013).

McGonigal, Jane, Reality is Broken: Why Games Make Us Better and How they Can Change the World, The Penguin Press (2011).

Montoya, Mitzi M., A. P. Massey, and N. S. Lockwood (2011) 3D Collaborative Virtual Environments: Exploring the Link between Collaborative Behaviors

and Team Performance. Decision Sciences Journal. 42 (2): 451-476.

Schell, Jesse, The Art of Game Design, 2nd Edition, CRC Press (2014).

Zichermann, Gabe and C. Cunningham, Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps, O'Reilly Media, Inc. (2011).

Special Invited Program

Keynotes

Karl M. Kapp

Reaching the Engagement Horizon in Virtual Worlds: Crafting Engagement Through Games and Gamification

See Featured Paper (page 12)

Games, gamification and game-based learning have entered into the vocabulary of educators, eLearning developers and instructional designers from around the global in the past few years. Games have a seductive force and are seen as a great tool in creating engaging and interactive instruction. But are they effective for learning? What does the research tell us? We'll explore some of the research around games, gamification and virtual worlds while creating links between research and virtual world actions and interactions.

The use of games for learning seems like a good match, but we can't blindly take it for granted. Instead, we need to explore questions to make sure the intuitive link between games, gamification and virtual worlds reaches its full potential. In this keynote, we'll answer questions like: How does one mix virtual world and game-based learning experiences? How should games be integrated into a curriculum? Can attitudes and behavior change result from playing a game in a virtual world? What elements of games can learning designers borrow from game designers? Can flying around as a superhero in a virtual world make you a nicer person? Discover evidence-based techniques for increasing online engagement, interactivity and, most importantly, learning.

Karl Kapp, Ed.D., is a full-professor of Instructional Technology at Bloomsburg University in Bloomsburg, PA. He teaches subjects related to games, gamification and learning technologies. Karl is the Director of Bloomsburg's Institute for Interactive Technologies which works with organizations to create interactive instruction including games and simulations. Karl has authored or co-authored six books including "The Gamification of Learning and Instruction" and its accompanying how-to-book "The Gamification of Learning and Instruction Fieldbook" as well as the book "Learning in 3D" about virtual worlds for instruction. Karl has served as a Co-Principle Investigator on two National Science Foundation (NSF) grants related to games and simulations and serves as an external evaluator on a third game-related NSF grant. Karl is the author of several Lynda.com courses including the "Gamification of Learning." He is co-founder of the educational game company 2Klearning.com, founder of the educational consulting firm, The Wisdom Learning Group, LLC, a TEDx speaker and an international presenter who travels the world speaking on the convergence of games, learning and technology. Karl's work explores the research, theoretical foundations and application of effective game-based learning. You can follow his widely read blog at http://karlkapp.com/kapp-notes/.

Watch the recorded address here:

https://youtu.be/Hy1DYWGG5fA

Stephen Downes

Virtual Worlds on the Go

Social networking and learning communities are essential support systems for online learning. But is conversation enough? One of the promises of online learning is that it can take education out of the classroom and into authentic environments. This is one of the advantages of game-based learning. This is also one of the advantages of online virtual worlds and simulation systems. At the same time, though, students are increasingly leaving their desktop and laptop computers behind and taking to mobile devices. What does the learning ecosystem look like in such a world? What pedagogical affordances are created?

In this presentation Stephen Downes examines the intersection of learning, performance support, and mobile virtual worlds and simulations. He will discuss the real world applications for this technology, describing a variety of learning scenarios, and discuss the background and infrastructure needed to support such a system. Additionally, he will examine the role of educators and content publishers, identifying the need for institutions to provide learning support and scaffolding to draw out the benefits of what might be called virtual worlds on the go.

Watch the recorded address here:

https://youtu.be/Zg4q1zKUYPw

Stephen Downes is a specialist in online learning technology and new media. He is a leading voice in online and networked learning. He speaks from practical experience both as a college and university teacher and the author of learning management and content syndication software. Through a 25-year career in the field, Downes has developed and deployed a series of progressively more innovative technologies, beginning with multi-user domains (MUDs) in the 1990s, open online communities in the 2000s, and personal learning environments in the 2010s. Downes is perhaps best known for his daily newsletter, OLDaily, which is distributed by web, email, and RSS to thousands of subscribers around the world. As a teacher and designer, he is also known as the originator of the Massive Open Online Course (MOOC). As a theorist, he is known as a leading proponent of connectivism, a theory describing how people know and learn using network processes. Downes is also a leading advocate of open educational resources and free learning. Downes is widely recognized for his deep, passionate and articulate exposition of a range of insights melding theories of education and philosophy, new media and computer technology. He has published hundreds of articles online and in print and has presented around the world to academic conferences in dozens of countries on five continents.

