Virtual Worlds: New Directions for HRD Research and Practice

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Virtual environments, once used strictly for gaming and military training, have developed into spaces for community building and collaboration rather than competition. This literature review explores virtual worlds and underlying theories of interest to Human Resource Development. Findings suggest application opportunities for HRD in five areas, HRD education, training, community building, career development, and research. Usage implications and potential applications are suggested for HRD practitioners and scholars who wish to explore these phenomena.

Keywords: Online Learning, Virtual Reality, HRD Practice

Rope courses, zip lines, and team-building activities are popular for companies desiring to increase collaboration and cooperation among workers. These days, the term *gaming* is primarily associated with the video game market, whose annual revenues are expected to reach $44 billion in 2011 (DFC Intelligence, 2006). Video games (console, computer, and online-based) have been steadily replacing other forms of entertainment (Hutchinson, 2007). Gaming popularity has soared due to the development of life-like graphics and maneuverability that allow players to be immersed within the games. The potential for the increased engagement and active participation has caught the attention of educators as role-playing and adventure games lead all gaming sales (Annetta & Holmes, 2006).

Attention now is shifting from the video games to the virtual worlds themselves. Whereas gaming emphasizes competition and a final goal, the newer virtual worlds emphasize team play and community (Kushner, 2004). Virtual worlds bring this networking to another level allowing people to interact in ways that convey a sense of presence lacking in other media (NMC, 2007a).

What are Virtual Worlds?

Although one may play games within many virtual worlds (VWs), the worlds themselves are not games, and the users not necessarily gamers. The literature describes the VW phenomenon using a variety of terms including virtual worlds (NMC, 2007b), 3-D virtual worlds (Dickey, 2005a), multiplayer online games (MMOs) and multi-user virtual environments (MUVEs) (Delwiche, 2006), massively multiplayer online games (MMOGs) (Steinkuehler, 2004), and serious games (Hutchinson, 2007). "The most popular virtual worlds are multi-user spaces, meaning that many people can be in the same virtual space and interact with one another in real time" (NMC, 2007b, p.18). Some virtual worlds are freely accessed and some are closed (particular spaces that are private and/or require passwords.) Many VWs are free to use or require small monthly fees for access to advanced features. For this paper, a virtual world is defined similar to Annetta & Holmes (2006), as a three-dimensional world where multiple people can interact in real-time while using avatars (virtual icons) as representations of themselves.

Popular Virtual Worlds

People of all ages are spending more and more time online (Bell, Peters, & Pope, 2007). "MMOGs are quickly becoming *the* form of entertainment and a major mechanism of socialization for young and old alike" (Stienkuehler, 2004, p. 521). The phenomenon is not only popular in the US. In 2007, the largest virtual world, *Second Life,* reported that 60 percent of their users were in Europe and 13% from Asia (Gronstedt, 2007). Although there were over 30 major VWs in March of 2007, with the number expected to double every two years (Hedley, 2007), this paper will concentrate on two of the most popular to educators, *Active Worlds* and *Second Life*.

Second Life

Second Life describes its VW as a 3-D virtual world entirely built and owned by its residents (Linden Labs, Inc., 2007). Currently, *Second Life*, which began in June of 2003 is the most popular VW. *Second Life* had 180,000 residents in April 2006, 1.2 million in October 2006, 6.9 million in May of 2007, and over 9 million in August 2007 (Phillips, 2007). Basic membership is free in *Second Life* and allows users all privileges except landownership. Those desiring to own virtual land must pay the $9.95 monthly rate for a premium account.

Active Worlds

Active Worlds describes itself as a "community of hundreds of thousands of users that chat and build 3D virtual reality environments in millions of square kilometers of virtual territory" (Active Worlds, Inc., 2007, ¶1). *Active Worlds* claims over 2 million users, is free for those who want to explore in "tourist" mode, and costs $6.95 per month for those who want to upgrade to "citizen" status. Citizens have additional privileges of owning and building on land, selecting unique avatar names, and avatar customization. *Active Worlds* has an obvious commitment to education, creating the Active Worlds Educational Universe (AWEDU), an educational community making *Active Worlds* technology available to educational institutions, teachers, students, and programs.

