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Editors' Corner

An Ecology of Embodied Interaction: Pedagogy and *homo virtualis*

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Online virtual world environments have generated a public-private space that is being used for education across many sectors. Evidence is slowly accumulating that supports the idea that these spaces may be used as effective virtual learning environments because they comprise an interesting ecology of embodied interaction (Jarmon, 1996) – albeit virtual. Three critical elements for engagement in learning in the digital age are interactivity, connectivity, and access (Dresang & McClelland, 1999), and these are three key elements of the online virtual world environment of *Second Life* (SL). Research has suggested that such a learning environment can enhance student engagement through a sense of shared experiences, offers opportunities for collaboration, and provides access to information about the virtual environment and user-created content (FitzGerald, 2007). Users of SL are represented through their virtual avatars, and research on pedagogical agents has found that the presence of avatars can increase engagement and learning beyond computer-mediated communication without such agents (Atkinson et al., 2005). Learners can now inhabit a broader landscape, and we are previewing the emergence of *homo virtualis*.

Research on shared virtual environments (SVEs) and on collaborative virtual environments (CVEs) is particularly relevant to our concerns because this research examines participants' sense of presence, co-presence, and place-presence. Three-dimensional virtual worlds such as SL provide both synchronous and asynchronous collaboration environments and, compared to text-based online learning settings, create an enriched sense of place with the visual projection of oneself and other individuals. Collaboration can occur because SL virtual technology provides conditions for an experiential, embodied, and social reality, and this social reality provides a virtual "new space" wherein existing communication practices and social networking tools are converging. As Stahl et al. (2006) have argued: "CSCL [computer-supported collaborative learning] requires a focus on the meaning-making practices of collaborating groups and on the design of technological artifacts to mediate interaction" (p. 409). In SL, the participants themselves, as users, can become the creators of content, that is, of the artifacts that mediate their own interaction and learning, *homo virtualis*.

The construct of *the self*, that which experiences its own embodiment, can be both persistent and mutable. For example, as humans, we regularly "attach" tools to ourselves to extend our abilities beyond normal human-scale reach; a hammer attached to a hand leverages greater force, and a user "attached to" the Internet connects virtually with an online course. Gibson (1986) suggests that "the *boundary* between the animal and the environment is not fixed at the surface of the skin but can *shift*" (p. 41). Similarly, logging-in to the SL platform (attaching to it) provides users with a set of 3-D *sensory-orthotics* including robust camera controls, navigation capabilities (e.g., flying, teleporting, walking underwater), and the ability to create completely new virtual objects. These capabilities comprise embodied experiences for the user, and in interesting ways, the perceived boundary of the embodied self shifts from skin-bound into the highly extendible and socially-constructed world within and with which users *dwell* in SL (see Polanyi, 1966; and see *extensible self* in Adams, 2005).

Without the experience of actual immersion, conceptualizing a 3-D virtual world environment like SL can be a challenge. It is helpful to think of two co-evolving systems, one social and the other technical (Jarmon, 2009). The social system includes the users, the entire SL community of residents, and includes their extensions in real life. The technical system includes the SL software, the individual computer and Internet connection of each user, and the vast expanse of virtual simulations that comprise the SL metaverse (a combination of the real world with the virtual world). One approach for considering the development of the social system of SL is to view it as "constellations of interconnected practices," multiple communities of practice that are related depending on the perspective one adopts (Wenger, 1998; p. 127). Because of the co-evolution of both the technology and the social systems, SL is inherently a *learning organization* (Senge, 1993).

Suchman's research on human-machine communication has provided a useful framework whereby researchers can explore the relationships between everyday embodied communicative practices and the design of the *socio-technical systems* in which they can occur (Suchman 1987; 2002). The construct of embodiment and learning is of great interest to researchers when explored through the lens of the interactions of people's avatars with virtual objects, landscapes, sounds, and spatial constructs. Furthermore, the individual SL user's connectivity within the socio-technical system includes interacting with other people via their avatars, using a computer, monitor screen, keyboard, headset, and computer mouse with hands, body, and mind. All these elements also become parts of an extended system of experience and interaction, and they constitute, following Lave and Wenger, what might be called a complex situated learning environment (Lave & Wenger, 1991). Similarly, Siobhán Thomas, in his study of hybrid games (2006), uses a similar concept for describing what he calls pervasive learning games, and he suggests that what is most important is "not the use of so-called pervasive technologies but the social processes that connect learners to communities of devices, people, and situations (p. 42).