Bronwyn Stuckey

Signaling a New Reality

This presentation will take a look at some of the signals in the past year of a blurring of what is virtual. I have always been the person to call out people who use the real and virtual dichotomy, much preferring to use real and physical. That last year has produced many signals that show even these poles might become redundant. I hope the example we look at in the keynote will trigger your imaginations and help challenge many of the assumptions we hold about the place of our work in virtual worlds. These are the things that could readily be on our horizons so much sooner than we think. For us as educators it is less about keeping abreast of the technological advances but having audacious goals and imaginings. Intrigued? Come along and let's share our visions!

Watch the recorded address here:

https://www.youtube.com/watch?v=wsPnNxbNaQw

Bronwyn Stuckey is a self-described Warrior Princess, and a Consultant Specialist in Game Play, Gamification, Communities of Practice and Learning Communities.

Bronwyn has been engaged in educational community and games in learning development for the past 15 years. She has worked to explore virtual worlds, games in learning and how we can cultivate identity, agency, citizenship, leadership, and community for students and teachers.

Since leaving lecturing and learning design in the higher education sector her research, consultation and design have been in gamification and game-inspired designs for classroom contexts and professional learning and communities of practice. She is a current post-doctoral research fellow of the Arizona State University Center for Games & Impact and independently consults to global groups like Intel and Microsoft programs and education communities.

Ebbe Altberg

GridWatch with Ebbe

In this session, Ebbe Altberg, Linden Lab CEO, discusses issues of importance to the Second Life communities. His primary aim for the session, however, is to listen to Second Life residents and respond to questions. Topics of most interest included the community gateway project, Project Sansar, Second Life community ethics of conduct, and others regarding marketplace and business owners.

Watch the recorded address here:

https://www.youtube.com/watch?v=ovl-YCIO2Vc

Mr. Ebbe Altberg has been the Chief Executive Officer of Linden Research, Inc. since February 2014. Mr. Altberg served as Chief Operating Officer at BranchOut, Inc., since October 25, 2012 until February 2014. He was part of the executive team at Yahoo!, as Senior Vice President of Media Products. He served as Head of Audience Group at Yahoo! Europe Limited. Mr. Altberg was responsible for European consumer products of Yahoo! Europe. He served as Chief Product Officer, Vice President of Operations and Vice President of Product Development at Ingenio, LLC (alternate name, Ingenio, Inc.). Mr. Altberg worked for Microsoft, where he spent 12 years leading the development of several key applications and programs. He served as the Product Unit Manager responsible for the development of new multimedia applications and Web technologies for Microsoft Office; he led the program management team that designed Vizact 2000, a multimedia HTML authoring application; he spearheaded the program management team for the Macintosh Business Unit that produced Microsoft Office 98 for the Macintosh; and was the Lead Program Manager responsible for the design and delivery of Word for Windows releases 6.0 through Win97. During his career at Microsoft, Mr. Altberg secured two patents, both of which shipped in Microsoft products. He received a B.A. from Middlebury College.

Featured Panels

OpenSimulator Featured Panel

Moderator: Ghaelen D'Lareh

This panel, represented by long-time advocates, promoters, and educators in various OpenSimulator grids, both public and private will engage in a discussion on the different perspectives of people who use OpenSimulator as an alternative, or in addition to, Second Life. This will be a thoughtful discussion on dedication, awareness, perception, and opportunity of the various communities of OpenSimulator.

Panelists

Selby Evans

Selby Evans earned a Ph.D in psychology 1963 and was employed at Texas Christian University from 1964-1990. He taught courses in psychological measurement, computer applications, and systematic problem-solving. His research was in pattern perception, and cognitive systems, supported by U. S. Military organizations, NASA, National Institutes of Health, and other government organizations. He has more than 80 technical papers in professional books and journals. He is now retired as Professor of Psychology at TCU (as of 1990). He operated consulting business for 25 years, serving companies and government agencies in psychological measurement, problem-solving, cognitive engineering, and computer applications. He started blog, "Virtual Outworlding," in 2010, which has averaged over a million visits a year.

Maria Korolov

Maria Korolov is the editor and publisher of Hypergrid Business, covering OpenSim since 2009, and co-host of InWorld Review. She's been a technology journalist for almost twenty years, ran a news bureau in China for five of those years, and also reported from Russia, Afghanistan, India, and elsewhere in Eastern Europe and Asia.

Cynthia Calongne

Cynthia Calongne, aka Lyr Lobo, is a professor, author and researcher with 20+ years of experience teaching and developing virtual worlds and game simulations. With her team, she won the $25,000 Grand Prize in the 2010 Federal Virtual World Challenge for the Mars Expedition Strategy Challenge. A founding member of the Women in Virtual Reality (WiVR), Cynthia conducts simulation research with The Air University, with the US Army's Simulation and Training Technology Center on the MOSES project, and serves as an organizer for the OpenSimulator Community Conference (2014-2015) and Federal Consortium of Virtual Worlds 2015 conference.

