Chapter 19
Virtual/Mixed Reality: Next Generational Users of Instructional Tools for K-12 and Higher Education

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ABSTRACT

Use of classroom and online learning and administrative technologies in schools and higher education institutions has grown at an exponential pace. With growth comes expectations by students of using new and emerging technologies to support their learning. Such expectations are due in part to the generational shift from digital immigrant to more students being digital natives, and is particularly true for Gen z/iGen/Centennials (born in 1996 or later). The purpose of the critical review and exploratory case study was to gain insights from 18 instructional designers, information systems professionals, and content/subject matter experts pertaining to the current and future use of virtual/mixed reality technologies for both public and higher education.

INTRODUCTION TO THE ISSUE OF GENERATIONAL EXPECTATIONS OF TECHNOLOGY

In the 20th and 21st centuries, Americans have been classified into different social and cultural groups differentiated by age. Categories include: Gen Z, iGen, or Centennials (hereinafter Gen Z): Born 1996 and later; Millennial or Gen Y: Born 1977 to 1996; Generation X: Born 1965 to 1976; Baby Boomers born 1946 to 1964; and finally, Traditionalists or the Silent Generation, born 1945 and before (Generational Kinetics, n.d.). Two other groups have impacted the fabric of America due to the emergence of technology: digital immigrants and digital natives. Digital immigrants may be uncomfortable or not be as comfortable with technologies as digital natives. Digital natives are very comfortable with virtually everything technological and use these tools routinely in their work and personal lives (Plante, 2012).

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In June of 2015 the number of Millennials, who are digital natives, surpassed the population of baby boomers (U.S. Census Bureau, 2015). Digital natives expect their instructional and administrative tools to include the most up to date technologies (classified as "smart technologies") including virtual/mixed reality (VR/MR) solutions for both ground-based and online education.

In addition to the expectations of technology use by the various cultural groups, certain ethical and health issues surround the use of emerging technologies, especially virtual and mixed reality. Manufacturers of VR and MR have labeled 2016-2017 as the years of virtual and mixed reality systems for the consumer. Questions have surfaced as to the potential health and ethical risks; concerns raised even by a manufacturer of VR headsets. According to Magyari (2016), "…there has been a troubling lack of focus on the health and safety risks associated with strapping a large plastic brick over your eyes. If not properly addressed, oversight could well come back to haunt the fledgling industry…" (p. 1). In a study conducted at the University of California at Los Angles (UCLA) Keck Center for Neurophysics, effects on the brain of using virtual reality could result in a term known as cybersickness (Aghajan et al., 2015). Cybersickness is a theory that posits, "…if there is a mismatch between the sensory input to the inner ear and the eyes, a person will feel motion sickness" (Rebenitsch, 2015, p. 101).

In the UCLA Keck Center study, researchers tested a VR type of simulation on rats to see what effect VR [MR] had on the rats' hippocampal neurons. Researchers found that when exposed to VR, neurons seemed to fire completely at random as if the neurons had no idea where the rat was, and that half of the neurons had shut down (Aghajan et al., 2015). In a UCLA news release, principal investigator (Aghajan) stated, "The neural pattern in virtual reality is substantially different from the activity pattern in the real world. We need to fully understand how virtual reality affects the brain" (Wolpert, 2014, p. 121).

Background: Computer Gaming Drives the Proverbial Bus

Millennial and Gen Z online and traditional ground-based students (in both K-12 and higher education) have technology-use expectations that go beyond traditional classroom-based learning. Education administrators and faculty are challenged to incorporate enhanced instructional applications and tools in the form of AAI/VR/MR for both students and faculty. Millennials and Gen Z students will expect updated technologies due in large part to the popularity of "entertainment-based" AAI/VR and MR computer gaming from Microsoft corporation (Microsoft Mixed Reality, 2017). Entertainment-based computer gaming (including consoles like Xbox, PlayStation, and Wii) is big business. In 2017 the global computer gaming industry generated annual sales of $105 billion dollars (Superdata, 2017).

Beyond sales figures are statistics that may be of interest to educators in deciding whether to incorporate VR/MR technologies into their curricula. Online gaming and VR/MR provides an "ecosystem where players can personalize how they interact with games" (Superdata, 2017). A gender stereotype exists of a gamer being mostly male and a "geek." Almost 50% of all gamers today are female (Superdata, 2017). Virtual reality games account for approximately 70% of total VR revenue from all sectors including business, military, and healthcare. By 2020, gamers will spend approximately $4.5 billion on immersive (AAI/VR/MR) gaming, which is more than 20 times what they spent in 2017 (Superdata, 2017). Given such a level of interest, it may be natural that many Millennial Gen Z students, and even other generations, will want VR/MR technologies in ground-based as well as online classrooms. There are already examples of what can be termed crossover VR/MR "games" that started out as entertainment and could now be classified as "edutainment." Examples of massive multiplayer online roleplaying games (MMORPG) that have AAI/VR as a significant part of the experience for K-12 include the

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