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EDUCATIONAL PERSPECTIVE OF COLLABORATIVE VIRTUAL COMMUNICATION AND MULTI-USER VIRTUAL ENVIRONMENTS FOR BUSINESS SIMULATIONS

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ABSTRACT

Computer technologie have been adapted to reinforce existing learning theories and to promote new approaches to learning. A growing trend towards the adoption of the Internet as a vehicle for course delivery is observed. This paper attempts to identify some of the advancement in Internet technologies and educational pedagogy that could be deployed in Business education, such as the opportunity and incentives for existing business simulation system in standalone mode (in DOS or Windows format) to adopt a web-based or web-hybrid model.

In addition, collaborative virtual environments (CVEs) such as online forum and chats, and 3D Multi-User Virtual Environments (MUVEs) for learning are introduced and discussed for potential of integration with business simulation systems / games to provide a fun, game-like and authentic-task oriented approach system for teaching and learning .

INTRODUCTION

The initial competitive advantage of having exclusive access to the Internet technologies is eroded as this means of sharing information globally is pervasive. Universities are increasingly subjected to financial pressure to justify their role as a service in the future of education (Burnett & Beede, 1997; Beller, 1998). In recent years, there is a tremendous growth in the web-based courses globally. Computer technologies have been adapted not only to reinforce existing learning theories, but also to promote new approaches to learning. The important issue for university instruction is not the availability and affordability of sophisticated computers and telecommunications, but the ways these devices enable powerful learning situations that aid students in extracting meaning out of complexity.

This paper attempts to introduce and identify the value of the Social Construction of Knowledge approach to teaching and learning via the use of online Collaboration Virtual Environments (CVEs). It also attempts to propose viable technical method for existing standalone systems to move online.

SOCIAL CONSTRUCTION FOR TEACHING AND LEARNING

Salomon and Perkins (1998) highlighted the importance of viewing social entities as learners and the critical roles that tools played in the learning and development for both the individual and as a group. This is combined with the revolution in technology that provides educators a unique opportunity to chronicle how these tools will affect culture, the social systems and the individuals (William, 1998)

Salomon and Perkins offered four concepts that shaped the theoretical perspective of learning and development. Firstly, it purported that learning is embedded in social processes. Secondly, learning is mediated by participation in a social process of knowledge construction; thirdly, social artifacts or tools provide the scaffolding for learning; and finally the collective group itself is a learning system (Salomon & Perkins, 1999).

Studies have shown that guided inquiry, collaborative learning, mentoring, and apprenticeships are much more effective instructional strategies than the traditional approach of lecture and drill. According to social constructivist theory, learning environments that encourage active participation, interaction and dialogue provide students with opportunities to engage in a process of knowledge construction as they try to create meaning from new experiences (Jonassen et al., 1995)

A study by Pena-Shaff and colleagues (2001) analyzed students' participation, interaction and meaning construction in a college-level course using an asynchronous computer bulletin board system (BBS). It was found that reflective analysis, subjective analysis, task-related, assertion, experiential, topic evaluation and off-task were categories that emerged from the monologue messages. "Although there was interaction in the BBS discussion, many of the messages (69%) look more like a monologue, a conversation with the self in which participants posed

questions for consideration, and through analysis and argumentation reached their own conclusions about the issue." (Pena-Shaff et al., 2001 p.55).

Apart from the basics and fundamental, students should master higher-order cognitive, affective and social skills which is vital in a knowledge-based economy. These include being able to "thrive on chaos"; the ability to collaborate with a diverse team— face-to-face or across distance— to accomplish a task; and creating, sharing, and mastering knowledge through filtering a sea of quasi-accurate information. To raise all students to these advanced levels of accomplishment requires the sophisticated use of technology to individualize learning through deep content and powerful pedagogies, and computer simulation provides a good platform to effect this change.

