

Virtual Worlds in Education

EDUCAUSE Evolving Technologies Committee

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Introduction:

Virtual worlds are a 3-D computer-based simulated environment where individuals create an avatar, which is a virtual entity that can resemble anything from the actual individual or any other imaginable alter-ego. While the obvious uses for the tool are socializing and gaming, many virtual worlds can be used for political expression, education, and professional and military training. The "in world" experience easily emulates experiences and objects from real life often without the gravitational properties and physical impairments of the latter. By nature, virtual worlds are social, imaginative, and break the "draw within the lines" boundaries we knew in childhood.

Virtual worlds like Second Life, Active Worlds, Wonderland, and World of Warcraft are part of the Web 2.0 craze. Web 2.0 tools are socially interactive, facilitate creativity, and provide information sharing. Their effect on academia comes because of their nature and their purpose of fulfilling the social networking presence requirements of the Net-Gens, Generation X and Y, and Millenials. These individuals will drive the technology

needs of the future by demanding innovation as never before. Thus, Web 2.0 and the future Web 3.0 tools are being developed to address their needs. They hold the future in their hands, and their knowledge will drive learning environments with the use of new tools and techniques such as virtual worlds. Google created "Lively" which is a web-based virtual environment to enable access without a client download. So far, users are able to create their own virtual space or room and an avatar so they can chat with friends. The creation of a "one-world" fits all will soon be in the making and the merging of the collective set of virtual worlds is possible.

Some of the possibilities of virtual worlds are in the creative commons of offerings. Imagine reaching for the stars and actually being able to hold that star or move around it and "feel" it as avatars can do today. Walk into a Monet painting and "feel" the emotion in the painting and the message. This new world of learning creates "stars" in the eyes of learners that appreciate the complexity of the venue along with the ease of the delivery.

The environments of today will certainly not be the "wow" factor they are now in just a few short years. As the most popular 3-D virtual worlds expand, they may have to make way for the other worlds on the horizon. Sun Microsystems is producing one such world known as Wonderland which is an open source environment.

Open Source Virtual Worlds (VW)

While they may not be as sophisticated as Linden Lab's *Second Life* there are several open source virtual worlds that prove to be useful tools. The younger VWs include: Wonderland by Sun Microsystems, Croquet, Active Worlds, Club Penguin, Google Lively, World of Kaneva, and Small Worlds, to mention only a few.

Why open source? From an educational perspective, open source allows most anyone to express their creativity in developing avatars, groups and micro-societies in world. Those with programming skills can go further, having the ability to change the virtual world, albeit in a controlled manner, with enhancements to be tried, tested, and commented on by other members of the virtual world.

Wonderland is an open source toolkit for creating 3-D virtual worlds with a focus on the business environments. The vision of Wonderland is to provide a multi-user virtual environment that is secure, scalable, and reliable enough to conduct real business. With the growth of the telecommuting work force, the virtual world establishes a company common space that brick and mortar facilities have served as in the past. To accomplish this goal, Wonderland focuses on being an effective, functional, and reliable tool that has potential to respond to project growth. This environment is envisioned to allow real businesses to communicate with customers, partners, and employees. Furthermore, it will allow them to do their real work within the virtual world and eliminate the need for separate collaboration tools. For example, inside Wonderland, real co-workers can collaborate and work together on the same slide show presentation despite the physical limitations of "working from home". Wonderland also has collaboration

tools that include audio communications, a variety of live desktop applications, and the ability for users to tailor parts of the virtual world to meet their needs (Java, n.d.).

The major goal of Sun Microsystem's project is for the environment to be completely extensible: Wonderland can be expanded to create entire new worlds or adjust parameters for existing worlds, objects, and avatars. Sun Microsystems's long-term plans are to support content creation within the world, but to keep progress moving forward the platform supports imported 3D art created from outside applications.

Although the project is still in its early stages of development, Wonderland has exhibited potential. Wonderland has a roadmap that includes improving the usability of virtual worlds by being able to interact with objects on a different level, having the capability to have over 200 simultaneous users in a world in several rooms (JavaNet, 2008), providing additional security, improving live application sharing, recording video in-world, implementing private voice chat, and placing 3D models in world. Beyond that are plans to have additional share-aware applications and an API that developers can sink their teeth into. Some schools of thought believe part of the education of Second Life or virtual worlds is the social interaction with many types of individuals, companies, countries, etc. which that add to the holistic learning experience.

