

## Chapter 7

# Presence, Identity, Self-Representation, and Perspective Taking Within Virtual Online Courses

Effective synchronous instruction over the Internet has been the quest of researchers and practitioners for some time. As technology advances and students become increasingly more technologically savvy, Virtual Learning Environments are becoming a viable vehicle for distance instruction. Synchronous learning environments provide rich opportunity for building learning communities and Virtual Learning Environments allow students a sense of presence within their class.

Annetta and Holmes (2006) discussed some original findings on avatar choice and how it correlated with identity. This chapter will revisit those findings and report on how the technology has changed and allowed us more flexibility in discovering the potential value of avatars in online learning. Many studies have suggested positive outcomes with avatar use in video games and multi-user online environments. Avatars potentially build and sustain group commitment through expression of feelings such as salutations using a person's name and/or referring to the group as "we" (Rourke, Anderson, Garrison, & Archer, 1999). Richardson and Swan (2003) suggested that avatars provide individual students a sense of being. In addition, students with high overall perceptions of social presence scored high in terms of perceived learning and perceived satisfaction with the instructor. Annetta and Holmes (2006) conducted an explanatory case study about the use of avatars in a synchronous online science education course where we investigated presence and building community. Two cohorts of students were analyzed to ascertain individual emotions of presence in a virtual learning environment. Data were collected through class observations, written server side bots (a record of avatar changes and conversations), and interviews at the conclusion of the course. Case I was given the choice of 100 different avatars ranging from human to abstract objects such as a motorcycle, helicopter, or animal. Case II was given two choices, a male or female depicted as a tourist. Data from both cohorts showed students preferred to have a variety of avatars, especially the functionally different avatars presented. Responses from Case II expressed a lack of individuality and subsequently presence. The technology of Collaborative Virtual Environment (CVE) aims to transform today's computer networks into navigable and populated 3D spaces that support collaborative work and social play. CVEs are virtual worlds shared by participants across a computer network. Our work falls under the umbrella of CVEs. Benford, Greenhalgh, Rodden, and Pycock

(2001) suggested that avatars convey identity, presence, location, and activities to others. They are able to use these avatars to interact with contents of the world and to communicate with one another using different media including audio, video, graphical gestures, and texts.

As Gunawardena and Zittle (1997) reported, social presence is a strong predictor of satisfaction with computer-mediated communication. For students to feel an online course is a worthwhile experience, they need to feel as if they were part of the big picture, the community. Moreover, students need to see and hear others, even if the other students are avatars and that they are different from others in the class (Annetta & Holmes, 2006). This visualization creates a positive cognitive dissonance where the student struggles with reality and virtual reality. A struggle such as this seems to open cognitive channels (discussed more in depth in Chapter 9) that online learning has not yet seen. Eventually the mind decides the virtual world is the real world, even if it is not completely convinced, and one's sense of presence is heightened.

## Presence and Personality

Fundamentally, presence is a product of two factors: (1) "arrival," or the sense of being in the virtual environment, and (2) "departure," or the sense of not being in a virtual environment. "Arrival," or involvement in a virtual environment, is thought to occur when one focuses energy and attention on a coherent set of stimuli or meaningfully related activities and events, presented in the virtual world. This would suggest that increasing the focus of one's attention on events portrayed in a virtual environment enhances involvement, thereby increasing presence (Kinn & Biocca, 1997).

Immersion, whether physiological or psychological in nature, is intended to instill a sense of belief that one has left the real world and is now "present" in the virtual environment. This notion of "presence" has been considered central to virtual environments since its conception (Minsky, 1980). Barfield and Hendrix (1995) contrasted virtual presence to real world presence and defined virtual presence as the extent to which participants believe they are somewhere different than their actual physical location while experiencing a computer-generated simulation. Is that not what we are hoping for online? If you answered no to that question you may re-think your answer at the end of this chapter.

Garrison and Anderson (2003) defined social presence as "the ability of participants in a community of inquiry to project themselves socially and emotionally, as real people through the medium of communication being used." In the context of online learning, social presence has been associated with enhanced online social interaction (Tu & McIsaac, 2002). Interestingly enough, workforce development needs (i.e., 21st Century Skills) requires avenues for communication and teamwork. The ability to work collaboratively is at the heart of social presence theory. The premise of "social presence" is that if other people (i.e., representative avatars in our case) reside in a virtual learning environment, then there is more evidence that

the virtual environment really exists (e.g., cognitive dissonance). Correspondingly, if other persons in a virtual environment essentially acknowledge one's presence in that environment, then it offers further affirmation that one actually "exists" in that environment (Sadowski & Stanney, 2002). This early work suggested that intimacy and immediacy also enhance social presence.

