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Exploring the Contribution of Virtual Worlds to Learning in Organizations

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Abstract

Despite the growing interest of business executives, there is limited academic research on the contributions of virtual worlds to learning in organizations. We address this limitation by using a recently developed typology of virtual world capabilities to investigate the potential contributions of virtual worlds to learning in organizations. Recognizing that learning occurs at three levels within the organization, we proceed to develop a theoretical framework that relates virtual world capabilities to learning at each level. Our research contributes to the field by integrating multiple theoretically anchored dimensions and offering a framework that should serve as a building block for research on, and use of, virtual worlds in learning interventions in organizational settings.

Keywords

virtual world, learning individual learning, team learning, organizational learning, human resource development, learning interventions

Introduction

Human resource development (HRD) is "the process of facilitating organizational learning, performance, and change through organized interventions, initiatives, and management actions" (Gilley & Maycunich, 2000, p. 6). Hence, it is important for HRD researchers to investigate tools and techniques that have the potential to affect learning in organizations and to shape the discourse on the role of HRD professionals in utilizing these tools in organizational learning interventions and be champions of learning through technologies (Short, 2011). As technology is permeating our lives, the emergence of virtual HRD is shaping the future of learning in organizations

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(McWhorter, 2011). This article is specifically designed to examine the potential impact of virtual worlds to learning in the organizations.

Virtual worlds (VWs) have garnered increasing attention in recent years. Their rise has been seen by some as part of the natural progression of Internet-based technologies (Johnson, 2008). The growth of VWs has been impressive (Fetscherin & Lattemann, 2008). It is estimated that there are more than 200 commercial entities offering VW platforms (Mahaley, 2009; Shen & Eder, 2009). Commercial VW sites offer a number of products and services including gaming, socializing, commerce, and staff recruitment opportunities. Many of these sites offer virtual venues for training and development activities (Wankel & Kingsley, 2009). Academic institutions and commercial organizations are beginning to actively explore the opportunities that these immersive environments offer to enhance learning.

The question for HRD researchers and professionals to answer is, "Can we leverage VW capabilities to enhance learning in organizations?" We will explore the value in leveraging the capabilities offered by VWs to influence learning in organizations and to discuss its implications of our findings for HRD researchers and practitioners. Prior research that links VW capabilities and learning in organizations is used to guide our investigation. In the following sections, we begin by framing our discussion around relevant characteristics of the two constructs of interest (learning in organizations and VWs) and offering a theoretically anchored framework to guide subsequent discussions.

Learning in Organizations

Epistemological approaches to learning in organizations are rooted in the social view of learning (Antonacopoulou & Chiva, 2007). This view posits that individuals learn more efficiently by sharing tacit and explicit knowledge than through controlled formal systems (Nonaka & Takeuchi, 1995). As early as 1978, Vygotsky proposed that all learning is social in nature and is continuously developed in humans who engaged in social activities (Ardichvili & Yoon, 2009). The contexts in which individuals conduct social activities, such as work teams, organization culture, organization structure, and technologies, directly affect individual learning. In addition, new learning tools driven by Internet-based technologies have shaped social learning in recent years (Cabanero-Johnson & Berge, 2009). A virtual world is one such tool that allows the individual to go beyond the confines of the physical world and experience that new world as an avatar.

Learning drives change in organizations. Hence it is important that organizations institute effective learning processes to succeed in an increasingly competitive marketplace (Hannah & Lester, 2009). Learning in organizational settings has been a topic of interest among academicians and practitioners. The increasing number of related publications in academic journals and the popular press (Ardichvili & Yoon, 2009) amply illustrate this reality. As a multidisciplinary field with several coexisting foci of interests, the study of learning in organizations is inherently complex (Bapuji & Crossan,

2004; Hannah & Lester, 2009). However, we are in agreement with the generally accepted belief that learning facilitated by human resources rests at the core of an organization's capabilities and is fundamental to the development of an organization's value proposition (Argote & Ingram, 2000; Kang, Morris, & Snell, 2007). Hence, this article focuses on the implied need to enhance learning in organizations. More specifically, a multilevel conceptualization of the "learning in organizations" construct is used to structure and discuss the contributions of VWs to learning in organizations.

The Multilevel Approach to Investigate Learning in Organizations

The analysis begins by asking the question, "what is learning in the context of an organization?" Researchers have offered different ways to describe this phenomenon (Baxter, Connolly, & Stansfield, 2009; Fenwick, 2008). For the purpose of this discussion, Elkajer's (2001) definition of learning will be adopted. He defined learning as "an intentional effort aimed at discovering relations between our actions and the resulting consequences in addition to our former/present experiences" (p 441). His emphasis is on the process of inquiry that leads to growth in experiences by individuals, teams, and the organization. In this regard, knowledge is gained from a process of active inquiry and reflective experiences driven by people.