Capabilities in Virtual Worlds

Virtual worlds offer users the flexibility to create virtual representations of themselves, referred to as avatars. Avatars can be customized to each person with variables such as gender, body type, hairstyle, skin color, and clothing. Some VWs have canned gestures that "invoke more intuitive responses than trite emoticons" (Kushner, 2004, p. 54). Avatars provide users with a sense of being in the VW and they prefer to have a variety from which to choose (Annetta & Holmes, 2006). IBM has found their employees invest a considerable amount of time and effort in order to express their identities through customization of their personal avatars (Gronstedt, 2007). "The way that users control their avatars, whether they express themselves regularly with a jump in the air, or even a dance, influences the ways in which they are perceived by other users" (Williams, 2007, p. 14).

Virtual worlds allow users capabilities not possible in their first lives. Users who get bored with walking from place to place can fly there, or even teleport with the press of a key. A variety of viewing options allow users to not only see the world from their own point of view, but that of others. In addition, magnification options and 360 degree viewing give users entirely new perspectives on ordinary objects. Large systems such as the solar system can be miniaturized and small items such as molecules can be enlarged to give learners the ability to fully inspect objects in ways that best help them learn (Gronstedt, 2007).

One of the unique characteristics of virtual worlds is they are constructivist in nature. *Second Life* and *Active Worlds* are different from gaming environments because "nearly everything you see is created by users" (Gronstedt, 2007, p. 46). Learning in VWs is learner driven (built by users), rather than instructor driven (built by owners). This makes the environments test-beds for constructivist approaches to learning. Involvement in virtual worlds eliminates some of the disadvantages associated with meeting, learning, training, and interacting face-to-face. Virtual worlds have the ability to take online collaboration and interaction to new levels, break down hierarchies, and eliminate geographic boundaries (Gronstedt, 2007; Hutchinson, 2007).

Methodology of the Literature Review

An extensive literature review was conducted to collect theoretical and research articles focused on instruction and learning in virtual environments. The first step involved database searches for relevant literature in Academic Search Premier, Business Source Premier, ERIC, and Web of Science. The following keywords were used: virtual worlds, virtual environments, virtual gaming, multi-player online games, 3-D virtual worlds, multi-user virtual environments, massively multiplayer online games, serious games, learning, training, virtual reality, education, immersive learning environments, *Second Life*, and *Active Worlds.* Because of the novelty of these environments for learning, searches were limited to publication dates within the last 10 years, and narrowed to those that focused on learning, instruction, education and human resource development. The searches yielded eleven research studies published within the last ten years, which are presented in Table 1. To supplement the research studies, Internet searches were conducted to gather rhetorical, historical, and testimonial accounts from the popular media. Using the theoretical framework described later in this paper and the HRD constructs of training and development, career development, and organizational development, literature about virtual worlds was grouped into themes.

This review is not without limitations. There is a lack of published studies about using virtual worlds in business and industry, as most studies focus on use in higher education. In addition, although research is emerging about various aspects of the VWs, little data could be found on results-based evaluation data or learning outcomes.

Theoretical Framework Supporting Learning in Virtual Worlds

The popularity of virtual worlds can be linked to theoretical concepts found in studies on interactive learning environments (Chittaro & Ranon, 2007; Dickey, 2005b; Hayes, 2006). For example, researchers have linked literature on acquisition of expertise, augmented collective intelligence, and social and cultural capital (Hayes,

2006). Although more theoretical bases can be tied to VWs, three are discussed here. Literature on constructivist approaches to learning is linked to users' abilities to build, alter and view their surroundings from multiple perspectives (Dickey, 2005b; Kirkley & Kirkley, 2005). The immersive and 3-D qualities of the worlds are connected to situated learning. Research pertaining to social presence is related to the use of avatars and gestures.

