Virtual Environments for Corporate Education
Employee Learning and Solutions

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CyberMations Consulting Group, USA
Section 2
Applications

Chapter 5
Desktop Virtual Reality Applications for Training Personnel of Small Businesses ........................................... 69
Miguel A. Garcia-Ruiz, University of Colima, Mexico
Arthur Edwards, University of Colima, Mexico
Raúl Aquino-Santos, University of Colima, Mexico
Samir El-Seoud, Princess Sumaya University for Technology, Jordan
Miguel Vargas Martín, University of Ontario Institute of Technology, Canada

Chapter 6
Virtual Learning Environments for Manufacturing.................................................................................................. 89
Hamed Manesh, Eastern Mediterranean University, Turkey
Dirk Schaeffer, Georgia Institute of Technology, USA

Chapter 7
Applied Training in Virtual Environments ............................................................................................................. 110
Ken Hudson, Loyalist College, Canada

Section 3
Designs and Measurements

Chapter 8
Train the Trainer: A Competency-Based Model for Teaching in Virtual Environments .................................... 124
Mary Rose Grant, Saint Louis University, USA

Chapter 9
Assessing 3D Virtual World Learning Environments with the CIMPLE System:
A Multidisciplinary Evaluation Rubric .................................................................................................................. 147
Sean D. Williams, Clemson University, USA
Deborah M. Switzer, Clemson University, USA

Chapter 10
Developing Digital Literacies in Second Life: Bringing Second Life to Business
Writing Pedagogy and Corporate Training........................................................................................................ 169
Dirk Remley, Kent State University, USA

Chapter 11
Facilitating a Hierarchy of Engagement: Corporate Education in Virtual Worlds ............................................. 194
Paul R. Messinger, University of Alberta, Canada
Xin Ge, University of Northern British Columbia, Canada
Glenn E. Mayhew, Aoyama Gakuin University, Japan
Run Niu, Webster University, USA
Eleni Sioulia, University of Alberta, Canada
Chapter 11
Facilitating a Hierarchy of Engagement:
Corporate Education in Virtual Worlds

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ABSTRACT

Virtual worlds, where many people can interact simultaneously within the same three-dimensional environment, are productive enabling environments for corporate education. In this chapter, the authors propose a hierarchy of four types of educational engagement, at successively deeper levels of interaction. The authors then show that virtual worlds can be useful platforms for distance corporate education because they can be used to promote engagement at all four levels of the proposed hierarchy. By linking their hierarchy with existing learning theories, they argue that the effectiveness of corporate education can be successfully carried out by using virtual worlds. They also provide an overview of the historical development of virtual worlds, the development of distance education, and a description of technological, institutional, and research challenges needed to be met for distance corporate education to realize its potential.

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INTRODUCTION

Virtual worlds open up fruitful applications in distance corporate education because they promote multifaceted forms of distance interaction between the instructor and students and among students. The rich and diverse forms of personal and group interactions supported by virtual worlds go beyond one-way and two-way communication, prevalent in instructional videos or facilitated by videoconferencing, to also promote education co-creation and community building.

In this chapter, we propose a hierarchy of engagement in education consisting of four elements, and we discuss how virtualization technologies and virtual worlds provide a space in which distance corporate education can promote education at all four levels of this hierarchy. Section 2 of this chapter provides a background on the development of virtual environments, the history of distance learning, and relevant theories of education. Section 3 develops our proposed hierarchy of engagement and describes how virtual worlds enable engagement at all levels in this hierarchy. Section 4 addresses educational topics that are pertinent to virtual worlds education, including the influence of avatar mediation on learning and communication behavior (from a student’s perspective) and instructional issues arising in these worlds (from an instructor’s perspective). Section 5 concludes by indicating future technological, institutional, and research issues that will need to be resolved as we continue to leverage virtualization technologies and virtual worlds for corporate education.

BACKGROUND

We begin with a brief background about the emergence of virtual environments, the history of distance learning and corporate training, and a review of education theories related to distance learning.

Emergence of Virtual Environments. Virtual worlds represent a blending of two generations of gaming elements, developed over the past 35 years, with online social networking features. Understanding this progression provides perspective on virtualization functionalities that can be applied for education.

The first generation of video games dates back to the earliest coin-operated video games (e.g., PONG in 1972) which added real-time video interactivity to elements of earlier strategic or thematic role-playing games. Such interactivity enhanced reflexes and provided excitement. In 1986, video games were brought into the home with console system technology, such as the Nintendo Entertainment System released across the U.S. (previously released as Famicom in Japan), featuring popular characters like Mario, Donkey Kong, Zelda, and Popeye (Herman et al., 2008). Many of these games were initially for a single player, but multiplayer console system games followed, first with the MIDI Maze for the Atari ST in 1987. In these games, players compete or fight against each other (modern forms, such as the Nintendo Wii system, include dynamic user interfaces for various physical games and electronic sports). Similar games subsequently came to be run from LAN (Local Area Network) systems, which permitted everyone’s characters on the system to interact with each other. For example, in Maze War, a “first-person shooter” game first developed by high school students in a program sponsored by NASA’s Ames Research Center, users were represented as eyeballs hunting each other through a maze using only lines to give perspective to the 3D graphics. It was developed into a networked version (via serial cable) when one of the creators went on to college at MIT, and later was playable over the ARPAnet, the precursor to the Internet (see Jantz & Martens, 2005, for related LAN games). Subsequently, Neverwinter Nights and Dungeons and Dragons were introduced by America Online in 1991, which were early multiplayer games
with a graphical user interface (GUI) for the personal computer. A key element of all games in this generation was that players operated characters that interacted with other characters or with the environment in the game, and this element is carried into virtual worlds and has an important impact on the potentialities of the medium for education.

A second generation of video games can be linked with the emergence of the personal computer and Internet technology (after Tim Berners Lee of CERN made his World Wide Web software available for free download in 1992). Releases of the PlayStation 2 and Microsoft XBox offered gamers the ability to connect to the Internet and play against and talk with other gamers. This completely redefined what types of games would be popular in the home. With a network of users able to join in on a game, the landscape of video games became much more expansive, not only geographically, but also in terms of the nature of the social interaction they enabled. A few particularly important developments in Internet-based multiplayer games were Quake, a 1996 game that was the first in which players could exchange their own creations, Grand Theft Auto, the first to allow players to explore a world instead of moving through it in a linear fashion, and The Sims, a PC game later available for online play in which most of the content was user-created. Finally, World of Warcraft demonstrates how quickly a massively multiplayer online role-playing game (MMORPG) can grow, having gained over 11.5 million active users as of December 2008 since its beta release in March 2004 (Blizzard Entertainment, 2008; Murray, 2005). According to mmorepgchart.com, there were over 16 million active MMORPG subscriptions at the end of 2008. In this generation of games, remote access by many players, user generation and exchange of content (in some games, with well-defined currency and exchange systems), and flexibility and independence of movement (and even of user objectives) became standard—these are features that are shared with virtual worlds and influence the latter’s application for education.