Stephen Gasior

Stephen Gasior, Ph.D. has been a biology instructor at Ball State University and University of New Orleans. As Stephen Xootfly, he is an accomplished virtual world educator having taught several college biology courses with over 100 students total in Second Life and developing inworld activities. He has also used OpenSimulator in hybrid courses and co-developed learning activities for that platform. He is currently promoting collaborative work for STEM education via Virtual Islands for Better Education (VIBE) and Ball State University's Virtual Campus, REDGrid.

Caledon Oxbridge Featured Panel

Moderator: Ghaelen D'Lareh

In this session, members from Caledon Oxbridge University will discuss some of their major projects and contributions in virtual worlds, in particular how they feel their accomplishments have taken us toward a new horizon in immersive experiences.

Panelists

Carl Metropolitan/Carl Henderson

Current and former Chancellor and co-creator of Oxbridge; Executive Director of NCI from 2005 to 2009.

Wordsmith Jarvinen

Vice Chancellor at Oxbridge, Dean of Education, Oxbridge webmaster, and teacher.

Larkylou

A past Dean who would like to talk about helping non-English speakers.

Aevalle Galicia/Stacy "Stasia" Lynne Weston

Oxbridge teacher who in her RL is a person who wrote and defended her PhD dissertation—in part—on Oxbridge and the Particle Lab.

Andrea Jones

Dedicated Oxbridge volunteer.

Nyree Rain

An established resident of Caledon and Second Life, who used Oxbridge as a new resident.

Virtual Pioneers Featured Panel

Moderator: JB Hancroft

In this session, members from the Virtual Pioneers will discuss some of their major projects and contributions in virtual worlds, in particular how they feel their accomplishments have taken us toward a new horizon in immersive experiences.

Panelists

Beth Ghostraven/Beth S. O'Connell

A school librarian since 1998, Beth has worked with Kindergarten through 12th grade students and holds a Master of Education (School Library Media) degree from James Madison University. Beth came to Second Life in 2012 to network with VSTE (Virginia Society for Technology in Education), and quickly found the Virtual Pioneers and other education groups for which she publicizes and facilitates events. She is also involved with VSTE's Minecraft server, and initiated an outpost for VSTE on AvaCon's OpenSimulator grid.

Spiff Whitfield/Andrew Wheelock

Andrew is a Technology Integrator for Erie 1 BOCES/WNYRIC. He is one of the founders of the Virtual Pioneers. This group has explored history and culture sims in Second Life since 2007. Over the past 3 years he has been the project manager of the Island of Enlightenment Projects that has used Open Sim Virtual Environments to help students in grades 6-12 learn about history.

Mary Howard

Mary is a sixth grade ELA and social studies teacher in Grand Island New York who has been active in integrating Open Sim Platforms in her classroom for several years. Her work with the Islands of Enlightenment projects has been shared at ISTE, NYSCATE, Cornell University, and published in the VEN Journal, In transitions Magazine and the AMLE Magazine. Mary actively shares her experiences through Twitter and Periscope @mrshoward118 and publishes a great deal of her work in her blog: yoursmarticles. blogspot.com. Mary was recently awarded the Lee M. Bryant Outstanding Educator award for her work with Virtual Environments.

VSTE Featured Panel

Moderator: Charlotte Bailey

In this session, members from the Virginia Society for Technology in Education will discuss some of their major projects and contributions in virtual worlds, in particular how they feel their accomplishments have taken us toward a new horizon in immersive experiences.

Panelists

Beth Ghostraven/Beth S. O'Connell

A school librarian since 1998, Beth has worked with Kindergarten through 12th grade students and holds a Master of Education (School Library Media) degree from James Madison University. Beth came to Second Life in 2012 to network with VSTE (Virginia Society for Technology in Education), and quickly found the Virtual Pioneers and other education groups for which she publicizes and facilitates events. She is also involved with VSTE's Minecraft server, and initiated an outpost for VSTE on AvaCon's OpenSimulator grid.

Jazmemo Zimminy/Lisa Alconcel

Lisa is the Instructional Technology Specialists at Red Mill Elementary School in Virginia Beach, VA. She is a member of the Virginia Society for Technology in Education Virtual Environments PLN. She has also served as a VSTE Island Facilitator in Second Life since 2008.

Dae Miami/Dr. William F. Schmachtenberg

Dr. Schmachtenberg teaches Earth Science at Franklin County High School(FCHS) in Rocky Mount, Virginia, USA, and Geology and Paleontology at Ferrum College in Ferrum, Virginia. He is a research associate with the Virginia Museum of Natural History, and is an Apple Developer with 9 apps on the App Store. He is the faculty advisor for the Unity 3D club at FCHS. For more information go to: www.evwllc.co.

Bluebarker Lowtide/Vasili Giannoutsos

Vasili is a Graphic/Instructional Designer in the Virginia Beach Area. Currently going back to College to attain a Second Degree for Teaching and Curriculum Design for the High School Level. He is also a member of VSTE and ISTE and has served as a VSTE facilitator and builder in Second Life since 2010. He also makes machinima and writes for the Virtual Education Journal (VEJ).