Two alternate forms of learning in organizations have been discussed in the literature: exploratory and exploitative learning (March, 1991). Exploratory learning encompasses the pursuit of new knowledge. Exploitative learning is aimed at refining and deepening existing knowledge sets of an organization. Both exploratory and exploitive forms of learning have been found to influence the survival of the organization. Kang et al. (2007) and Katila and Ahuja (2002) argue that an organization must exploit its existing knowledge to ensure current viability and explore new frontier to ensure future viability

Learning in organizations takes place in the context of social interaction (Adler & Kwon, 2002). Several metatheories have been used to explain learning in organizational contexts (Swanson & Holton, 2001). Among them, constructivist, social learning, and situated learning theories (Bandura, 1977; Taylor, Marienau, & Fiddler, 2000; Piaget, 1977; Vygotsky, 1978) are particularly relevant to our discussion. The constructivist perspective posits that knowledge is constructed when individuals attribute personal meaning to their learning experience. The individual makes sense of the information and internalizes the knowledge by experiencing it. This is similar to Elkajer's (2001) definition of learning.

Taking an inclusive approach, Watkins and Marsick (1995) proposed that learning could occur at four levels: individual, team, organizational, and society. However, if the unit of analysis is the organization, there is agreement in the field that learning is deemed to occur at three of these four levels, that is, the individual, team, and organizational levels (Bapuji & Crossan, 2004; Baxter et al., 2009). Such thinking finds support in the works of Hannah and Lester (2009) who characterized leadership interventions at the micro level (individual), the meso-level (social network or team), and

the system level (the organization). In addition, other researchers (Crossan, Lane, & White, 1999; Yukl, 2009) have noted that HRD professionals should focus their efforts not only on individual learning but also on collective learning of teams and organizations.

Researchers who study learning in organizations have suggested that we need to address learning at all three levels if we want to understand its implications in an organizational context. Higher level (team and organizational level) learning cannot occur without the existence of individual learners (Baxter et al., 2009). The individual's cognitive process (such as inquiry and reflection) drives knowledge creation and learning. Yet, without connection to the team and the organizational context, what was learned will lose its meaning and support of the contextual environment. Crossan et al. (1999) go a step further and propose that four board processes link the three levels of learning. These are intuiting, interpreting, integrating, and institutionalizing. For example, consider the situation in which an individual working on intuiting and interpreting processes suddenly finds it difficult to transform the newly learned material to achieve performance enhancements. The individual must then seek the assistance of the team to aid with the integration of the new learning and then institutionalize the new knowledge at the organizational level.

In line with prior research, we use a three-level operationalization of the "learning in organization" construct to explore the contributions of VWs to learning in organizations. We posit that each level of learning has its own unique characteristics and reflects a unique learning phenomenon worthy of research attention.

Virtual World and Learning in Organizations

What are Virtual Worlds?

Rooted in the concept of Multiple User Virtual Environments (MUVE), VWs are designed to provide virtual environments with 3-D capabilities. VWs have been discussed and studied by researchers in several contexts, including business, education, and information sciences (Davis, Khazanchi, Murphy, Zigurs, & Owens, 2009; Dede, Ketelhut, & Ruess, 2002; Messinger et al., 2009; Noam, 2007; Papagiannidis, Bourlakis, & Li, 2008). Messinger et al. (2009) defined VWs as environments where "thousands of individuals can interact simultaneously within the same simulated three-dimensional space" (p. 204). Others view VWs as computer-generated spaces populated with 3-D avatars (Castronova, 2005; Kohler, Matzler, & Füller, 2009). Recognizing that VWs can deliver both vividness and interaction in a 3-D environment, still other researchers have viewed VWs as technology-mediated communication channels that allow individuals to experience a heightened presence (Steuer, 1992). Given the purpose of this research, we use Dede et al.'s (2002) definition of VWs because it best reflects the context of learning in these 3-D virtual environments:

VW CAPABILITY DIMENSIONS	SUB-DIMENSIONS
Tactical Capabilities	1. Immersion 2. Engagement 3. Collaboration 4. Creativity 5. Knowledge Migration
Technological Capabilities	6. Real-time Interactivity 7. Avatar-Mediated Communication 8. Electronically-enriched Interaction
Spatial Capabilities	9. Spatial Transformation 10. Spatial Convergence

Figure 1. Capabilities of virtual worlds

> ". . . Virtual worlds are virtual environments that enable multiple users to simultaneously access virtual contexts, interact with digital artifacts, represent themselves through avatars, communicate with other individuals and computer-based agents, and engage in collaborative learning activities."