Although not gaming, per se, social networking sites have also influenced the development of virtual worlds. Beginning with SixDegrees.com in 1997, social networking sites such as MySpace and Facebook have proliferated quickly (see Boyd & Ellison, 2007 for an overview). In addition, shared video materials have been facilitated by YouTube. The primary elements required for social networking are some sort of (asynchronous or synchronous) communication mechanism (e.g., comment boards, chat, instant messages, blogs or live voice chat) and the ability to identify who is speaking (e.g., user names that are permanently assigned). Given the ability to communicate, networks of participants naturally arose. Social networking sites also added two more common elements: the ability to create a user profile with information about oneself that is accessible to other users, and a “friend list” that allows the definition of a set of users that one trusts and with whom one wants to remain in contact. Those on the friend list are often given access to more information, the ability to know each other’s online status, notices of updated profile information, etc. Social networking sites exist for those who share a common interest or hobby, geographical location or other demographic attribute (e.g., sites created specifically for children or teens), or for professional networking. One study of college students in 2006 found Facebook to be tied with beer for popularity and second only to the iPod (FOX News, 2006). Mobile phone handset manufacturers, seeing the growth of social networking sites access from handsets (15% of the 25 million U.S. users of smart phones use them to access social networking sites almost every day) are adding social networking site access capabilities to phones that lack normal smart-phone features in an attempt to bring in more mainstream customers. Overall, virtual worlds have come to include many of these social networking features, particularly various similar communication mechanisms.
Facilitating a Hierarchy of Engagement

(e.g., chat, text messaging, live voice chat), user profile information and news, and lists of friends (and interest group memberships) that constitute extensive networks.

Virtual worlds have grown to incorporate many elements first introduced in video gaming and social networking. Although virtual worlds vary greatly in purpose, type or location of world, users, interaction patterns, and business models, they share a number of the above-described elements: (1) people represent themselves with avatars, (2) people are free to move about and act as they please, and (3) people communicate and exchange content in various ways.

First, the most basic element of virtual worlds is that the users are represented by customizable 3D anthropomorphic digital representations of themselves, called avatars. The term “avatar” derives from the Sanskrit word “avatarah,” which means “incarnation,” and in the context of virtual worlds, the term denotes a graphical object corresponding to the user’s virtual body in the world. Users can generally choose the avatar’s sex, basic shape, hair, etc., with very detailed customization possible in many of the worlds. They can dress the avatar in clothing that they choose. In many worlds the avatar does not even need to be human: it can be an animal, mythical creature, cloud of mist, point of light, or anything else imaginable, but the large majority of users in most worlds use human-looking avatars. The incredible freedom to very effectively project almost any image of oneself to the world is an important part of the popularity of virtual worlds. This image may reflect the user’s real life appearance, personality, etc. or it can be something entirely different. The key is that the representation is rich and meaningful. And the more engaging the setting and believable the characters, the more meaningful the user’s interaction is with a particular world.

Second, a key element in most virtual worlds is the ability to explore and move within the world. Avatars can generally walk or run, and in some worlds they can even fly. Vehicles may be available, or – the ultimate convenience – avatars can teleport from one place to another. The experience of interaction in the virtual world can also be heightened as avatars gain the ability to interact with objects. These objects can be anything, including animal and plant life, structures, and vehicles. Objects and avatars can be scripted to move in certain ways, with some worlds allowing programmed movement that can be quite subtle and life-like. Several worlds also employ sophisticated physics engines, which consist of software that replicate gravity, etc. Scripted movement can also be interactive, animations being chosen from a heads-up display (HUD) on the screen, for example. The content can be supplied by professional content creators or can be developed by the users themselves, possibly in collaboration with others. In many worlds, the content can be bought and sold in a virtual economy, complete with an in-world monetary system, that may be tightly controlled by the company running the virtual world or that may be quite open with anyone able to convert in-world currency for U.S. dollars (and by extensions, Euros, Yen, etc.).

Third, in-world collaboration, of course, would not be possible without communication and exchange. As suggested by virtual worlds’ roots in social networking, interaction with others is absolutely essential. Text communication is common, and some worlds allow for voice communication. Generally, either public or private conversations are possible. The one extremely important element of communication missing in most worlds is “body language,” those elements of meaning that we take from being able to actually see the person as he or she talks. As mentioned above, avatars can be scripted to move in lifelike ways, so that communication within the world becomes much more than just text or even voice chat. Still, this does not have all of the richness of the actual human body language, but enhanced gesturing enabled by new sensor applications is becoming more possible.

Overall, virtual worlds are playing an increasingly important role in the lives of many
people (Messinger et al., 2008). According to one estimate, 20 to 30 million people regularly participated in virtual worlds in 2006, spending an average of almost twenty-two hours per week within these spaces (Balkin & Noveck, 2006). A market research company goes on to suggest that "by the end of 2011, 80 percent of active Internet users (and Fortune 500 enterprises) will have a 'second life'" (i.e., an avatar or presence in a virtual community like Second Life; Gartner, 2007). Some authors even suggest that virtual worlds will become as important to companies in five years as the Web is now (Driver et al., 2008). For those who participate in them, the names of these worlds are household words, including (adult worlds such as) Second Life, World of Warcraft, Kaneva, Entropia Universe; (children's worlds such as) Webkinz, Neopets, Club Penguin, Habbo, Whyville, TyGirlz, and RuneScape; (community-specific worlds such as) Cyworld, HiPiHi; (media-focused worlds such as) vSide; (and educational worlds such as) ActiveWorlds, there.com, and Forterra Systems. Indeed, virtual worlds are believed to have implications that go beyond how we play, to also include how we work and learn (Balkin & Noveck, 2006; Bartle, 2006); and many activities in virtual worlds are growing in the realms of education and culture.

Concerning education, well over 150 universities now have a presence in Second Life, and a number of universities conduct classes and other educational activities (Graves, 2008). Business, public organizations, and cultural groups are using the environment for conferencing, public meetings, delivering informational services, performances, and exhibits. Given this burgeoning activity, it is timely for us to understand the implications of virtual worlds and virtualization technologies for distance corporate education.

**Distance Learning and Corporate Education.** In order to put into perspective the potentialities of virtual worlds for corporate education, we begin by providing background about distance learning and its relationship with corporate education.

Distance learning can be traced to the mid 1800's in Europe (Moore, 1990). In the U.S. it was advocated by a Boston-based group, "The Society to Encourage Studies at Home," founded in 1873 by Anna Eliot Ticknor. The concept was popular and the society had gained about 10,000 students within its first 24 years (Watkins, 1991). Academic degrees for students completing the required correspondence courses were first offered by Chautauqua College of Liberal Arts (1883-1891, as authorized by the state of New York).

As distance learning grew, institutions worked to better meet the needs of their students. Faculty traveled to hold classes off campus (Moore, 1990). As technology for both live distance connections (e.g., telephones, television) and recording (e.g., audiotape, videotape) developed, it was incorporated into distance education (Meyer, 2002). In the 1980s, satellite telecommunications became popular for broadcasting lectures to off-campus locations. Microwave-based interactive video emerged in the late 1980s and was later replaced by land-based technologies (Chaney, 2004).