Moreover, the "channels" on the Internet are becoming so large that they are disappearing as we are drawn "inside" of them. The U.S. entertainment industry is developing almost magical ways of using "cyberspace" to enable sensing and acting across barriers of distance and time— unfortunately often for mindless ends. Children are spending much of their time in shared virtual environments, and even adults are deflecting their activities into cyberspace as opposed to the real world. This situation is potentially troubling, but also provides an opportunity: We can work to repurpose these powerful interactive media to help all learners master 21st century skills through mindful engagement that mixes real and virtual contexts. New learning technologies can provide powerful leverage for all these innovations. The best strategy under these circumstances is the collective, strategic evolution of "next generation" curriculum standards, assessments, and pedagogy. Hence, there is potentially a good fit among games (with the element of fun), social construction of knowledge, computer business simulations and the Internet to "making sense out of uncertainty".

BUSINESS SIMULATION GAMES WEB-HYBRID MODEL

A survey of the 28 business simulation games packages listed in ABSEL website (ABSEL) saw a diverse application of technologies in the operations of these simulation gaming packages which covers a wide range of domains: Business Strategy, Marketing, Banking, Finance, Accounting and Operations Management, Logistics Management and Information Technology. Of the simulation packages surveyed, 44% are DOS-based, and 26% are Windows-based and the rest are web-based. COMPETE, a marketing simulation game package has adopted a hybrid approach.

COMPETE, a marketing simulation game, has a DOS-based simulation engine to receive the participants input and to process the simulation output. It also has a web-based component, known as COMPETE Data Entry System (CODES) (Palia et al., 2000; Palia et al., 2001) for data-entry and retrieval, administrator data-retrieval and posting of participants' periodic results online. In addition, it houses a number of online analysis tools, such as interactive online Boston Consulting Group (BCG) Matrix Graphics Package (Palia et al., 2002) and online Product Positioning Matrix (PPM) (Palia et al., 2003)

This approach allows existing DOS/Windows simulation gaming packages to be integrated with the Internet for reasons that a complete conversion to a Web-based system may not be feasible owing to the lost of original source codes, lack of funds or professional for future development or conversion of the simulation game. The advantage of this hybrid method, or even via a web-based system, is the ability to incorporate analysis tools (it could be built by the originator, or by the participants and incorporate into the system) to allow the capture of the kind of analysis that the participants made. This may help to understand the mental models or heuristics that the participants adopt in reaching their decisions, which is impossible via a standalone system.

As an example, the Boston Consulting Group (BCG) Matrix - Product Portfolio Analysis (PPA) Graphics Package, developed by the Boston Consulting Group in strategic market planning (Palia 1991; Palia 1995; Palia et al 2002), is a PC, DOS-based marketing decision support tool that facilitates strategic market planning. . In the model, the growth share matrix (GSM) and the growth gain matrix (GGM) are used to display the relevant information about the firm's portfolio of products. The heart of product portfolio analysis involves the creation and interpretation of the GSM and GGM displays for the firm and its competitors. Figure 1 shows the graphical output of the BCG Matrix PPA Graphics Package.

The Interactive Online BCG Matrix Product Portfolio Analysis graphical package was incorporated into CODES (Palia et al., 2002), which allows participants to take the results directly from the simulation output to generate graphs for interpretation. The keys steps to generate the graphs and use of other online analysis tools can be logged. Figure 2 shows a sample of the graphical output of the Interactive Online BCG Matrix PPA graphical package.

In addition, with the funding and presence of professionals, it maybe able to create a bridging interface between the DOS-based/Windows-based simulation games and the Web Interface by using a free component such as such Aspexec ™ to be used in Active Server Pages (ASP) programming. This will allow the simulation game administrator to execute/control the DOS-based simulation program via an online interface.