In 2008 major architectural enhancements are planned to be made to Wonderland and those include an education initiative. First, all major APIs will be redesigned to improve future development. Second, the current graphics engine will be replaced with the more modern jMonkeyEngine (JME) graphics engine. The third major change is replacing the existing avatar system with a state-of-the-art avatar system with new features which will improve and extend avatar behaviors (Java, n.d.).

Croquet is another popular open source virtual world. Unlike Second Life, however, Croquet does not run on a centrally based server, but each person's local machine. The interactions between players result from only commands sent over the network that are then executed on fast local virtual machines. These commands are sent to the local machine along with a time stamp from the router. The local machines then process the commands received from the router based on the timestamp, and, voila, the players' actions from multiple local processors are in sync. Since all processing is done on the basis of the router's time stamp, not the local computer's clock, the action between local machines is synced closely enough that, at computer speeds, variances to wall-clock times of the actions between the local computers is not noticeable (Open Croquet, 2008) .

The development roadmap for Croquet includes, as high priority items: development of navigational controls that are more like game navigation conventions; the integration of a hybrid 2-D/3-D applications in which 2-D objects can exist and act as full 3-D objects with no additional support; an integrated Instant Messenger client that can act as an ad hoc rendezvous service by exchanging "meet me" information with other Croquet users; VoiceOverIP and video integration; World content servers to share and re-instance data sets and objects throughout the Croquet world; and, the ability to support multiple

languages, to mention only some.

Why is the ET Important to Higher Education?

Virtual Worlds are great social networking tools and allow hundreds of thousands of users to engage each other in real time. Interaction with other avatars can be between someone as close as your office mate or from anywhere around the world. Learning a new language? Teleport to France or Spain for a cultural immersion and have a conversation with someone in their language, learn their culture, talk about their work and family lives. As the technology matures, the importance of the virtual world environment to education can only expand in future years. They enable interactive learning and a huge social network.

In a Virtual World, existing educational tools such as a PowerPoint presentation, images, and links to websites, course material, and 3-D objects can be aggregated into a dynamic learning hub. In addition, course material that was once difficult for the growing number of visual learners to digest is a scalable project given the capabilities provided by virtual worlds. Imagine first-year health students exploring the cardiovascular system as a single cell of blood circulating through the winding veins and into the heart's chambers to be flushed back out into the arteries. Lessons can be taken "out of the classroom" and into in world museums where real world art is replicated. Revitalization of course content in an environment that is engaging, interactive, entertaining, and challenging is the essence of Virtual Worlds. The static chalkboard, much as we hate to admit, is fading. Virtual Worlds bring a new dimension to face-to-face teaching as well as distance education.

How is the ET Evolving?

The Future of Virtual Worlds

Applications for virtual worlds such as Second Life are increasing in number and usage is sky rocketing. Companies are using the worlds for marketing purposes, training, and meetings. Educational institutions are delivering online courses and enhancing face-to-face courses, bringing in local and international students. These augmented reality environments have thus far been regulated to a laptop or desktop computer. To meet the ever-evolving challenges of staying ahead of the game, mobile access to virtual worlds is becoming a new reality.

In June of 2008, Second Life became available on mobile phones with 3G or WiFi through Vollee, an application that can be downloaded on at least 70 different mobile phones at this time and can actually run the Second Life application. Chris Mahoney, Business Development Manager, Linden Lab emphasized the importance of this achievement, "...For Linden Lab, this represents an intuitive way to extend the reach and accessibility of the Second Life Grid platform..."This is a great way for Second Life Residents to stay connected to their friends, business and experiences in-

world, wherever they are."(Vollee, 2008) As 3G and WiFi capabilities extend, imagine the possibilities. Just login with your mobile phone and interact with your class and people throughout the world, no matter your location.



The iPhone application above gives a good view of what Second Life looks like on a mobile phone. Navigating through the world is easy as you can fly or teleport. It is also possible to instant message (IM) someone in-world and other features are on the horizon moving residents into a rich persistent virtual 3-D world.