Social presence is also seen to influence not only online activities generally designated as group projects, but also those usually designated as individual projects (Richardson & Swan, 2003). Building upon our work in 3D virtual learning environments, Shawn Holmes and I (2006) studied the link between personality and presence in 3D online worlds. Seventeen undergraduates in their senior year participated in the study as part of a senior seminar class in science education. The class, held in the *Wolfden* (the name I gave to the VLE), was designed as an open communication forum with scaffolded discussion threads facilitated by the instructor. Before the first class, each student took a Jung-Myers-Briggs (JMB) personality test.<sup>1</sup> Each student was asked to respond to their individual JMB test as confirmation of the results. Surprisingly, each of the 17 students confirmed that their JMB results were not in line with their self-perceived personality. The students were given a choice of 100 avatars from which to choose during the course of the semester. The students could change avatars at any time so long as they noted the name of the avatar in which they chose to represent them in the *Wolfden*.

During the final class, the students were asked to share the avatar(s) they chose during the semester and why they chose it. These responses were recorded and compared to the JMB test from the first class. Results of the study were enlightening. Following a double-blind review process to insure inter-rater reliability, it was concluded that there is not a very strong relationship between results from the JMB personality test and the avatars chosen. Based on student responses, results from our studies were confirmed in that avatar choice depended more on how a student felt in a particular class or how they felt emotionally on a particular day rather than their overall personality or at least as it was suggested by the JMB result. It is also important to note that there was not a strong relationship between individual results on the JMB and what students predicted their personality would be prior to taking the test. Most students disagreed with the results of the JMB, which might explain why there was not a relationship between personality and avatar choice in a 3D VLE.

Three-dimensional worlds allow participants to become immersed in the environment and its contents, individuality in respect to the other students in a class, and a belonging to a community of learners. To insure participants are psychologically experiencing what the target experience was meant to be, social psychologists must produce an affective experimental illusion to affect their participants' capacities in attention, motivation, and imagination. Hoyt, Blascovich, and Swinth (2003) replicated the classic social facilitation/inhibition effects where individuals' performance on a task is affected by the presence of others using computer-controlled agents and human-controlled avatars. Results suggested participants mastered one of two tasks

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<sup>1</sup><http://www.humanmetrics.com/cgi-win/JTypes2.asp>

and subsequently performed the mastered or non-mastered task either alone or in the presence of a virtual human audience whom they were led to believe were either computer-controlled agents or human-controlled avatars. Those performing in the presence of avatars demonstrated classic social inhibition performance impairment effects relative to those performing alone or in the presence of computer-controlled agents. The results gave the social psychologists greater confidence that a VLE can be implemented successfully for collaboration, training, and education because the interactions seem to be governed by similar social dynamics such as face-to-face (FtF) interactions. The results of Hoyt, Blascovich, and Swinth (2003) and our studies confirm that 3D VLEs are as close as humans have gotten to replicating traditional face-to-face instruction (from a psychological perspective) at a distance.

One could argue that Videoconferencing or new classroom management software such as *Elluminate*® provides a platform for real synchronous face-to-face instruction. However, 3D VLEs provide a cognitive framework for replicating a traditional classroom in that students are always “on screen” (i.e., visible to the instructor and their peers) and cannot readily take a passive role in learning. From our work we see the introverted student who is generally not participatory in face-to-face classrooms seems to come out of his or her shells in these environments.

In light of the findings in a study by Jones (2002), for most college students the Internet has enhanced their education. It has changed the way they interact with friends, classmates, professors, and information. Considering Katz’s (2005) report on the implications of networking in higher education, which claims an increase in virtuality, mobility, and community in the universities, interactions on the Web will become an expression of virtual portals and avatars. Chepya (2005) distinguishes “presence learning” from “distance learning” to explain his online pedagogical technique. Presence learning is a connection between the instructor and student that is tangible as the student is engaged in the online class. As the instructor overcomes invisibility and becomes a participant in the lectures and discussions, a shared memory of incidents and events are formed. Such elements as companionship and presence, once thought unattainable on the Internet can be achieved successfully through a fusion of technology and pedagogical technique thus building a virtual community. Thought must be given to the aesthetics of online pedagogy and a shift from each and every trick used in front of a physical class to presenting it “in front of” an online class (Chepya, 2005).

