

ALCHEMY SIMS

Immersive Learning:
utilizing the powerful interaction
of games, 3D visualization, and
narrative storytelling to create
compelling environments to learn
and train in.

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I-Introduction.

There are over 1 billion registered accounts in Virtual Worlds today. [KZero 2009] While the biggest segment is virtual worlds used by 10-15 year old game players, who no doubt will continue to access this form of communication and entertainment for the rest of their lives, there is growing usage by the education and business sectors as well. *The purpose of this white paper is to examine what makes virtual worlds a valuable, and some might argue, a necessary aspect of education and training programs now and in the future, and how virtual environments are brought to their optimum levels by the careful combination of gaming methods, 3D visualization and narrative storytelling. Finally, the actualization of a virtual space and its attendant economic factors will be discussed as a planning guide.*

The virtual environments contained in Virtual Worlds come in many shapes and sizes, some are designed to augment other forms of information delivery such as face to face teaching and presenting, and some are designed for a complete immersive singular experience. Each has its place and value. What needs to be acknowledged from the start is the innate complexity of creating a virtual environment designed to deliver information in at least 3 or 4 ways simultaneously. When the users virtual presence, their avatar, is in the world, they see the 3D environment, hear the sounds and voices around them, can read text and/or watch video, as well as interact with objects surrounding them through a variety of tools and programs. This is the heart of **Immersion**- creating a sphere of sensation around the observer that is informing them of their presence and actions inside the virtual space, and it is through this phenomenon that virtual worlds can reach and teach.

"Reach and teach". What helps a student or trainee learn? One significant factor involves learning the information, and practicing the skills in an environment similar to the one that the skills will be ultimately be utilized in. Storage of new information, recall, and recognition of that information are linked in the memory and bound by the experience or environmental context they were learned in. This is called "Encoding Specificity". [Tulving 1982, 1983]

Virtual worlds can *"reach"* in several ways: 1) they are distance learning facilities by their nature, 2) they can be visually modified to

Crucial Elements for the development of Immersive Virtual training environments:

Accurate detail and architecture that relates to the human scale

Interactive signage and objects that engage visitor trainee

"Sound-scape" to support sense of realism and aural depth

Avatars of appropriate size and dress

Snapshot: Virtual Afghanistan, mountain village for operations practice and tactics. Built to look as real as possible given the limitations of a skybox and to be lean on the usage of geometry, this skybox is set up to allow for free role play scenarios and tactical training. Used for teaching observational based thinking and responses.

"See and think"

Extant at Alchemy Sims Region in Second Life



<http://www.youtube.com/watch?v=gnAr2EWo8Xo&hd=1>

create an environment that is reminiscent of the actual real world environment that the new skills will be practiced in, and 3) they have the capacity, with the right design, to inject compelling contextual content into the environment which underscores and supports the encoding of the new memories.

Virtual worlds can *"teach"* in several ways: 1) in the classic way, they can serve as classrooms the whole world can access, 2) they can create an environment that reveals its depths of information as the student explores it, and 3) they can allow for the collaborative creation of 3D information and sharing of such with the learning group. Additionally, the social factor in virtual worlds is significant in the learning process. Typically, in virtual environments like Second Life, social connections happen on several levels simultaneously. This can, and should be leveraged by the virtual world designers to provide not only a space that encourages social connections and sharing, but also provides an atmosphere for students to compete fairly and raise the general level of learning accomplished in the classroom.

Consider the intersection of methodologies from game design, 3D visualization, and narrative storytelling in a virtual environment and the potential for Immersion in these three scenarios:

1) **TRAINING:** *Imagine students learning about the operations of an Air Force flight line by enacting the role of a repair team. As they walk among the refueling jets, troubleshooting them, working with pilots and the squadron crews, they learn. As they experience virtual bad weather and the time pressure of an ongoing mission, they learn. As they check the displayed data over the aircraft to gauge the effectiveness of their efforts, they learn.*

2) **CULTURAL:** *Imagine trainees for foreign missions and deployments able to virtually walk the streets of another country, learning to read and understand visual clues that could impact their safety and success. In a "See and Think" scenario; perhaps an Afghanistan village with all of its distractions and mysteries, they would interact with other avatars playing various roles, to test and reinforce their understanding of the culture and language, in a non-threatening environment that can train them without any actual international impact.*

3) **COLLABORATION:** *Imagine prototyping and demonstrating a new device, or object, or molecule to the team, and at the same time displaying 3D statistical data that supports the concept and allows deeper understanding of capacity, and technological details. The team can make changes that all can see in 3D simultaneously.*

Avatars and Identity:

In a virtual world, the choice of an avatar and its clothing and accessories are crucial to providing the support identity for the non-spatial, interpersonal and open communication that an immersive globally synchronistic experience will demand of the participant. In short, your avatar "anchors" you to personal choice of visual identity, that you can use to express yourself with.

