

Distance Learning Exchange

The Role of Immersive Media in Online Education

Stephen C. Bronack

Abstract. An increasing number of educators are integrating immersive media into core course offerings. Virtual worlds, serious games, simulations, and augmented reality are enabling students and instructors to connect with content and with one another in novel ways. As a result, many are investigating the new affordances these media provide and the impact each is having on important pedagogical constructs such as presence, immediacy, and immersion. New models for designing, delivering, and facilitating instruction are emerging, many with a particular eye toward supporting adult and continuing learners in the 21st century.

Keywords. immersive media; online learning; games; simulations; virtual worlds; augmented reality; adult learning

Learning is a social act, occurring through collaborative activity among more- and less-capable peers (Vygotsky, 1978). Creating socially supportive structures for learning is particularly important when working with adults (Foley, 1995). Emerging media—such as simulations, serious games, virtual worlds, and augmented reality—are enabling a level of immersion previously unavailable to both traditional and distance educators. Immersive media are those that enable a deep sense of social or physical presence, typically via a combination of high-resolution visuals and realistic sounds (Isgro, Trucco, Kauff, & Schreer, 2004). An increased sense of presence, even when physically separate from one another, allows instructional designers to deepen and extend the pedagogical constructs that situate learning (Lave & Wenger, 1991), particularly within lived experiences (Crowther, Maclachlan, & Tett, 2010).

As Johnson and Levine (2008) note, the idea of immersive learning is not a new one. Indeed, for as long as we've been learning from and with one another, educators have connected learners and content through approaches ranging from apprenticeships to storytelling. What is

new, however, are the myriad and rich media teachers and learners have at their disposal today to seek and to create engaging, meaningful contexts for learning and to support the development of a distributed community of inquiry (McKerlich & Anderson, 2007). Some may question whether mediated immersion techniques are better suited for a generation of students not typically enrolled in continuing higher education. However, according to a leading industry research firm, nearly all active Internet users today have developed some type of mediated identity (Gartner, 2007). In fact, many platforms for immersive media—such as cell phones and game consoles—may be more prevalent among adults than youth, although adults tend not to use as many functions of the devices they own compared to youth with similar devices (Zickuhr, 2011).

Immersive Media for Learning

There are many today who are exploring the use of immersive media to help others learn, some with high degrees of success, particularly in nontraditional spaces. For example, Heldal et al. (2005) note that those engaged in collaborative learning tasks via immersive media

perform as well—and sometimes better—than those in both nonimmersive and even face-to-face conditions. Having the opportunity not only to participate in interaction but also to become aware of the artifacts and residue of others' interactions is an essential element of effective online instruction. By enabling a sense of presence and immediacy typically unavailable in both traditional face-to-face and Web-based instructional environments, immersive media are helping continuing and higher education professionals provide high-quality, interaction-rich learning experiences to a broader population of learners (Hutchins, 2003). For instance, Russo and Benson (2005) suggest students' perceptions of the presence of other students and of the instructor in an online class are significantly related to students' positive attitudes toward the course and the level of satisfaction with their own processes of learning. The following sections briefly describe four categories of immersive media.

Simulations

Simulations are constructed events designed to afford realistic approximations of experiences that either are too difficult, too expensive, or too dangerous to provide otherwise. The most established of the immersive media categories, simulations have been used effectively to train pilots (Hays, Jacobs, Prince, & Salas, 1992), soldiers (Macedonia, 2002), and even teachers (Dieker, Hynes, Hughes, & Smith, 2008). Vogel et al. (2006) note in their meta-analysis that game- and simulation-based learning approaches generally result in higher cognitive gains among students compared to traditional approaches.

Serious Games

Serious games—that is, the use of games and game play constructs toward utilitarian goals—are one of the fastest-growing areas in immersive educational media today. As part of the overall multibillion dollar video game industry, serious games no longer are confined to military training labs. For example, games such as *Immune Attack* (Federation of American Scientists, 2006) and the *Diabetic Dog Game* (Nobel Media, 2011) engage K–12 students in science-based game play aimed toward learning practical information outside of the game itself. Some have noted, however, that although video games are a common and effective platform for informal learning through play, many remain skeptical and are reticent to incorporate them more fully into our formal educational spaces (Annetta, 2008).

