

## Chapter 5

# Finding and Evaluating Great Educational Games

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### ABSTRACT

*Digital games are increasingly being used as educational tools. They are intrinsically motivating for many students and offer a natural learning environment. However, not all games are equally effective in the classroom and there is thus a need for frameworks to guide teachers so that learning goals are aligned with a game's goals and to determine whether or not the game design supports effective learning. This chapter offers an analysis framework that can be used by classroom teachers to understand the different ways that games can support learning and to critique specific games to determine whether or not they meet the learning requirements. The chapter includes a checklist for teachers, as well as a feedback form for students who playtest games for use in the classroom.*

### GAMES AND LEARNING

Digital games are increasingly being used as educational tools (Habgood & Ainsworth, 2011). As technology becomes more sophisticated, the potential for integrating games and learning dramatically increases (Paras & Bizzocchi, 2005). However, the challenge for educational game

designers is to make sure that learning dynamics are properly integrated with gameplay dynamics to create an intrinsic learning environment (Prensky, 2000). By creating intrinsically motivating experiences educators can maximize the impact of games in the classroom (Kiili, 2005).

Despite the fact that there have been many books written about game design in general, there has been much less written about designing and evaluating educational games (Habgood & Ainsworth, 2011). Few frameworks are available to

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guide an educator who wants to use games in the classroom (Hong et al., 2009; Kiili, 2005). Only a limited amount of research can be found on the value of specific games in the K-12 environment (deFreitas, 2006). Because different types of games align with different types of learning goals, not all educational games will be equally effective for every situation (Fisch, 2005). With all these factors to consider it can be hard for a teacher interested in using games in the classroom to know where to begin.

Unfortunately, even when games are used in the classroom there are few reliable ways for educators to assess their effectiveness. A study of the use of Quest Atlantis in a science class resulted in mixed conclusions (Lim, Nonis, & Hedberg, 2006). While students seem more engaged with the game environment than the standard classroom, there was no increase in overall learning. Additionally, Schrader (2010) found that although the game Spore is designed around the concept of evolution it is more likely to reinforce misconceptions than to correct them. Therefore it is very hard for educators to properly evaluate existing games for use in the classroom, without further guidelines from researchers.

The purpose of this chapter is to outline a game analysis framework to provide important questions that teachers can ask themselves in order to evaluate both the appropriateness and the potential effectiveness of a specific game. The framework combines instructional design principles and general game design principles, and will start with an overview of the elements of the framework followed by an in-depth look at each section with support from the literature. The appendix includes a checklist that teachers can use to apply the analysis framework to a specific game, as well as a feedback form for students that is also based on the analysis framework.

Those studying educational game design can also use the information in this chapter to learn more about design by analyzing existing games. This chapter focuses on digital games, which in-

cludes games played on a computer, a dedicated game console, or a hand-held device, and refers to players, students, and learners interchangeably.

## OVERVIEW OF FRAMEWORK

The analysis framework proposed in this chapter is built on three parts: Setting learning goals, identifying strategies that support motivation and make games fun, and identifying strategies that support learning.

### 1. Define Instructional Goals

As with any learning task, learning outcomes can vary widely depending on the game designer's goals (Warren & Najmi, 2013). Also, teachers can use games in different ways in order to achieve distinct learning goals. For example, *Angry Birds* can be used to analyze trajectories in a Physics class, or to analyze hit-to-miss ratios in a Math class. The first step should always be to identify the desired learning goals for a specific game - what skills or knowledge should players gain by playing the game? A good way to think about this is in terms of *Bloom's Revised Taxonomy*, which presents a hierarchy of skills that correlate to different levels of learning. This hierarchy consists of 6 levels:

- Remembering
- Understanding
- Applying
- Analyzing
- Evaluating
- Creating

Different games will address different levels of the taxonomy - identify which level is being targeted with the gameplay.

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