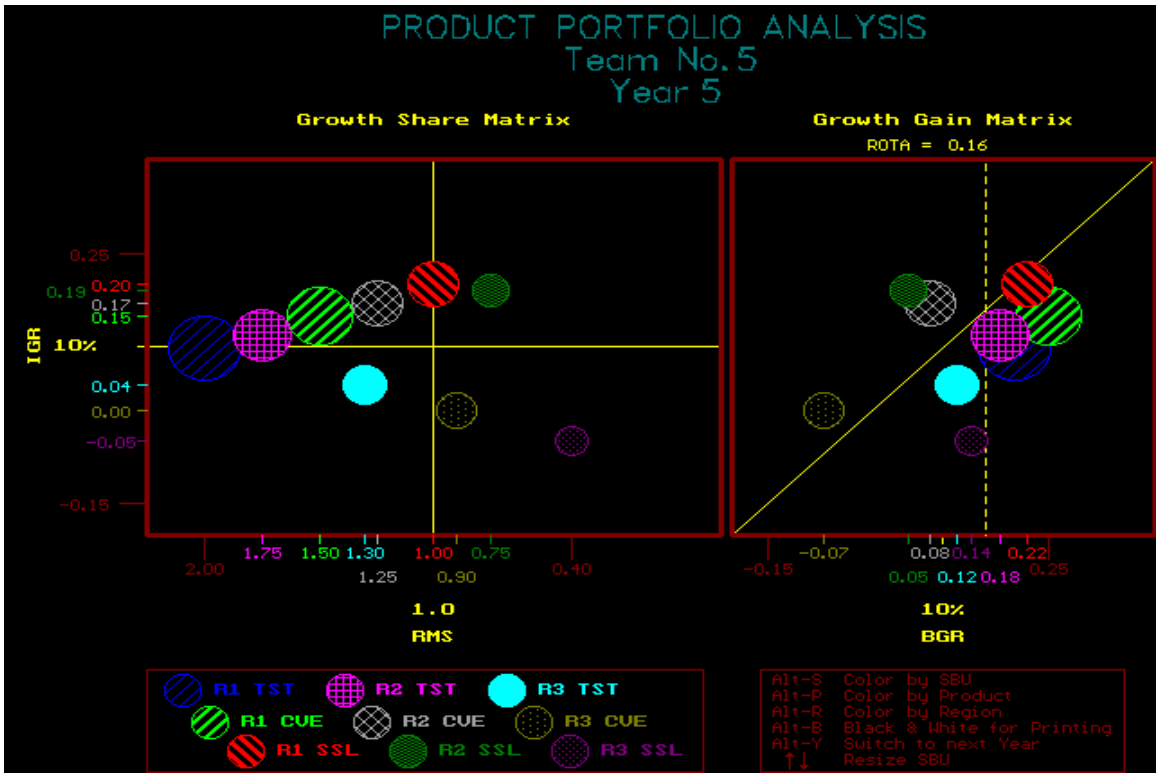

Figure 1: Sample graphical output from BCG Matrix PPA graphical package

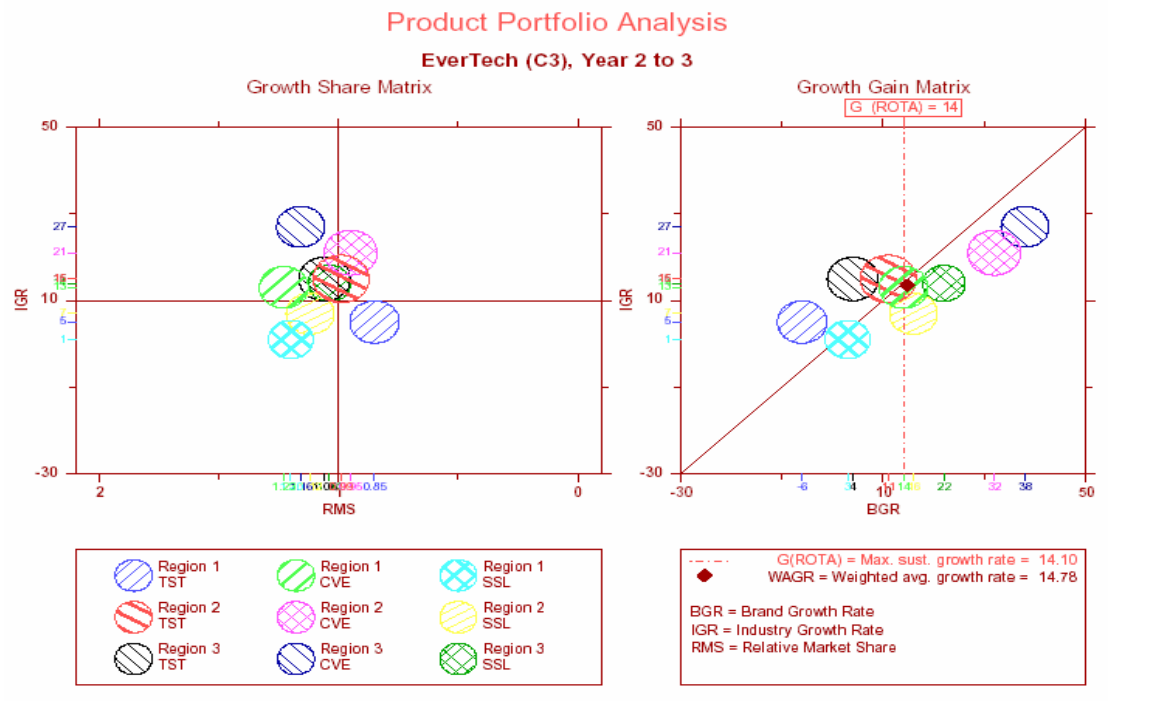

Figure 2: Sample graphical output from Interactive Online BCG Matrix PPA graphical package

COLLABORATIVE VIRTUAL ENVIRONMENT

A Collaborative Virtual Environment (CVE) is a computer-based, distributed virtual space where people can meet and interact with others, with agents or with virtual objects (Snowdown et al., 2001). It has been used in various educational settings, ranging from K-12 to higher education cohorts. Most of these environments have an integrated chat or forums, or both.

Palloff and Pratt have called for a "new paradigm" in electronic distance learning, which avoids the typical content-and-facilitator-driven model, and aims to achieve in its place a far more free-flowing and interactive experience, which is more appropriate to the mechanism of delivery (Palloff & Pratt, 1999). This has been echoed by Jonassen and colleagues in which the techniques form the essence of self-directed learning, which is often regarded as being far more appropriate than instructor-directed learning when applied in a distance education context (Jonassen et al., 1995)

Online communication tools are commonly used to support education provide for both asynchronous and synchronous mode of instruction. Common asynchronous tools include email, listservs, and web bulletin boards (forums). Synchronous tools include chat rooms, application sharing (including whiteboards), tele-conferencing and videoconferencing, and occasionally text-based multi-user domains (MUDs/MOOs). Other tools, such as streaming video, webpages, online tests, and computer-based training (CBT) systems are for use by single users, and have little to do with communication and community.

