

Using a Mediated Environments Reference Model to evaluate learners' experiences of Second Life

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Abstract

The study of learning in multi-user virtual environments draws on the literature from many different fields. To synthesise these, a mediated environments reference model has been created that structures the different elements and establishes a consistent nomenclature for describing mediated environments. This model also forms the basis of the evaluation of Theatron 3, a project in Second Life in which learning activities take place within recreations of historical theatres. The paper describes the elements of the model, outlines the Theatron 3 project and reviews the applicability of the reference model in organising the concepts within disparate literatures and also in forming the basis of an evaluation of learners' experiences.

Keywords

Multi-User Virtual Environments, learner experience, conceptual frameworks, reference models

Introduction

The intention of this paper is threefold. Firstly it outlines a reference model that has been developed to describe the experiences of learners in mediated environments. Secondly, it describes the Theatron 3 Second Life theatre project. Finally, it analyses the value of the reference model in developing an evaluation framework. The fourth part of the process, that of applying the evaluation framework to the project, is still to be undertaken, but the preliminary results of this will be presented at the conference.

The literature on learning in mediated environments

The term "mediated environments" is taken from Steuer (1995; 37) and describes those forms of communication technology in which "information is not transmitted from sender to receiver; rather mediated environments are created and then experienced". A mediated environment can be defined in a variety of ways, but the essential features are that they enable users to communicate synchronously at a distance, and use a spatial metaphor to create a sense of realness to the interaction (Towell and Towell, 1997; 593). Some definitions include text-only environments called MUDs or multi-user dungeons, for other commentators there must be a visual representation of the space and the participants for it to fall within the definition (Schroeder, 2002a; ix - xi). Examples of these are telematic environments, where the participants see a physically real but remote environment, and multi-user virtual environments (MUVEs), where participants see a computer-generated simulated environment. Although MUVEs have been around since the mid-1990s (Schroeder, 2002b; 1) they have primarily been used for social networking and much of the research has been focused on this aspect. This paper reports on a PhD study being undertaken that attempts to answer the questions:

- How do *learners* behave in these environments?
- What do they value or not value and like or dislike in these environments?
- How do they use the technology?
- How do they relate to other participants in these environments?

Conducting the literature review for this study was problematic due to the various disciplines involved; The literature review undertaken for this study examined the technological literature regarding presence (for example the use of teleoperators and telerobotics for remote operation), the use of online communication for teaching (although this is largely the role of computer-mediated *text-based* communication), the field of serious gaming (that is the use of gaming in education and other non-gaming areas) and the study of the social aspects of massive multiplayer online role play games (MMORPGs) and MUVEs. There are overlapping concepts between these fields, but also some inconsistencies with the terms used (for example "social presence" in Zhao [2003: 445]; Arbaugh and Hwang, [2006: 10];

IJsselsteijn [2005; 9]; Sallnäs [2002; 174]). All of them, however, are concerned with communication at a distance and in what this experience means to the participant. It was in order to synthesise descriptions from these domains and create a more comprehensive framework for cataloguing these experiences that a reference model for mediated environments was developed. “Model” in this context means a “mediating form of representation” i.e. “is an abstract representation which helps us understand something we cannot see or experience directly” (Conole et al, 2005; 8). Developing a Mediated Environments Reference Model also entailed creating a self-consistent nomenclature, adopting existing terms where these are commonly employed or inventing new ones where existing ones were too ambiguous.

The original reference model drew on the work of Newman (2005;2), Thomas (2004) and Knudsen (2004) and synthesised categories they had identified. As additional subcategories were found during the literature search, these subcategories were added, merged and redefined to create clear distinct categories that also eliminate redundancy as much as possible. Most recently, as the case study developed (described below) and it became obvious that there would be a range of different types of activity, and this too would influence the experience for the learners, the model was expanded to include the types of activities that might take place in these environments. Although space here is too limited to discuss the entire model, and define the terms contained within it, an overview can be seen in figure 1 and example categories within the model are described in the next section.