For example, the Educators Coop (signifying both *co-op* and a *space of close proximity*) is a three dimensional virtual world residential community of university faculty, librarians, and K-12 teachers actively teaching or conducting research in SL. Participants are from 42 different educational institutions and the large majority first met one another and have only known one another virtually. They meet regularly in SL to share virtual world teaching strategies, to design virtual world and real world research projects, to collaborate on interdisciplinary conference sessions, and most importantly, to create a support system for geospatially separated academic practitioners interested in teaching and conducting research in virtual worlds (Jarmon & Sanchez, 2008).

Preliminary results indicate that these researchers and educators are using the virtual world in very practical and concrete ways to carry out research and educational projects collaboratively. In other words,

the diverse participants in the virtual Educators Coop community, their students, and their guests, create what Gee has called "cross-functional affiliations" (2007, p. 327). They have their real life and virtual areas of specialization, but they also collaborate and share their knowledge and resources. According to de Nood and Attema (2006), in open-ended online simulations such as SL, the:

> … distinction between the physical (real) world and the virtual world tends to disappear. As the distinction between these two worlds fades in the experience of the visitors, one speaks of 'inter-reality.' When these virtual worlds continue to grow and develop, they would then seem to offer practically unexplored opportunities for our society, in economic, cultural and social terms. (p. 3)

Exploring the concept of what it might mean to be "virtually co-present" presents a number of very complex challenges, and this theme cannot be fully addressed here. While in some ways similar to real life face-to-face interaction in that virtual participants seem to be improvising on real life communicative practices (and as yet the relationship between the "real" and the "virtual" is far from being clearly understood), virtual face-to-face interaction, generally, involves an ecology of actions including chat and speech, virtual movement and alignment, virtual gaze direction, virtual touch, virtual proximity, and a whole range of multimodal communicative resources (including channel-availability and access) and their relationship with one another as they unfold in real time and asynchronously (for face-to-face ecology of interaction see, e.g., Goodwin, 1986; Jarmon, 1996).

Researchers examining collaborative virtual environments are particularly interested in the relationship between co-presence, the sense of being with other people, and place-presence, the feeling that a virtual environment is a place (Steed et al., 1999). To measure co-presence and place-presence, experiments are conducted with small groups of participants where they are typically asked to perform a short problem-based task such as solving a puzzle (Sonnenwald, 2006). The act of solving a puzzle is thought to give participants a shared experience, which in turn leads them to report higher feelings of co-presence with one another. As Myers (1999) points out, "The process of simulation is intrinsically related to the process of play"(p. 486).

However, it is the experience of embodied social connection with others and the immediacy of social co-presence that users repeatedly reference, and these interactions suggest sites for future research. Educators and learners in SL may experience a new sense of connection with others, with their professional networks, with organizations, and thus not feel so isolated in their work or social life. Another approach to understand co-presence that is based on the principles of embodied cognition (Riva, et al., 2006) defines presence as the "non-mediated perception of successfully transforming an intention into action," rather than a notion that persons are physically occupying the same geographical space. A 2009 study (Jarmon, et al.) found that some students reported that the three-dimensionality of the SL environment facilitated the sense of personal presence and tangible experiences as factors that enhanced learning. For example, here are some comments the students made during a focus group about their class experiences in SL:

> Yeah, the embodiment of it [SL]. You generally somehow do feel more like a human being.

> The other thing about SL is that I think it can enhance learning, is that it's very evocative. Like, if you had to build the model of those Alley Flats [in the real world] you never would have been able to capture the alley with like those pigeons, the papers blowing in the wind and everything. And especially with those big screens [virtual images of Austin skyline]. *I just felt I was there. And so I had a very visceral connection to what was being built.* I don't think you can get that in a model or anywhere except real life or virtual reality. (italics added for emphasis).