Virtual World Capabilities

Identifying the capabilities of a VW is the first step in the process of understanding how a VW can be leveraged to influence learning in organizations. In a recent paper, D'Souza, Li, and Du (2011) reported on the dimensionality of VW capabilities. After reviewing existing literature on VW capabilities spanning several fields, including HRD, Internet marketing, information technology, virtual environments, and learning, these researchers isolated multiple categories of VW capabilities. Three of these capabilities—tactical, technological, and spatial capabilities (see Figure 1 below)—are relevant to learning in organizations. It is important to point out that our focus is on VW capabilities that contribute to learning interventions in organizational settings. Other VW capabilities, such as risk management capabilities and system capabilities

identified in the D'Souza et al. (2011) framework were not included in Figure 1. In the paragraphs that follow, we provide a brief description of each of the 10 subdimensions listed in Figure 1 to provide a foundation for the subsequent discussion.

Tactical Capabilities

Immersion. Hemp (2008) notes that the 3-D structure of a VW nurtures immersive behavior in an individual. In addition, the use of avatars in the 3-D environment provides richness, realism, and heightened levels of telepresence (Kohler et al., 2009; Ijsselsteijn, Rider, Freeman, & Avons, 2000; Steuer, 1992). Evidence from studies conducted in academic environments suggests that such immersion does occur (Eschenbrenner, Nah, & Siau, 2008; Richter, Anderson-Inman, & Frisbee, 2007).

Engagement. Researchers have found that the level of engagement is believed to be higher in VW environments than in other virtual environments because of the ease of communication in VWs (Howarth, 2008) and the choice of method for self-expression (Kohler et al., 2009; Owens, Davis, Murphy, Khazanchi, & Zigurs, 2009). This seems to be especially true in facilitated cooperative learning environments (Mason, 2007).

Collaboration. VWs, like other virtual environments, have been found to (a) enhance iterative or interactive collaboration, (b) provide shared outcomes, and (c) support the altruistic behavior of individuals (Eschenbrenner et al., 2008; Jarmon, Traphagan, Mayrath, & Trivedi, 2009; Thomas & Brown, 2009). In addition, VWs have been found to create more personal connections (Melcrum Publishing, 2008), provide unprecedented levels of interactivity (Kohler et al., 2009), and improve collaboration, communication, and cooperation (Fetscherin & Letttemann, 2008).

Creativity. VWs provides conducive environments for creativity similar to the real world given that VWs provide the freedom to experiment (Kohler et al., 2009). In addition, the use of avatars allows individuals to represent their demeanor in the VW better.

Knowledge migration. There is evidence that creativity in the VW can lead to innovation and that this innovation can be transferred to the real world or can be leveraged in the VW (Hemp, 2006; Kohler et al., 2009). However, the efficacy of such transfers has not been investigated rigorously. In one of the few studies that addressed this issue, Mikropoulos (2001) analyzed brain activity present in research subjects while they performed tasks in the real world and in VWs and found that crossover effects are possible.

Technological Capabilities

Real-time interactivity. One of the features of a VW is the facilitation of synchronous communication. Communicators need to be present in the VW for communication to occur. This limits the ability to rehearse because the interaction occurs in real time. On the other hand, such communication enhances spontaneity in the dialog. These

communication characteristics mimic real-world encounters more precisely than other forms of electronic interactions (Kahai, Carroll, & Jestice, 2007; Kohler et al., 2009).

Avatar-mediated communication. The use of avatar-mediated communication is another distinguishing characteristic of VWs. The fact that these avatars are created in 3-D adds to the attractiveness and mystique of VWs (Hemp, 2006). In addition, the use of avatars facilitates communication by enhancing telepresence (Peterson, 2006). However, avatars provide a level of anonymity that can be a double-edged sword because high level of anonymity could lead to deceptive behaviors (Howarth, 2008).

Electronically enriched interaction. Researchers have found that VWs provide media richness and interactivity at levels not achievable with other media (Coyle & Thorson, 2001; Daft & Lengel, 1986). More important, VW technology offers the capability to control, deliberately, one's nonverbal communications in a virtual environment.

Spatial Capabilities

Spatial transformation. Virtual world provides a convenient instrument for the replication and extension of, or the escape from, reality (Hemp, 2008). To varying degrees, VWs allow individuals to configure their profile, define the boundaries of their space, and choose their interaction. More important, they do so very efficiently. *Virtual World News* has documented how IBM saved US$320,000 when it conducted a meeting using the spatial transformative capabilities of a VW (Anonymous, 2009).

