

Education in Multi-User Virtual Environments

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ABSTRACT

Multi-User Virtual Environments are online, distributed 3D environments that offer many educational benefits. Second Life is a MUVE that is user-created and extensible and is used for many educational applications. The demographics of the survey respondents are diverse both by age, location, and educational level. The learning curve follows the standard distribution with most "Moderate" as the most picked choice. Most courses don't offer assessment through typical quizzes and tests but lean towards demonstration of ability. From most to least beneficial to the educational experience, respondents list communication, creativity, collaboration, and individuality / personal expression.

Introduction

The fast-changing nature of technology constantly creates processes and opportunities that enable education. It takes people actively seeking educational applications through technology to help them become widespread and developed.

This paper delineates many benefits and detriments of using a Multi-User Virtual Environment, or MUVE, for educational purposes, and suggests methods to improve the educational experience through improvements to processes in the MUVE and in correlation with existing technologies, so as to maximize the impact.

1. Learning Management Systems

Currently the most widespread use of the World Wide Web for education is through Learning Management Systems, or LMSs. LMSs have simplified the process to create

instructional web pages for teachers and students by minimizing the learning curve of publishing content on the internet. The teacher doesn't have to know very much web design or interface design, but instead uses a set of tools to publish content easily.

But there are still struggles with LMSs. According to Paulsen in Online Education and Learning Management [1], a large number of Cisaer institutions offer few Web-courses. In fact,

As many as 23.1% of the institutions report having only one Web-course, and 46.2% of them report offering less than 5 courses. Only four institutions reported having 100 courses or more... The survey also showed that 29.3% of the institutions report that they have 100 or fewer students. Only four institutions reported having more than 5,000 students.

Though a few years have passed since this publication, it helps show that while there is a push in the educational sector for web-based learning, there is a lack of a unified approach. Not surprisingly, the Computer Science and related technical fields are using LMSs much more than other disciplines, largely due to the technical nature of the systems.

Learning Management Systems have largely matured and now include features like chat rooms, discussion forums, grade books, and assessment through multiple choice questions and other similar methods, but are still used primarily for document repositories [2].

2. Multi-User Virtual Environments

Multi-User Virtual Environments (MUVES), also sometimes also referred to as Massive Multiplayer Online Games (MMOGs) or the Metaverse, have been a long time in the making.

MUVES can track their history from the 1987 when Chip Moringstar and Randy Farmer

launched the first 2D chat world entitled “Habitat” [3], through the ongoing video game industries efforts in interactive games, to immersive online virtual environments like Ultima Online, Everquest, and Second Life.

Second Life is unique in MUVES in that the content found in the distributed server grid composed of thousands of servers is entirely user-created and extensible.

In other words, the “game” has a moderately developed set of 3D-creation tools as well as the ability to add scripting based on C/C++ to the objects you create. SL also allows connections to the internet through throttled HTTP requests and XML-RPC, permitting interaction with the internet.

While Second Life has been online for four years, it is just reaching a wide acceptance level. In the educational sector it has moved a little beyond the early adopter phase, and starting to gain maturity. With over 4,500,000 accounts, 23,500,000 sq. meters of virtual land, 25,350 residents making positive cash flow, and \$1,500,000 USD spent in-world in the last 24 hours [4], SL shares the diversity that is inherent in the real world, including a virtual stock market, governmental and educational initiatives, as well as a pretty stable economy with managed inflation.

The issues in question are serious enough to finally garner the attention of congress. Dan Miller, senior economist for the Joint Economic Committee believes that

Right now we’re at the preliminary stages of looking at the issue and what kind of public policy questions virtual economies raise — taxes, barter exchanges, property and wealth ... You could argue that to a certain degree the law has fallen (behind) because you can

have a virtual asset and virtual capital gains, but there's no mechanism by which you're taxed on this stuff [5].

This is indicative of the newness of certain applications of technology in MUVES. Right now there are several coinciding paradigm shifts that offer unique opportunities to pioneers in the field. Of utmost importance is the attention that is put on the educational initiatives.