The Mediated Environments Reference Model

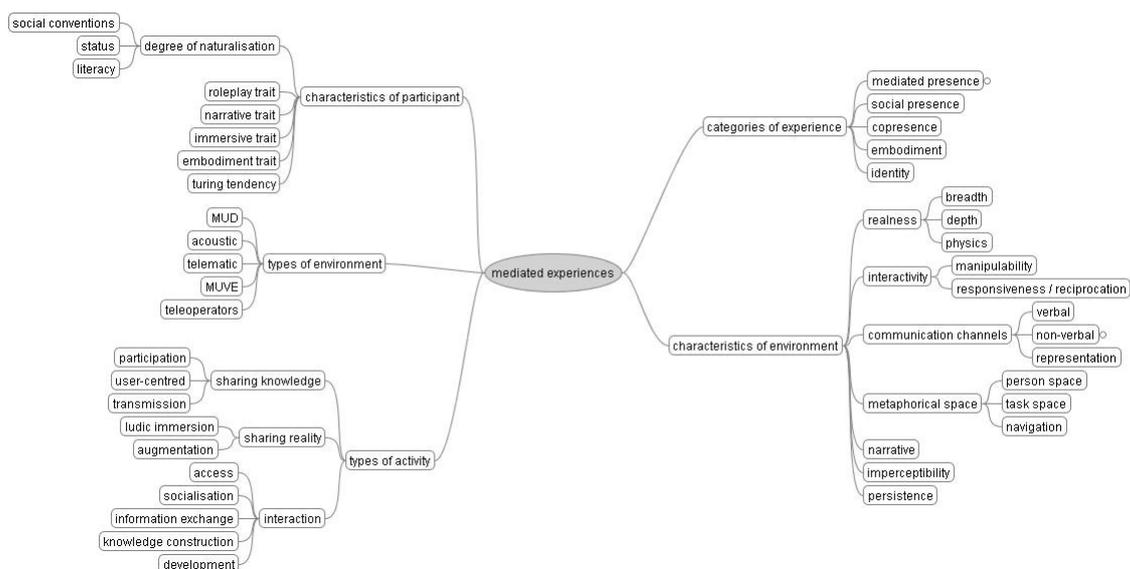


Figure 1. The Mediated Environments Reference Model (v 9)

Categories of experience

The following categories attempt to identify, and distinguish between, the different aspects of the experience of engaging with others in a mediated environment.

Mediated presence

The word “presence” is the sense of *oneself being somewhere else* (Sheridan, 1992; 120). However this is not used consistently within the literature. Some writers use the word “presence” as a contraction of telepresence, for example the International Society for Presence Research (Floridi, 2005: 4) or to mean being physically present (Steuer, 1995; 35). Also, the word telepresence itself is not used consistently; Steuer defining it as being either the sense of being at a remote location or in a virtual world (1995; 36), whereas Sheridan uses the phrase “virtual presence” for the latter and telepresence solely for the sense of being at a remote site (Sheridan, 1992; quoted in Zhao, 2003: 445). I’ve adopted Sheridan’s nomenclature, but coined the phrase “mediated presence” for telepresence and virtual presence in

combination to avoid ambiguity.

Copresence

Another aspect of the experience of mediated environments is the impression of *being together with others*, labelled as “copresence”. Again, there is some inconsistency within the literature, with writers using the phrase “social presence” with this meaning (Zhao, 2003: 445). I’ve adopted the phrase copresence, since social presence has an alternative meaning (below) and using two different phrases for two different phenomena will avoid confusing the concepts.

Social presence

Social presence has the meaning of *the ability to project oneself socially and emotionally*, for example, within the Community of Inquiry model (Garrison, Anderson and Archer, 2000; quoted in Arbaugh and Hwang, 2006: 10). Becker and Mark (2002; 29) define social presence as “a perception of others that is enabled by a particular technology”. These would not seem to be conflicting definitions, since projecting oneself to others and their ability to perceive that projection would seem to be two halves of the same process.