Loren Chrononaia/Keith David Reeves

Keith is the author of "Insurrection: A Teacher Revolution in Defense of Children" and "Paperless Research Writing: Effective Digital Scaffolding for Academic Writing." Having taught every grade K-12 in rural and urban environments and poor and affluent schools, he currently serves as Senior Coordinator of Instructional Technology at Yorktown High School in Arlington, VA and as the Board of Directors Liaison to the Virginia Society for Technology in Education Virtual Environments Professional Learning Network. He is online at www.KDReeves.com.

Thunder Insippo/Kim Harrison

Kim is the Technology Integration Specialist at Indian Lakes Elementary School in Virginia Beach, VA. She is the chair of the Virginia Society for Technology in Education Virtual Environments PLN. She runs a Minecraft server for kids ages 6 to 16 with Serena Offcourse and Techplex Engineer. For more information go to www.eastcoastminers.org/. Her blog can be found at blogs.vbschools.com/KimsKaleidoscope/.

General Presentations

LECTURES

A Virtual Course Using Communities to Study Cultural Diversity

Ewan Bonham (Avatar)

Jasmine Lordenwych (Avatar)

This presentation describes a 3 credit hour University course through the Department of Social Work which uses the plethora of opportunities for exploration of Second Life (SL) communities and cultures. SL is a virtual platform that affords immersive opportunities for students to sensitize and educate themselves in a structured yet self-directed course- design framework. With the use of SL as a virtual reality platform, students are able to choose which resources are used to train them in basic navigation and which communities, representing a wide variety of cultural practices of interest to them, they would choose to study. The course design and syllabus representing evolving improvements from lessons over several years will be shared. A series of short video recordings will demonstrate the components of this course and how it clearly augments Social Work studies in both Human Behavior in the Social Environment and interviewing practice skills for client cultural assessments. Students were given pre and post surveys tapping into several areas of satisfaction in using this media. Students were also asked to write reflective papers, excerpts to be shared.

The format within SL required construction of a central teleportation Community Cultural hub (CCH) used by the students to easily navigate from the central meeting site to a variety of previously vetted communities. Key representatives from the communities were interviewed by the authors to screen for educational value and validity of the identified community as seen in the professional and traditional literature for that tradition. Steps were taken to provide a training workshop in basic SL navigation skills as well as introduction and practice in the creation of an avatar that made a personal statement of identity for the students.

Previous studies conducted by the authors which helped shape this course as well as ongoing research will be discussed.

Track: Higher Education/College Best Practices

Putting the Language back into Language Engagement

Caledonia Skytower

Language is an ever-evolving, rich expression of who we are as people, as cultures, and as moments in history. Understanding the language of Shakespeare and Yeats helps us understand their hearts, their times, and the issues that shaped them. Such knowledge equips us to face the challenges of our own age and create new stories for future generations. To meet this potential, language arts learning must challenge itself to be more than a simple trip from "once upon a time…" to "and they lived happily ever after." Caledonia Skytower will explore the unique properties of virtual worlds for language arts including accessibility, immersion, and social interaction. There are not a few challenges too: technological barriers and respect for copyright. Using a "three dimensional Power-Point," she will explore the possibilities in not only providing the skin and sinew of a plot line, but the very bones and muscle of language itself following the ancient tradition of the bards. Where could immersive language arts be taken on a virtual platform? Come, gather round the fire and explore the possibilities. Caledonia shares her experiences in building dynamic language arts virtual programming from the work of Seanchai Libraries.

Track: Field Practices

Help! I have a (blind/deaf/paralyzed/disabled) student in my SL class next term!

Alice Krueger/Gentle Heron

Experience what an SL class is like for the 1 student in 10 who has a disability. You must accommodate them. But how? Virtual Ability, Inc. has over 8 years of experience helping persons with all kinds of disabilities use virtual worlds. Our strategies and tools include alternate viewers, assistive tech interfaces, environmental redesign and personal assistance. We can help you design appropriate accommodations for your students with disabilities and help them be successful.

Track: Field Practices

Creating an Award-Winning Educational Machinima

Marie Vans/amvans Lapis

Machinima can be an effective way to teach about historical figures and events as well as to capture real-time activities in virtual worlds. As part of an assignment for a virtual world course taught through the San José State University, iSchool in the spring of 2014, I created a machinima that won the Curriculum Content Category in the Adult division as well as an honorable mention for Literary Quality in the 2015 ISTE EduMachinima Fest.

I will present the assignment, including the rubric used for grading and how I integrated the criteria into the story-line used. I will then illustrate the research approach used to determine the historical character and an event in her life that was used as the basis for the story. The story development of the event described will demonstrate how I stitched together the events that occur in the machinima. I will also cover the technical challenges I faced including depiction of several characters simultaneously, costume procurement, and audio for voice, music, and background sound effects. The machinima, "Catherine de Medici – St. Bartholomew's Day massacre", was also presented at one of the two 2015 VWBPE machinima sessions. I will discuss how I captured footage and edited shots in order to piece together the story. Finally, I will talk about the process of creating machinima using examples from the 33 machinima I have created and posted on my YouTube channel and the iSchool VCARA channel since 2013.

