Chapter 9
Fundamental Design Elements of Pervasive Games for Blended Learning

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ABSTRACT

Though not widely researched or implemented in the field of blended learning, pervasive game frameworks in the alternate and augmented reality game genres are highly relevant to education, particularly in curricula seeking to use blended principles. Key characteristics of alternate and augmented reality games are identified, along with specific game examples, and their applicability to various learning theories including situated learning, guided experiential learning, and integrated thematic instruction. Several learning projects using these frameworks conducted by the Mixed Emerging Technology Integration Lab are described, and the Moving Knowledge Engine delivery system and game engine for pervasive blended learning solutions is outlined. The chapter concludes by discussing future possibilities for implementing pervasive games in blended learning programs to achieve deep, complex learning and high student engagement.

INTRODUCTION

New approaches to learning are emerging almost as fast as new technologies to serve and deliver them. Frameworks for meeting learning and performance objectives must be fast and flexible enough to accommodate both the speed of change and the breadth of new models. The level of complexity entailed, as a designer, to make something simple and well tuned to the learning needs of a particular audience requires the integration of multiple disciplines and tool sets. Meeting the learner's needs

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within the context of their role is a key tenet of situated learning and often vital for professional education, where blended learning practices are frequently deployed. The opportunity to use location and other contextual elements to meet learning and performance outcomes can be seen in the disciplines of augmented reality, alternate reality games, mobile learning games, and other location-based learning initiatives.

Research and implementation in the field of blended learning has primarily focused on the domain of eLearning, perhaps combined with traditional classroom instruction, but the intersection of blended learning with games research and design has been minimal. In this chapter we will discuss the significance to blended learning in one specific subset of digital gaming, the field of technologically enabled pervasive games, with a focus on technologically enabled solutions in the alternate reality game (ARG) and augmented reality game genres. This chapter will highlight several models and examples and provide case-based information on several approaches that have proven effective. Details of past examples and the theoretical underpinnings will also be presented, along with future research directions and recommendations.

We will begin by providing brief background information on the field of pervasive gaming in general, as well as some foundational research on the use of games for learning. In the following section, we will describe alternate and augmented reality games in more detail, identifying their key design features, how they are pervasive, and briefly describe several notable examples of each type. As much work in pervasive gaming is outside the education space, we have provided both general examples to further describe the general history and frameworks of these games, but also follow up with more examples specifically from the learning space.

Following these sections, we will discuss several of the projects our Mixed Emerging Technology Integration Lab has implemented using conceptual frameworks from alternate and augmented reality gaming. Project descriptions are followed by a discussion of our Moving Knowledge engine that provides technical capability for automated and learner-triggered content delivery across platforms and formats, which can be deployed for direct learning content as well as narrative scaffolding for complex training game frameworks.

The chapter will close with a discussion of how these design and technology solution frameworks fit into the overall concept of blended learning, and may illuminate potential for expanding and transforming existing content into new educational techniques, along with augmenting curricula and programs with discrete game exercises. We discuss how these pervasive game frameworks enable blended learning programs across platforms, formats, and learning theories, and ways to leverage simple and inexpensive techniques and technologies to accomplish these solutions.

BACKGROUND

Pervasive Games

Pervasive games are a broad and often contested category. We define them here as games structured to cross temporal, location, and medium boundaries, "pervading" multiple types and spaces of play; this identifies pervasive gaming according to its foundational thought processes and blended design approaches, as well as their social components (Montola, 2005; Stenros, Montola, & Mäyrä, 2007) rather than defining them strictly according to certain types of delivery technologies (Nieuwdorp, 2005; Walther, 2005). Pervasive games exist on a continuum of digital and physical, with some games focused almost entirely on players moving in and interacting with physical locations as in *The Go Game* while others, including some alternate reality games like *Majestic,* may exist entirely online. Play spaces crossed or mixed through pervasive games may be blending