From preschool through college, students interact in a social environment in which a teacher is present directing them toward a common goal. Online education courses need to juxtapose making students feel as if they are part of the whole and that they are individuals. This is not unlike a well-designed face-to-face class. Students with a sense of presence will have a greater degree of satisfaction with the course. As our work suggests, individuality in an online course can be achieved by giving students many choices. The data suggest students chose avatars based on either the avatar function in the class assignment (i.e., flying jumping, gestures, etc.), or more commonly by how the avatar affected the students as individuals. Avatar choices can reflect the student’s gender, ethnicity, and personality or the desire to change as their mood changes. Knowing how a student feels by

observing avatar choices helps the instructor incorporate factors that are correlated to building a sense of community in the course.

Social presence is also seen to influence not only online activities generally designated as group projects, but also those usually designated as individual projects (Richardson & Swan, 2003). In addition, students with high overall perceptions of social presence scored high in terms of perceived learning and perceived satisfaction with the instructor (Richardson & Swan, 2003).

This idea relates to the process of perspective taking. Dewey's methodology from the early 1930s is employed by Selman (1977) in his five-step perspective taking approach: 1. Defining the problem; 2. Considering the feelings of others involved; 3. Brainstorming alternative ways to solve the dilemma; 4. Choosing a course of action; and 5. Evaluating the probable outcome. Finally, culturally relevant pedagogy (Ladson-Billings, 1995), analogous to culturally responsive teaching (Gay, 2002; Villegas & Lucas, 2002), is related to student experience – all students achieve academic success, maintain or develop cultural awareness, and are prepared for active participation in a democratic society. Conceptually, perspective taking includes empathy to the degree that one must take into account the perspective of the other, at least what the other is experiencing, to project possible consequences of one's actions. Of course, one can take the perspective of the other without being empathetic to the consequences of one's actions.

## **Stimulating Perspective Taking Through Cognitive Conflict**

Perspective taking provides the opportunity to consider the viewpoints of others and induce cognitive conflict. This type of growth and recognition of self does not happen in isolation. It occurs through the cognitive development of social interactions and/or moral experiences challenging conflict between thought and behavior, resulting in more sophisticated, consistent, and comprehensive perspective taking behavior (Hall & Bishop, 2001; Selman, 1977). Through social games and social and moral dilemmas, Selman and Byrne (1974) identified four developmental levels of social perspective taking. The levels are age-related in a form similar to Piaget's cognitive operations. They are logically related structures that individuals display when understanding another's point of view: level 0 – no differentiation of points of view; level 1 – unable to maintain own perspective and put oneself in the place of another, nor able to judge own actions from another's point of view, yet understands subjectivity; level 2 – able to reflect on own behavior from another's point of view, recognizes others can place themselves in his/her shoes, however reflections do not occur simultaneously; level 3 – able to reflect on each point of view simultaneously, consider a situation from another perspective, and put his/herself in another's shoes before deciding how to act.

Perspective taking levels are basic structures of social reasoning and are used in content areas such as interpersonal relations, moral reasoning, social problem solving, and communication skills. Imagine a situation where you are teaching ethical sensitivity and racial tolerance. You can have white students take on an avatar that

is black and ask them to participate in a world where they are not treated as part of the group. The student in this case gets the real sense of what someone from another race feels when not included. This is another example of how avatars in 3D worlds can provide unique situations above and beyond what we can replicate in the real world. This is in alignment with the five-step sequence outlined in the practice-oriented Icelandic Project by Adalbjarnardottir (Selman, 2003) which lead discourse about social conflicts. This approach is designed along the lines of a three-step approach first suggested by John Dewey in the early 1930s. Both approaches were employed by Selman (2003) as a pedagogical practice for social conflicts. In brief, social conflicts are approached by the following: defining the problem, considering the feelings of others involved, brainstorming alternative ways to solve the dilemma, choosing a course of action, and evaluating the probable outcome. This implies that intervention research should aim to stimulate perspective taking through content areas of social reasoning (Selman, 1977).