Spatial convergence. Individual engagement is influenced by social, cultural, and geographic differences. The convergence can become challenging when group members exist in communities that are socially, culturally, and geographical diverse. The ability to "shrink" geographic distances makes VWs attractive to managers (Owens et al., 2009).

Proposed Framework that Links Learning in Organizations to Virtual Worlds

Now that we have identified appropriate dimensions for each of our constructs of interest, we move forward and investigate the interaction between these constructs at the dimensional level as shown in Figure 2. Cultural and structural facets have been shown to affect each level of learning in organizations (Senga, 1990). Hence, some researchers have argued that VWs support learning in organizations because they offer attractive facets like immersive learning spaces where the individual can be the creator and recipient of learning content (Gronstedt, 2007). Other researchers have supported the belief that VWs engage learners and nurture powerful interactions while simultaneously providing the freedom to experiment and be creative (Howarth, 2008; Melcrum Publishing, 2008).

VWs provide a promising learning environment that resembles the real world (Dede, Ketelhut, Nelson, Clarke, & Bowman, 2004). Researchers have shown that VWs draw on the power of situated learning by immersing individuals in learning

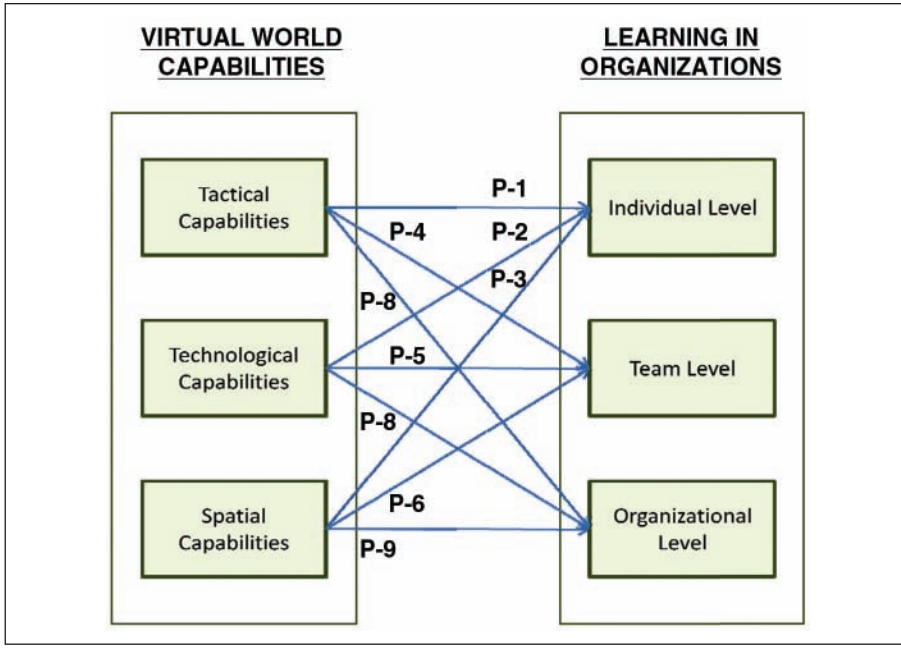

Figure 2. A theoretical framework linking virtual world capabilities and learning in organizations

experiences with problems and contexts similar to the real world (Dede et al., 2004). For example, IBM uses VWs to train new employees to absorb the company's culture, values, decision-making structure, and technical skills. "IBM employees can immerse themselves in a digital realm where learning, collaborating, and play are all part of the work environment" (Pollitt, 2007, p. 14). Through their avatars, individuals gain a sense of presence in the VW. They can role-play, participate in communities of practice, and nurture all three levels of learning. From a constructivist perspective, it is argued that these combinatorial capabilities generate learning and developmental growth that can complement or supplement what traditional learning environments offer. Hence we submit that the unique and valuable capabilities of the VW offer good options to researchers and practitioners who are interested in harnessing its potential to enhance learning in organizations.

Johnson (2008) projected that VWs will eventually be seamlessly integrated into our lives just as the World Wide Web (WWW) was over the past 15 years. As we progress toward such seamless integration, businesses will find themselves increasingly drawn to this new and largely uncharted territory. As these developments follow their course in the industry, researchers will similarly be drawn to investigate ways to leverage the immersive nature of the VW to increase learning in organizations (Calongne, 2008; Dede et al., 2004; Jarmon et al., 2009; Wagner & Ip, 2009). However, the applications of VWs to learning in organizations present some challenges, not the least of

which is the lack of research on how to integrate VWs into business activities. Other challenges include the need to read subtle "natural" cues of the participants, technological limitations of the VW environment, and systems costs. The well-being and safety of the participants in VWs could also be challenged by online hostile behaviors of others in the VW (Eschenbrenner et al., 2008). We remain cognizant of these challenges as we develop our framework on the potential contributions of VWs to learning in organizations.