Recently in January 2007 the Second Life client went open source to help harness the SL communities to contribute to the platform. Additionally, major companies have started investing in the platform in a big way like IBM's \$10 million initiative for creating a 3D web browsing experience [6].

SL has already established viability for educational purposes. There are 92 Universities in-world already as well as several organizations, libraries, and museums [7]. There are several initiatives to increase the quality of the teaching and learning tools.

Methods

The following methods were used to collect data:

1. Choice of questions

I have been visiting many universities and speaking with teachers and students in Second Life. Additionally, I joined the ISTE: International Society for Technology in Education in Second Life group, and through some friends there was invited to ELVEN, an organization devoted to helping preK-12 educators and librarians to integrate new technologies into teaching and learning. Through conversations with some of their members, I formulated the questions for the survey.

The questions serve to find out what is working with classes currently, and what features would help students and teachers learn. The questions are designed to be largely quantifiable, but most have the option to add text as explanation of the answers.

The questions are as follows:

- 1) What is your location?
 - 2) What is the highest level of education you have completed?
 - 3) How many courses have you taken in Second Life?
 - 4) What course(s)?
 - 5) Did the course(s) perform assessment through quizzes or tests?
 - 6) How difficult do you feel the SL learning curve is?
 - 7) What was beneficial to your SL educational experience?
 - 8) What things would you like to see improve the quality of your educational experience in Second Life?
2. Choice of medium for survey

The data for this study was gathered by an internet survey. Because Second Life is an online world, people from across the globe can use it for educational reasons. An online survey was chosen for technological reasons including 24 hour uptime, broad geographical reach, and the fact that the users would have to have online capabilities by default to have taken classes in SL.

3. Respondent Selection

The respondents were selected by asking people to participate and by sending group messages asking for voluntary participation. I was assisted by some key members of educational

communities that have established many contacts with students and teachers in Second Life already.

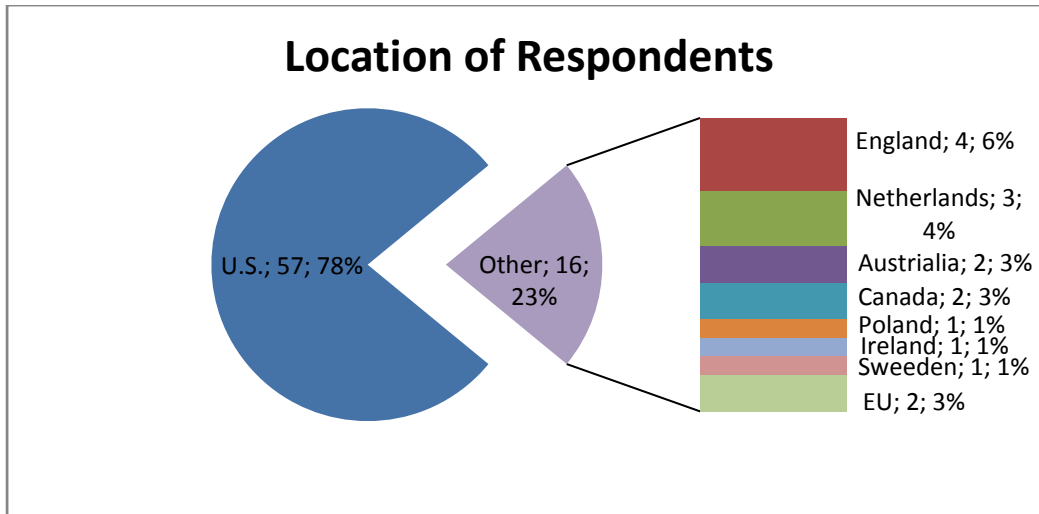
Results

There were 80 respondents for the survey. We allowed some questions to have multiple answers, and many were not required. This accounts for different numbers between the questions.

1. What is your location? (Multiple Choice with Text Explanation)

From the 80 respondents, 57 are from the United States; specifically, Arizona, California, Connecticut, Florida, Georgia, Illinois, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Montana, North Carolina, New England, New Jersey, New York, Ohio, Oregon, South Carolina, Tennessee, Texas, and Virginia.

