The Viability and Value of Student- and Teacher-Created Augmented Reality Experiences

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ABSTRACT
This paper describes the process and results of a project to incorporate Augmented Reality (AR) technologies and pedagogical approaches into a Virginian elementary school. The process involved training 5th grade teachers on the design and production of narrative-based AR games in order to give them the skills that they could then pass on to their students. This article focuses on describing the training process, the pedagogical approach, and an exploration of the practical issues that arose from this project (e.g. policy and fiscal issues that dictated the choice of technology). The discussion of the results from this effort demonstrates the promise of the approach, and shows the potential for educational practices.

Keywords: Augmented Reality (AR), Educational Games, Educational Technology, Narrative-Based Pedagogies, Teacher Training

INTRODUCTION
Augmented Reality in educational settings has been defined as “games played in the real world with the support of digital devices (PDAs, cell-phones) that create a fictional layer on top of the real world context” (Squire & Jan, 2007, p. 6). Both the 2010 (K12 edition) and 2011 Horizon’s Reports identified Augmented Reality as a medium-term technology for learning (New Media Consortium, 2010 and 2011). For the most part, Augmented Reality Games (ARGs) have traditionally been conducted outdoors with the aid of GPS-enabled handheld computers (O’Shea, Mitchell, Johnson, & Dede, 2009). Efforts underway at the University of Wisconsin, Massachusetts Institute of Technology and Radford University have all focused on using smartphone technology to deliver educational ARGs in outdoor settings.

Before going further, however, it is important to define what is meant by the term “game.” There are numerous definitions of the term. The Merriam-Webster dictionary defines games as activities “engaged in for diversion or amusement” (Merriam-Webster, Inc., 2011), however, the focus in this definition on “diversion or amusement” creates difficulties...
for educational institutions that see this sort of game as a distraction from educational efforts rather than a necessary component of them. Koster (2005), in his book A Theory of Fun for Game Design, dismissively quotes definitions by Roger Caillois (“activity which is… voluntary… uncertain, unproductive, governed by rules, make believe”), Johan Huizinga (“free activity… outside ‘ordinary’ life…”) and Jesper Juul (“a rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable”) but fails to see how any of these are helpful in making games “fun” (p. 12).

There have been several recent efforts to move beyond the view of games as “unproductive” or “diversions”, and to work towards seeing games in a more positive light. For example, McGonigal (2011) quotes Bernard Suits, who defines games as “the voluntary attempt to overcome unnecessary obstacles” (p. 22). Not only is this a more elegant and simple definition than those offered before, it is also a much more educationally sound view of games as it speaks directly to the type of engagement that educators wish to engender in their classrooms.

The question, though, is what kinds of games would be most advantageous to learning environments? This is particularly important given the high-stakes nature of the current accountability movements. Shaffer (2008) takes exception to the underlying foundations of the high-stakes testing movement by saying:

(Young people in the United States today are being prepared – in school and at home – for standardized jobs in a world that will, very soon, punish those who can’t innovate. Our government and our schools have made a noble effort to leave no child behind: to ensure, through standardized testing, that all children make adequate yearly progress in basic reading and math skills. But we can’t ‘skill and drill’ our way to innovation. Standardized testing produces standardized skills. Our standards-driven curriculum, especially in urban schools, is not preparing children to be innovators at the highest technical levels that will pay off most in a high-tech, global economy. (p. 3)

Shaffer’s solution is to propose the creation of a series of epistemic games – games that focus on placing students within the context of a profession in order to learn as they simulate professional practice (see, for example, Shaffer, 2007 or Nash & Shaffer, 2011). In this sense, students learn the skills and knowledge associated with real-world settings rather than though the artificial environment of teacher-lead classrooms. McGonigal (2011) echoes these thoughts. She argues that games create engagement with the content to an extraordinary level – a level that can be recreated in educational settings with the proper tools. In fact, she argues for the concepts associated with ARGs when she says “(i) instead of teetering on the tipping point between games and reality, what if we threw ourselves off the scale and tried something else entirely? What if we decided to use everything we know about game design to fix what’s wrong with reality?” (p. 7). Both McGonigal and Shaffer argue for just the type of experiences that ARGs can be used to create.

AR Elements

Predominantly, educational AR experiences revolve around some sort of central mystery that students must solve either individually or in a group. Through the process of solving this mystery, students utilize a technological medium, such as an iPod Touch, to interact with their environment as they gather virtual data that provides the academic challenges upon which the event is based. In this way, the academic learning is necessary to successfully complete the experience, but it is not the main reason for undertaking the challenge. For example, if students are solving a mystery about aliens that have crashed near their school, they can gather clues about the intention of the aliens by measuring the ratios and proportions of the virtual
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