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Designing Instruction and Professional Development to Support Augmented Reality Activities

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ABSTRACT

Advanced technologies are changing the educational and organizational landscape. Technologies such as augmented reality are providing professionals access to technology-enhanced activities that promote greater acquisition of new concepts through immersive learning experiences. Prior research conducted on augmented reality has resulted in findings that demonstrate numerous benefits associated with its use including increasing learner levels of motivation, content knowledge, and critical and problem-solving skills. These tools have been implemented at all levels of education and across a range of professional settings. This article will explore how the inclusion of these tools provide employees access to cutting-edge technologies that promote skill growth and improve efficacy in their professional responsibilities and how fog computing has the capability enhance this technology.

KEYWORDS

Advanced Technologies, Augmented Reality, Curriculum Considerations, Higher Education, K12 Education, Learning Outcomes, Learning Technology, Professional Development, Professional Settings, Training

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INTRODUCTION

The way in which we teach, train, and acquire information has changed dramatically over the last several decades. Classroom settings now commonly contain technologically enhanced activities in which learners and employees are actively engaged via their laptops, computers, and/or mobile devices. Through the advancement of technology, educators and employers are now able to integrate a wider range of resources to supplement and enhance students' and employees' learning gains and levels of motivation and engagement. In fact, Martín-Gutiérrez and Contero (2011) suggested that augmented reality (AR) has been found to improve not only the learning process but may also result in easing the teacher's workload. Additionally, the inclusion of AR could help to enhance learners' levels of enthusiasm toward learning (Abdoli-Sejzi, 2015). However, in order for AR to function effectively and provide seamless user experiences, applications need to include high computational capacity (Salman et al., 2020). Fog computing can be integral to helping AR technology become more usable and sophisticated. Additionally, Salman et al. (2020) explained that "augmented reality applications are computationally intensive and have latency requirements in the range of 15-20 milliseconds. Fog computing addresses these requirements by providing on-demand computing capacity and lower latency by bridging the computational resources closer to the augmented reality devices" (p. 56). Yousefpour et al. (2019) described fog computing as "bridging the gap between the cloud and the internet of technology devices by enabling computing, storage, networking, and data management" (p. 289). They further postulated that this technology has been utilized in academia to address issues of high-bandwidth, ultra-low latency, and privacy concerns.

Abdoli-Seizi (2105) proclaimed that "AR is currently revolutionizing how we educate and learn" (p. 3) and that the creation of these types of learning experiences may be perceived by learners to be more interesting and satisfying. Further, Gold (2018) hypothesized that fog computing technology can provide solutions to vision-blocking problems and in recognizing when a hologram is obstructed in a user's view. By resolving these types of issues, AR can be more effectively integrated into academic curriculum to better prepare students for diverse workforces. Particularly, educators have also expressed that the inclusion of AR into their curriculum promotes student interest and engagement and they perceived these tools as possessing pedagogical value (Tzima et al., 2019). These pedagogical changes may help to meet the unique learning preferences of digital learners who want and may even expect more technologically enhanced learning and training experiences.

Abbas and Admand) (2020) shared positive outcomes have been found with using fog computing and AR in a model of healthcare systems and in using pFogSim. Further, they conducted a study in which they examined an AR application focused on students learning about plants that implemented Fog computing for eight different application placements that also yielded positive results. Indeed, Abdoli-Sejzi (2015) proclaimed that AR is a tool that can have a dramatic impact on contexts that include educational and training experiences. Researchers have discovered immersive learning approaches

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