For each VW capability dimension to be valuable, organizations should be capable of leveraging them and achieving learning outcomes at the individual, team, or organizational levels. In the following section, we use the framework proposed in Figure 2 to guide our discussion on the potential contributions of VW capabilities to learning in organizations at the dimensional level. Note that the arrows in Figure 2 represent the possible ways that VW capabilities can potentially influence learning in organizations.

Research Propositions

Kang et al. (2007) conceptualized three identifiable social relational dimensions of learning in organizations: structure, affect, and cognition. The structural dimension reflects the patterns of connections among organizational actors that enable learning. The density of the network and frequency of interaction are examples of measures of learning on the structural dimension. The affective dimension reflects the motives, expectations, and social norms that influence learning. For example, expectation of reciprocity and trust between learners regulates the quality and quantity of the knowledge exchanged. The cognitive dimension reflects the shared representation, understanding, and systems of meaning needed for learning to occur. We will use Kang et al.'s social relational dimensions to guide the discussion as we link VW capabilities to each levels of learning in organizations. Our discussions will lead to appropriate research propositions.

Individual-level Learning and Virtual World Capabilities

For individual learning to truly affect organizational performance, it needs to proceed from declarative knowledge to procedural knowledge. A novice can regurgitate a principle or a set of rules without knowing the conditions for effective application; an expert, however, can access the knowledge with functional and conditional applicability (Glaser & Bassok, 1989). The progression from declarative knowledge (novice) to procedural knowledge (expert) can take years (Prietula & Simon, 1989). During this process, a higher level of proficiency is developed. As a result, what would require conscious, deliberate, and explicit thought becomes the obvious thing to do, and what has been learned becomes tacit knowledge and intuition (Crossan et al., 1999).

Organizations invest heavily in employee learning and development to make this happen (Tsui, Pearge, Porter, & Tripoli, 1997). In an effort to integrate concepts of

individual learning and learning organization cultures, Song and Chermack (2008) theorized that there is a logical progression in organizational knowledge formation from the tacit knowledge of individuals to the applicable knowledge of the organization. Researchers have found that organizations recognize this progression and invest in congenial learning environments that promote individual learning and reflective experiences (Davis & Davis, 1998; Watkins & Marsick, 1995).

We believe that VWs offer tactical capabilities that are uniquely suited to these needs. More specifically, they offer a learning environment that is rich in interaction, visualization, immersion, simulation, and telepresence. The environment can feel authentic in content and culture and can offer collaborative and collective creation of content (Warburton & Pérez-García, 2009). It offers a structure for connectivity in this virtual environment where the learners can exercise their newly learned declarative knowledge and feel safe because of a shared understanding of expectations and trust in the VW.

In traditional online communication (e.g., email, chat, blogs, etc.) the barriers to employee participation are the fear of misleading other community members and the fear of being criticized (Ardichvili, Page, & Wentling, 2003). The source of these fears is often the inability to guage online conversation partners' reactions due to the absence of facial expressions and other nonverbal cues and the impersonal nature of online community (Ardichvili, 2008). However, in VWs, learners can convey their reaction by imitating facial expressions and nonverbal cues through their avatar. Thus the VW environment can mitigate some of these fears. In VWs, individual learners can interact with others in the community, construct learning content, solve problems, and gain firsthand experiences in an environment that closely resembles reality.

In summary, VWs offer opportunities for immersion, engagement, and collaboration. They have been also shown to stimulate creativity and knowledge migration. Hence, they can be expected to enhance learning at the individual level. We offer the following proposition:

Proposition 1: Tactical capabilities of a VW can be used by organizations to enhance individual-level learning.

Researchers have proposed using situated learning theory and community of practice models to explain how individual learning can be supported by interactions between novices and experts (Brown & Duguid, 1991; Lave & Wenger, 1991; Lohman, 2006). Researchers have also posited that the expert must engage in an interpreting process for learning to occur (Crossan et al., 1999). Finally, the interaction between novices and experts needs to take place in a context that is familiar to both the novices and the experts (Crossan et al., 1999; Lohman, 2006).

Jarmon et al. (2009) found that VWs offers significant opportunities for interaction between novices and experts to occur. VWs foster a community of practice and support situated learning by offering real-time interactivity, avatar-mediated communication, and electronically enriched interaction. This provides individuals with the

flexibility to gather in the virtual space and to construct their own learning experiences. In addition, VWs can be configured to offer authenticated and safe environments for individuals to explore, discover, and express themselves (Calongne, 2008). Therefore, we offer the following proposition:

Proposition 2: Technological capabilities of a VW can be used by organizations to enhance individual-level learning.