Avatars developed by
Alchemy Sims



Knowledge is not just learning, it is application too. The addition of a virtual environment to a course of study allows for that application of theoretical skills in an environment that teaches and assesses their progress in many ways.

II- Why use Virtual Worlds.

There are many fundamental reasons for using a virtual environment for education and training- in general they are:

- 1) *SAVE MONEY: Cost savings on travel and lodging for the participants involved with virtual events and training is significant.*
- 2) *BETTER RETENTION OF INFORMATION: There is more physical comfort and mental relaxation for the student when they are an avatar as opposed to being imaged on a video feed, leading to an optimal mental state for learning.[Caleb Booker 2009]*
- 3) *SAVE LIVES: Information can be presented in a synchronous as well as asynchronous manner. It can also be presented in smaller segments over longer periods of time allowing for greater absorption and practice of new material, at no greater cost. Knowledge can save lives.*

Specific reasons to use virtual environments in Virtual worlds for learning.

Retention of information and influence of behavior

With the post 9/11 security rules, students were no longer allowed to shadow real border guards to learn their interview techniques. Loyalist College started to utilize a virtual border sim, and with that environment to help them, the students improved their test scores in the Border Guard training program by 39% . [Loyalist 2009]

The Michelin Group successfully utilized Second Life for training their development, architecture, infrastructure, security and integration employees in their enterprise virtual environment. [Forrester Research 2008].

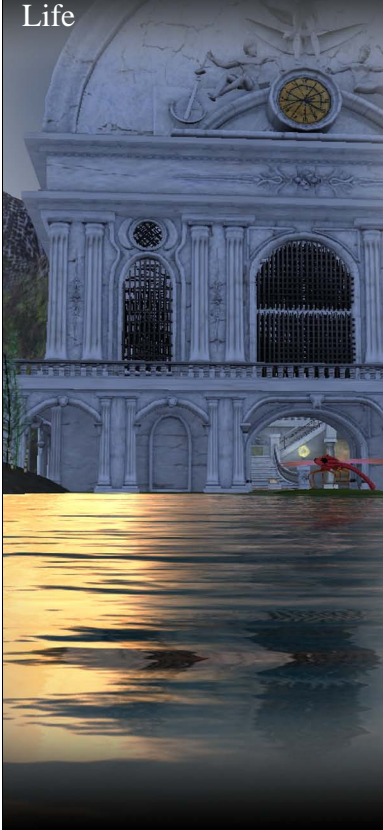
Identifying with an avatar is a very powerful influence on the behavior of the user of a virtual world. Studies have shown that physical activity for a real person can be encouraged by a thin physically fit avatar. [RTI study 2009]

With more than a billion users of the 3D web worldwide, many of them entering the workplace in 8-10 years, it is only logical to prepare for the incorporation of the culture and practices of those virtual environments into a training infrastructure. Meetings, presentations, and company training are all viable uses of the virtual environment, and the more that can be done in a social,

Snapshot: Virtual Game Scenario developed as "proof of concept" with grant from IBM.

In-Land "Search for the Sy" was a 3 level hunt and build game that involved skills such as location reading, object linking, decryption of code, and complex instruction sets. Average number of visits per day was over 50, with a 30% visit return rate.

IBM Exhibit C in Second Life



http://www.youtube.com/watch?v=i2ZqhGID_Tw

collaborative, immersive and "game like" way, the more successful it promises to be. [Philips Design 2009]

Immersion

Imagine learning to observe a foreign culture for the subtle signs of communication, while standing on their virtual street, or sitting in their living room. All around are the sights and sounds of the new culture, and hidden within the body language and words are the clues to a successful interaction. When the observer/student is focused and oriented mentally to the goal of accessing a comprehensive understanding of all that is happening in the environment, they learn. If the environment also has embedded information about the culture, that can be accessed by a mouse click/object touch or hover clue, then an overlay of information can also be embedded.