Self-presence (embodiment)

Self presence, or embodiment, is the feeling of oneself having a presence and body within the virtual or telematic domain. It is described by Biocca (1997) as “users’ mental model of *themselves* inside the virtual world”. Knudsen (2004; 42 - 43) classifies three different types of body:

- Physical body – the physically real body
- Extended body – the representation of the body as mediated through technology and displayed at a remote site. This can be an image in videoconferencing, or an avatar.
- Mental body – “the internal mental representation of a real or imagined body” (Knudsen, 2004; 43). This is equivalent to Biocca’s concept of the phenomenal body.

According to Biocca, where we locate our “self” is not necessarily in our physical body, but can be within the extended body. This transfer of our phenomenal body on to an external agent gives rise to embodiment (Biocca, 1997).

Identity

Since MUEs enable interaction between people to be conducted entirely online, the absence of direct visual and audio contact, and the great deal of flexibility the technology provides for creating digital representation, enables users to adopt new identities. These representations are manufactured either for roleplay, for deception, or for experimenting with experiencing interaction as a person of different age, race or gender; an activity known as “identity tourism” (Nakamura, 1995; quoted in Taylor, 2002; 58). Some create an identity online that they see as a truer reflection of themselves than their offline selves Taylor (2002; 54-55).

Characteristics of participants

The following categories do not claim to represent a psychology of individual difference between participants within a mediated environment, but are a list of the behavioural differences displayed by individuals when engaged in activities within these environments.

Degree of naturalisation

Prensky (2001;1) claims that the students who grew up using digital technologies have actually developed different thinking patterns as a result. The people who grew up with digital technologies are described as digital natives, those of us from previous generations are digital immigrants. Prensky’s observation is useful, in that it broadens the nature of interaction with technology from simple ‘literacy’ and introduces a familiar metaphor with which to consider adoption of technology, however, it is possibly simplistic in that it postulates a direct division into two aspects. Rather than adopt Prensky’s categories directly, therefore, I’ve adopted it as a continuum, labelled “degree of naturalisation” to the digital world.

Narrative tendencies

Narrative tendencies are “the individual’s predisposition for creating and finding narrative” (Newman, 2005; 3). The characteristics of a person with high narrative tendencies are described by Newman as wanting to “gather details about the environment, characters, and events of an encounter”. Conversely a

person with a lower narrative tendency will be “satisfied with less detail, and will quickly become overloaded”. There is also an implication that they will have less willingness to suspend disbelief and engage in play (Newman, 2005; 3).

Immersive tendencies

One of the factors that Steuer (1995; 40) identifies that promote mediated presence is “the characteristics of the individual experiencing the environment”. Newman (2005; 3) describes people with high immersive tendencies as people who are:

able to block external distractions and become very focused, to the point where they become unaware of their immediate environment and the passage of time (Newman, 2005; 3).

Embodiment tendencies

Heeter (1995; 200) identified two characteristics of users, which she stated as being propensities for involvement in virtual worlds; these are the propensity to engage belief in a virtual world (equivalent to Newman’s “immersive tendency” [2005; 3]) and the propensity to engage belief in a virtual body (an “embodiment tendency”). Heeter found that this propensity varied from individual to individual. In her study, participants engaged in a 3D virtual world in which the participants’ image was superimposed over computer-generated images projected on a screen. Heeter found that 29% to 31 % of respondents “felt as if ‘the being on the screen’ was their real self, 26% to 29% felt that their physical body was their real self and 40% to 42% felt that both were real” (Heeter, 1995; 200). Heeter comments:

The percentages were surprisingly consistent across different audiences and different virtual experiences. ... About one fourth of the population is so strongly situated in the real world and their real body that they have a difficult time becoming involved in a virtual world. (Heeter, 1995; 200).

Roleplaying tendencies

Many participants choose to play roles within these environments, either continuously or only within dedicated spaces. The factors that inform the extent to which roles are played include identity tourism (their desire to experiment with different genders, races or ages in order to experience these different roles) and their desire for openness or anonymity. The need or desire to maintain a persistent identity within the community also plays a part.