Table 1. *Empirical Studies Focused on Virtual Worlds, Instruction, and Learning (1997-2007)*

Author and Publication Year	Primary Research Questions	Findings
Barab, Hay, Barnett, & Squire (2001)	How do shared understandings and products emerge through student and teacher practices in virtual environments?	Becoming knowledgeable and skillful in a practice or concept is a multigenerational process that evolves in terms of contextual demands and available resources. There is a reciprocal relationship of learning and doing.
Modjeska & Chignell (2003)	How do people with different levels of spatial and structure learning abilities perform in a virtual world?	Both spatial ability and world design significantly affect performance measures but did not affect the factor related to attitude or feeling. Structure learning ability had a significant affect on performance.
Steinkuehler (2004)	What are the social and political practices of massively multiplayer online gaming? How does one become a member of this community? What is the importance of participation in this community for the situated identities of its members?	Newcomers learn the game through full participation with more knowledgeable/skilled others. During collaboration, the focus is on the activity with information playing a secondary and supporting role. Ones progress and accomplishments are clearly represented in some way.
Dickey (2005a)	How is Active Worlds being used for distance learning? What are the unique learning experiences afforded by this medium for spatially distant learners?	The ways Active Worlds is being used for learning include: facilitating collaboration, community, and experiential learning; facilitating situated learning and embodiment in the learning environment.
Annetta & Holmes (2006)	What are the individual emotions of presence in a virtual learning environment?	The instructor must be in the environment and create an environment that is clear to everyone in order for the course to be a success. Avatars provide students with a sense of being. Avatar choice usually implies gender, ethnicity, and personality.
Delwiche (2006)	How do massively multiplayer online games support situated learning theory?	Game accessibility is crucial to learning. Students preferred to play the game with others. Massively multiplayer online games are safe learning environments. Students reported that learning occurred and they produced quality research.
Nicolopoulou, Koštomaj, & Campos (2006)	What is the nature of group dynamics and facilitators' interventions in virtual space?	Group activities are dynamic, therefore it's hard to capture workflow. The dynamics of a particular group was the prime factor of electronic togetherness. Facilitation is more effective when knowledge of group dynamics is taken into consideration.
Peterson (2006)	What interaction management strategies do non-native speakers employ during task-based interaction in Active Worlds? Does avatar use enhance tele-presence? How do non-native speakers negotiate meaning when non-understanding occurs?	Interaction management strategies employed included: use of feedback markers, addressivity, and time-saving devices. Use of personal avatars contributed to a sense of telepresence and copresence. Five of the 24 participants reported that use of avatars made them feel more involved. Interactions involving negotiation of a new idea occurred in a manner similar to face-to-face interactions.
Martens, Bastiaens & Kirschner (2007)	How do students learn in constructivist e-learning environments that provide a "virtual" reality and authentic problems?	Developers had higher expectations than occurred in the explorative nature and perceived authenticity of the environment, in addition to the use of role-play. Results were better than the developers expected in the areas of extent of confusion, extent of collaboration with other learners, usefulness of discussion, and motivation.
Williams (2007)	What are the issues associated with using participant observation to conduct research within a virtual environment?	Taking field notes proved a challenge due to decisions over times and tools. Digital and voice recording tools can also be used in virtual research to complement field notes. VWs afford the researcher opportunities to use these methods unobtrusively.

Constructivism

Virtual worlds such as *Second Life* and *Active Worlds* are almost entirely constructed by their users. As such, the users give meaning and context to the world, and provide their own experiences as they create new worlds (Chittaro & Ranon, 2007; Dickey, 2005b). Constructivism suggests that learning is an active process in which learners construct new ideas or concepts based upon their current and past knowledge (Bruner, 1973). "The combination of senses and experience facilitates perception as well as allows the user to define his or her construction of that knowledge through experience" (Moore, 1995, p. 101). By allowing students to engage in collaborative experiences, students may begin to construct their own meaning in these VWs, transforming these experiences into more authentic learning environments (Woo**,** Herrington**,** Agostinho, & Reeves, 2007). The collaborative nature of virtual learning environments, and the shared meaning these collaborative experiences generate, supports self-directed and learner centered approaches to acquiring new knowledge.

Situated Learning

Most traditional classroom learning is done outside the context of the information presented. Situated learning theory suggests that learning is social in nature and that knowledge needs to be presented in authentic contexts in order for learning to occur (Lave & Wenger, 1990) "Virtual environments and ubiquitous computing can draw on the power of situated learning by creating immersive, extended experiences with problems and contexts similar to the real world" (Dede, 2004, p. 13). Dede cites two attributes that make these worlds powerful, the ability to access information resources and community distributed across distance and time and the ability to create interactions and activities not possible in the real world. Learning is situated in action, so key to learning in VWs is that "thinking" becomes visible, concrete and collective (Hayes, 2005)

New users to virtual environments go through an 'immigration process' when they choose their avatar's appearance and name (Williams, 2007). Learners move through an enculturation and learning process similar to legitimate peripheral participation (Lave & Wenger, 1990), moving from the periphery of the world to the center as they become more expert, active, and engaged. People in VWs develop shared meanings, ways of communicating, stories, and experiences all in the context of the virtual world itself (Annetta & Holmes, 2006).

