

# Chapter 8

## Bridging Research and Game Development: A Learning Games Design Model for Multi-Game Projects

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### ABSTRACT

*Over the past 20 years, instructional designers in the Learning Games Lab at New Mexico State University have developed a design model for game development that brings researchers, educators, and game developers together throughout the design process. Using this approach, game developers and content experts (a) work collaboratively to ensure educational goals and outcomes are appropriate for the learner and the learning environment, (b) immerse themselves in both content and game design, and (c) test extensively throughout development with members of the target audience. In this chapter, the authors describe the model as it was used in development of several math games during a four-year development cycle for the Math Snacks project. They discuss the implications of this approach for the creation of other educational games or suites of games and share recommendations for expansion of the model to other developers.*

### INTRODUCTION

Interactive media designers at New Mexico State University (NMSU) have refined a process for creating educational games during their 20 years of educational and serious games development. Through their experiences they have defined a

*Learning Games Design Model* in which game developers (programmers, artists, writers, and project managers) and content experts (educators, instructional designers, and researchers) work collaboratively throughout the game design process (Chamberlin, Trespalacios & Gallagher, 2012). Under the *Learning Games Design Model*, mem-

DOI: 10.4018/978-1-4666-6102-8.ch008

bers of both groups collaborate early in the process, and all team members are given responsibility for both game design and educational outcomes. All members of the design team (usually six to 12 individuals) work together to understand the content and to refine educational objectives and adjust them to gameplay mechanics. The team uses extensive formative evaluation during the design process. Because of this dual immersion approach, content specialists are better able to embrace all aspects of gameplay in working towards educational goals, and game developers can design and revise gameplay while keeping educational objectives a priority.

Usually, the development team works on one game at a time, with a content expert, educator and game developers (including an instructional designer, animators and programmers). Most recently, the team has completed a four-year cycle of development during which they worked from an extensive list of educational objectives for the sixth-grade math learner. As with other projects that employed the *Learning Games Design Model*, the *Math Snacks* project team started with research to shape their objectives and target audience, convened a team of educators, math education content specialists, and game developers to work towards game development goals. Funded by the National Science Foundation, the team was granted five years to complete the project, including initial research on learning needs (the gaps in mathematics understanding for sixth grade students), development of learning tools (ultimately, six animations, five games and related learning materials) and research on effectiveness and use of those tools. This longer design period meant that — unlike previous game development projects at NMSU’s Learning Games Lab in which only one game was designed at a time — the *Math Snacks* design team produced many related games, animations and learning tools from *one* extensive list of objectives, with *one* design team. Though some members of the design team left the project, or joined the project during the

design period, the majority of the team stayed the same, working together over many years. This longer-term, complex project serves as a model for other game developers, working with similar content over several game designs.

## BACKGROUND

Educational games are fundamentally different from games created to “entertain.” While most game developers want educational games to be entertaining to attract and retain the target audience, these games are meant to create lasting behavior or knowledge change that will outlive the gaming experience. Yet, there is an explicit concern that efforts to promote effective design models for creating educational video games are lacking (Bjork & Holopainen, 2005; Shafer et al., 2005). As Salen and Zimmerman (2006) mentioned, game designers or design teams have unique processes to elaborate video games; however, little is offered in the literature regarding instructional design models for creating video games with educational purposes (Watson, 2007), or what literature calls *serious games* (Kankaanranta & Neittaanmaki, 2009), *epistemic games* (Shafer et al., 2005), or *instructional games* (Hirumi et al., 2010a). This may be because the design of these types of games is a complex process (Gunter et al., 2008; Hirumi et al., 2010b; Murphy et al., 2011). While game designers or design teams offer distinctive approaches to video game development, the relevance of an iterative design process in video game creation is undeniable (Adams & Rollings, 2007; Bates, 2004; Salen & Zimmerman, 2004, 2006).

Game design involves groups of people with different academic backgrounds (Hunicke et al., 2004; Tang & Hanneghan, 2011). Development of educational and serious games is often done in an environment in which instructional designers or content specialists establish educational goals and possibly even begin game development, then employ a development team to create the game.

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