23 are from outside the United States with four from England, three from the Netherlands, two from Australia, two from Canada, one from Poland, one from Ireland, one from Sweden, one from India, one from Singapore, and two from the European Union.

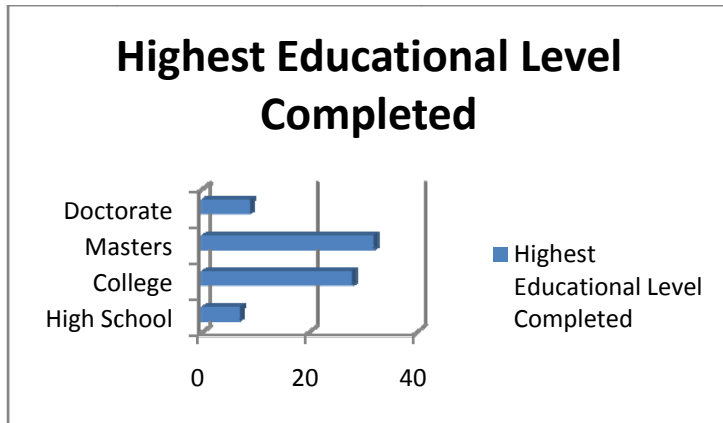


2. What is the highest level of education you have completed? (Multiple Choice)

One respondent was still in High School while seven have completed High School already and all have some college experience. This group had the least amount of respondents.

28 respondents have at least an Associates or Bachelors degree in areas including Librarianship and Information Studies, Applied Science, Business Administration, Bachelors of Communication : Information, Computer Science, History, Industrial Design, Information Technology, and Psychology.

32 respondents have completed their Masters degrees in areas including Educational Technology, Elementary Education and Political Science, Library Science, MLIS, and more. Many have more than one Masters degree. Nine respondents have completed their Doctorate



3. How many courses have you takes in Second Life? (Multiple Choice)

35 respondents have taken 1-2 courses in Second Life. 25 have taken three or more courses. 20 have not taken a course.

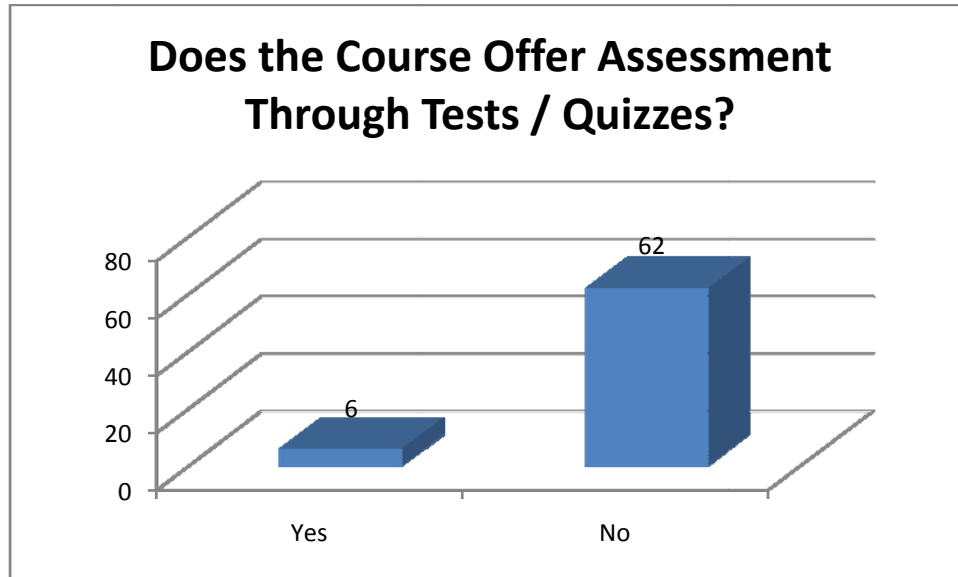
4. What courses? (Multiple Checkbox with Text Explanation)

There were a number of courses that were taken, subdivided into voluntarily and mandatory categories. The voluntary classes include basic and advanced SL building classes, basic and advanced scripting, SL clothing basics, SL land ownership, workshops, lectures, bookmaking, special interest classes, anti-griefing, Machinima, and a few university courses. Some were self paced and others were not. The mandatory classes include building, scripting, digital communication, and part of a Masters course in Exploratory Learning Using Games and Simulations.