Professionals are generally seen by society as having a specialized body of knowledge. They base their practice on that body of knowledge that is beyond the reach of lay people (Furlong, Barton, Miles, Whiting, & Whitty, 2001). The development of knowledge-based skills may take long periods and sections of time that may occur within higher education institutions. Related to knowledge-based skills is the notion of autonomy because professionals use their judgment in uncertain situations rather than routine situations. These judgments are made on behalf of their clients, patients, or students, as seen by the professional. Exercising this judgment requires values, which it can be argued are no obvious forms of training (Furlong, Barton, Miles, Whiting, & Whitty, 2001). Rule and Bebeau (2005) state young professionals start their careers not fully understanding the exact nature of the “roles and responsibilities of the professional” (p. 55). However, Bebeau has been successful using professional codes of ethics and cause/effect awareness to measure and develop ethical sensitivity in dental professionals.

This takes effort and may increase the unwanted thought, whereas perspective taking allows the teacher to lower the level of stereotypic accessibility by remaining present in the interaction. Galinsky and Moskowitz (2000) suggest alternative strategies such as active consideration of others’ viewpoints, framings, hypotheses, and perspective taking can be used to decrease stereotypic thoughts.

Considering others’ viewpoints is simply what is known as empathy. The degree of Empathy is the amount of perspective taken. The more an environment can stimulate empathy for other students and/or animated characters or agents in the virtual space, the greater perspective a student will have in that environment.

A Stanford University study about interactive characters suggests substantial opportunities for them to enhance online experiences. This is because computer-generated actions of avatars can replace human-controlled avatars and provide activities that are scalable and replicable. The major findings of this study suggest that human–media interactions are fundamentally social and that character interfaces bring social intelligence to online interactions. Further, the benefits of character interfaces are as follows:

1. Characters make explicit the social responses that are inevitable
2. Interactive characters are perceived as real social actors
3. Interactivity increases the perceived realism and effectiveness of characters
4. Interactive characters increase trust in information sources
5. Characters have personalities that can represent brands
6. Characters can communicate social roles
7. Characters can effectively express and regulate emotions
8. Characters can effectively display important social manners
9. Characters can make interfaces easier to use
10. Characters are well liked

Many studies address social relationships in online education. Mama (2001) compared students' attitudes regarding a site-based and a Web-based class (with three face-to-face meetings). It was found that the students in the Web-based class felt it was more personal than traditional, face-to-face courses. Swan (2001) reported that students perceived online discussions as more equitable and more democratic than traditional classroom discussions, and that there was a positive relationship between levels of interaction among students and student satisfaction in the course.

Richardson and Swan (2003) indicated that social presence was positively correlated with students' perceived learning. Students learned course material, and found that efficacy is clearly an indicator of learning. Many other studies claim to have found a positive correlation between social presence and student's perceptions of their learning (Christophel, 1990; Richardson and Swan, 2003). There is also evidence supporting the level of students' perceptions of social presence in their courses and higher results on learning measures (Picciano, 2002). Schutte (1997) found that students in the online course perceived a greater amount of peer contact than traditional, face-to-face students and also earned significantly higher grades than their traditional student counterparts. Rodriguez, Plax, and Kearney (1996) reported that teacher immediacy behaviors influenced students' affective learning, and ultimately influenced students' cognitive learning.

Building communities of practice or professional learning communities is becoming popular once again in educational research. Before exploring the possible connection between social presence and community, it is helpful to understand what is meant by community. Researchers do not always provide a definition of community or an explanation of the link between social presence, community, and learning (Jones, 1995; Gunawardena, 1995; Rourke et al., 1999; Reid, 1995; Swan, 2002; Tu & McIsaac, 2002). Brueggemann (2002) describes community as shared experiences in which both individual and group needs are met, and holds that community can be linked to a place and time but can also transcend them. Rovai (2002) sees community as a group of individual members of formal and informal organizations, interacting and connecting with each other. With this understanding of community, the link between social presence and community can be further explored. Wise, Chang, Duffy, and del Valle (2004) state that the concepts of social presence and community both transmit the sense of relating and caring among participants.

Gunawardena (1995) asserts that “The development of social presence and a sense of online community becomes key to promoting collaborative learning and knowledge building” (p. 164). She believes that collaborative learning is possible only if participants have social presence, a sense of community, and a common goal. Rovai (2002) evaluated online and traditional classes of 14 professors, finding that certain online classes had significantly higher ratings from students on feelings of community in the classroom. He asserts that the method of teaching, not the environment for delivering the course, is what influences feelings of community. This is an important reference because although this book focuses on 3D virtual learning environments, we are not promoting technology over good teaching. Technology is simply the tool that provides the instructor with the ability to be the most effective one can be.