The broad adoption of personal computers and the subsequent development of the World Wide Web, however, have taken interactive educational technology to a new level. Institutions of higher education offering distance education courses increased from 33 percent in fall 1995 to 44 percent in academic year 1997-98 (the statistics from this point come from Meyer 2002). Among public institutions, the numbers were even higher, with distance education courses offered by 72 percent of two-year and 79 percent of four-year institutions. The same period saw a doubling in the number of degree or certificate programs (860 to 1520), courses (25,730 to 52,270), and enrollment (753,640 to 1.6 million). By 1997-98, 60 percent of institutions used the Internet for distance education. What would have earlier required dedicated communication lines and very expensive specialized equipment, generally set up in dedicated
distance learning or teleconferencing facilities, can currently be accomplished with much less expensive software and hardware. Indeed, for small groups or for personal video chat, all that one needs are video chat software, available for free from many social networking sites, and an inexpensive webcam and headset.

Overall, there are five characteristics of distance learning (also known as correspondence study, home study, independent study, external study, distance instruction, distance teaching, distance education, etc.) pointed out by Keegan (1996): (a) the learner is in a remote location relative to the teacher, (b) an educational organization influences the planning and preparation of materials and provides support services, (c) course content is provided in technical media—print, audio, video, or computer—that coordinate the activities of the teacher and learner, (d) two-way communication is available so that the student may benefit from or even initiate dialogue, and (e) learners are generally taught as individuals rather than groups, except for occasional larger group meetings either face-to-face or at a distance (Chaney, 2004; Holmberg, 2003; Keegan, 1996, p. 50).

In the past several decades, distance learning has become a primary format of corporate training. The classroom programs have been blended with or substituted by various forms of technology-supported distance learning with a goal of increasing reach and reducing cost (e.g., CD ROMs, VideoDisks, VHS tapes, Video Broadcasts, online corporate universities, and other web-based programs). Often corporate training is in groups at a remote location. Compared to general-purpose distance education, corporate training has different needs—more situation-specific training and often geared toward practical skill development. Corporate clients often ask for things that are much more specific and corporate trainees may bristle at presentations of theories out of context of application.

Corporate training is particularly suited to virtual worlds, because corporate learners respond well to, and often expect, interactive educational formats. General education can be done in one-way communication modes, such as PowerPoint presentations in lecture formats. By contrast, corporate training often is more effective when learners are put in situational learning environments insofar as possible (e.g., business negotiations, client consulting, or customer conflict resolving). And virtual worlds can be used to enable situational training even when participants are interacting with each other remotely.

**Review of Learning Theories Related to Corporate Education.** Prior to presenting our hierarchy of engagement for learning, we consider related extant hierarchy of objectives models for learning. In particular, hierarchy of objectives models describe different objectives (or cognitive attainments) associated with the process of individual learning. According to these models, one must master a lower level of objective before one can move on to achieve the next level of objective. The most influential formulations of the hierarchy of objective model include the following. (1) Bloom et al.'s original taxonomy identifies six levels of cognitive objectives, ordered from simple to complex (and from concrete to abstract): knowledge, comprehension, application, analysis, synthesis, and evaluation (1956). (2) Anderson et al.'s revision of Bloom et al.'s taxonomy describes six classes or stages: remember, understand, apply, analyze, evaluate, and create (2001). Compared to Bloom et al.'s original work, the names of the objectives have changed from nouns to verbs. In addition, the revised framework elaborates on the "subject matter" of knowledge and classifies it into four types: factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge (i.e., knowledge of cognition in general and awareness of one's own cognitive process). (3) Krathwohl, Bloom and Masia's (1964) taxonomy recognizes five hierarchical stages of learning: receiving (i.e., awareness of the ideas being taught), responding (i.e., showing some level of commitment to the education), valuing (the ideas being taught), organization (i.e., relating and
harmonizing the ideas to the value system already held), and characterization by value (i.e., acting consistently with the value being taught). At the highest stage of learning, the ideas being taught have been completely internalized by the learner. Overall, the conceptual framework advanced in this chapter differs from the above theories. But there is a relation, perhaps a correspondence, whereby at each successively deeper stage of engagement that we will describe in our hierarchy, corresponding higher educational objectives in these above hierarchies will be obtained.

We also acknowledge existing learning theories as background for our proposed hierarchy of engagement for learning framework. These include social presence theory, collaborative learning theory, and situation learning theory. We briefly discuss these theories below.

(1) Social Presence Theory. Social presence theory is the foundation for many theories on the effects of new media. The basic idea is that the effectiveness of communication through a medium is principally determined by the degree of social presence (i.e., a person's sense of awareness of the presence of the other party in a communication interaction) that the medium affords to its users (Short, Williams & Christie, 1976). According to this theory, increased sense of presence leads to better interpersonal involvement. In addition, Short et al. rank face-to-face communication highest on a continuum of social presence, whereas written, text-based communication is lowest. As virtual worlds bypass many technical limitations of remote communications and bring back certain elements of face-to-face communication through the use of avatars in an immersive 3D virtual environment, we expect that virtual worlds significantly increase learners' sense of synchronous presence of facilitators and other learners, and thus intensify two-way communications in corporate education.

(2) Collaborative Learning Theory. The term collaborative learning refers to an instruction approach that involves collaborative effort among students or between students and teachers to achieve educational goals. It emphasizes the importance of collaboration and sharing learning responsibilities and experiences, rather than considering the learners as competitors against each other, or viewing the teachers as unilaterally controlling the learning process. The effects of collaborative learning have been widely investigated. Abundant literature has recorded that, for primary, secondary, and undergraduate education, collaborative learning methods can produce desirable effects compared to individual learning, such as increasing learner interest, improving information retention, and enhancing critical thinking (e.g., Gokhale, 1995; Johnson & Johnson, 1986). Other desirable implications of collaborative learning include (a) positive interdependence among participants, (b) high levels of interaction among participants, preferably face-to-face, (c) individual accountability, (d) enhancement of participants' interpersonal skills, and (e) learning to communicate about group processes (Johnson & Johnson, 1993). Compared to traditional school-based education, corporate training puts more emphasis on active involvement of the employees/learners and on teamwork within the workforce. Employees need to perform critical thinking, solve problems, and make decisions as a team. Indeed, the development of professional practices and skills through collaborative learning is one of the primary goals of corporate training. Consequently, corporate training actively engages employees/learners with peers and facilitators to co-create an educational experience through collaborative learning. Since virtual worlds create an enriched sense of immersion in virtual scenario-specific
environments, with animated visual projection of participants interacting with each other, these worlds enable companies to better carry out collaborative learning by involving learners in the process of education co-creation.

(3) Situated Learning Theory. Situated learning theory recognizes the fact that knowledge is situated within a community of practice rather than existing in isolation, and therefore emphasizes the importance of learners' interaction with the community that embodies certain beliefs and skills to be acquired. In particular, it is noted that unintentional learning (versus deliberate learning, such as learning through classroom instruction) can take place when novices or newcomers in various occupational groups become engaged with a community of practice through a process referred to as "legitimate peripheral participation" (Lave & Wenger, 1991). Participation can take a form of seeking membership of the community, living in the world, interacting with other members, taking apprenticeship, etc. (Wenger, 1998). Participation is legitimate in a sense that all parties in the community accept the newcomers as members of the community. Finally, participation of the newcomers is peripheral because the newcomers start by performing peripheral or less important tasks in the community. In sum, situated learning theory suggests that engaging learners with a community enhances the effectiveness of the learning process. When companies use virtual worlds to facilitate corporate education, employees, learners, and facilitators can easily build and maintain communities around certain themes or practices in virtual worlds, both as part of the training programs, and as an on-going platform for information sharing after classes are over. This kind of engagement with a community is conducive to corporate education.