5. Did the course(s) perform assessment through quizzes or tests? (Multiple Choice)

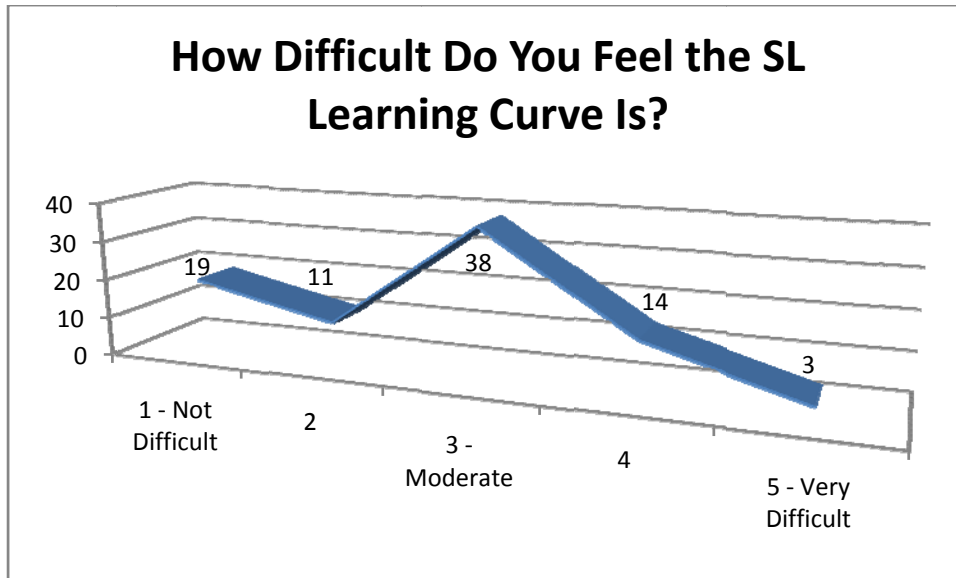
Less than six of the respondents conducted assessment through web site integration with multiple choice and short answer. More about this is covered in the discussion section. 62 didn't have to take assessment via normal real life (RL) methods, but many were performance

and demonstration based in Second Life. Most continue to use what they learned for personal applications, including one individual who is working on a 3D quiz technique.



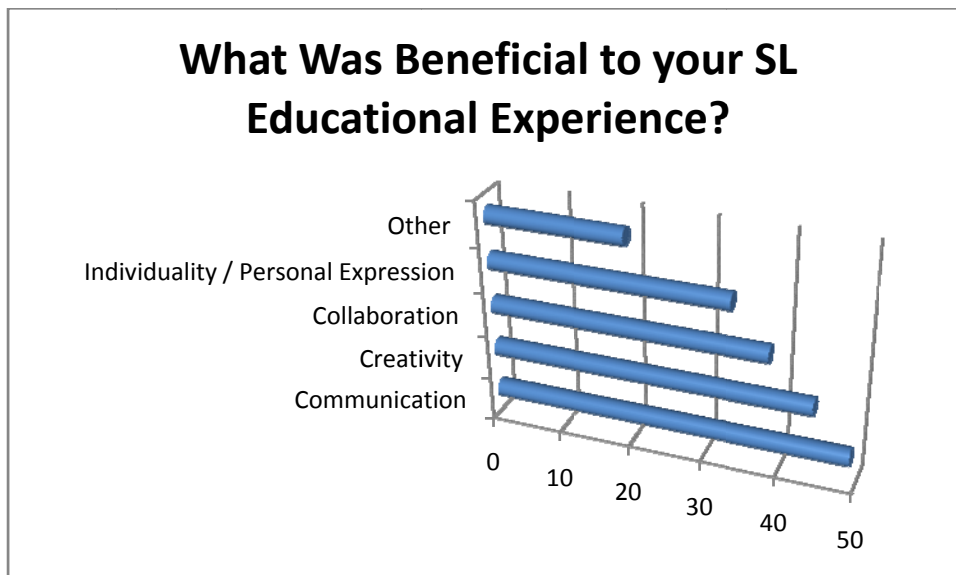
6. How difficult do you feel the SL learning curve is? (Multiple Choice)