Social Presence Theory

A high degree of online presence was found to increase satisfaction with learning experiences and enhance student learning (Richardson & Swan, 2003). In virtual worlds, presence is developed through avatar positioning, appearance, and performance to create online identity (Williams, 2007). Virtual identity is represented by the use of avatars. "With avatars, interaction becomes more complex, with the combination of the textual utterance and the corresponding avatar gesture" (Williams, 2007, p. 9). Annetta and Holmes (2006) suggest if social presence is linked to individuality, students in a learning community who perceive they are recognized as individuals will feel a sense of presence inside that community. The presence resulted in higher course satisfaction.

Findings and Implications for HRD

The guiding question for the review of the literature and resulting implications was: What are the implications to HRD for using virtual world technologies? Through the lenses constructivism, situated learning, and identity and presence, five areas of particular interest to Human Resource Development (HRD) emerged. These are HRD education, training, community building, career development, and research. Relevant literature is discussed in each section followed by examples and strategies for use in the field of HRD.

Virtual Worlds for HRD Education

The *2007 Horizon Report* (NMC) describss virtual worlds as areas of emerging technology likely to impact higher education within two to three years. One reason the educational potential of VWs is gaining attention is college students are primed for using the Internet as a social and educational gateway (Annetta & Holmes, 2006). Dede (2004) claims virtual learning environments can help engage learners who do poorly in traditional settings. Choices afforded within such virtual environments give educators and learners the options of constructing their own worlds or using an existing world, in addition, they can self-define the context of the learning environment (Dickey, 2005b).

Students at University of Central Missouri, Ball State University, and University of Illinois have courses conducted entirely within *Second Life* (Phillips, 2007). Another use involved students who role-play as ethnographic researchers, by developing questions and collecting data through observation in a VW (Delwiche, 2006). *Active Worlds* is being used to teach a business computing skills course asynchronously (Dickey, 2005a). A University of California psychology class simulates hallucinations associated with schizophrenia with posters that transform into profanities and threatening voices as students move near (Gronstedt, 2007). Other virtual assignments

focus on teamwork, such as helping medical students collaborate on surgical procedures (Kharif, 2007). Educational institutions are buying land in VWs and replicating features of their campuses (Phillips, 2007). The Alliance Second Life Library project collaboratively internationally to develop a world library and both Appalachian State University and Eastern University (PA) have institution-specific libraries in *Active Worlds* (Bell, et al., 2007).

HRD educators should be investigating virtual world technologies to teach concepts and principles, providing bridges between practice in the classroom and applications in the real world. Imagine the virtual office where students must make sense of ethical dilemmas through interactions with other workers. Consider the virtual industry where students must walk among workers and machines, seek out documents, and interview managers in order to deem training needs. Possible educational strategies include building case-study environments where student avatars become active participants and problem-solvers; holding symposia in virtual classrooms where dispersed learners can hear and watch the presenter's avatars and interact with multi-media; and building small group meeting spaces where students discuss course content and work collaboratively on projects.

Virtual Worlds for Training

The U.S. military realized the advantages of training in virtual worlds early on (Virtual Worlds News, 2007). Large corporations are beginning to move some training programs into VWs as well (Gronstedt, 2007). Corporate trainers see these environments functioning as "safe" training spaces, allowing for practice without the consequences for "real world" mistakes (Delwiche, 2006). Virtual worlds allow trainers to place trainees in controlled, yet realistic environments for both learning and action. These environments have great potential for increasing engagement in distance learning (Phillips, 2007). Active learning takes on a new role and learning by doing and situated learning are much more affordable and realistic. "Activities that allow learners to create, problem-solve, make decisions, and reflect enhance engagement and learning" (Dickey, 2005b). In addition, the monitoring and recording capabilities in most VWs provide inexpensive and effective tools for evaluation (Mantovani, Gianluca, Gaggioli, & Riva, 2003). Some influential companies foresee that much of online communication in the future will be in the form of a virtual world and will become as common as email (Kushner, 2004).