**HIERARCHY OF ENGAGEMENT AND CORPORATE TRAINING**

We now propose a hierarchy of engagement for corporate training and describe how virtual worlds facilitate all levels of this hierarchy. The purpose of our hierarchy is to reframe past taxonomies of learning in a form that is more directly reflective of the stages of engagement that are done using interactive electronic media. With the aid of this hierarchy, one can classify the extent to which different educational endeavors utilize the various levels of engagement in this hierarchy. In principle, we suggest that maintaining a balance among these forms is particularly desirable - the basic information can be stated in the lower levels, but practice, correction, and reinforcement leading to deeper levels of mastery and utilization of concepts are attained at the higher levels. Technology plays a key role in our hierarchy of engagement, as movement from one level to the next, particularly in distance settings, becomes more difficult without technology to facilitate the various types of interaction. Figure 1 shows a progression of four stages of engagement in education.

According to this hierarchy, the education process includes (1) one-way communication, (2) two-way communication, (3) education co-creation, and (4) community building. The activities of the learner correspondingly include (1) receiving and beginning to retain information, (2) assimilating (or accommodating) the information and skill development, (3) applying the information to practical contexts to generate value for the company and other employees, and (4) interacting with other employees in a process of ongoing learning. Traditional distance learning is most suited to one-way communication, and the Internet constitutes an improved vehicle for students' engagement in enhanced asynchronous communication. The thesis of this chapter is that 3D virtual worlds go a step further by promoting a synchronous avatar-based social computing context for deeper educational engagement at all four levels of the proposed hierarchy.
We propose a progression of learning forms with increasing levels of engagement, as shown in Figure 2. One-way communication facilitates simple knowledge transfer. This is mostly new knowledge that fits into people's existing informational structures (or schemata, in the language of Piaget). That is, people's basic understanding of the world is not changed, but they are given new information to place within their existing cognitive structures. Two-way communication facilitates people learning new cognitive structures and developing new skills. To internalize such knowledge, it is necessary for learners to try out new skills or cognitive structures on new examples and to obtain feedback from the instructor and other learners. For skill development, which requires a cognitive step from passively knowing a set of principles to seeing how to apply them in context, it is helpful for learners to try out new practices in hypothetical learning situations and to receive feedback from the instructor and other learners. Education co-creation goes a step further in the interactive process by having learners try out new practices in their actual work settings. In this context, the educators or facilitators essentially act as expert consultants to the learners, providing feedback on the suitability of the learners planned or past activities. Community building goes to the next step where employees begin to interact with each other on an ongoing basis (possibly using virtual environments as a communication medium, if convenient), to help one another continue to learn and enhance productive effort with the company. Thus, the outcome of learning progresses, along this hierarchy from simple knowledge transfer, to learners benefiting from new ways of thinking (cognitive structures) and skill development, and, finally, to learners developing an enhanced set of values that better promote ongoing learning and productivity.

Overall, past forms of asynchronous distance learning mostly promoted knowledge transfer. The richer forms of synchronous communications in virtual worlds better facilitate two-way communication, and educational co-creation. With time, community building on these virtual platforms permits the educational activity to take on a life of its own as employees utilize the environments for ongoing dialog. Some of these ideas are summarized in Table 1, wherein we see a progression from (a) asynchronous to synchronous communication, (b) instructor-learner communications to learner-learner communications, (c) abstract knowledge (possibly with scenario-based examples) to
Facilitating a Hierarchy of Engagement

Figure 2. Learning progression in the hierarchy

1. One-Way Communication
2. Two-Way Communication
3. Education Co-Creation
4. Community Building

Table 1. The nature of interaction along the hierarchy

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Who speaks</th>
<th>Domain</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Way Communication</td>
<td>Asynchronous</td>
<td>Teacher</td>
<td>Set Examples</td>
</tr>
<tr>
<td>Two-Way Communication</td>
<td>Synchronous (or Asynchronous)</td>
<td>Instructor and Learner</td>
<td>Scenario-based</td>
</tr>
<tr>
<td>Education Co-Creation</td>
<td>Synchronous (or Asynchronous)</td>
<td>Instructor and Learner</td>
<td>Real-collaboration</td>
</tr>
<tr>
<td>Community Building</td>
<td>Synchronous (or Asynchronous)</td>
<td>Many Learners</td>
<td>Real-collaboration</td>
</tr>
</tbody>
</table>

collaboration on real problems, and, finally, (d) interaction occurring primarily during classroom time to interaction occurring any time.

The stages of interaction in the hierarchy are described in detail as follows.

One-Way Communication. The lowest level of education consists of simple one-way information transfer from the instructor to the learner. Such communication, which is as old as writing, is what many might first think of about distance education, with knowledge being passed from teachers to students either through live, remote connection, or in a prerecorded lecture or text.

The advantage of one-way communication is that the cost per participant can become trivial as the number of participants rises. A disadvantage of one-way communication is that it is very limited in terms of its ability to reach higher levels of educational objectives. For example, this type of communication is unlikely to advance educational attainment beyond knowledge and comprehension in Bloom et al.'s taxonomy (1956), or beyond remember and understand in Anderson et al.'s taxonomy (2001).

The Internet has been very useful for one-way communications, using web-based modules, assignments, quizzes and exams. This is supplemented with communication with instructors through email. This is an efficient way to disseminate knowledge to motivated students. The nuances of how to learn are harder to transfer in this way, but assistance from a real instructor via email can fill this gap.

In virtual worlds, one-way communication involves asynchronous provision of information very much like other distance education. This in-
Facilitating a Hierarchy of Engagement

Figure 3. Outdoor classroom and interactive 3D tutorial

includes multiple media provision (primarily video and audio) of such information formats as printed handouts of lectures and supporting material and downloadable articles and lectures (see Figure 3, left panel; Edwards, 2009). This may also permit learners to make queries of pre-programmed informational sources or to manipulate 3D objects, or possibly the use of automated bots or simulators (see Figure 3, right panel).

Overall, virtual worlds can perform one-way communication in much the same ways as traditional distance learning and the Internet. The 3D medium may also permit some forms of more vivid delivery of one-way communications, which can be a benefit for certain domains of instruction. Generally, while all forms of one-way communication are low-cost, they are mostly limited to lower-level educational objectives.

Activeworlds, Inc. is an example of a virtual-world service provider that helps companies to deliver corporate education. In addition to hosting a large open virtual world of its own (Alpha World), its services facilitate various forms of advanced one-way communication, as well as other communication forms more elevated in the hierarchy. The company offers a quick entry into the use of virtual worlds, hosting client-specific virtual worlds on its servers and licensing its technology to clients who want an independent hardware solution. Those virtual worlds come equipped with Office documents display tools and a library of models and textures (which facilitate one-way communication). They also support VoIP, building tools, and standard modeling program formats for creating custom objects (facilitating two-way communication). As of our writing, the company claims among their licensees many fortune 500 organizations and well over 250 schools and universities.