Track: Tools and Products

Virtually Changing: Using Virtual Worlds for Positive Behaviour Change

Nina Lancaster

This talk will focus on how virtual worlds can be used to support and influence behaviour change positively. In particular, mental health and performance outcomes can be affected by applying cutting edge psychological systems such as Neuro Linguistic Programming, Positive Psychology and other personal development methods.

We will look at the benefits of using Virtual Worlds, the type of issues that can be treated, and how we can create an environment conducive to positive behaviour change using these technologies.

This talk is aimed at coaches, mentors, teachers and other personal development professionals wishing to help their clients be happier, healthier and more balanced.

Track: Field Practices

Panels

A Quest for Exceptional Immersive Learning Spaces at All Levels

Valerie Hill/Valibrarian Gregg

Marie Vans/Amvans Lapis (Avatar)

Three panelists illustrate a variety of 3D virtual worlds and immersive learning spaces as examples of engaging learners in activities that cannot be experienced in traditional physical classrooms or online learning systems. For newcomers, web-based virtual worlds, without the steep learning curve associated with Second Life, make a good introductory experience. More advanced learners will be interested in the tools used by commercial game designers and virtual reality programmers. Come hear about the various tools used for all ages from Kindergartners in Minecraft to seniors wanting to explore history, heritage or anything imaginable. A variety of subjects will be demonstrated alongside the comparisons of tools and skills necessary to build, design, and experience high quality educational content in a virtual world setting.

Track: Tools and Products

Innovations in Teaching/Learning in Virtual

Rhiannon Chatnoir

Marly Milena

Renne Emiko Brock-Richmond/Zinnia Zauber

This panel will feature Marly Milena, Thuja Hynes, Hephaistos Semyorka, Gentle Heron, Zinnia Zauber, and Rhiannon Chatnoir, who have each developed innovative processes, teaching methods, and tools to engage learners and communities in subjects such as science, empowerment, values, creativity, identity, symbolic problem solving, community development and support. Members of the panel will each present their approach, share demos and slides, and invite the audience to ask questions and share their own original approaches.

Track: Field Practices

Nonprofit Commons: Creating Impact Through a Community of Practice

Rhiannon Chatnoir

Brena Benoir

Buffy Beale

Renne Emiko Brock-Richmond/Zinnia Zauber(Avatar)

Nonprofit Commons (NPC) was designed to create a community of practice for nonprofit professionals, librarians, and social good focused technologists to explore and learn about virtual worlds such as Second Life, and to investigate the many ways in which organizations might utilize these unique environments. Through this community, NPC provides space to qualifying groups, holds regular meetings and network events, offers peer mentoring, and has created a cooperative, social-civic good focused learning environment that fosters outreach, education, fundraising, and impactful mission building, all in a virtual space. In this panel presentation, members of the Nonprofit Commons in Second Life community will share peer-based learning strategies, community development best practices, and stories of how using a virtual environment as part of this collaborative community of practice have impacted their work and individual organization missions.

Track: Advocacy

WORKSHOPS

Love the Lag: Exploring the Key Design that Makes Virtual World Theater Come Alive

Rose Artifex

When time lag is explained it seems incomprehensible and impossible. It isn't - but a hands-on practicum is the best option. The members of the Quill & Quarrel troupe will demonstrate exactly how lag and latency distort stage production. We will explain the aspects of the problem and the methods developed by the Q&Q to overcome it. Then students will organize and participate in short skits to experience the ways that productions can succeed.

Track: Field Practices

Virtual World Simulations: Designing Authentic and Effective Learning Experiences

Isa Goodman

Mysti Andel

Simulations can provide an authenticity of learning that is not necessarily bound to their physical fidelity. In his research Aaron Griffiths investigates the elements essential to the creation of an authentic context for learning and explores how those elements might be effectively applied in virtual world simulations. This presentation demonstrates interactively the pedagogical and design rationale employed by the presenter in pursuit of this research and provides educators with insights into designing effective learning experiences.

Track: Games and Simulations

Symbolic Modeling and Gestalt Applications for Education and Coaching in Second Life

Marly Milena

The purpose of this workshop is to provide a new process for teaching and learning called Symbolic Modeling which is particularly suited to virtual environments. Whether investigating ideas, feeling states, values, decision strategies or other content, the technology of SL allows for builds and other arts tools to be used to gain new perspectives and insights in a process that goes beyond thinking and talking alone. In this session, we will talk about this approach, particularly emphasizing GESTALT psychology and how it is applied in working with this process. We will demonstrate using a virtual drawing board and by accessing a geometric shape from the available tools and editing it in a variety of ways to create a metaphorical representation of an idea, value or feeling state.. The object is given a voice, a Gestalt awareness approach, and speaks to the builder and a dialogue and experimentation with the object ensues, including attention to the body at the computer, in which new learning, perspectives and insights are possible.(Photos, paintings and other arts-based tools can be used as well. One or more persons can be involved in the process). This will be especially valuable for educators, coaches, group leaders, and counselors who want to learn a unique and creative way to work with individual students, clients and groups in Second Life. Students will make new connections, gain insight, and shift perspective in ways that are not possible in traditional dialogues. To see samples of this type of work, please go to this section of my website: http://www.peoplesystemspotential.com/projects_second_life.php

