

CHAPTER 1

INTRODUCTION

The Internet and the World Wide Web (WWW) have had a great and resounding impact on the field of education and the design of instructional materials. Unlike any predecessor technology, the computer and subsequently computer mediated communication is not only influencing and changing our practices within the classroom, but is also expanding and challenging our beliefs and definition of what constitutes a classroom or learning environment.

While the Internet has certainly impacted education, it is the WWW that has in many ways made computers, networks, and servers everyday terms. The WWW marked a great departure in not only the ways in which information is presented and accessed, but it also shifted our relationship to information and called into question the notion of how learners acquire knowledge. With the widespread use of this hypertext or hypermedia system, information no longer had to be presented in primarily linear forms afforded by books and films, instead information could be organized and presented in a relational fashion. This shift in the way information can

be presented and accessed has added much fuel to constructivist theories that learners construct knowledge through relationships rather than acquire knowledge through transmission.

The influence of the WWW is only beginning to be realized. In addition to impacting education and theories of knowledge construction, the WWW has also caused educators to look into the role of collaboration both within the classroom and as an extension of the learning environment.

As the WWW has evolved, new technologies have emerged that will continue to impact the field of education. Recent developments in programming systems such as Virtual Reality Modeling Language (VRML), Java, and chat applications have allowed for the emergence of desktop Web based 3D multi-user worlds (virtual worlds). Roughly, these 3D virtual worlds can be described as a combination of the 3D settings of desktop virtual reality (VR) and VRML, interactive multimedia, and a chat application. Although relatively little research has been done about 3D virtual worlds, they may offer a great many opportunities and prospects for distributed and distance learning.

One area worth further investigation is the educational use of these 3D virtual worlds. Three-dimensional virtual worlds offer the availability of learning experiences that are not always possible to replicate in a physical classroom. Like educational VR applications, 3D virtual worlds present many possibilities and implications for education by offering alternative means of accessing information through experiential learning. With limitations, these worlds offer the multi-sensory channels and interactivity of multi-media, but with the added elements of self-

representation and the interconnectivity of chat applications. Like VR, they "provide a different way to see and experience information, one that is dynamic and immediate" (McLellan, 1996). Unlike more traditional VR, 3D virtual worlds allow for collaboration both over time and space.

Research Questions

Three-dimensional virtual worlds may offer great potential for education, however, there is need for much research into the dynamics of these worlds in order to aid developers, designers, and educators in creating effective learning environments. This investigation focused on a three-part study to identify and explicate various elements of design of several of the more popular 3D virtual worlds as well as investigate current educational uses. The purpose of this study is to examine both the design and educational practice by addressing the following questions.

1. How is the user constructed by the design?
2. What unique learning opportunities are available through the use of 3D virtual worlds?

Initially these questions may seem unrelated, however, both address different, but closely related aspects of the study of 3D virtual worlds for educational purposes.

The first question addresses issues of design, while the second focuses on practice.

Design of the Study

The methodological framework for this qualitative investigation will employ Grounded Theory Methodology (Strauss and Corbin, 1994). Grounded theory is an approach to research in which theory is generated during an iterative process of data collection and analysis. Unlike the positivist tradition of deductive top-down hypothesis testing, grounded theory does not rely on *a priori* theory, but rather theory evolves out of a "continuous interplay between analysis and data collection" (Strauss and Corbin, 1994). Methods of data collection, similar to most other methodologies that fall into the qualitative research continuum, include observations, formal and informal interviews, and documents (Strauss and Corbin, 1994). The choice to employ grounded theory for this investigation is due primarily to the fact that 3D virtual worlds are emerging technologies. Little research has been conducted about them; subsequently there are few theories about the use of them for specific purposes such as education.

Throughout this investigation, no *a priori* theory is offered, but rather theory is been generated from the iterative process of data collection and analysis. It is acknowledged that by employing grounded theory, subjectivity is part of the process.

This research will take the form of a two-part study. Part one is an investigation into how three, 3D virtual worlds construct the user. The three applications discussed are Circle of Fire's Active Worlds; blaxxun interactive's Contact 4.0 within the context of Colony City; and OnLive! Traveler. Various aspects of the design discussed are based on the following categories: presence, representation, and embodiment. Part two of this study consists of two case studies

investigating the use of Active Worlds (AW) for both informal and formal education. The first case study focuses on a class offered through the Active Worlds University for users wishing to learn to create AW objects. The second case study investigates an undergraduate business-computing course offered by the University of Colorado–Boulder, College of Business. The primary tools used for data collection include ongoing participatory observations, formal and informal interviews, documents, and the applications.

Significance of the Study

It is hoped by conducting this qualitative investigation into the use of virtual worlds as learning environments I can add to the limited body of research about these environments by characterizing and comparing elements of design and how design operates in constructing users. In addition, it is hoped that my research will yield significant information into unique learning opportunities 3D virtual worlds might offer for both formal and informal learning environments. That in turn will aid both 3D world developers as well as educators interested in using these environments for distributed and distance education.