Two-Way Communication. The next level of education consists of information exchange between the instructor and students to facilitate learning and new skill development. A traditional form of two-way communication involves classroom settings in which participants are geographically collocated and communication is synchronous. Early forms of distance education involved asynchronous two-way communication (with written or phone feedback). The Internet led to substantial growth in electronic asynchronous two-way communication through on-line learning forums and sites. With the aid of new technologies, two-way communication at a distance has increasingly allowed us to return to situations where the instructor and learners are temporarily collocated (in 3D or 2D virtual spaces) with synchronous (i.e., live) interaction.

The main advantage of this level of engagement is that it allows the instructor and learners to jointly explore the content at deeper levels, matching the
level of learners' interests and knowledge (often in real-time). Two types of such deeper interaction include "Q&A" sessions and scenario-based skill development. First, concerning two-way communication, real-time queries can help avoid gaps in an instructor’s presentation. They also provide the instructor with the opportunity of elaborating on a topic in which a sizable group of learners shows interest. Perhaps, more importantly, providing students with chances to ask questions and obtain answers can greatly assist students in forming new internal models of particular subject matter, with students checking their perceptions through directed trial and error. Second, concerning scenario-based skill development, two-way communication can permit students to run through particular preplanned learning scenarios, with feedback from the instructor. The instructor can provide corrections, modifications, and nuanced. For example, in a retail service delivery scenario, a learner could be told that a potential customer enters the store or office articulating his or her needs. For several script variations, the learner would indicate how he/she would respond. It is possible, in this context, to set up student-teacher or student-student role-plays. After each, the instructor can offer comments and suggestions.

As classes explore content at deeper levels, students can benefit from communication in various ways. Some students can engage in direct instructor-student communication. Other students can benefit vicariously through observing the interactions of the instructor and other students. And still other students can interact with other students in discussion about the contents. All these forms of interaction help the learners to higher levels of internalization and application of the subject matter (e.g., comprehension, application, analysis, synthesis and evaluation, in Bloom et al.'s taxonomy (1956); understand, apply, analyze and evaluate in Anderson et al.'s taxonomy (2001); or valuing and organizing on Krathwohl et al.'s taxonomy (1964)). But for all their advantages, two disadvantages of traditional classroom settings are that, first, students must travel to the classroom site, and, second, for participants to have an opportunity to speak and discuss, there are limitations on the number of participants who can work with a single instructor.

The key advantages of distance learning are that it can avoid these limitations by making education both possible at a distance and more efficient with the instructional resources. The result is a saving in transportation time and cost and in course fees (by better utilizing instructional resources). Distance learning to targeted groups can also permit the instructor to customize content for particular learner groups.

Distance learning in simulated classroom settings can be done by having people remotely participate through videoconference links. For example, as one student group is taught locally, another student group can participate in the same classroom session remotely. The latter group can view a large screen or set of screens, and distant learners can offer queries through a button click, and, when called upon, ask questions through a microphone or by "texting." Alternatively, the Internet can also be used to have the instructor communicate remotely to a number of geographically dispersed students.

For example, "webinar" software allows a speaker to make an oral presentation with slides and video content, and to take questions from remote viewers. As a more elaborate example, software such as Elluminate allows a class of 20 to 60 learners to participate relatively easily. The level of interaction is somewhat limited. The instructor can talk and present PowerPoint slides and observe limited forms of student responses (in the form of icon heads that are effectively nodding "yes" or shaking "no"; students can also raise their hands to address the class). The students who are called on can communicate their questions or comments either through on-screen texting or orally to the group via a microphone-enabled headset.

These various forms of distance learning make possible remote corporate training, but the vari-
ous technologies limit the range and richness of interactions among the students. Virtualization technology takes this electronically mediated two-way interaction out of a preformatted flat-screen environment into a richer multipurpose 3D environment. The setting may be a virtual classroom, but virtual field trips are also possible. These may include walkthroughs of physical examples, sometimes seen in real museums, such as a functioning human organ like a simulated human heart, a place like a virtual retail store or shopping mall, and any object like a virtual cell or atom. Interaction with the virtual environment can be multifaceted, through texting, oral communication, avatar gestures, and displaying objects that avatars have in their inventory. For instance, the virtual objects can be made to respond to people’s requests by enlarging a specific part of the virtual object, revealing more detailed information, giving further instructions, providing answers to frequently-asked questions, etc. In addition, the two-way communication made possible by virtual worlds is particular desirable for such activities as language learning (listening to taped dialogs, practicing speaking, and being corrected), refining sales techniques (role-playing in particular scenarios and receiving constructive suggestions afterward from the instructor), and advertising management (constructing practice advertising campaigns and receiving constructive feedback).

The key advantage of virtual worlds for education is that, while the cost of transportation and of educational materials is largely avoided, there is still richness of interaction with the instructor and among the learners. Anonymity may also be an advantage, because the embarrassment of making a mistake or of initially being awkward trying new things may be reduced. Another advantage is that many of the educational resources are scalable and there may be economies of scale. But even for virtualization technologies, there are still limits on the number of participants who can work with a single instructor. And the instructor may require special training to fully utilize the potentialities of the virtualization environment. Generally, this is a resource intensive level of engagement, if not in terms of technological assets, then in terms of instructor time. Depending on the effectiveness of the facilitator, this can be a very powerful framework for meeting any level of educational objectives.

Qwaq Inc. is an example of a virtual-world service provider that stresses its technology’s ability to integrate with other applications in group situations (involving two-way interactions). This facilitates workgroup collaboration in a simulated virtual operations environment. In a recent application, the U.S. Navy’s Naval Undersea Warfare Center is evaluating virtual world technology for training, rapid prototyping, design collaboration, and war gaming. It used Qwaq technology to create a virtual Combat Systems Center. Within the virtual center, crews collaborated with each other, and interacted with applications and data just as they would onboard a submarine. The project leader summed up the usefulness of such a training system: “The virtual Combat Systems Center has the potential to allow us to effectively train crew members around the world without having to transport them to our physical facilities. We now have the ability to replicate our submarine environments in high fidelity and provide virtual access to the applications and data the fleet requires. This means that our submariners and officers could always have access to all of the latest training and technical expertise no matter where they are located.” (Qwaq News, 2009)

**Education Co-Creation.** For this phase, we see the educational process becoming directly active in helping to create value for a learner in attaining a career or life goal. In this case, learning occurs not for its own sake, for a grade, or to please the instructor, but to enhance a career or a life goal of the learner. In principle, such is the case for much primary and secondary education, and we argue that the more motivating forms of such education
explicitly recognize this link for students. A key to education co-creation is giving participants effective tools for participation in the creation process and a stake in the outcome.

This activity, already being linked with inherent personal motivations, engenders high involvement, with the learner helping to determine the domain of learning. This approach builds on the concept of value co-creation, which is important in the management literature (Frøhlich & Ramaswamy, 2004) and in service science (Vargo & Lusch, 2004). In this process, the participant becomes a co-creator in the experience and takes some responsibility for the experience. This is especially important in a corporate training setting, where developing corporate culture and policies valued by employees can be a significant competitive advantage.