The spatial transformation capability of a VW allows the individual to configure their profile and influence their space in the virtual environment to achieve a comfort level that is supportive of their individual learning needs. In addition, they can choose to be involved or to disengage from an interaction (conversation) without concerns of potential future negative consequences. Therefore, we believe that,

Proposition 3: Spatial capabilities of a VW can be used by organizations to enhance individual-level learning.

Team-level Learning

Teams are the building blocks of an organization.[1] They allow the organization to synergistically combine and leverage the skills, talents, and perspectives of individuals. A team learns when one member initiates a learning activity and the rest of the team responds to create new meaning, communicate the new meaning, and eventually build consensus (Watkins & Marsick, 1995). Individuals sometimes informally seek coworkers to develop creative solutions (Marsick & Volpe, 1999).

A key requirement for a successful team activity is the ability of its members to collaborate, connect, and interact with other members. The team members should be capable of collectively generating creative solutions and engaging in problem solving (Peters & Manz, 2007; Van Der Vegt & Bunderson, 2005). The collective learning process of a team is strongly influenced by each member's tacit and explicit knowledge. It is also influenced by the quality of relationships and interactions between team members (Hannah & Lester, 2009). By building shared expectations and trust among team members, learners in a team can improve the affective dimension of learning, thus achieving higher quality and quantity of knowledge exchange (Kang et al, 2007). The tactical capabilities of a VW have been found to enhance team processes, nurture collaboration and problem-solving skills, and foster collective creativity (Davis et al., 2009; Owens et al., 2009). As noted above, these are prerequisites that facilitate team-level learning. Hence, we offer the following proposition:

Proposition 4: Tactical capabilities of a VW can be used by organizations to enhance team-level learning.

Using the Second Life platform as an example, Messinger et al. (2009) argue that VWs offer technological capabilities to create self-sustaining "eco-systems" that affect team-level and organizational-level learning. Several other scholars also support the argument that the technological capabilities of VWs, (e.g., real-time interactivity, electronically enriched interaction, and avatar-mediated communications) can be used to enhance learning outcomes at the team level. For example, in an educational environment, Echenbrenneer et al. (2008) found that VW capabilities enhance engagement and learning. Similarly, Kahai et al. (2007) found the extent to which team learning acquired during electronically enriched interactions in VWs exceeded those of other virtual communication options. Finally, Owens et al. (2009) provided an example of team-based activities enhanced by the technological capabilities of the VW because participants could deliberately control their nonverbal communication for the benefit of others.

Thus VWs could potentially provide a team of individuals the opportunity to articulate and share their perspectives and to deal with conflict of opinions in the team. During this process of give and take, a higher order of learning is achieved. Despite the apparent value gleaned from using VWs, not all organizations seem eager to jump on the VW bandwagon. However, those that have done so claim several benefits have accrued. For example, the U.S. Army uses online group training for new recruits, and IBM uses VWs for training and social acculturation of new hires. VWs have also been used to create a team environment for professional (medical) skills training (Freitas, 2009) and production skill training (Watanuki, 2008). Hence, we posit that,

Proposition 5: Technological capabilities of a VW can be used by organizations to enhance team-level learning.

A virtual team can take advantage of the diverse and varied expertise of team members at different locations. Siebdrat, Hoegl, and Ernst (2009) found that successful virtual teams can often outperform colocated teams if they are set up and managed correctly. In particular, performance was found to be enhanced when managers provided teams with tools needed to optimize team performance (Horwitz, Bravington, & Silvis, 2006). In general, a VW can bridge the spatial divide and offer a higher sense of colocation. Fostering a global culture, enabling collaboration training, and providing team-building support are distinct capabilities that can be offered by VWs (Johnson, Suriya, Yoon, Berrett, & Fleur, 2002; Siebdrat et al., 2009). Therefore, we posit as follows:

Proposition 6: Spatial capabilities of a VW can be used by organizations to enhance team-level learning outcome.

Organizational-level Learning

Successful organizations are structured to capitalize on the learned capability of their employees. Organizational-level learning involves the acquisition, transference, and

integration of new knowledge that transcends team or functional "silos" that may exist in the organization (Kang et al., 2007). Typically, the outcome of organizational-level learning is the institutionalization of knowledge and the diffusion of shared understanding or mental models within the organization (Hannah & Lester, 2009). Such learning differs from individual-level and team-level learning (Cross et al., 1999) and is supported by an organizational culture that (a) empowers individuals to embrace a collective vision and (b) motivates management to establish systems that capture and share knowledge (Swanson & Hilton, 2001; Watkins & Marsick, 1995).