Asynchronous tools have an important role in the "anywhere, anytime" paradigm of distance education that makes it attractive to many people. Many students reported that they felt more at ease with participation when they have had the time to construct their arguments. Synchronous tools such as whiteboarding, however, are recognized as being very useful for brainstorming-style discussion sessions or small group meetings, which are fundamental to many of the modern educational techniques.

The advantage of an asynchronous system allows cross-border and multi-time zone collaboration for the simulation game. Participants from all over the world, with Internet access, will be able to communicate with their counter-parts. In addition, this allows the professors or researchers to capture the decision making process (via the chat logs or the forum postings), so as to have a better understanding of the decision processes adopted by the students. For privacy, participants in a group can have a password-protected forum, so that other teams are not able to peep at their postings.

Setting up chats and forums needs not be expensive. Abide the cost for running the server, there is open-source and free chat and forum software available for use. For synchronous chat, some of the tools include ASPChat (Aspchat) and FlexChat (Flexchat). Netmeeting (Netmeeting, Microsoft) can also be used for online voice and video chat. For BBS or forums, there are Yet Another Bulletin Board (Yet Another Bulletin Board), WebWiz forum (Webwiz), Snitz forum (Snitz), Delphi forum (Delphi), etc. For those who wish to have a Portal look that integrates a forum and an online chat into the website, there are Mambo (Mambo) and Ezaspsite Portal software (ezaspsite) for free.

Existing simulation packages can incorporate the synchronous and/or asynchronous mode of communication and interaction for teaching and learning. The basic requirements will be a 24/7 server (which can be hosted commercially or by the University), the communication tools (ASPChat, Snitz, phpbb, WebWiz, Yet Another Bulletin Board, EzAspSite), the relevant databases such as Microsoft Access, MySQL (Mysql) or Microsoft SQL Server (MSSQL).