Virtual Worlds

Virtual worlds are persistent online social spaces where users represent themselves and interact with one another via avatars. In many ways, virtual worlds are similar to video games and share a common ancestry with massively multiplayer online (MMO) and multiuser domain (MUD) games. However, unlike games, virtual worlds focus more on supporting social interaction and enabling users to create the worldst hey occupy. For many, these “generative qualities” (Kluge & Riley, 2008) are what make virtual worlds an attractive immersive media for teaching and learning. The ability for users to create components of their own world is a key differentiator between those virtual environments that grow into vibrant communities and those that fade into the ether (Kohler, Matzler, Hutter, Thiemann, & Fuller, 2011).

Augmented Reality

Augmented reality combines place- and network-based information to provide an enhanced view of the physical world around us. Though still several years from common use (Johnson, Smith, Willis, Levine, & Haywood, 2011), augmented reality offers opportunities both to describe and to experience the world in which we live (O'Shea, 2011). From an instructional standpoint, augmented reality supports activities such as games, quests, and other explorations that actively engage learners in rich spaces for learning. Software such as Layar and Wikitude allow developers to create augmented reality experiences delivered to mobile devices such as handhelds and smartphones. Examples of augmented reality learning programs include Alien Contact! (Handheld Augmented Reality Project, 2008) and Bike Box (ARIS games, 2010).

Presence, Immediacy, and Immersion

Whereas each of these categories of immersive media includes sophisticated and engaging tools for distance educators and learners, it is not the tools, themselves, that are important. Rather, it is the pedagogical approaches and psychological constructs each enables that matter most. Dede (1995) notes that the most compelling of these includes: presence, immediacy, and immersion.

Presence

Presence has been defined as the sense of “being there,” when “there” is a mediated space, such as a virtual world, simulation, or game. Heeter (1992) suggests

there are three dimensions of presence: personal, social, and environmental. Social presence (often referred to as copresence) is the extension of personal presence to include not only the method of being in a mediate place but also the sense of being in that place with others (Zhao, 2003). Environmental presence is the degree to which the mediated space reacts to the presence of those participating within it. Personal presence has been related to lower-level learning objective achievement, whereas social presence seems to foster higher-level objective achievement (Selverian & Hwang, 2003). Bente, Ruggenberg, Kramer, and Eschenburg (2008) suggest that immersive media are more effective in supporting social presence, trust, attention, and overall communication quality when compared to less-immersive media, such as text-based chats. When employed effectively in higher education courses, immersive media can enable a sense of “teaching presence” that is related significantly with students’ recognition of learning community and instructional direction (Shea, Swan, Li, & Pickett, 2005).

Immediacy

Immediacy has been defined as actions that foster a sense of proximity or psychological closeness through the use of both verbal and nonverbal cues (Gorham, 1990; Mehrabian, 1971). The idea that instructional immediacy plays a significant role in creating the conditions for effective learning is not a new one (e.g., Andersen, 1979), nor is it unique only to mediated learning environments. Researchers have suggested that a positive relationship exists between instructional immediacy and cognitive learning (Rodriguez, Plax, & Kearney, 1996; Witt, Wheelless, & Allen, 2004) as well as college student class attendance (Rocca, 2004). Some have suggested verbal cues are more relevant to online learning than nonverbal cues due to accessibility factors (Freitas, Myers, & Avtgis, 1998) and that the design of computer-based learning environments can both promote and inhibit the perception of instructional immediacy (LaRose & Whitten, 2000; Swan, 2001). Immersive, presence-based media can help reintroduce nonverbal cues into our online learning spaces, ameliorating some of the accessibility concerns noted earlier.

Immersion

Immersion is the combination of both physical and symbolic cues to provide a “comprehensive, realistic experience” that causes a person to suspend disbelief that he or she is actually situated within a mediated space (Dede, 1996, 2009). As Savin-Baden (2010) points out, the kind of immersion effect that technologies such as

virtual worlds, games, simulations, and augmented reality enable can be both liberating and debilitating. Challenges include a lack of fidelity to physical settings, difficulty achieving high quality immersion, and potential aftereffects like motion sickness (Loomis, Blascovich, & Beall, 1999). Benefits include enabling multiple or otherwise unavailable perspectives, a high degree of “situatedness” in learning activities, and potential opportunities for effective transfer of knowledge (Dede, 2009).

