

Chapter 14

Augmented Reality in Informal Learning Environments: A Music History Exhibition

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ABSTRACT

Augmented reality (AR) allows computer-generated imagery information overlays onto a live real-world environment in real time. Technological advances in mobile computing devices (MCD) such as smart-phones and tablets (internet access, built-in cameras and GPS) made a greater number of AR applications available. This chapter presents the Augmented Reality Musical Gallery (ARMG) exhibition, enhanced by AR. ARMG, focused on twentieth century music history, and aimed at the students from the 2nd Cycle of basic education in Portuguese public schools. In this chapter, the authors introduce AR technology and address topics like constructivism, art education, student motivation, and informal learning environments. They conclude by presenting the first two parts of the ongoing research conducted among a sample group of students contemplating the experiment in an educational context.

INTRODUCTION

New and innovative technologies continue to modify every aspect of home, life and work: the way we communicate, learn, and socialize. Computer technologies are changing the ways we think and make sense of our world (Collins & Halverson, 2009).

While educators may legitimately debate strategies and methods of education, all agree that participation in the world of the 21st century will demand technology competence. Technology is essential in teaching, communications, mathematics and science, and it is no less important in the arts. Technology is an important tool that can improve the educational system, but the challenge of integrating technology into the delivery of educational content remains. Digital technologies, in all areas, can enhance student achievement by addressing introductory and advanced skills, assessment of student progress and student motivation (Assey, 1999).

Presently, Information Technology (IT) has become a ubiquitous component of undergraduate education. The use of computers and mobile computing devices (MCD) in educational context are commonplace in terms of usefulness and acceptance over the past few years – technology has found its place inside and outside the classroom for academic purposes (Sandler, 2010). These MCDs have increased processing power and usability, and are accessible on a large scale, which has significantly contributed to their ease of use and at implementing innovative educational processes in numerous educational institutions and universities (Figueiredo, Gomes, Gomes, & Lopes, 2014).

Augmented Reality (AR) is a technology that combines real-world objects and digital information in real-time. AR, according to Azuma (1997), is a system that features three main characteristics: First, it combines the real and the virtual world; second, allows interaction, and third, it incorporates the possibility of visualizing three-dimensional (3D) digital objects. Early AR experiments date back to the late 1960's and to Ivan Sutherland's work. At present, AR is widely available through mobile computing devices such as smartphones and tablets. According to the 2012 Horizon Report, AR was identified as “an emerging technology with high relevance for teaching and learning and predicted to have a large adoption by 2015 (NMC Horizon Report: 2012 higher education edition, 2012).

Constructivist pedagogical approaches are inherent in most performance-based music courses. Students can apply new knowledge and receive synchronous feedback from teachers. However, knowledge-based courses such as music appreciation, theory, and music history have historically relied on direct instruction and the lecture-model. Technology offers new opportunities to bring constructivist pedagogy to knowledge-based music courses, adding the possibility of autonomous exploration of interactive multimedia content (Keast, 2009) into the teaching-learning process in music history.

This paper introduces the concept and development of the Augmented Reality Musical Gallery (ARMG), focusing an audience of 2nd Cycle of basic education students at Portuguese public schools. ARMG is an interactive exhibition that aims to provide a constructivist pedagogical approach to the music history teaching-learning process and to promote AR technology as a means to deliver educational multimedia content to young students in an informal learning environment. The ultimate exhibition goals are to enhance student motivation towards music history learning and to improve their educational outcomes in music classes.

This paper's organization is the following: Section II introduces how AR technology is used for educational purposes and its major affordances. Section III introduces the concept of the constructivist pedagogic model and the topics of art, motivation and informal learning environments. Section IV describes the concept and development of the ARMG. Section V presents the first and the second part

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