Despite the acknowledged strength of chats and forums as a platform for education, there are a number of deficiencies in its use as a means of interpersonal communications are discussed in the literature such as the limitation to transmission of interpersonal and social information, diminished social-context cues and restricted number of channels, particularly nonverbal modes of expression (Chambers, 1999). The crucial requirements for community and richer interpersonal communication are very often badly supported by online tools as we cannot see the facial expressions or body language; we cannot hear voices or tones of voice to convey emotion. Back in the late 1980s, Nipper discussed the need to create a sense of "synchronous presence" to reduce the social distance between participants; indeed, this need for social connection is a goal that almost supercedes the content-oriented goals for a course (Nipper, 1989). Furthermore, users typically have a very limited awareness of others, who may silently "lurk" in text-based environments (Preece, 2000). There is evidence of crude simulation of body language in today's text-based CMC environments, such as emotional icons are used extensively in chat rooms and newsgroup messages to give users the ability to express emotion. Table 1 gives an example of some commonly used emotional icons and its textual form.

Graphical						
Textual	:D	:)	:(	;)	:|	:x
Meaning	Very happy	Smile	Sad	Wink	Neutral	Angry

Table 1: Examples of Graphical and Textual Emotion commonly used

We must also recognize that the forum does not cause learning, (Stephen & Simon, 1999); the instructional design and methods use will. One approach is via role-playing, whereby each participant can adopt the role of the Chief Executive Officer (CEO), Chief Marketing Officer, etc., and act on these roles to provide the decision entries for the business simulation games.

MULTI-USER VIRTUAL ENVIRONMENT

Initially, the first CVEs were text based, such as MUDs (Multi-User Dungeon) and MOOs (MODs, Object Oriented), but progressively, 3D virtual environments were introduced. While the graphics of virtual environments have generally been rather unsophisticated, studies have shown that even crude block-like forms of avatars can be useful in communicating non-verbal social cues (Tromp & Snowdon, 1997). Such graphical 2D or 3D CVES provides a richer collaborative arena for social encounter and community building (Neal, 1997). Maher and colleauges advocated that such virtual environment where learners can share experiences is essential for learning. (Maher et al., 2001)

According to Christopher Dede, the Timothy E. Wirth Professor in Learning Technologies, educators can borrow from the entertainment industry itself, retooling its successful technologies for the classroom. He said, "Computer programs are gateways to engagement. What we put inside these programs can turn them into gateways to learning." (Christopher Dede) Gee (2002), in his book "*What Video Games Have to Teach Us About Learning and Literacy*", describes a game as a complex system of interrelated parts meant to engage and even manipulate the player in specific ways.

In today's world, educational experiences involves a combination of the use of face-to-face teaching with synchronous and asynchronous mediated interaction. This instructional strategy distributes learning across a variety of geographic settings, across time, and across various interactive media. The creation of a multi-user virtual environment (MUVE) that encompass the business simulation game, coupled with synchronous and asynchronous tools for communication and interaction may bring the element of fun and play into the business education, further enhancing the motivation and a unique authentic learning experience for the participants.

MUVE allows multiple participants engage in collaborative learning activities by accessing virtual environments synchronously and by interacting with digital artifacts. Participants represent themselves through avatars (see Figure 3) and communicate with other participants and computer-based agents. Examples of such 3D virtual environment for interactions are ActiveWorlds (used by QuestAtlantis) and DeepMatrix.

Figure 3: A sample output of an Avartar in a 3D MUVE – QuestAtlantis

MUVEs have progressed with advancement in Internet technology; they were completely text-based, and used primarily for Dungeons and Dragons type games, but are now integrated with sophisticated interfaces, allowing for URL projection, PowerPoint and RealAudio presentations and many more useful features. MUVEs can act as intranets in some ways, with in-house mail, conversing in private rooms or on channels, creating rooms with interactive robots (for when you're not online), mailing lists, projection devices and a myriad of other useful (educational) features.

Each MUVE operates a little differently than others and has its own theme and purpose. They can exist in various forms: it can be created to resemble a physical space, or exists virtually as buildings and campuses (ActiveWorlds, Maher et al., 2001). It can also persist virtually as frontiers (Schroeder et al., 2001; Hudson-Smith, 2002). In addition, it can be a meeting place, defined as an electronic container where meetings and related activities happen continuously over time (Snowdown et al., 2001), or as information spaces (Dickey, 1999), virtual stages (Machado et al., 2000; Bullock et. al, 2001) or as a shared workplace (Youngblut, 1998)

In a MUVE, students can alternate classroom discussions with simulated virtual experiences that can include remote participants. MUVE adds important dimensions to face-to-face instruction, enabling some learners who might be silent in classroom settings to "find their voices." 3-D MUVEs (ActiveWorlds) may restore classroom synergy and provide immediate feedback through a medium that is both intuitive and familiar to contemporary students. It replaces the text-based MUDs (multi-user domains) of the past, in which physical environments were described via text.