Turing tendencies

The Turing test was first proposed by Alan Turing in 1950 (quoted in Penrose, 1989; 7-8) as a means to determine whether an artificial intelligence was thinking as a human. The essential element of the test was that a person would communicate through text with either a person or a computer, and if it was not possible to distinguish between the two, then the computer could be said to be thinking. A phenomenon noted in some observations of behaviour in MUVES is the tendency of some participants to doubt that others with whom they are interacting are human, but are instead computers. For example, in a study reported by a participant

formed the belief that the cartoon-like avatars were not embodying real people but were “robots”, and as a result she cut down her communication with them. It was only when they laughed (“something a robot cannot do”) that she believed they were real. (Slater and Steed, 2002; 153)

In the studies by Newman (2007; 98) in which participants were asked to converse with a teddy bear named Albert (played by Newman’s research assistant) through a variety of media, several of the participants believed that they were interacting with a computer program. From reading the transcripts of these interactions it appears that participants were employing a Turing test, although in this case the purpose was not to create a program sophisticated enough to pass as human, but to determine whether the other participant was human or not. Since, as far as I am aware, no word currently exists to describe this activity, within the MERM I have labelled it as “turing”. To “ture” is hence the verb to describe the act of interrogating the nature of other participants in order to determine their humanity or artificiality.

Characteristics of environment

These are a synthesis of observations by Steuer (1995; 41-42), Dreyfus (2000; 57; quoted in Tompkins, 2003; 195) and from empirical data gathered from a previous study (Childs, 2007). These are not discussed here for reasons of space.

Types of activity

In order to classify the different types of activities that will take place during the Theatron 3 project, three complementary classification systems have been adopted, one from the literature on the social analysis of MUVes, one from the use of computer-mediated communication for learning, and one from the use of serious games in learning.

Immersion and augmentation

Bennetsen (2006) observes the two dominant modes in which activities take place within virtual worlds. He refers to these two modes as Immersion and Augmentation. Participants who favour immersion activities emphasise the role-play nature of the environment. They see the virtual worlds as a self-contained space, similar to Huizinga's conception of a play-sphere or "magic circle" (Rodriguez, 2006). However, Bennetsen is using the term "immersion" differently than the literature on presence uses it. Immersion there means the "set of physical properties of the media technology that may give rise to (mediated) presence" (IJsselstein, 2005;8). Bennetsen uses it to mean that someone has taken on the prerequisites for entering the play-sphere, i.e. adopting the behaviours and conventions that exist within it. To differentiate the two, within the MERM the former is described as sensory immersion, the latter as ludic immersion.

The alternative to using the environment for ludic immersion is to conduct augmentation activities (Bennetsen, 2006). These use the virtual worlds as a platform for conducting and enhancing real world communication. In this mode, people's real world identities tend to be known, and there is no sense of roleplay, or adopting the conventions of a separate self-contained space.

Types of learning activities using games

Mor *et al* use three categories to describe learning through games; these are transmission, user-centred and participation (2006: 15). The transmission mode draws on a behaviourist model and "is based on the idea that knowledge can be transferred from one person to another and, where technology is concerned, from a person to an object, and from an object to a person" (Mor *et al*, 2006; 15). The user-centred model draws on constructivist models of learning; these place the internal thought processes of the learner at the centre of the activity and require the user to solve problems and explore the game environment (Mor *et al*, 2006; 17). The learning and accuracy of the learning is constrained by the learners' ability to create their own synthesis or identify the knowledge embedded within the game (Mor *et al*, 2006; 24). These two categories are essentially between the user and the game; the participation model extends this relationship to include the teacher, other educational contexts and other gamers (Mor *et al*, 2006; 24).

Level of interaction

Models of learning activities within technological environments also take into consideration the need for participants to acquire the skills required for participation. Learning activities can therefore, in addition, be divided into which step on a ladder of development, the activity takes place. The model developed by Salmon (2004) is an example of this form of incremental development. In this model, the students start with a basic level of interaction, which just involves familiarisation with the technology. This then progresses through more complex forms of interaction and culminates with the students being able to develop without direct input from the teacher, either individually or collaboratively.