Track: Field Practices

Power Promos

Rockcliffe 2.0

Kevin Feenan/Phelan Corrimal

This power promo will provide highlights of Rockcliffe's service methodology and how it relates to measurable academic performance. The session will focus on three key areas of performance evaluation, scholarship, teaching, and service, and how Rockcliffe's services can enhance career advancement, collaborative opportunities, and knowledge emergence.

Track: Tools and Products

Rockcliffe Library Network

Kevin Feenan/Phelan Corrimal

This power promo session will describe the function of the Rockcliffe Library Network and inform conference attendees on the long term objectives of the Library project. The session will draw on achievements Rockcliffe has helped facilitate over the past 9 years using Second Life and OpenSimulator, Wikis, and where Rockcliffe intends to take our Library services over the next 3-5 years.

Track: Tools and Products

The practice of the class in the virtual classroom with the HTML texture screen

Yuzuru Jewell

The Video using the content annotation tool is displayed on the virtual classroom using the real-time video streaming services service. The students' chats are converted to the voice in order that the teacher can answer the students' question quickly.

I developed these two types of content annotation tools for the virtual classroom, and a text-to-speech tool for Second Life chat.

- 1)	Two annotation tools:
  a) Desktop Annotation Tool – allows you to draw on the computer screen, captures what you do on it and streams it live. b) Whiteboard and Image Annotation Tool – allows you to draw on JPEG/PNG/BMP files on a tablet or with your mouse and live streams it through a projector. For details, please visit http://kanae.net/penworks/en/

Using the above tools, the teacher can use the HTML texture of the virtual space as an electronic board (whiteboard). Since Japan adopted EPUB3.0 as a format for public electronic textbooks, I enabled it to show it. But I have not exhibited this yet. I will announce it at the VWBPE conference.

- 2) Text to Speech Tool – converts IM, local chat and group chat in Second Life to voice; also works on Skype with group chat. Please visit http://kanae.net/secondlife/idobata_en.html for details.

With the Text to Speech tool, the presenter can receive feedback from the audience appropriately, on voice. I did the technical enhancement to get faster response from last year to it, allowing for smoother dialogue between presenter and audience.

I teach classes using these tools at midnight SLT every the Saturday at "Freedom City" in Second Life. The audience is mainly users of my tools. I talk about how to use my 3D tools and report to the user group within the Second Life. Since all of the audience is Japanese at Freedom City, I speak in Japanese.

Track: Tools and Products

Edorble: 3D Virtual World for Online Education

Gabe Baker

This session will introduce Edorble, a 3D virtual world for education, that is currently in beta. The session will outline its capabilities, development timeline and potential benefits for the education community.

Track: Tools and Products

Immersive Experiences

CERTsimulator

Cindy Bolero

VWBPE guests will get a sneak peek at the very early stages of CERTsimulator, There will be tours of some of the meeting/training areas and exploration of some of the disaster zones under construction.

Track: Games and Simulations

Fire on the Horizon, Are You Prepared?

Brian Cleveley

Secure the Shelter - Blaze is a stand-alone wildfire preparedness computer simulation designed to educate participants about the wildfire risks of their home and community and what steps to take to reduce the risks of ignition by:

1.   understanding the combustibility levels of different building materials and vegetation.

2.   understanding how yearly maintenance can reduce the level of combustible materials around their home.

In addition, the simulation educates people on steps to be prepared for possible evacuation before a risk arises on the horizon.

World fire statistics gathered by the International Association of Fire and Rescue Services from 1993 through 2013 from 27-57 countries reported 3.1 to 4.5 million fires yearly depending upon the year (Brushlinsky, 2015 retrieved January, 16, 2016 from http://www.ctif.org/sites/default/files/ctif_report20_world_fire_statistics_2015.pdf). In the United States, "more than 70,000 communities are located within or adjacent to forests or rangelands" (retrieved January 16, 2016 from http://www.fs.fed.us/managing-land/fire).

The U.S. Forest Service FY 2016 budget is estimating 1.126-1.629 billion on fire suppression for 2016 (retrieved January 16, 2016 from http://www.fs.fed.us/sites/default/files/media/2015/07/fy2016-budgetjustification-update-four.pdf).   Homeowners can help mitigate this cost by managing their property

fuel loads. Flying embers can ignite debris on a roof miles away; therefore, homeowners play a critical role in reducing the spread of wildfire by "cleaning their property of debris and maintaining their landscaping" (retrieved January 16, 2016 from http://fireadapted.org/).