Some of the more mainstream businesses that have a virtual world presence include IBM, American Apparel, Dell, Reuters, Circuit City, Sears, British Petroleum, Intel, Infinite Minds Radio, Pontiac, and Sun (Gronstedt, 2007; Bell et al., 2007; Business Week Online, 2007). Sun Microsystems built the Sun Pavilion and holds press briefings and runs a development conference and training for Java technologies and IBM offers "workshops for developers on a private island using *Second Life* scripting tools" (Salomon, 2007, p. 9). Virtual reality training is also seen advancing the education of health care professionals, allowing students the ability to learn through first-person experience, to simulate person-to-person interaction in psychology training, and to launch 3-D trainers for surgical simulation (Mantovani, et al., 2003).

HRD training professionals can use VWs for a variety of training purposes. The ability to model just about anything in 3-D, at about any scale, to about any perspective, has the potential for use by training professionals to illustrate a variety of concepts in new ways (Gronstedt, 2007). Not only can students learn in realistic environments, but they can also practice and be evaluated in it. Some training applications might include: building a 3-D model of a particular product so that salespeople can inspect it from alternative perspectives; building a virtual replica of a machine so that employees can practice operation without the potential for waste or danger; and building a virtual storefront where customer service professionals can test their skills interacting with diverse clients.

Virtual Worlds for Building HRD Community

Research into gaming suggests the mechanisms designed for learning in game-play are contingent upon the game as a social practice (Stienkuehler, 2004).Virtual learning environments are ideal for bringing together people from diverse places. Learners can be put into groups, encounter problems, and given tasks to increase their collaborative capacities, while in the real world, assembling some groups is problematic or impossible, due to time, cost, and travel barriers. If it is assumed, as Lave and Wenger (1990) claim, that learning is socially constructed and emerges from the world in which the learner is situated, then learning in VWs has great potential. In spring of 2007, New Media Consortium (NMC) asked educators about professional gains associated with their use of *Second Life*. Fifty-eight percent of respondents cited expanded professional networks and increased collaborations, 13% acknowledged becoming local experts, and 7% described increased professional opportunities not available in real life.

Working within virtual worlds allows the Alliance Library System collaboration between librarians around the world (Bell, et al., 2007). Problem-solving games have been used by defense and homeland security practitioners to foster more robust collaboration and practice development (Roth, 2005). Intel has been using 3-D worlds for

conferencing, allowing employees from all over the world to collaborate on projects such as product strategy and technology planning (Kharif, 2007). The BBC held its annual 'One Big Weekend' rock concert in *Second Life*. "Organisers agreed this added a new level of interactivity for those who were unable to attend physically" (Salomon, 2007, p. 10). In face, IBM has held parties in *Second Life* for past and present employees (Salomon, 2007).

HRD professionals and educators can also make use of virtual world technologies in this capacity. HRD programs and courses can use virtual learning worlds to promote community within courses and programs. This may be especially important for distance education programs whose retention rates suffer when dispersed students feel disassociated with the program and other students. Other strategies might include: forming virtual spaces that encourage international communities of scholars to interact and perform collaborative research inside the VW; facilitating scholar-practitioner partnerships to bridge theory to practice; and building places for program alumni to interact with former instructors and other alumni.

Virtual Worlds for Career Development

Career development often gets less attention than many of the other more visible HRD concerns. Virtual worlds can house professional resources, assessments, job postings, databases, and much more. The environment allows the users to peruse resources while maintaining a certain level of anonymity. Employees can access a variety of professional and career development opportunities without the threat of repercussion from suspicious supervisors or the fear of having an insufficient learning in a topic.

IBM employees can enter the virtual world to practice interviewing skills in front of audiences and attend classes to learn new languages (Gronstedt, 2007). The Australian company *Hyro* established a recruitment office in *Second Life, as c*ompany officials believe it exposes them to a new supply of candidates not limited to Australia (Salomon, 2007). Employees working in other countries, other time zones, and other cultures can access, discuss and act upon information in context. Over 250 educational institutions have a presence in *Second Life* offering everything from academic programs to continuing education classes (Phillips, 2007). For example, Boise State University hosts research presentations in their virtual learning center.