When evaluating the experiences of the students, this evaluation will be conducted in reference to where the activity is located in respect of these three categories:

- Relation to reality: I.e. whether the activity is about enhancing shared real-world relations or is located within a shared play-sphere.
- Relation to knowledge: the model used for the type of learning activity, whether knowledge is to be transmitted, constructed, or developed participatively.
- Level of interaction: which step along the Salmon ladder of interactivity the activity takes place.

The Theatron 3 Project in Second Life

Second Life is a multi-user virtual environment that supports user-created content. Users of the platform (called residents) can purchase virtual land, either on the mainland, shared with other residents, or on private islands. The Centre for Computing in the Humanities (CCH) at King's College, London has purchased two islands for its Theatron 3 project on which a series of theatres will be created. These theatres were originally designed as web-based VRML models for the EU-funded Theatron project in 2001 (Denard, 2007) and are a collection of twenty theatres from different historical periods (figure 2). The project is directed by the King's Visualisation Lab, part of CCH, in collaboration with the Higher Education Authority Subject Centres for Dance, Drama & Music and English. It is funded by the Eduserv Foundation. The project runs from 1st June 2007 to 31st May 2009.



Figure 2: Three theatres on the Theatron Islands in Second Life

Five education projects will be conducted throughout 2008 and the first term of 2009 as part of the Theatron 3 project, using the theatres built by CCH in Second Life. These activities are being run at five different institutions (Lucas, 2007). The areas these projects are investigating are listed below.

- Scenographic principles in Second Life (Paul Brownbill, University of Wolverhampton)
- Integrating live and virtual performance (Joff Chafer, University of Coventry)
- Commedia dell' Arte (Gordon Duffy-McGhie, Middlesborough College)
- Interdisciplinarity and creativity (Chris Wigginton, University of Northumbria)
- Renaissance drama (Gweno Williams, York St John University)

Applying the Mediated Environments Reference Model

As a tool for reviewing literature

Smyth (2004) describes some of the functions of a framework such as this model to be “a tool to scaffold research and, therefore, to assist a researcher to make meaning of subsequent findings” and also that the model “forms part of the *agenda for negotiation* to be scrutinised and tested, reviewed and reformed as a result of investigation” (Guba and Lincoln, 1989; quoted in Smyth, 2004). The MERM has been a means by which further literature can be viewed, and additional categories placed within the larger context. At any stage, therefore, the framework should only be seen as a snapshot of a developing work; as a means of communicating the various elements of any analysis, not an attempt to portray the entirety of the field. It also acts as a shared ground with other researchers for them to reflect upon and challenge the structure of the research (the “agenda for negotiation” described by Guba and Lincoln).

As an evaluation framework

The evaluation of the Theatron 3 project will consist of observation of the activities, focus groups with the participants (using recordings of inworld sessions for stimulated recall) and semi-structured interviews with selected participants. The data gathered from these will be structured according to the MERM. These data will also enable the validity of the MERM to be tested, and if need be, additional categories to be added.

The failures of a conceptual framework such as the one being developed here is that dividing the various aspects into well-bounded categories is not entirely practicable. The MERM has already been piloted in a study of a telematic environment (Childs, 2007) and although the structure provided by the model aided

the analysis of the data, the interdependence of the various elements made a thoroughly systematic interview process very difficult. The framework is therefore not designed to be a means to take the experiences of participants and box them into separate aspects, with no repetition, but rather a means to ensure that the various aspects are considered, and then placed within the overall analysis.

Another issue with applying a model such as this in evaluation is raised by Smyth (2004) in that it “consciously, or unconsciously, informs thought and practice by increasing personal sensitivity to notice particular occurrences” (Mason and Waywood, 1996; quoted in Smyth 2004), i.e. the structure can become self-fulfilling, in that the data that fit within it will be recognised, and that which does not will be excluded. Input from other researchers on the validity and generalisability of this model is therefore welcomed.

Conclusions

Even if this specific framework is not adopted outside of this study, the idea of using a framework, to indicate to other researchers simply and visually where one believes ones own research findings fit into the overall field would, I believe, be a practice worth adopting for any researcher. Developing a map would help other researchers make sense of ones research and place it within its relevant context.

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