On a scale of 1 to 5, with 1 representing not difficult, 3 being moderate, and 5 being very difficult, 19 respondents rated the learning curve at 1, 11 rated it 2, 38 rated it 3, 14 rated it 4, and 3 rated it 5.



7. What was beneficial to your SL educational experience? (Multiple Checkbox with Text Explanation)

49 respondents selected communication. 44 selected creativity. 38 selected collaboration. 33 selected individuality / personal expression. 19 selected other.



For communication, people liked it for the following reasons: uniting people, bringing technologies to life to help establish and maintain communication with others, and ease of chatting to group or individual.

For creativity, people found these things beneficial: it was “a world to be built,” application of other skills in a new environment, design classes, gallery showings, object creation, Info Island and the Tower of Prim locations in SL, the freedom of the environment, learning new things in general, imagination is the limit, and it was an inspirational environment.

For collaboration the following was said: building together, assistance from peers is nice, interaction helps a lot, finding similar people around the world, the international atmosphere in general, geographic separation of teacher and student is less of a barrier, giving back to the SL public.

For individuality, there no optional text answers were submitted. For other, the respondents noted the benefits of: coding skills, getting up to speed on scripting, greater presence than previous web spaces, the lack of time and economical barriers available in RL, people skills, interactive educational installations, teachers who were prepared, confidence building and desire of taking another course, and metaphysical aspects like the fulfillment of dreams.

8. What things would you like to see to improve the quality of your educational experience in Second Life? (short answer / optional)

There were 58 respondents to this optional question. They listed many improvements they would like to see. Here are the responses. They are summarized here, and may be viewed in their entirety at the iVersity website [4].

For basics the respondents highly stressed the need for the reliability of the system, and the minimalism of lag. They also want an easier user interface (UI) to shorten the learning curve for people not used to video games, and better inventory management.

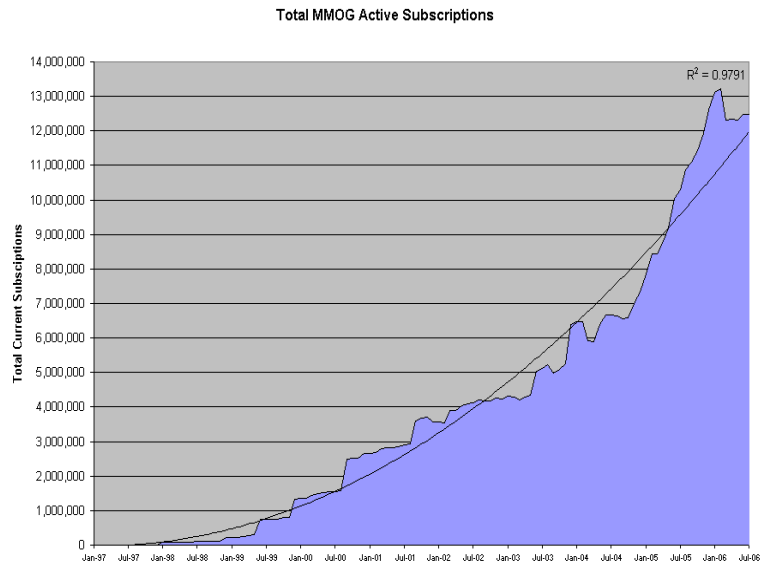
Additionally, there is the usual wish list of technology. Amongst it is the ability to archive items, better development tools, better search for events and locations, better tools for viewing text information, better integration of web technologies in SL environment, high quality audio and video streaming, RL voice and video communications, 3D viewers for Second Life, and RL to SL display and distribution tools.