Assumptions

1. It is assumed that collaboration and communication are important components for learning. This assumption is based on work in social constructivism (Vygotsky, 1978). Additionally, it is assumed that active learning is important in the learning process. This assumption is based on

the foundation of a constructivist approach to learning (Duffy and Cunningham, 1996) and further re-enforced by such learning theories as situated learning (Lave and Wenger, 1991; Brown, Collins, and Duguid, 1996), and engagement theory (Kearsley and Shneiderman 1998). It is also assumed that both the behaviorist and social-cognitivist approach to instructional design hold value in the learning environment, although the constructivist approach is stressed because of the relevance of it in 3D virtual worlds. This assumption is based on previous work conducted in text-based virtual worlds (Bruckman, 1997). However, it should be noted that while a constructivist approach may be most suitable to these environments, by no means is it the purpose of this study to imply that a constructivist approach is the only instructional approach with merit.

2. It is assumed that Grounded Theory methodology is an appropriate approach for investigating 3D virtual worlds. The triangulation of methods such as prolonged engagement in the field, participatory observations, and formal and informal interviews will serve to provide validity and reliability in this investigation.

Limitations

This study consists of a two-part investigation preceded by a short history and background information (Chapters Two and Three). Chapters Four, Five, Six, Seven, and Eight, focus on how the user is constructed within three, 3D virtual worlds. It

should be noted that the proceeding investigation is by no means comprehensive, but rather meant to serve as a representative sample. The final section of this study (Chapter Nine) consists of an investigation into how one particular 3D virtual world (Active Worlds) is currently being used for education. Two case studies of the use of Active Worlds for informal and formal education are presented.

The overall focus of this study is on the construction of users with regards to the educational implications of using these 3D virtual worlds as learning environments as well as to present two cases in which one 3D virtual world (Active Worlds) is being used. However, it should be noted that this study does not attempt to delve deeply into the construction of societies, communities, the psyche, or address social/psychological construction of "self." This research is limited to the realms of instructional design and 3D virtual world technology.

In addition to limitations of the scale of this investigation, it is also acknowledged that this research is historical in nature. 3D virtual worlds are emerging technologies and as such are subject to continual revision. As new features are added the dynamics of these environments alter.

Definition of Terms and Acronyms

Avatar: An avatar is the visual representation of a user in a multi-user environment.

CMC: Computer-Mediated Communication

GZ: Ground Zero. Within the Active Worlds universe, GZ is the 0 north, south, east, and west coordinates for a world. Typically when users *arrive* in a world, they *land* at GZ.

In-World: The term "in-world" is most often used with Active Worlds (AW) to refer to a user as being present somewhere within the AW universe.

IRC: Internet Relay Chat

Lol: Laugh out loud.

Lurk: To lurk in a world means that a user is not actively participating, or making his/her presence known to others.

MOO: MUD Object Oriented is a text-based social chat application. See Chapter Two for a more in-depth description.

MUD: Multi-User Dungeons or Domain is a text-based role-playing environment (RPG).

PW: Primary World. This term and definition is coined by Michael Heim in his book, *Virtual Realism*. According to Heim, the PW, refers to "the world (the context of human involvement) outside the computer generated world...and has distinguishing properties such as natality or mortality, fragility or vulnerability to pain and injury, and personal care."

Teleport : A teleport is a transport device usually found in various worlds within the Active Worlds Universe that transports users from one site or world to another. While any object may serve as a teleporter, typically teleporters resemble and allude to various transport mechanisms of science fiction films and books.

Virtual Worlds: Virtual Worlds is a somewhat generic term used to describe multi-user environments such as text-based chats, IRCs, MUDS, MOOs, as well as 3D simulated environments. The term is sometimes used to refer to VRML sites as well.

VR: Virtual Reality

VRML: Virtual Reality Modeling Language

WWW: World Wide Web

Summary

Though the WWW is relatively new, it has impacted the field of education. Within a few short years the WWW has evolved into not only a tool for information dissemination, but is now a medium for distributed and distance education. In order for the field of education to remain current and perhaps even play a role in shaping technology it is important to investigate what emerging technologies may offer. 3D virtual worlds have much potential for distance and distributed education because they provide synchronous communication with a simulated 3D environment in which users (learners) can meet and collaborate from spatially distance locales. In addition to distance education, they also provide many unique learning opportunities. However, it is important that we understand both the characteristics and contributions of the applications in order to access their potential as learning environments.

The following chapters are roughly divided into three sections. The first section, Chapters Two and Three contain a short history of virtual worlds (Chapter Two), and the literature review (Chapter Three). The second section (Chapters Four, Five, Six, Seven, and Eight) focuses on how the user is constructed by three, 3D virtual worlds. Chapter Four provides an overview of the methodology and organizational structure for the three chapters to follow. Chapter Five focuses on Active Worlds. Chapter Six focuses on blaxxun interactive's Contact 4.0 within the context of Colony City, while Chapter Seven focuses on OnLive! Traveler. Chapter Eight provides a discussion of all three 3D virtual worlds as well as a discussion of

the educational implications. The third section, Chapter Nine, presents two case studies of how Active Worlds is currently being used for both informal and formal education. Finally Chapter Ten provides a summary of the study and discusses conclusions that may be drawn from the investigation. In addition, recommendations for design, practice, and future research are presented.