Education co-creation in corporate education can occur when the instructor teaches learners how to improve the current practice that they often use in the course of their careers. This takes scenario-based skill development a step further by improving on the learner’s stated current practice. In this way, the instructor takes on the role of an oversight expert consultant or counselor for the group. Alternatively, new individual and group activities can be initiated, and counseling services can be provided by the instructor to facilitate this. In this way, the ideas enter directly into the learner’s life to improve current practices for the better.

This can occur through the Internet, but is particularly facilitated using virtualization technologies in corporate training. Virtual-delivered corporate education affords the opportunity for distance delivery of expert-consulting or counseling services both in the classroom and on virtual field trips, in one of the following two ways.

First, education co-creation can occur by taking scenario-based skill development a step further. Employees can describe their current practices and the instructor and other students in class can suggest how to improve on those current practices. As with two-way communication, this can be learned through direct interaction with the instructor, vicarious observation of the interaction of a learner and the instructor, and through sharing of ideas between learners.

Second, education co-creation can occur through new desired individual and group vocational activities initiated by the instructor. For example, employees in different functional areas may be combined to form a product design group, because they view and evaluate the product from different perspectives (e.g., marketing, engineering, manufacturing, finance, cost accounting, and customer services). These people could be given a new product development template and the facilitator/instructor would be able to share knowledge through multiple experiences in this process across different industries and for various products or services.

When effectively developed and administered, education co-creation does not have to be significantly more expensive than two-way communication, but learners need to be more invested in the activities. This level of training is also just as scalable as two-way communication. While this has been done with past forms of distance learning, the need for personal interactions makes it easier to assist learners in achieving career or life improvement at a distance using virtualization technologies.

As an example of education co-creation, the I-95 Corridor Coalition (agencies in those states through which I-95 passes) needed a way to train first responders to traffic incidents to shorten response time, clear accidents and congestion more efficiently, and enhance overall safety. They chose the University of Maryland’s Center for Advanced Transportation Technology Laboratory to develop a virtual reality training solution. The lab used virtual world technology from Forterra Systems to create a multi-player simulation, in part because the Forterra technology had the ability to easily record simulations, facilitating participants’ learning by reviewing performance after completion of the simulation. Participants using this virtual
world training environment worked together in simulated accident and congestion scenarios to build a more efficient system, which in turn benefits all the participating members (Forterra, retrieved 2009). Nodoubt, the training experience improves the performance of all the agencies in the system and contributes to career development of the trainees.

The I-95 Corridor Coalition is interesting as an example of what we feel is a competitive advantage of virtual worlds for corporate training; simulation-based learning. Often the most engaging learning experiences are simulations of real-world (or hypothetical) situations. The problem in the past, however, was that effective simulations in the real world were extremely difficult and expensive, if not impossible, to create. In virtual worlds, however, almost anything can be simulated, and the ease and cost of creating and running such simulations is steadily dropping. (At the same time, simulation-based training presents a challenge for corporate trainers because this approach toward training requires new training skills.)

Community Building. The apex of the hierarchy consists of engagement going beyond relying on the instructor, wherein an ongoing process by learners is facilitated to enhance learning. Teacher-student relationships are limited in scale, and as the number of participants increases, the instructor’s available time does not. The key to moving beyond the limits of the teacher-student relationship is to increase the size of the network. It can be preferable if a corporation can foster a process that has a positive influence on the corporate culture. Creating an educational community allows participants to draw on many more resources and communication becomes much more than just two-way. While some sort of central administration or facilitation is possible and often desirable (through on-line community forums and sites), communities cannot be centrally controlled without losing the essence of what gives them value. As they are co-created by their members, they become “owned” by those that create them.

A major advantage to this level of engagement is its ability to escape the scale and scope constraints inherent in the lower levels. As Bob Metcalfe suggested in the early 1980s, the value of the community grows in proportion to the square of the number of participants (known as Metcalfe’s Law). In addition, with communities’ ability to bring the varied experience and expertise of a diverse organization to bear on training and other challenges, the value can grow even faster.

For example, after a class offering, groups of like-minded employees may wish to maintain periodic (e.g., weekly) communication about their activities for sharing tips and continued learning. This is particularly desirable with companies geographically dispersed throughout the globe, and for companies with different product/service divisions that engage in similar activities where ongoing communication of shared practices can be mutually beneficial.

One of the easiest ways for corporations or other groups to begin using virtual worlds is to use an existing solution that facilitates community building. For example, many companies use designated areas in Linden Lab’s Second Life for periodic virtual meetings, training simulations, design collaboration, etc. Thus, in late 2008, IBM’s Academy of Technology used Second Life for a Virtual World Conference and Annual Meeting for over 200 participants. IBM designed a virtual conference center in a secure environment within Second Life, with areas for presentations and breakout sessions, as well as a Green Data Center, a library, and areas for informal gathering. One of the barriers to using virtual worlds for meetings is that participants have to learn how to use them (e.g., communication, navigation), so IBM offered pre-conference training on the basics of Second Life (Second Life Grid, retrieved 2009).

Other very popular existing solutions that facilitate community building involve social networking sites such as Facebook, MySpace, and YouTube. Even corporations can use sites such as these to further education through com-
munity building by facilitating dissemination of experiences, ideas and opinions, product reviews, digital content (including photos, video, audio, and software), etc. But along with the substantial potential for community building from these solutions come risks to the participants and the corporation, including the loss of privacy together with the possibility that somewhat personal aspects of a person’s social self become inappropriately disseminated in the person’s business or professional life, or that competing firms gain illicit access to a firm’s trade secrets.

**Relationship with Existing Learning Theories.** Now that we have introduced the hierarchy of engagement for education, we can relate it to four existing learning theories discussed earlier (see Table 2).

First, the hierarchy of objectives models proposed by Bloom et al. (1956), Anderson et al. (2001), and Krathwohl et al. (1964) focus on depicting different cognitive stages at which individual learners internalize educational information (e.g., a learning process progressing from receiving ideas, to understanding, evaluating, applying, and assimilating the ideas). The difference between the older hierarchy of objectives models and our hierarchy of engagement is that the former describe what goes on within a person’s mind in the course of the learning process, and the latter describes what goes on between people to stimulate the learning process. The hierarchy of engagement is particularly relevant for describing the effects of interactions in online settings. The two types of hierarchies are related: in general, we conjecture that increasing levels of interaction (engagement) promote higher-level education objectives.

Second, social presence theory (Short et al. 1976) emphasizes the importance of participants’ sense of presence of the other party in two-way communication in order for the communication to be efficient. Because the use of avatars in the immersive 3D virtual environment increases learners’ sense of presence, virtual-world-enabled corporate training facilitates two-way communication (so long as the avatars have actual participants behind them and are not “bots”).