[Dede 2010]

Disabled access

The National Science Foundation supports the University of Georgia and Georgia Institute of Technology in their efforts to increase the number of students with disabilities getting degrees in science, technology, engineering and math, through the use of virtual environments. Imagine a virtual Dr. Albert Einstein or Professor Stephen Hawking teaching physics to disabled students from around the world. [GPB News 2010]

Imagine utilizing virtual environments and emoticon symbols to reach the autistic mind, enabling them to understand the complexities of human emotion and body language. [CNN-2008]

Collective Knowledge and Participation

Massive multiplayer online games, such as World of Warcraft, teach the observer how much team play and communication can be enhanced through game playing. Imagine how much more training could be added into a student's experience if the appeal of the training program had the appeal of a popular online game. Games have long been considered instructional tools, and a virtual environment can hold many types of games that can teach.

[New York Times 2010]

Distant Social Interaction combines with subjective Point of View

It is the unique phenomenon of virtual environments. There is a natural overlapping transfer of cultures as the avatar, who represents a human replete with their own attitudes and opinions, starts to interact with other people on a global, synchronized, immediate platform. In an open virtual world, students and trainees can

Games

"A game is a problem-solving activity, approached with a playful attitude"

From "The Art of Game Design" by Jesse Schell

3D Visualization

"The use of computer-supported, interactive, visual representations of abstract data to amplify cognition."

From Readings in Information Visualization: Using Vision to Think. Edited by S. Card, J. Mackinlay, and B. Shneiderman. San Francisco: Morgan Kaufmann, 1999. p. 6

Narrative storytelling

"Evidence strongly suggests that humans in all cultures come to cast their own identity in some sort of narrative form. We are inveterate storytellers"
(Consciousness Reconsidered 198).

exchange information globally, refining and adapting their knowledge as they relate to their counterparts throughout the world.

Conclusion: We have only scratched the surface on the potential for learning in virtual worlds. As educators and trainers seek to define the learning experience in terms of 3D, and weave new ways the information can be presented in a virtual space, more possibilities for virtual teaching environments will occur. In fact, the students themselves may lead the way, as they create new ways to "mash-up" the media, adding 2D, social and moving image based media into their 3D learning spaces.

III. Actualization of a virtual teaching environment.

For the purposes of this white paper, we shall restrict our discussion to only two portions of the Metaverse: Second Life, and OpenSim because of the interesting interaction that these virtual worlds platforms are having. Approximately 4 years after Second Life started, a new grid called the OS Grid began to appear. These virtual world regions are running OpenSim, which is an open source server platform for hosting virtual worlds. Open Sim is known mostly for compatibility with the Second Life client, but it is also a great platform for hosting many types of alternative worlds with different feature sets containing multiple protocols [Open Simulator]

Although these worlds run a code that is compatible with the basic code that supports the sims in Second Life, they are not under the management of Linden Labs. Very quickly, people who use virtual worlds saw an opportunity to develop their own worlds. Places like OSGrid, Reaction Grid, Joykadia, and the Franco Grid started. Client browsers such as Phoenix, Imprudence and Hippo have been developed to allow the avatar to chose which grid to travel to outside of Second Life, and to begin the transfer of wholly owned content from one grid to another. Some grids are self hosted and others utilize various hosting companies to keep their sims online all the time.

What's more, a Metaverse teleport system is developing. It is called the Hypergrid, and it connects many of the growing grids together via portals. Even though these aspects of the Metaverse are still very much in alpha or early beta, the new grids have added regions at an accelerating pace with the OSGrid leading the way. [Hypergrid Business-2010]

The economics of owning, building and running a virtual environment or region should be one of the first and most important considerations when a training facility considers the use of virtual in their day to day training. Initial and ongoing hosting costs, ongoing

Snapshot: Virtual Data Display-"Tidal Mills" at Beach Ride. 3D display of annual tidal data from 2010, shown in a time-lapse format for the coastal area along Long Island, NY coastline and up the Hudson River. This build explores the concept of data viewing from alternate perspectives to gain fresh insights.

Real-time display of Tidal Data in an art based format.



<http://www.youtube.com/watch?v=kiE1QqFjJv8&hd=1>

expenses of keeping staff on the site, as well as builder updates and improvements in content, scripting and functionality are important to consider and compare to the costs of creating and maintaining a real world facility.

For many in the non-profit and educational realm, OpenSim offers some welcome relief from the high costs of land hosting in Second Life. [Betterverse 2010]

Another interesting possibility is the portability and singular access to a virtual environment that having a "Sim on a Stick" affords. With an appropriately selected USB stick, the user can download three readily available programs, creating a standalone virtual region that allows for offline access of a virtual space. The capacity for secure display of virtual content is inherent, as is the capacity to allow the content to be traveled readily for display in areas without internet access. For instance, a virtual 3D scenario could be viewed by troops in a remote location that lacks access to the internet for training in the field. (for downloads go to: www.simonastick.com)

Once the decision to go to a virtual teaching environment has been made, there are some key questions to be asked of the planners. In the decision range below, we tried to give a rough idea of the ranges in cost and functional capacity that are currently available in virtual worlds, and where those choices might lead the planners to look for the best option in hosting and building their virtual training environment.