Learning at the organizational level can be incremental or transformational. Incremental learning is focused on refining current operations through exploitative learning activities such as continuous quality improvement, while transformational learning attempts to use explorative learning to alter the current practices of the organization (Watkins & Marsick, 1995). Irrespective of the approach chosen, these are complex and challenging tasks that require commitment and cooperation. An examination of the tactical capabilities of VWs (identified earlier in this article) suggests that VWs can support knowledge creation through deep engagement of the learner and collaborative knowledge construction (Paavola, Lipponen, & Hakkarainen, 2004; Thomas & Brown, 2009). Gronstedt (2007) notes that "VWs provide learning organizations with a powerful, unique ability to engage and empower employees in ways that accommodate their digital and mobile lifestyles, adapt to their individual learning needs, and encourage collaboration" (p. 49). Hence VWs offer tactical capabilities that could be employed to encourage a learning culture in a collaborative digital space. We therefore posit as follows:

Proposition 7: Tactical capabilities of a VW can be used by organizations to enhance intraorganizational-level learning.

Organizational-level learning occurs when knowledge obtained from external sources is acquired, assimilated, and exploited (Cohen & Levinthal, 1990). In an increasingly dynamic and competitive environment, it is imperative that organizations manage this knowledge absorption process. Otherwise, firms run the risk of falling into one of the many learning traps including familiarity (tendency to employ know solution), maturity (tendency to employ proven solution), and propinquity (tendency to employ solutions close to the known solutions; Ahuja & Lampert, 2001; Bapuji & Crossan, 2004).

Holmqvist (2009) notes that due to the lack of structure and cognition (shared mindset), interorganizational learning could run into roadblocks when actors experience difficulty in recollecting past experiential solutions. This stymies the learning experience. Homqvist also noted that partners of the alliance or joint venture may approach the same experience from different perspective due to the difficulty in balancing the exploitation and exploration orientation toward learning (organizations typically demonstrate a tendency to focus on one orientation as their organizational learning culture); thus preventing learning from occurring. However, if appropriately designed by using a customized combination of technological and spatial capabilities,

the VW environment may offer interorganizational learning communities the necessary structure, bridge spatial differences, and transcend limitations embedded in organization-specific domains. For example, avatar-mediated communication and electronically enriched interaction—two types of technological capabilities found in VWs—have been found to offer unique opportunities for organizations to facilitate learning and enhancing telepresence across spatial boundaries (Peterson, 2006).

There exists a substantial body of research on the ability of organizations to absorb new knowledge (termed the "absorptive capacity" of the organization). This research suggests that successful companies can fine-tune these antecedents in real-world environments to manage the knowledge absorption process. We posit that the organizations could do the same in VW environments. For example, there are documented instances of established firms appropriately fine-tuning the technological capabilities of the VW to obtain new knowledge from their customers(e.g., through electronically enriched interactions; Tikkanen, Hietanen, Henttonen, & Rokka, 2009; Berthon, Pitt, Halvorson, Ewing & Crittenden, 2010) and fine-tuning the spatial capabilities of their VW to take advantage of spatial capabilities (e.g., through spatial convergence; Alpern, 2010, Hesseldahl, 2009). Hence, we offer the following propositions:

Proposition 8: Technological capabilities of a VW can be used by organizations to acquire new knowledge and thereby enhance interorganizational learning experiences.

Proposition 9: Spatial capabilities of a VW can be used by organizations to acquire new knowledge and thereby enhance interorganizational learning experiences.

Discussion

Situated learning theory posits that learning and knowledge construction cannot be conceived easily in the abstract form and that they need to be presented in an authenticated context (Ardichvili & Yoon, 2008; Lave & Wenger, 1991). The ability to provide an authenticated context and to keep the learner engaged in a VW makes it a good tool for learning in organizations. The unique existentialistic experiences in a VW also allow individuals to experience a heightened presence (Steuer, 1992) that attract learners' attention and offer a safe environment for them to shape their experiences in this "authenticated context" (Chapman, 2008). However, most of the research on these characteristics of the VW has been conducted at the individual learning level. There is a need for further research that explores the existence of this phenomenon at the team and the organizational level.

VWs can extend the boundary of the real world by allowing participants, through their avatars, to become simultaneous consumers and creators of knowledge. This gives participants the ability to reconcile current practices with this new extension of reality by seeking answers to questions like "To what extent should we rely on it?" "How should proprietary information be treated in these environments?" "What level

of managerial control should be injected in this new learning space?" These are some of the many questions that need to be answered. We believe that our development provides a framework for researchers and practitioners to address such questions.