Conclusion

Integrating immersive media into online learning is not a new solution to an old problem. It is a new solution to a new problem, an opportunity to do things otherwise impossible. Immersive media help us reintroduce into our online environments some of the most powerful pedagogical tools we have used in our traditional educational spaces but have struggled to transfer into our online ones. As we continue to use immersive media to add the social and our “selves” back into our online educational efforts, we need to do so with an understanding of how both teachers and learners create, utilize, and ultimately blend their mediated selves with their corporeal ones. Already, new pedagogical models are emerging that focus on game-based learning (Gee, 2007), simulation-based learning (Gibson, Aldrich, & Prensky, 2007), and virtual world-based learning (Bronack et al., 2008). As the technologies mature, so will the models. The result? A broadened spectrum of approaches and opportunities to support meaningful learning in continuing and higher education and the development of all those who seek new knowledge and skills, regardless of geography.

References

- Andersen, J. F. (1979). Teacher immediacy as a predictor of teaching effectiveness. In D. Nimmo (Ed.), *Communication Yearbook 3* (pp. 543–559). New Brunswick, NJ: Transaction Books.
- Annetta, L. A. (2008). Video games in education: Why they should be used and how they are being used. *Theory Into Practice, 47*(3), 229–239.
- Aris Games. (2010). *Bike box*. Retrieved from <http://arigsawes.org/featured/the-bike-box/>
- Bente, G., Ruggenberg, S., Kramer, N., & Eschenburg, F. (2008). Avatar-mediated networking: Increasing social presence and interpersonal trust in net-based collaborations. *Human Communication Research, 34*(2), 287–318.

- Bronack, S., Sanders, R., Cheney, A., Riedl, R., Tashner, J., & Matzen, N. (2008). Presence pedagogy: Teaching and learning in a 3D immersive world. *International Journal of Teaching and Learning in Higher Education*, 20(1), 59–69.
- Crowther, J., Maclachlan, K., & Tett, L. (2010). Adult literacy, learning identities and pedagogic practice. *International Journal of Lifelong Education*, 29(6), 651–664.
- Dede, C. (1995). The evolution of constructivist learning environments: Immersion in distributed virtual worlds. *Educational Technology*, 35(5), 46–52.
- Dede, C. (1996). The evolution of constructivist learning environments: Immersion in distributed, virtual worlds. In B. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 165–175). Englewood Cliffs, NJ: Educational Technology.
- Dede, C. (2009). Immersive interfaces for engagement and learning. *Science*, 323(5910), 66–69.
- Dieker, L., Hynes, M., Hughes, C., & Smith, E. (2008). Implications of mixed reality and simulation technologies on special education and teacher preparation. *Focus on Exceptional Children*, 40(6), 1–20.
- Federation of American Scientists. (2006). *Immune attack*. Retrieved from <http://www.fas.org/immuneattack/>
- Foley, G. (1995). Teaching adults. In G. Foley (Ed.), *Understanding adult education and training* (pp. 31–53). Sydney, Australia: Allen and Unwin.
- Freitas, A., Myers, S., & Avtgis, T. (1998). Student perceptions of instructor immediacy in conventional and distributed classrooms. *Communication Education*, 47, 366–372.
- Gartner Research. (2007). *Gartner says 80 percent of active internet users will have a "second life" in a virtual world by the end of 2011* [press release], April 24, 2007. Retrieved from <http://www.gartner.com/it/page.jsp?id=503861>
- Gee, J. Research. (2007). *Good video games + good learning*. New York, NY: Peter Lang.
- Gibson, D., Aldrich, C. & Prensky, M., (2007). *Games and simulations in online learning: research and development frameworks*. Hershey, PA: Information Science.
- Gorham, J. (1990). The relationship between verbal teacher immediacy behaviors and student learning. *Communication Education*, 37, 40–53.
- Handheld Augmented Reality Project. (2008). *Alien contact!* Retrieved from <http://storify.com/skateice0822/alien-contact>
- Hays, R., Jacobs, J., Prince, C., & Salas, E. (1992). Flight simulator training effectiveness: A meta-analysis. *Military Psychology*, 4(2), 63–74.
- Heeter, C. (1992). Being there: The subjective experience of presence. *Presence*, 1(2), 262–271.
- Heldal, I., Schroeder, R., Steed, A., Axelsson, A., Sponte, M., & Wideström, J. (2005). Immersiveness and symmetry in copresent scenarios. In B. Frohlich, S. Julier, & H. Takemura (Eds.), *Proceedings of IEEE Virtual Reality Conference 2005* (VR '05) (p. 311). Bonn, Germany: IEEE Computer Society Press.
- Hutchins, H. M. (2003). Instructional immediacy and the seven principles: Strategies for facilitating online courses. *Online Journal of Distance Learning Administration*, 6(3), 1–13.
- Isgro, F., Trucco, E., Kauff, P., & Schreer, O. (2004). Three-dimensional image processing in the future of immersive media. *IEEE Transactions on Circuits and Systems for Video Technology*, 14(3), 288–303.
- Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K. (2011). *The 2011 horizon report*. Austin, TX: The New Media Consortium.
- Johnson, L. E., & Levine, A. H. (2008). Virtual worlds: Inherently immersive, highly social learning spaces. *Theory Into Practice*, 47(2), 161–170.
- Kluge, S., & Riley, L. (2008). Teaching in 3D-virtual worlds: Opportunities and challenges. *Issues in Informing Science and Information Technology*, 5(1), 127–135.
- Kohler, T., Matzler, K., Hutter, K., Thiemann, R., & Fuller, J. (2011). Experience design for communities in virtual worlds: Come for the attraction, stay for the interaction. *International Journal of Web-based Communities*, 7(2), 174–188.
- LaRose, R., & Whitten, P. (2000). Re-thinking instructional immediacy for web courses: A social cognitive exploration. *Communication Education*, 49, 320–338.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, MA: Cambridge University Press.
- Loomis, J., Blascovich, J., & Beall, A. (1999). Immersive virtual environment technology as a basic research tool in psychology. *Behavior Research Methods, Instruments, & Computers*, 31(4), 557–564.