Track: Games and Simulations

Get Scrooged: a virtual Christmas Carol

MrK Kas

Get Scrooged presents eight scenes from the classic Dickens tale as tableaus in the virtual world. Each stave in the tale is presented with two scenes, and users can click on the NPC characters to hear what they are thinking in this scene.

Town and village scenes are set in a wintry, snowing virtual landscape, which can be further explored for additional contextual information.

Track: Games and Simulations

Hero Walk

Thuja Hynes

Participants are immediately immersed in the theory and spectrum of Hero Walk, through identification with particular colors and perspectives provided. Guided by a Prime Maven, the group is compelled to deal with one or more dramatic and immediate tests or situations. Referencing Hero theory by Joseph Cambell and color theory by Max Lüscher, plus history and the group's collective wisdom, we derive a heroic response, exceed our limits, and gain valuable tools for future engagement.

Track: Advocacy

How Big Data, Virtual World Games and the Internet of Things Create Smarter Learning Environments

Cynthia Calongne

Join us as we explore the use of Big Data and the Internet of Things with virtual world learning simulations and single player or multiplayer educational roleplaying games (SPERGs and MPERGs). We'll begin by introducing the technology, how it is applied, and how data is collected and analyzed from the portal and game simulations.

The session blends voice, imagery, text, an interactive tour of the simulations and games via several teleporters.

Several SPERGs and MPERGs may be played after the main session. Multiplayer games require groups of 2-7 players. Please plan for additional time if you wish to play the games.

http://metaverse.austudiox.com/

Track: Games and Simulations

The Quest

MrK Kas

The Quest is a series of 10 problem-based learning challenges which train the basic skills of operation in the Second Life virtual environment. Step-by-step clues are presented as English riddles, which guide Questors to explore a simulated medieval village called Camelot, discover secret doors, and win treasure!

Questors who can solve all 10 clues are given an opportunity to explore the bonus level of Clue #11: the shipwreck world of the lost pirates!

Note: a team of volunteers from the Community Virtual Library (CVL) will role-play in period costume as live docents / guides along the Quest route during selected times. A Renaissance Faire is also planned during the conference period, with jousting, sword fighting, wine and food stalls, etc.

Track: Games and Simulations

Virtual Epidemiology in OpenSimulator: Walking in the footsteps of John Snow

Kim Anubis

This immersive experience walks educators through the benefits of OpenSimulator as a rapid and effective development platform for engaging students in historical and spatial learning. The Virtual Epidemiology Investigation featuring John Snow and Cholera in London 1854 gives learners the opportunity to reenact the case study investigation that eventually led to profound changes in our understanding of disease. The development cycle and student learning outcomes will be discussed as well as insights from the instructor on its effectiveness.

Track: Higher Education/College Best Practices

VWBPE Acknowledgements

Committee

Executive Committee

Kevin Feenan

Leticia De León

Lorraine Mockford

Organizational Committee

Logistics/Sponsorship

Kevin Feenan

Johannes1977, Vice-Chair

Megan Hauser (avatar: Megynn Haus), Vice-Chair

Programs

Leticia De León

iSkye Silverweb, Vice-Chair

Social

Roseanne Vojtec

Volunteers

Becky Adams

Cathy (avatar: Ladyslipper Constantine), Vice-Chair

Vasili Giannoutsos (avatar: Bluebarker Lowtide), Vice-Chair

Outreach

Lorraine Mockford

Marketing and Communications

Beth S. O'Connell

Information Management

iSkye Silverweb

Dirk McKeenan, Vice-Chair

Member At Large

Jeannette McDonald

Volunteers

Broadcast Production

Andy Wheelock (avatar: Spiff Whitfield)

Carol Silverman (avatar: globalhugger)

David Gomez (avatar: Dahveed)

Godwin Amo-Kwao (avatar: Pedro)

Marion Smeltzer (avatar: Nova Saunders)

Mark McKee (avatar: JetBlack Miles)

Mary Willms Wohlwend (avatar: Lobo Gandolf)

Yvette Montoya (avatar: Hope Amity)

James Lloyd (avatar: James Atlloud)

Mal Burns (avatar)

Logistics

Firery Broome (avatar)

Paramparamm Papp (avatar)

Raskolnikow Roffe (avatar)

Nigma Sterling (avatar)

Adrienne Pascal (avatar)

Eve Dejavu (avatar)

GreenLantern Excelsior (avatar)

Indgig Deka (avatar)

Tahisha Fairplay (avatar)

Eleseren Brianna (avatar)

Outreach

William Krebs (avatar: AgileBill Firehawk)

Alice Kreuger (avatar: Gentle Heron)

Carolyn Campbell (avatar: Carolyn Carillon)

Marcia Kloepper (avatar: Marcia Kjeller)

Thomas Dombrowsky (avatar: Mohamed Mukaida)

Programs

Charlotte Bailey (avatar)

Dauna Kiser (avatar: Ghaelen Winnikow/)

James Stibbards (avatar: JB Hancroft)

Marie Vans (avatar: Amvans Lapis)

Peggy Lee (avatar: Linda Sautereau)