Two characteristics of VWs that are uniquely different from other tools for learning in organizations, and also different from other internet applications, are (a) avatar-mediated communication and (b) electronically enriched interaction. These two characteristics of the VW allow participants to control their nonverbal cues during the communication process that can potentially enhance the learning outcome. People become more aware of nonverbal communication because they have to manipulate their avatars. Of course, such practices could expose the participant to opportunistic or deceptive behaviors of others in the VW. This is a relatively new concept for HRD professionals and researchers and is worthy of consideration because of the importance placed on nonverbal communications in HRD (Owens et al., 2009). We believe that this is an area ripe for further research.

VWs provide an individual with unique opportunity to go beyond the confines of the physical world and to encounter new experience as an avatar in a virtual world. From a HRD perspective, this raises two important questions: (a) How, and to what extent, will the VW experience alter the individual's cognitive map? (b) If it does result in alterations, would it affect learning at the individual, team, or organizational level? Indeed, if the experience and the accompanying learning in the VW are too far removed from reality, or have limited transferability to the real world, should we tread carefully or avoid VWs altogether? Fortunately, there is research (Mikropoulos, 2001; Eschenbrenner et al., 2008) that suggests that this may not be the case, and that VWs do not suffer from severe limitations in these areas; however, the research is spotty and further research is necessary.

Research has revealed that VWs should be configured on four dimensions: purpose, place, platform, and population (D'Souza et al., 2011; Messenger et al., 2009; Porter, 2004). Adjusting the four dimensions is essential because the resulting configuration defines the mix of tactical, technological, and spatial capabilities of the VW. What are the implications for the structure of the VW environment in a HRD context? How scalable is this virtual environment? These are important questions that are of particular interest to practitioners who will have to make the corresponding investment decisions. Further research on these issues would be valuable to practitioners.

As an extension of the point made in the prior paragraph, we had posited that the organization's ability to manage the process for acquiring new knowledge from external sources may be possible in a VW. Although there is some supporting evidence in the works of Hemp (2006) and Kohler et al. (2009), we are not quite certain whether participants can bring what is learned from the common virtual space back to their individual organizations. This needs further exploration and is a topic worthy of future research.

Both researchers and practitioners have highlighted the immersive and collaborative characteristics of VWs. Researchers have demonstrated that VWs draw on the power of situated learning by immersing individuals in learning experiences with

problems and contexts similar to the real world (Dede et al., 2004). Practitioners (e.g., corporate entities like IBM, Sears, BP, BMW, and Dell; and nonprofits, universities, and government agencies), for their part, have invested millions of dollars on VWs (Mahaley, 2009; Ringo, 2007; Shen & Eder, 2009). Clearly, managers at these organizations, and a growing number of researchers, believe that VWs have the potential to affect the business significantly. Moving forward, it would be logical to expect that well articulated academia–industry partnerships would help aggregate, strengthen, and extend the existing body of knowledge in the area.

Conclusion

The mandate to enhance learning in organizations has garnered considerable research interest (Burke, 2002; Ulrich & Smallwood, 2005). Our review of recent publication in HRD, organizational learning, and absorptive capacity suggest that the search for tools and techniques to enhance learning in organizations is intensifying. One potential tool that has not received much attention in the HRD literature is the VW. There is growing body of research on the capabilities of VWs and the potential to harness these capabilities to enhance business activities (Fetcherin & Latterman, 2008; Johnson, 2008). With that in mind, we investigated the contributions of VWs to learning in organizations. The framework that evolved from our research identifies specific VW capabilities that could be leveraged to influence learning at all three levels: the individual, team, and organizational level.

The proliferation of VWs in recent years has been quite impressive. It is estimated that Second Life, the 800-pound gorilla in the VW space, reported 1,365,570 worldwide users within 60 days on August 21, 2010 (Linden, 2010). An increasing number of users and developers of VWs see promising potentials for the technology (Johnson, 2008). By combining the capabilities of graphics, gaming elements, chat rooms, and online commerce, VWs could have much to offer HRD researchers and professionals in the future.

We believe that the framework presented in this research will help move the field forward. We expect that the eventual tests of hypotheses derived from our propositions will result in valuable information that would inform the discussion on the ability of VWs to influence learning in organizations. In addition, the framework can be used to help facilitate discussions on the design, development, and implementation of learning initiatives in VW environments. Virtual learning and technologies are pressing the changes of HRD professionals from expert of learning and development to partners of leading and supporting solution creations in a smart [learning] organization (Yoon & Lim, 2011).

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Note

1. In this study we use the term "team" to signify a group of individuals assembled for a specific purpose. Teams can have formal structures or informal structures.

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