- Macedonia, M. (2002). Games soldiers play. *IEEE Spectrum*, 39(3), 32–37.
- McKerlich, R., & Anderson, T. (2007). Community of inquiry and learning in immersive environments. *Journal of Asynchronous Learning Networks*, 11(4), 35–52.
- Mehrabian, A. (1971). *Silent message*. Belmont, NJ: Wadsworth Press.
- Nobel Media. (2011). *Diabetic dog game*. Retrieved from <http://nobelprize.org/educational/medicine/insulin/index.html>
- O'Shea, P. (2011). Augmented reality in education: Current trends. *International Journal of Gaming and Computer-Mediated Simulations*, 3(1), 91–93.
- Rocca, K. (2004). College student attendance: Impact of instructor immediacy and verbal aggression. *Communication Education*, 53(2), 185–195.
- Rodriguez, J. I., Plax, T. G., & Kearney, P. (1996). Clarifying the relationship between teacher nonverbal immediacy and student cognitive learning: Affective learning as the central causal mediator. *Communication Education*, 45, 293–305.
- Russo, T., & Benson, S. (2005). Learning with invisible others: Perceptions of online presence and their relationship to cognitive and affective learning. *Educational Technology & Society*, 8(1), 54–62.
- Savin-Baden, M. (2010). Changelings and shape shifters? Identity play and pedagogical positioning of staff in immersive virtual worlds. *London Review of Education*, 8(1), 25–38.
- Selverian, M., & Hwang, H. (2003). In search of presence: A systematic evaluation of evolving VLEs. *Presence: Teleoperators & Virtual Environments*, 12(5), 512–522.
- Shea, P, Swan, K., Li, C. S., & Pickett, A. (2005). Developing learning community in online asynchronous college courses: The role of teaching presence. *Journal of Asynchronous Learning Networks*, 9(4), 59–82.
- Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education*, 22, 306–331.
- Vogel, J., Vogel, S., Cannon-Bowers, J., Bowers, C., Muse, K., & Wright, M. (2006). Computer gaming and interactive simulations for learning: A meta-analysis. *Journal of Educational Computing Research*, 34(3), 229–243.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Witt, P., Wheelless, L., & Allen, M. (2004). A meta-analytical review of the relationship between teacher immediacy and student learning. *Communication Monographs*, 71(2), 184–207.
- Zhao, S. (2003). Toward a taxonomy of copresence. *Presence: Teleoperators & Virtual Environments*, 12(5), 445–455.
- Zickuhr, K. (2011). Generations and gadgets. *Pew Research Center*. Retrieved from <http://pewinternet.org/Reports/2011/Generations-and-gadgets.aspx>

Copyright of Journal of Continuing Higher Education is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.