ElizabethWallington (avatar)

Zia Rivera-Clarkson (avatar: Amari DiRicchezi Thomas)

Peer Review

Andres Padilla-Oviedo

Carl Henderson

David Sturges

Doug Switzer

Elisa Segoni

Helen Karakolidou

Hope Botterbusch (avatar: Esparanza Freese)

Irene Knokh

Jean Hewlett

Lin Wang

Maricarmen Gil

Marie Vans

Mark Choman

Paul Rudman (avatar: PD Alchemi)

Ramiro Delarosa

Roxanne De Leon

Sandrine Han

Sharon Kibbe

Sheri Jacobson

Stylianos Mystakidis (avatar: Stylianos Ling)

Wendy L. Keeney-Kennicutt (avatar: Julia Tiraxibar)

Social Committee

Barbara Seaton (avatar: Helena Kiama)

Bob Vojtek (avatar: BJ Gearbox)

Chris Luchs (avatar: Abacus Capalini)

Coz Okelly (avatar)

Kae Novak (avatar: Kavon Zenovka)

Kim Harrison (avatar: Thunder)

Mary OBrien (avatar: Serena Offcourse)

Nancy Zingrone (avatar: Maggie Lamimore)

Scott Merrick (avatar: OptoMystic)

Tanya Martin (avatar: GridJumper)

Torgon Woodget (avatar)

Volunteers - Hosts and Mentors

Elizabeth Stenger (avatar: CallieDel Boa)

Cynthia Calongne (avatar: Lyr Lobo)

Elisa Segoni (avatar: Elektra Panthar)

Giovanni Anfossi (avatar: Slatan Dryke)

Laura Briggs (avatar: Cyndyl Enyo)

Maha Abdelmoneim (avatar: Olivetree Lighthouse)

Alma Ivonne Ruelas (avatar: VivienneAKittenn)

Buffy Bye (avatar: Buffy Beale)

Caramia Rosado (avatar: Aurora Autopoiesis)

Cathy Riley (avatar: ChainLinx)

CuriousAboutSL (avatar)

Doris Molero (avatar: Pionia Destiny)

Francesca Vigano' (avatar: Fran Gustav)

Holt Roussel (avatar)

Jorgia Blackburn (avatar: K.D. Hatheway Dial)

Kate Tautges (avatar: Kitty Tully)

Killashandra Lavendel (avatar)

Lisa Durff (avatar: Edith Halderman)

Maite Hidalgo (avatar: Kay Pyara)

Phyllis Singer (avatar: Phyllis Bigboots)

Reina Lingle (avatar: Sabia Visi)

Rossana Barrios (avatar: PI Illios)

Royann Black (avatar: Ruby Vandyke)

Sharon Kibbe (avatar: Abbie Michalski)

Trent Warnock (avatar: Pim Peccable)

Index of Authors and Presenters

THE UNIVERSITY of NEW MEXICO
EXTENDED LEARNING
Online Programs

online.unm.edu

WHOLE BRAIN HEALTH

INSPIRE
CHANGE
INNOVATE
INTERACT
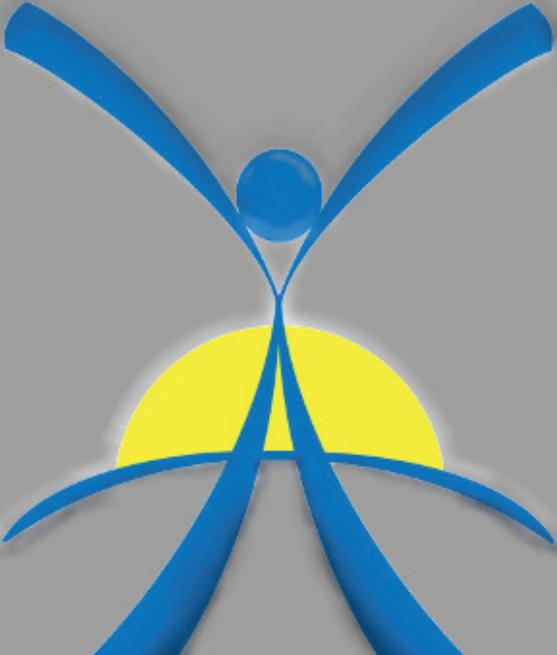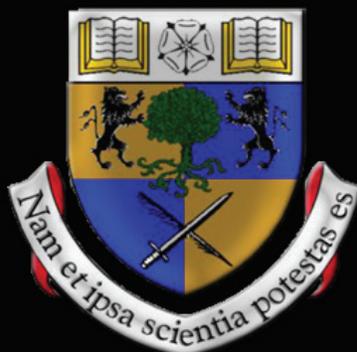

Virtual Ability, Inc.
A Supportive Virtual Environment

IDAHONIA
Virtual Campus Team

Furthering the Use of
Virtual Experiential Education

University *of* Idaho

Rockcliffe

University

Nam et ipsa scientia potestas es

http://urockcliffe.com/