Another mobile application from Comverse Technology creates the ability to run Second Life on Java-enabled mobile phones and integrates short message service (SMS) and instant messaging with streaming video directly in-world. Google developed Android, an open-sourced mobile phone platform which certain Samsung phones will include and be able to access virtual worlds. This technology will allow a user to run Second Life (Akihabara News, 2008). Beam me up Scottie? Perhaps in the future virtual worlds will be a hologram from a wrist apparatus previously known as a watch! This device could project a hologram, talk to other avatars, and interact in groups. Addressing the current social groups is important and providing applications that are accessible for them will become common place. Of course, it should also be simple, easy, and convenient. One click and a single movement could be wrapped into an application which is more sophisticated than what is available today.



Another future technology for virtual worlds or their likeness could be from an application resembling the Microsoft Surface (Microsoft, 2008) enabling movement on a tabletop where you could use your hands to move freely in-world. The possibilities of holding a class are now magnified as the viewing is exponential. Touching and running an application with ease should be the future.



What other uses will virtual worlds deliver? The federal government is studying the use of virtual worlds combined with artificial intelligence (AI) (Hill, 2008). It is the perfect environment as emotions and interactions are already in place. The virtual robots (avatars) are created by a person and AI features can simply interact with these avatars. The environment is controlled and includes holographic projections in the future. The military services are also using virtual worlds for training of pilots and tank crews.

Future abilities also include the movement within a virtual environment without the use of a mouse by using a camera to capture body movement. The avatar can move through the world quite easily. Mitch Kapor and Philippe Bossut designed a prototypical interface that demonstrates the possibilities for operating Second Life "hands free" without a mouse or keyboard (Hands Free, 2008). To make this work, they modified the open source Second Life client to support a 3D camera as an input device.

Researchers from Georgia Institute of Technology in Atlanta, Georgia and Ludwig-Maximilians-Universität in Munich Germany Technology are doing interesting work in the field of "augmented reality". Avatars and environments created in Second Life can be integrated with real-life images and environments using a 3-D video camera. Second Life worlds can then be integrated with real-time video feeds to future Second Life applications to include enhanced real-time collaborations and recorded videos.

Closing

What are the consequences of implementing the ET?

In some ways implementing emerging technologies like virtual worlds, is akin to vaccinations. Like a vaccination, it will be a little painful in the beginning, but its benefits

are incalculable. In a virtual world the pedagogical concept of "what if" become "when." Social and sociological research has already begun using virtual worlds. In the virtual world form of simulated society, nuances of behavior can be implemented and controlled; hence, they can form variables for analysis of forms of social interaction. There already exists many internet- and web-based teaching "games" to teach language, and politics and political negotiation to name only two. Such "games" may be based on standardized or pre-formulated interaction scenarios. "What if" these activities occurred in a virtual world becomes "when" these activities occur in a virtual world and the parties of the negotiations (avatars) are face-to-face and a comment or challenge is made, the other must react instantaneously and in a way not to overly antagonize the other party to the negotiation. Hence, a truly real life simulation of social interaction useful to those from perhaps grades 4 through adulthood; in psychology classes, social work classes, political science classes, institutes of international affairs and political diplomacy, wherever and whenever simulated real life interaction can augment the other modalities of learning being used. The creative ideas of students can be instantaneously introduced into the interaction and tested. The student's "what if" becomes transformed into "when; now". It is possible that these technologies will enable quantum leaps in pedagogy -- how wonderful for the students, how wonderful for the teachers!

How should we proceed?

We should proceed any way but cautiously. To be cautious is to risk pedanticism. To introduce this widely and allow it to be adopted where it is accepted is to promote learning, enable students to take more charge of their learning and its uses as they see it. Learning becomes a living experience of ideas colliding with other ideas to create new learning and new ways of learning.

Conclusion:

Simulations and games are becoming vastly popular and more a way of life for the upcoming generations. It is necessary to capture and hold the attention of upcoming students with more than words. Virtual Worlds can deliver dynamic content, interactivity, and a social bonding which students and employees need to further their learning. Instructors and employers will need to learn more about virtual worlds and their applications to further the growth of both education. Hold on to your seats - the ride maybe bumpy, but the exhilaration will be worth the effort and time.

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