Wegerif (1998) found that students who felt more like insiders in the learning community were more likely to achieve success. Learning takes place in a social environment, and cognitive understanding and personal construction of knowledge depend on relations with others (Fung, 2004; Richardson & Swan, 2003; Vygotsky, 1978). Creating a safe environment for a learning community in class allows students to take risks and collaborate in an authentic manner (Bonk & Cunningham, 1998). Wegerif (1998) contends that it is essential for students to feel that they are members of a community in order to collaborate and learn, and that computer-mediated communication can provide support for the development of feelings of community.

Synchronicity can be valuable for virtual communities provided that members actually take advantage of the synchronous technology design by interacting (Blanchard, 2004). Chepya (2005) suggests the instructor must “be there” and create a “there” that is palpable to everyone. When Internet communication works, the medium becomes a place, as a physical classroom is a place. The learning environment is shared rather than didactic in nature. This notion of being there can meld into what is known as immersion. *Immersion*, as we are defining it, is embedding students inside lifelike problem-solving situations where characters are investigating simulated scenarios, situations, and collaborations that are not possible in a classroom setting (Dede, 2005).

According to Dewey (1916), the difference between play and what is regarded as serious employment should not be a difference between the presence and absence of imagination, but a difference in the materials with which imagination is occupied. A well-defined and constructed virtual environment should elicit this idea. Adding depth and breadth to the general aggression model, Eastin (2006) presented three experiments that test the relationships among user and opponent gender representation, opponent type, presence, and aggressive thoughts from violent video game play. It is important to note that the environments we discuss in this book are not necessarily video games but to make them immersive, the components of good video games could be employed. Eastin suggested that females experience greater presence and more aggressive thoughts from game play when a gender match between self and game character exists. Further, when playing against a human opponent (rather than a computer), aggressive thoughts increase. Finally, playing as



a male against a female opponent consistently and significantly decreases aggressive thoughts. This is where a fine line between play, immersion, and presence takes hold. If these environments are constructed in a similar manner in which we have used them, then we need to be sure males and females play equally participatory roles. If not, then the environment becomes deindividuated.

Deindividuation is a state in which people lose their individuality because “group members do not feel they stand out as individuals” and individuals act if they are “submerged in the group” (Festinger, Pepitone, & Newcomb, 1952). The ability to work collaboratively is at the heart of social presence theory. *Social presence* has been defined as the ability of participants in a community of inquiry to project themselves socially and emotionally as real people through the medium of communication being used. Social presence is a strong predictor of course satisfaction regardless of the medium or how content is delivered. Intimacy, immediacy, and identity enhance social presence. Although we’ve touched on all of these in this chapter, *intimacy* and *immediacy* are two terms that add to immersion and social presence and thus need further explanation. *Intimacy* can be defined as the perceived shared control of the environment either with the instructor, classmates, or the computer and *immediacy* is the amount of communication (whether it be verbal or non-verbal) present. When using teleconferencing as a form of distance learning, people may change their behavior. If they cannot be seen, they may use the verbal channel as a substitute for the non-verbal. Thus, they might say “I agree” instead of nodding. It seems, then, that non-verbal cues may not be as crucial as first supposed. Instead it seems that the major difference between the media may lie in the “social presence” that they provide.

Non-verbal cues such as gestures are a central feature of communication and cognition. When students engage in conversations in the presence of material objects, or in our case virtual objects, these objects provide a phenomenal ground against which students can enact metaphorical gestures that embody (give a body to) entities that are conceptual and abstract. In such instances, gestures are often subsequently replaced by an increasing reliance upon the verbal mode of communication. During transitional states of understanding, gestures depict new understandings, although students’ linguistic competencies have not yet developed to express the understanding in a verbal modality. The gestural and verbal modalities therefore express different types of understanding. These results find support in several studies on gestures during “hands-on” science classes. When students are asked to make sense about phenomena that they did not know prior to instruction, the gestural expressions appear to precede the evolution of new verbal modes of expression (Roth, 1999, 2001).

Roth and Lawless (2002) give examples of different types of gestures. These gestures are easy to comprehend in traditional classrooms but the transfer to online learning has been difficult, even in videoconferencing. The examples are as follows:

*Beats* – Void of propositional content, but provide a regular, temporal structure to communication and may facilitate the (lexical) search for words.