Range of Basic Project Elements

Size of Area needed

Large- 4 or more sims → Medium- 4 sims → Small-1sim

Nature of experience

Minimally interactive → Very interactive
 few scripts → many scripts
 Light functionality & physics → Heavy functionality

Budget available for build

Small- 0 to \$25K → Medium-\$25-100K → Large-\$100K or more

OpenSim grids → Second Life grid

Alchemy Sims/ Who we are:

Ann Latham Cudworth

(SL/ Annabelle Fanshaw)

<http://www.linkedin.com/in/anncdesigns>

The founder of Alchemy Sims, is a 2 time Emmy award winning Production Designer for Network Television. She has been designing virtual environments since 1996. She taught Design and Visualization at NYU for 12 years. Over the last 3 years she has gathered the best and brightest of builders and programmers for her projects.

Tim Widger

(SL/ Layton Destiny)

Lead builder and modeler has created many exquisite and complex buildings, props and avatar accessories for our projects.

We also have assistance in Second Life from the following avatars:

Vicki Brandenburg

Arrehn Oberlander

Arkowitz Jonson

Conclusions:

Virtual environments in virtual worlds are here to stay, and will continue to grow in popularity as they are introduced to our children through schools and social media.

Virtual environments offer a cost effective and compelling way to present a multimedia based training program that emulates the real experience and provides for a deeper and richer embedding of information into the trainee's memories.

Virtual environments allow for teaching and practicing "See and Think" scenarios, such as the virtual Afghan village scenario.

More sophisticated Virtual Tools/games need to be developed. It is conceivable that virtual environments that concern themselves with concepts of operations, explanation of foreign technologies, national strategic studies and decision making can be developed. Touch and learn environments are just in their infancy and can become very powerful "rich media" teaching devices which can include sound, haptic (touch sensation), video and interactive chat. [Media Richness Theory]

Measuring the metrics of the trainees learning capacity and progress is inherent, as systems of sensors that touch and listen can be added into the learning environment, thus creating a scoring and ranking system as well.

Further Information: This paper only gives glimpses of what's happening in Virtual Worlds and the virtual training environments contained within. If you would like to learn more about Virtual Worlds and what can be done with them, please feel free to contact us at Alchemy Sims:

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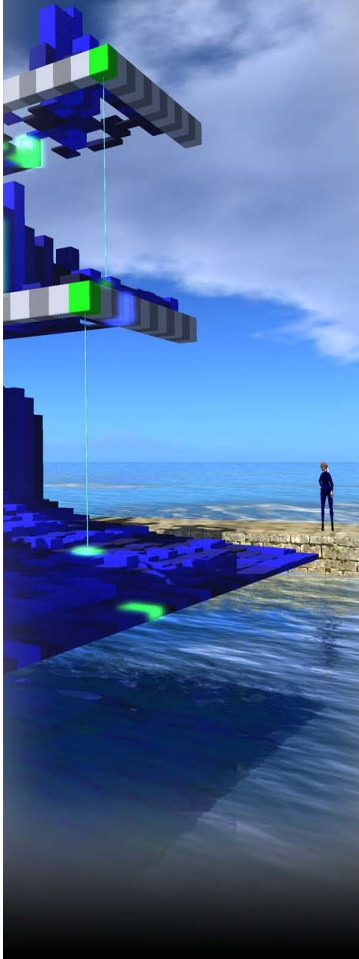
Website: www.alchemysims.com

Avatar: Instant message to Annabelle Fanshaw in Second Life, OS Grid, and other Open Sim grids.

Second Life: Alchemy Sims Region

YouTube: Alchemy Sims Channel

Snapshot: Virtual Data
Display Environment



http://www.youtube.com/watch?v=zKE_kp_2q9s&hd=1.

"We all live everyday in virtual environments, defined by our ideas."

Michael Crichton

What we do at Alchemy Sims:

We design and build Virtual Environments in Virtual Worlds that are immersive, complete interactive experiences for the visitor.

We are here to bring new ideas to virtual world construction, and to utilize information display in new and creative ways.

Alchemy Sims is a small Woman-owned business, registered with the State of NY and available for collaborative opportunities.

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