In addition, this extended sense of co-presence in a virtual world may have real life health-education implications for people. Health researchers Gorini et al. (2008) have studied online technology and health issues and they suggest that:

> … compared with conventional telehealth applications such as emails, chat, and videoconferences, the interaction between real and 3-D virtual worlds may convey greater feelings of presence, facilitate the clinical communication process, positively influence group processes and cohesiveness in group-based therapies, and foster higher levels of interpersonal trust between therapists and patients. (p. 2)

A user's ability to view or observe his/her own avatar while engaged in interaction adds an additional perspective to research on virtual co-presence, embodiment, and learning. Recent research in neuroscience and psychology has suggested that a network of mirror neurons in the human brain constitutes an experiential "simulation" and provides the basis for empathic understanding of one another in interpersonal relationships and thus in collaboration (Gallese, Eagle & Migone, 2007; Freedberg & Gallese, 2007). This research may have critical implications for some special needs populations as well as athletes and older adults. For example, stroke victims visiting the protected virtual area in SL for people with disabilities called SL Dreams have reported that the experience of seeing themselves walking aided in their recovery (Stein, 2007).

A better understanding of virtual co-presence has worldwide implications with clear relevance for the education industry globally. The European Community has appropriated funding for 2002 through 2013 for a research initiative aimed at continuing the study of presence but to also include presence engineering: the deliberate manipulation of technological and non-technological factors to create those forms of presence that enhance users in primary activities. Moreover, it enlarges the scope and ambition to mixed realities, to social interaction, to persistent effects and to a wider range of technologies, including mobile and low-end ones. (Information Society Technologies, 2009).

For purposes of analysis, it is important for researchers to begin to make some distinctions between various participation levels regarding SL. The experience of embodiment and co-presence with others is in many ways driven by these distinctions, and much of the talk about education in virtual worlds often fails to take into account students' degree of entry into the virtual world in terms of both duration and frequency. For now, however, at one end of the spectrum and speaking generally, some learners may only read or hear about SL but never actually log in to the online program, and this level of participation can be considered to be minimal at best, because their understanding of a "virtual world" is not based on first-hand experience.

Second, as may be the case for a number of educators and students, virtual activities in a class may be mediated through the instructor and his/her avatar in SL by way of the projection of the laptop's monitor onto a large screen in the classroom. Although students may be able to watch and hear the interaction with others through an instructor's avatar, these students had no agency themselves; however, they may have experienced some minimal degree of co-presence or participation in the virtual world. Third, in many virtual learning activities, students log into the SL program on their own and may began to experience participation levels with a fuller sense of personal agency. Finally, depending on both the duration of time spent in SL and the frequency of students' visits to SL, the probability increases that they may experience a sense of fuller participation, agency, and co-presence with others. This discrepancy of degrees of participation in SL can influence how students respond to survey questions and can impact educational research findings accordingly.

In conclusion, user acceptance of 3-D virtual world environments may be one of the most critical challenges to overcome (Fetscherin & Lattemann, 2007, p. 20). The fact that there is no predefined structure on how to use virtual worlds suggests how critical instructional design can be to facilitate learning in such environments (Mayrath et al., 2007; Sanchez, 2007). Lynch and Tunstall (2008) have suggested that projects attempting to develop educational simulation games require a development framework and design process that is integrated into course design, is engaging, relevant, useful for students, and is flexible, cost effective, and reusable (p. 383). More basic research is needed to demonstrate how effective learning activities are being designed in virtual spaces and how virtual space are influencing what we imagine *education* itself will become.

Effective applications in SL will result from educators developing skillful mental flexibility and a deeper understanding of other perspectives, of underlying worldviews, of virtual artifacts, including new technologies, and of the special affordances of virtual space. Just as people's exposure to the alphabet can pull them into a new landscape inhabited by their empowered literate-selves (Waiba, 2009), so does exposure to the virtual world pull us into a broader landscape where "real life" plus "virtual life" yields a reality that is rapidly growing more vast and that is inhabited by – and being created by - *homo virtualis*.

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