The survey shows that educational tools and features are highly desired with a centralized place for events, course materials, email notification, scheduled classes, digital transcripts of lectures, conversation control and anti-griefing measures, and better advanced examples.

Discussion

The findings of this research are very positive. While the list of desired improvements is rather large, the future is looking good. There has been a recent explosion of the amount of interest in Second Life.

All of the statistics are following exponential growth [], coinciding with a common interpretation of Moore's law. This chart illustrates the increase in the total number of active subscriptions in Massive Multiplayer Online Games. From January of 2000 to July of 2006 the subscriptions



raised from 1,000,000 to 13,000,000; an increase of 1,300%, roughly doubling every 18 months.

This exponential growth is also found in the education community in Second Life. Everywhere I went in Second Life while researching this subject I was met with open arms. The sense of community is there, but so is the desire for tools to enable SL to become “Web 3.0;” to provide dynamic data interfaces in combination with the existing infrastructure of Web 2.0 to an immersive, interactive environment.

I received feedback from people in at least 10 countries, from all levels and types of educational and professional backgrounds. The amount of diversity is both amazing and encouraging. Take the different disciplines represented for example: Information, Computer Science, History, Industrial Design, Information Technology, and Psychology for undergrad; Educational Technology, Elementary Education and Political Science, Library Science, MLIS, and more. Many have more than one Masters Degree. Nine respondents have completed their Doctorate.

The breadth and depth of wisdom, understanding, and knowledge of just the respondents to this survey are phenomenal, and indicative of a trend. With the right tools we can build a sense of cohesion in the class rooms that will encourage development and innovation.

An emphasis has to be on tools that break the technological barriers and stress convergence and ease of use. The user interfaces need to become better and more intuitive to reduce the learning curve of Second Life. A lot of this can be accomplished through HUDs, or Heads Up Display that are similar to widgets for your desktop computer, as well as classes for basic operations in SL, and other types of objects.

One thing that many people said was that they wanted more technological integration into the client with features like better support for HTML and Flash, voice and video integration. While there are limitations you would be surprised what you can accomplish with some ingenuity.

In some projects with iVersity we have managed to connect to the web through both HTTPRequest and XML-RPC allowing us to connect to a dynamic web site to get data. We are using a PHP page to connect to a mySQL database for transparent integration of many web technologies.

For the people interested in voice communication, it is not a dream, but a reality. iVersity just got a voice server and has the capacity for 25 concurrent voice customers. The platform is efficient, reliable, and scalable with only a small client to be installed in a few easy steps, and upgrade to as many customers as desired at any time. We are using this for presentations at Symbion Island, among other things. While it is a separate application doing the actual sending of the voice packets, it is not dependent on the latency in a Sim, or virtual land,

due to all the concurrent scripts running on the server, because the voice server is not on the grid, but on a different web server entirely.

Another project in the bioscience department is using biofeedback. We have a heartbeat and skin galvanization monitor that plugs into a USB port and automatically can interface with our custom software to send the data to a database, and then send a request for that new data from Second Life and alter an object with the data we receive in near real-time.

Other projects include working with a PHP / MySQL based Artificial Intelligence Markup Language for Natural Language Processing, 3D visualization of databases, alternate peripherals for controlling avatar functions, and outputs for stereoscopic vision.

Summary

Multi-User Virtual Environments are online 3D environments that are becoming increasingly prevalent, with the users rising from about 1,000,000 to near 13,000,000 in 2006. Second Life is an MUVE that is entirely user-created, collaborative in nature, based on a solid programming language of C/C++, allowing scripting extensibility of user created 3D objects. Combining creativity and ingenuity with technology can impact the educational system by providing tools and repeatable processes in new ways to teach and learn.

When you can interface with the web you can also harness the power of Learning Management Systems. For things like document repositories, database connections, and most high-quality web applications, LMSs are a better choice, but a key point is creating a seamless interface with the MUVE to take the existing tools and integrate them with new capabilities.

When combining Second Life and the internet it is good to apply high cohesion and low coupling as design principles. iVersity is excited to continue development of tools for the educational community and the centralization of knowledge databases.

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