Today's MUVE environments look like popular video games: a classroom or building is represented visually (three-dimensionally), and courses are conducted within. These online environments are accessible via any computer with an Internet connection. In the MUVE classroom, students are assigned a 3-D human know as "avatar," and move through the classroom using their arrow keys; they can stand, sit, or fly by clicking buttons on the toolbar. The instructor, represented by a "teacher" avatar, can interact

with the class in a variety of ways. The simplest is via text-chat, which is identical to an instant message conversation. (These chats can be saved and posted for future review.) An example of such a MUVE is shown in Figure 4.

University of Houston's experimentation with MUVE may point the way toward the revitalization of instruction and increased retention in online instructional delivery. A pilot course using a MUVE was conducted at the University of Houston fall semester, 2003, and continues in spring 2004. This course provides instruction in human resource management/business writing and was developed specifically for hospitality industry majors. It integrates online, 2-and-3D applications to help students see and present themselves more clearly as valuable employees. Based on very positive instructor and student evaluation of this course, University of Houston has planned to pilot several additional MUVE enhanced courses.

Another of such work to implement an online 3D multi-user virtual environment (MUVE) game is, *Quest Atlantis* (Barab, Thomas, Dodge, Carteaux, Tuzun, in press). The core outcome of their work has been to build a socially-responsive gaming context that is academically valuable, game-like, and engaging. . Their work is grounded in the learning engagement theory, a framework that guides the study at the intersection of education, entertainment, and social commitments. Figure 5 shows a sample output from QuestAtlantis.

CONCLUSION

A major challenge in generalizing and scaling up an educational innovation is helping practitioners to "unlearn" the beliefs, values, assumptions, and culture underlying their organization's standard operating practices. Altering deeply ingrained and strongly reinforced professional rituals takes more than an informational interchange of the kind typical in conferences and most professional development. Collaborative learning environments can enable virtual communities that provide affective and social support, which may lead to deeper behavioral changes in educational practices.

Technically, standalone simulation systems can adopt a hybrid web-based system mode to tap on the enormous opportunities afforded by the Internet. It would be encouraging to have more business simulation to ride on this Internet platform by incorporating collaborative learning environment and/or MUVEs that is filled with fun, play and authenticity in its process to mimic the real world.

