Chapter 4.18

Leveraging the Affordances of an Electronic Game to Meet Instructional Goals

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ABSTRACT

Electronic games have the potential to support learning by doing and enhance student motivation. However, there is little guidance in the literature on how to leverage the affordances of electronic games to design effective instruction. This chapter is our effort to start to accumulate knowledge to guide the design of electronic educational games. We present a case study describing how the unique components of electronic games enabled the design of Conquest of Coastlands, a learning environment delivered as an electronic game. We describe how our team synthesized two sets of design principles from the literature on electronic games, instructional design, and intrinsic motivation and how these principles informed the design of Conquest of Coastlands. The principles and the related case study may inform the design of future electronic educational games and generate research questions to be investigated in empirical research.

INTRODUCTION

The Federation of American Scientists (FAS) released a report in October 2006, proposing digital games as a solution to reshape education (2006). The report lists a series of research and

development challenges. One main area of challenges focuses on the design of games for learning. How can we design games that contribute to instructional goals? To answer this question, we need to understand the affordances (Gibson, 1977) of the electronic games, the potential and possibilities that the media may offer to enable effective learning.

Electronic games have two affordances for impacting learning: the promise to support learning by doing (Kirriemuir & McFarlane, 2003) and the motivational effects of games. Supporters of electronic educational games emphasize the potential of electronic games in providing simulated real world experiences. Squire (2006) considers game playing as designed experience, in which students learn through participating and performing in the game world. Gee (2007) states that the games that he is interested in "are digital simulations of worlds that are 'played' in the sense that a player has a surrogate or surrogates through which the player can act within and on the simulation" (p. 1). These are epistemic games (Shaffer & Gee, in press) in which learners play the role of professionals such as engineers, urban planners, journalists, or lawyers in authentic simulations of a society. It is argued that these games help learners develop ways of thinking and knowing valued by respective professions.

Advocates of electronic educational games often cite the work on intrinsic motivation to support the use of games in education. Psychologists (Lepper & Malone, 1987; Malone, 1981) analyzed computer games and identified a list of elements that are motivating, including challenge, curiosity, fantasy, and control. Flow (Csikszentmihalyi, 1991) is another theory related to motivation. It describes a sense of control, deep engagement, and exhilaration when one is involved in an optimal experience. Research shows that intrinsic motivation and flow positively contribute to learning (Cordova & Lepper, 1996; Csikszentmihalyi, 1991; Hektner & Csikszentmihalyi, 1996).

These views provide valuable insights on the effective dimensions of electronic games in education. However, how do instructional designers transform the two affordances of electronic games to enhance motivation and simulated experience into effective design of instruction? How should elements of electronic games be designed to meet instructional goals? This chapter explores these questions by presenting a case study of how the unique components of electronic games enabled the design of Conquest of Coastlands, a learning environment delivered as an electronic game.

This chapter starts with a theoretical framework that identifies the components of electronic games and describes two instructional design models and a motivation theory, all of which are guiding the design of our learning environment. Then, it presents an overview of the game and the quest that we are developing. Next, it describes the instructional elements identified for the quest and discusses how we leverage two affordances of the game to support effective instructional design.

THEORECTICAL FRAMEWORK

Components of Electronic Games

Electronic games usually have two components: story and game play. Although some game designers argue that story is not a necessary element in all games, we consider it a key element in electronic educational games (Williams, Ma, Prejean, & Richard, in press). A story in an electronic game consists of characters, settings (context), and events (plots) (Stapleton & Hughes, 2006). Characters act to pursue the object of their desire or motivation. This action constitutes the plot. In the course of their pursuit or quest, characters encounter obstacles or problems that interfere with their achieving of the goal. This is the source of conflict, which is the essence of drama. Characters seek solutions to problems and take action to overcome obstacles. The drama consists of the ongoing friction between the characters' motives,

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