Third, collaborative learning theory (Johnson & Johnson, 1986) elaborates on shared responsibility of learners and the importance of learners being actively involved in the education process. This bears upon education co-creation in the proposed hierarchy of engagement. Lastly, situated learning theory explains how the community of practice can promote learning, especially unintentional or informal learning (Lave & Wenger, 1991). This is relevant to community building in our hierarchy of engagement, and also to education co-creation. Companies can facilitate the latter two deeper forms of engagement by encouraging employees to increase knowledge, information, and experiences together with their peers and educators, and also to build communities around certain themes and practices in virtual worlds.

**Table 2. Relevance of learning theories to proposed hierarchy of engagement**

<table>
<thead>
<tr>
<th></th>
<th>Hierarchy of objectives</th>
<th>Social presence</th>
<th>Collaborative learning</th>
<th>Situated learning</th>
</tr>
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<tbody>
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<td>One-way communication</td>
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<tr>
<td>Two-way communication</td>
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<td>Education co-creation</td>
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<td>Community building</td>
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INFLUENCE OF AVATAR MEDIATION ON LEARNING AND ON TEACHING

We have demonstrated how virtual worlds facilitate all four levels of engagement in our hierarchy and how the hierarchy relates to four existing learning theories. Now we turn to special issues concerning the influence of avatar mediation on learning and teaching.

**Class or Individual Instruction.** A key issue that instructors must choose is whether they want to have formal class sessions or more individual instruction. Individual one-on-one instruction can be costly in terms of instructor's time, but there is the possibility of having students complete tutorial modules and then meet individually or in groups with the instructor. Instructors using virtual worlds should try different variations. For one class covering materials such as accounting, it may be desirable to have 50% class, 40% tutorials, and 10% direct one-on-one feedback. For marketing, it might be better to have 75% class (alternating between discussion and group presentations), 15% tutorials, and perhaps 10% one-on-one feedback.

**Influence of Avatar Mediation on Learning.** It should be noted that avatar-mediated communications in corporate training involve varying degrees of anonymity (i.e., reduced awareness of one's self identity). We can distinguish between complete anonymity and partial anonymity in virtual world corporate training. An example of the former is a class in which trainees sign up from outside; an example of the latter would be a class where employees sign up from a company and at times can be expected to meet face-to-face. The implication of anonymity is that it might alter participants' behaviors in the virtual worlds relative to those in the real world.

Previous research on computer-mediated communication (CMC) indicates that the state of felt anonymity makes people feel less socially and psychologically inhibited than they normally do in the real world (Kiesler & Sproull, 1992). For example, it is found that anonymous participants in computer-mediated discussions disclose significantly more information about themselves than people who engage in face-to-face discussions (Joinson, 2001). More recently, Messinger et al. (2008) reported the results of a survey among participants of the virtual world Second Life. These results indicate that participants indeed consider themselves to be more outgoing, confident, risk-taking, extroverted, and less inhibited when they interact with others via avatars in virtual worlds than in the real world. This behavioral change in avatar-mediated interaction presents both an opportunity and a threat.

On the positive side, avatar-mediated communications help learners to overcome social and psychological inhibitions. Learners may be more willing to participate in group discussion and share their ideas with others. They may be more likely to say what they think, what first comes to mind, and even candidly offer constructive criticisms about their own companies. In addition, learners tend to be more open to participate in role play in simulated scenarios. Consequently, virtual worlds are particularly conducive to learning processes that include role play and group discussion. It may be desirable to assign people in roles as a presenter and a reviewer, or to have two groups interact, one presenting, and the other critiquing, and then switch roles.

On the negative side, avatar-mediated communications are likely to be more frank when learning objectives are not met or when participants are bored. A particular problem is that it is not really possible to establish true eye-contact with a large group of people. The instructor can see their avatars, but many will be still, and it is not clear whether a particular participant is checking his email or browsing the Internet concurrently with an instructional session. Also some learners are likely to have distractions when they are online attending an instructional session. We encourage instructors to develop a cycle of bringing partici-
pants into the discussion. Of course, this will be challenging with classes of more than 50, but we do not encourage classes of more than 30, and even that number may be a challenge.

A second issue is avatar appearance and attire. Research has shown that participants in a virtual world like Second Life will normally make their avatars somewhat more attractive than their real selves, but not inordinately so (Messinger et al., 2008). Also the clothes are likely to be less conservative and more revealing or sexy than in the real world. The instructor has two choices in this regard. In some situations it can be useful to acknowledge this reality and “play with it” with the class. The alternative is to encourage learners to develop and use a business avatar, with suitable body and facial features and attire. This may have attendant risks of appearing over-controlling, so an option (as a tip when learners are giving presentations or engaging in skill-development role-play) is to ask learners to utilize their “business” avatar.

Further issues are training students to avail themselves of the functionality of the world or virtual environment. Chances are for the first such class, it will be necessary to teach the class about certain virtual world features.

Influence of Avatar Mediation on Teaching. A key issue for the instructor is to design the appearance of his or her avatar. Specifically, the instructor needs to decide how attractive and expert-like the instructor’s avatar should be. Research has shown that customers purchasing products with moderate levels of involvement react better to avatars that deliver services when those avatars are more attractive (but perhaps not distractingly so). On the other hand, consumers react more positively to expert avatars when they purchase products associated with a high level of involvement (Holzwarth, Janiszewski & Neumann, 2006). Extending this to learning environments, we recommend that the instructor choose an avatar that is attractive, but has some aspects of experience or expertise visible (e.g., an avatar in proper business suit, wearing glasses). One interesting feature that the instructor can use in avatar-mediated education delivery is that the instructor has the capability to change dress, appearance, or even use different avatars for different scenarios. This requires a great deal of technical competence to avoid having undue pauses in a class.

Furthermore, the instructor must utilize special methods and techniques to keep a class engaged. For example, the instructor needs to have the skills to display and share multimedia files (e.g., audio files, videos, Word documents, PowerPoint presentations) in the virtual world environment. She might need to develop (and also teach the learners to develop) certain virtual objects for specific training scenarios. Finally, she also needs to develop skills to pass the floor to the students, organize virtual group discussion, group presentations, or role plays.

CONCLUSION

Virtual worlds represent a 3D extension of the Internet combined with social computing functionality. As perhaps the most multifaceted of new media, virtual worlds engender both high potential and low learning cost for companies utilizing them for corporate education.

This chapter describes a four-element hierarchy of progressively deeper levels of educational engagement, involving one-way communication, two-way communication, education co-creation,
and community building. This hierarchy, together with the point that the virtual worlds permit multifaceted educational communication across all four elements of the hierarchy, is offered as a conceptual academic contribution.

This chapter goes on to describe current effective practices by which companies achieve all four levels of educational engagement in the hierarchy. One particular area of great potential consists of simulation-based training – an area that has been infeasible for many companies in the past. Virtual worlds make simulations relatively simple and cost effective, and we look forward to corporate trainers increasingly turning to simulations for many types of applications. The description of these practices is intended to assist practitioners. We discuss the above topics after we first provide a background of the historical development of virtual worlds, a discussion of the emergence of distance education, and a short review of relevant past learning theories.

Many issues remain for future consideration. These include continued work developing applications of virtual worlds for education; enhancement of communication technologies; and future research topics concerning education utilizing the new media, including virtual worlds.