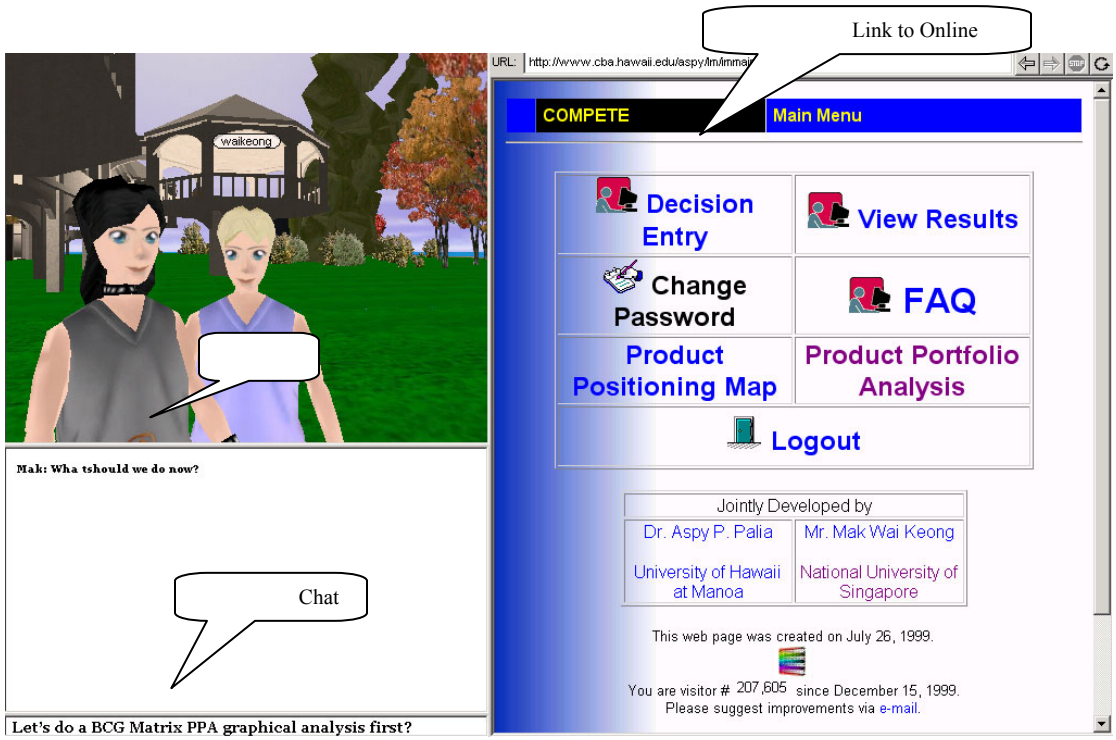

Figure 4: Example of a MUVE

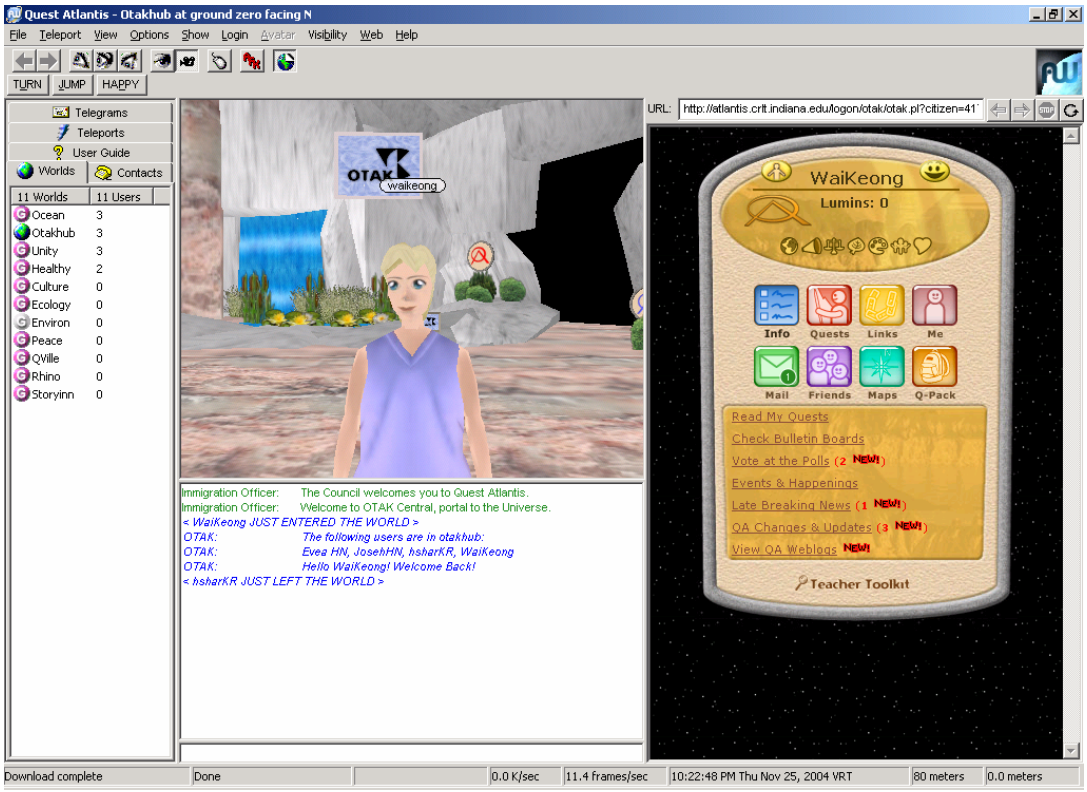

Figure 5: Sample screenshot from Quest Atlantis

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