HRD programs can build their own meeting and training spaces. Programs can publish materials that market their programs and people. Professors can make their own research available and noticeable. Imagine the virtual counselor available 24x7x365 to hand out development information and the career opportunity library where all company and external resources are housed. Imagine the employee who feels shame at not having completed high school, having the ability to talk about educational options without the potential of reprisal or embarrassment. One strategy might include creating a space where potential students go to hear a virtual student answer questions about her or his HRD degree. A virtual professor might discuss the research strengths of the faculty; facilitating virtual mentoring programs between senior and junior workers in an organization. HRD professionals can create virtual simulations of a variety of jobs so that workers can explore the range of career opportunities within an organization.

Virtual Worlds for HRD Research

Researchers in the social sciences are seeing the VWs as viable spaces for research purposes (Williams, 2007). Virtual environments can be controlled as tightly or loosely as desired and tools are beginning to be developed for user documentation and recording. Past research has included data collection from chat logs, navigation logs, user key strokes, time logs, movies taken within the VW, user surveys and user-created documents and objects. Methods have included cognitive ethnography and discourse analysis using participant observations (Steinkuehler, 2004).

In addition to studies about the environment itself, such as how people choose avatars (Annetta & Holmes, 2006) and how people communicate (Steinkuehler, 2004), VWs are being manipulated into experimental laboratories. Recent research includes studies to understand economic concepts such as price elasticity and demand (Phillips, 2007) to utilize social network analysis (Bainbridge, 2007), and to observe the impacts of changes in legal rules (Bradley and Froomkin, 2003, as cited in Delwiche, 2006). Bainbridge (2007) notes that *Second Life*, in particular, is well suited to conduct formal experiments in social psychology or cognitive science, as the researcher can build a virtual laboratory and recruit research participants.

HRD scholars can use VWs to explore many of the same research questions explored in other environments, making cost and ease of research more practical. Strategies might include observation of avatars as they encounter ethical dilemmas for research on ethics; recording how avatars interact with each other and form relationships as a way of investigating social networking; building a model world with specific social and economic constructs to see how avatars behave when investigating social equity; and interviewing members of a gay and lesbian group within a VW to see if learning is affected by the use of avatars.

Barriers and Challenges in Using Virtual Worlds

Because many popular virtual worlds are not dedicated to training and education, there are barriers to use. Sites tend to regularly shut down for maintenance with little notice (Grontstedt, 2007). Some corporate and university firewalls do not work well with the worlds since the applications reside on outside servers. The applications also take fairly high-speed Internet connections in order for users to have a pleasant experience (Gronstedt, 2007). The environment can also be addictive (American Medical Association, 2007). One hour planned in the virtual world can easily turn into four (Bell, et al., 2007). Other problems associated with simulation use are blurred vision, eyestrain, fatigue, disorientation, balance disturbances and nausea (Mantovani, et al., 2003). In addition, since the worlds are a representation of both the good and bad in society, users may encounter places, avatars, and language that are disagreeable or offensive. Transferability and reuse are concerns. In VWs such as *Second Life*, all content (structures, information, buildings, etc.) must be created within the world and cannot be moved to other worlds or created with other tools. There is a learning curve to participation in VWs (Kharif, 2007), although most offer some sort of orientation. There is an even greater learning curve for those who wish to develop objects within the environment. Finally, because this phenomenon is still in its infancy, some of the tools necessary to perform valid research, such as precise user tracking and recorders, have not yet been developed.

Conclusion

The potential uses of virtual worlds for all areas of HRD are becoming apparent, although there is the need for further research into the impact and consequences of the environment. These environments have the potential for facilitating gains in learning, retention, building and maintaining relationships, and deeper understandings through their ability to immerse people in environments, simulate reality, and foster collaboration. As those interested in more effective teaching, learning, and personal development, HRD practitioners and scholars owe it to themselves to start investigating these virtual technologies in order to stay relevant in this increasingly digitized world. By using these worlds in education, training, community building, career development, and research, HRD practitioners and scholars can add to current strategies and methodologies.

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