Chapter 4
Mobile Technologies for Making Meaning in Education: Using Augmented Reality to Connect Learning

Teresa L. Coffman
University of Mary Washington, USA

Mary Beth Klinger
College of Southern Maryland, USA

ABSTRACT

This chapter examines the use of mobile technologies to integrate technology into the classroom environment so that students can experience real-world learning. The use of augmented reality is emphasized to enhance the learning process and provide engaging and authentic student-centered experiences. Using augmented reality, personalized learning is possible that encourages a constructivist approach and where the learning process is the main focus. Students are able to construct knowledge through augmented experiences that support the curricular content and then share this newfound knowledge with others. The use of augmented reality as a cognitive tool can connect learning and allow students to work collaboratively with deeper and higher-level meaning as a result.

DOI: 10.4018/978-1-5225-8106-2.ch004
INTRODUCTION

Educational research has focused on the cognitive and personal context from which educators apply augmented reality (AR) to learning experiences. It is considered a constructivist learning tool and is used to engage students with digital technologies (Dunleavy, 2014; Saidin, Halim, & Yahaya, 2015). AR is able to immerse students in meaningful exchange and provide contextual options for students to interact with the content and their own learning (Azuma, et al, 2001; Dede, 1995; Efstathiou, Kyza, & Georgiou, 2018; Neville, 2010).

Improvements in mobile technologies and other digital tools such as smart phones, tablets, and smart glasses create an opportunity for educators to integrate digital technologies into the teaching and learning process (Chang, Lee, Liang, & Wu, 2013; Dede, 2011; Squire & Klopfer, 2007). Students are able to use virtual reality (VR), augmented reality (AR), and/or mixed (hybrid) reality (MR) to collaborate on authentic, real-world problems and provide solutions, thereby enhancing their own learning in a creative and innovative approach (Dunleavy, Dede, & Mitchell, 2009; Geer & Sweeney, 2012).

While VR and MR are increasing in educational popularity, the focus of this chapter is on augmented reality to connect learning in the classroom with new material and experiences (Carbonell, Saorin, & De la Torre Cantero, 2018). AR is explored throughout this chapter using a social cognitive instructional design and a constructionist model to support student-centered learning experiences. Educators can use the interactive capabilities presented by AR to engage learners, encourage reflection, and support active inquiry as they design instruction to maximize learning (Dunleavy et al., 2009; Mathison & Gabriel, 2012).

The objective of this chapter is to examine the use of augmented reality as a cognitive tool to create authentic learning experiences for students to explore and apply their learning in situated experiences (Brown, Collins, & Duguid, 1989; Dunleavy, 2014). It focuses on the design of instruction to yield a student-centered approach in the creation of augmented reality products. Emphasis is placed on helping students make connections and construct content around their own knowledge and interests in a cooperative learning environment.

BACKGROUND

Augmented reality is the process of superimposing layers of information such as text, video, and/or primary source data on top of a physical object to support or extend the object (Craig, 2013; Curcio, Dipace, & Norlund, 2016). AR is an interactive process. Whether as a user or a creator, learners are interacting with digital information as it relates to a real-world object. Through this interaction, context between what a student is learning and the object itself can create an immersive approach for students to explore the world in an authentic way (Harley, Poitras, Jarrell, Duffy, & Lajoie, 2016). At the same time, new knowledge can be integrated within the learning experience. This creates an opportunity for students to develop new information and practice essential skills in applied ways (Agarwal, Finley, Rose, & Roediger, 2017).

Augmented reality has the potential to create a student-driven design whereby students can solve content specific problems in collaboration with classmates through applied practical experiences that utilize technology to extend the learning experience (Bitter & Corral, 2014). This extension has the potential to transform learning, especially when students take an active role in designing and constructing the virtual augmented product (Bailey, 2019).
Related Content

Pre-Service Teachers’ Perceived Relevance of Educational Technology Course, Digital Performance: Teacher Perceived of Educational Technology
www.igi-global.com/article/pre-service-teachers-perceived-relevance-of-educational-technology-course-digital-performance/236073?camid=4v1a

Edu-ACoCM: Automatic Co-existing Concept Mining from Educational Content
www.igi-global.com/article/edu-acocm/236072?camid=4v1a

Conceptual Possibilities and Restraints in Educational Games
David Richard Moore and E-Ling Hsiao (2014). Educational Technology Use and Design for Improved Learning Opportunities (pp. 139-150).
www.igi-global.com/chapter/conceptual-possibilities-and-restraints-in-educational-games/110058?camid=4v1a

The Impact of Language Use and Academic Integration for International Students: A Comparative Exploration Among Three Universities in the United States and Western Switzerland
www.igi-global.com/article/the-impact-of-language-use-and-academic-integration-for-international-students/244207?camid=4v1a