Applications. Future applications of virtual worlds for education include (1) improved integration of traditional education with educational techniques that use the new media, including virtual worlds and social networking; (2) increased connectivity between different virtual worlds and forms of social computing; and (3) development of rating metrics of technological capabilities of the various extant worlds, user demographics, and manuals to help firms choose in which worlds to conduct educational activities and enhance community building. Because we are still in the "early days" of virtual worlds, we must continue to develop new best practices to utilize these worlds for each of the four elements of the proposed hierarchy of educational engagement.

Technology. Important issues involve identifying and developing future technologies that will continue to enhance communications and social computing in electronic gaming, online social networking, and virtual worlds. These new technologies should make the linkages more seamless between existing communications forms and between devices (including computers, telephones, cell-phones, televisions, car navigation systems, stereos, home alarm systems, other sensing devices, radios, cameras, camcorders, and musical instruments). Improvements in sensing devices and the non-verbal gesturing capabilities of avatars would also be desirable.

Research. A key research question that requires further examination involves establishing the link between deeper levels of engagement in our proposed hierarchy and educational outcome variables such as concept recognition, understanding, and retention. A second area for future research is to elaborate on ways to best manage each of the four engagement forms of the proposed hierarchy. This would describe which communication media, technologies, social computing sites, and virtual worlds are most amenable to each of the four types of educational engagement. In addition, it would be desirable to further explore the interpersonal implications (among learners and between learners and facilitators) associated with using virtual worlds for corporate learning, including (1) anonymity and employee identity, (2) retaining control over levels of privacy, (3) how corporate culture plays out in a virtual world, and (4) the best way to design and manage instructors' avatars. More generally, research should be done to ascertain how to harness new media generally, what effects various types of new media have on learning behavior, and the new roles of communication technologies in delivery of education.

Lastly, concerning our hierarchy of engagement, an important issue concerns whether the effectiveness of utilizing the proposed hierarchy is universal. We think it would be interesting to
Facilitating a Hierarchy of Engagement

consider whether application of our hierarchy of engagement would be equally effective and relevant regardless of various moderating factors including (1) whether the subject matter is complex or simple, (2) whether the students have higher or lower levels of sophistication, educational attainment, and career accomplishment, (3) whether the prevailing culture is collectivistic or individualistic, and (4) whether the prevailing culture is vertical or horizontal in structure.

For complex and subtle subject matter, we conjecture that multiple forms of engagement with students are more effective in achieving educational objectives than using one-way communication. Having some interaction with and testing of new ideas appears to be needed, in our opinion, to put complex ideas into perspective, and a single educational form (such as one-way communication) would be insufficient for achieving standard learning objectives. For students that are sophisticated or have high levels of educational and career accomplishments (regardless of whether the material is complex or simple), we conjecture that utilizing multiple forms of engagement will be relatively more effective in attaining learning objectives than only using one-way communication. These individuals are trained to be critical in their thinking and not to take dogma on faith (this consideration is particularly important when considering the benefits of using virtual worlds for corporate training, where some learners are quite sophisticated and accomplished). For collectivistic and hierarchical cultures, we conjecture that one-way communication is relatively more effective than for individualistic or horizontal cultures. For the latter cultures, we conjecture that one-way communication will be relatively ineffective, and that utilizing a hierarchy of engagement will be much more effective.

Thus, we think a hierarchy of engagement will be particularly effective (1) for complex subject matter, (2) for students that are sophisticated and accomplished, and (3) for individualistic or horizontal cultures. One-way engagement, by contrast, is sufficient and relatively more effective (but not necessarily more effective than using the full hierarchy) when dealing with collectivistic or hierarchical cultures with simpler subject matter and with students that are not particularly sophisticated or accomplished. We hasten to acknowledge that these are just our conjectures. These conjectures need to be tested, and we welcome such inquiry.

Overall, teachers, administrators, and education scholars are still learning how to best teach people in online environments. We are also still learning how well-established educational practices transfer to virtual worlds. Our hope is that the hierarchy of engagement described in this chapter will aid in the future development and application of virtual worlds for corporate education.

ACKNOWLEDGMENT

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REFERENCES


Facilitating a Hierarchy of Engagement


**KEY TERMS AND DEFINITIONS**

**Virtual World:** A virtual world is a common three-dimensional (3D) or two-dimensional (2D) space where thousands of people can interact simultaneously. Members of a virtual world (through their avatars) can engage in rich interactions with each other: they can exchange messages, objects, and money; they can communicate through voice over a headset and microphone; they can navigate through the world by walking, running, driving vehicles, flying, and teleporting; and they can “experience” the world through a rich variety of
interactions with it, including dressing, changing their avatars' shapes, touching things, building and owning things, engaging in quests, doing sports, dancing, hugging, and kissing (for an overview, see Messinger et al. 2009)

**Avatar:** An avatar is a customizable 3D anthropomorphic digital representation of a virtual world user. In Sanskrit, “avatara” means “incarnation.” The use of the term was made popular by Neal Stephenson (1992) in his novel *Snow Crash.*

**Social Networking:** Social networking is the process of connecting with other individuals or groups to share information or participate in joint activities. As commonly used, this process is moderated by Internet websites, which individuals or groups use to communicate with each other digitally.

**Distance Education:** Distance education involves the pursuit of a course of study away from the campus of the school providing the instruction. Students typically pursue this course of study from their homes. This is also known as distance learning, correspondence study, home study, independent study, external study, distance instruction, distance teaching and distance education.

**Corporate Training:** The training of employees to work for a company or corporation, typically involving learning required work skills, company-specific business information, and company processes and values.

**Educational Engagement:** The process of interacting with another person (a teacher, another student, or an interested layperson) to pursue some form of study or learning activity.

**Hierarchy of Objectives:** Hierarchy of objectives models describe different objectives (or cognitive attainments) associated with the process of individual learning. According to these models, one must master a lower level of objective before one can move on to achieve the next level of objective.

**Social Presence Theory:** According to social presence theory, the effectiveness of communication through a medium is principally determined by the degree of social presence (i.e., a person's sense of awareness of the presence of the other party in a communication interaction) that the medium affords to its users (Short, Williams & Christie, 1976). According to this theory, increased sense of presence leads to better interpersonal involvement.

**Collaborative Learning Theory:** Collaborative learning theory refers to an instruction approach that involves joint effort among students or between students and teachers to achieve an educational goal. It emphasizes the importance of working together and sharing learning responsibilities and experiences, rather than considering the learners as competitors against each other, or viewing the teachers as unilaterally controlling the learning process.

**Situated Learning Theory:** Situated learning theory emphasizes that knowledge is present within the community of practice rather than existing in isolation. The theory emphasizes the importance of learners' interaction with the community that embodies certain beliefs and skills to be acquired and recognizes the important of unintentional learning (versus deliberate learning such as learning through classroom instruction) when newcomers in various occupational groups become engaged with the community of practice through a process referred to as “legitimate peripheral participation” (Lave & Wenger, 1991).

**ENDNOTES**

1. Neal Stephenson made this use of the term “avatar” popular in his novel *Snow Crash* (Stephenson, 1992). The term has since become ubiquitous with the 2009 release of the blockbuster movie “Avatar.”

2. We thank an anonymous referee for suggesting that we acknowledge issues related to culture and education.