*Deictic* – When a speaker points to actual objects that are either present, non-present, or metaphorical in nature.

*Iconic* – When they bear perceptual relation with concrete entities or events. For example, relations between objects in space, modes of action, or paths of movement.

*Metaphoric* – Similar to iconic, but the images produced relate to abstractions. In such gestures, abstract content is given form in the imagery of objects, space, movement, and so forth.

Gestures are enacted against a perceptual ground, from which, as part of the function of gestures, certain features become salient. Consequently, because they are salient, they do not need to be talked about. This frees up resources in the production of speech that, in some theories, taxes the short-term memory required for word search and assembly of sentences (Anderson, Boyle, & Yost, 1985). The perceptually available entities and gestures therefore scaffold the development of scientific language because they take on representative functions, while the verbal modality is able to devote itself almost entirely to the construction of new theoretical sentences. Though they differ in many respects, both major theories on gesture–speech relations presume that speech and gesture are generated by an underlying semantic model (Hadar & Butterworth, 1997; McNeill, 1985). These situated learning environments advance the learner within a socio-cultural structure. They allow the learner to transfer tasks from virtual environment to same experiences in the real world.

## Virtual Community

A virtual community can be defined as an aggregation of individuals or business partners who interact around a shared interest, where the interaction is at least partially supported and/or mediated by technology and guided by some protocols or norms. Porter’s (2004) typology of virtual communities includes two first-level categories: Member-initiated (those where the community was established by, and remains managed by, members) and Organization-sponsored (communities that are sponsored by either commercial or non-commercial (e.g., government, non-profit)).

At the second level of the typology, virtual communities are categorized based on the type of relationship fostered among members of the community. Member-initiated communities foster either social or professional relationships among members, while organization-sponsored communities foster relationships both among members (e.g., customers, employees) and between individual members and the sponsoring organization.

The Porter typology draws upon Markus’s (2002) typology where virtual communities are categorized based on their social, professional, and commercial orientation. In social communities, personal relationships of a non-professional nature are fostered. Often, these communities evolve around leisure activities, hobbies, or other non-professional interests. In professional communities, member relations are formed around shared professional interests. These communities

include expert-based knowledge networks and student-based learning communities. However, the concept of the organization-sponsored community extends beyond Markus's notion of commercial communities by recognizing that communities could also be sponsored by non-profit organizations and government agencies.

Unlike the description of synchronicity, interactivity is viewed as a continuum (Rafaeli & Sudweeks). Indeed, a highly interactive environment can enhance a member's perception of social presence, co-presence, and sense of place (Blanchard, 2004). It also can facilitate the construction of social reality for members (Rafaeli & Sudweeks, 1997). The platform, therefore, focuses only on the technical design for interaction. This is an advantage of 3D virtual environment. All of the attributes of synchronicity are seemingly symbiotic with interactivity. Interactive responses are important in promoting socially meaningful interaction and serve to measure, build, and sustain relationships. This includes a willingness to continue to interact, indicate interpersonal support, and encourage and accept others (i.e., taking one's perspective).

Educational technology has progressed through a number of stages, focusing, in turn, on the content to be learned, the format of instructional messages, and interaction between computers and students. The field is now concerned with the study of learning in complete, complex, and interactive learning environments. These environments allow both the simulation of experiences that students might have in the real world and also the creation of compelling experiences that cannot normally be experienced directly. These environments are also frequently inhabited by more than one person, making learning within them a social activity where learning is distributed among both people and artifacts (Winn, 2002).

According to the University of Manchester's Mark Clark, "The nature of documents is increasingly trending to compound documents that incorporate image, data, text, and voice annotation. E-mail is likely to shrink as a way of sharing documents, giving way to the increased use of collaborative working environments for document development analysis, editing, and even drafting. Videoconferencing, particularly that on the high end associated with technologies such as access grids, is showing exponential growth. Increasingly, virtual communities will be built upon networks as the glue to provide social cohesiveness." Managing the deployment and then integration of converged technologies into a cohesive, converged service environment – and ultimately into the kind of rich collaborative environment as Clark describes – will likely demand considerable attention in the future (Katz, 2005). This is not an easy task but a task we are meeting directly through 3D virtual learning environments. Further research is necessary but this book continues to provide evidence that these environments can be a successful medium of the present and the future.

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