

# Educational Gaming Design

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Simulations Games in Education

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## Introduction:

A game is defined as an activity that provides entertainment. Games are not typically thought to be educational; however games can be effective in the educational setting. Because of the growing popularity of games, teachers are becoming interested in using games in education. As this interest grows, teachers are beginning to become more involved in the design phases. There are a number of factors that should be taken into consideration when designing an educational game. Game design is a complex and involved process; game designers must be aware of the different elements involved. There is no perfect model; educational game design is a broad subject that groups very different approaches and methodologies (Moreno-Ger.P et. al., 2008). This document will focus on educational game design and provide some principles that can be used throughout the stages of game development.

## Game Design Principles:

### Goals

A game must have goals. "Good educational games will consider both the learning goals/content and the game play at the same time"( Klopfer, Osterweil, & Salen, 2009). This means that as the game is being developed goals and content should both be considered simultaneously. There has to be a challenge for the player, hence, a goal to achieve. As stated by John Laird, a game shouldn't be too easy or too hard; there must be a balance. According to Laird, there should be long-term, medium-term and short-term goals (2005). Some common goals we see in games is solving puzzles, scoring points, and improving abilities. It is important that the designer realizes the need for goals and makes sure the goals are well defined and measurable. Swartout and van Lent found that the goals of different levels help motivate learners to continue playing (as cited in Dondlinger, 2007, p. 24). This is why goals are so important

because it is directly linked to repeat play. When players know that they're pursuing some goal, it keeps them engaged.

### **Distinguishing between Elements of Content in Gaming: Educational versus Edutainment**

Edutainment games are classified as “those which follow a skill and drill format” where the player(s) are practicing and repeating skills in order to memorize the facts (Dondlinger 2007). Students who engage within edutainment games are more likely to see situations that are non-trivial and boring. Even though edutainment gaming may seem harmful, recalling knowledge continually can see benefits within the math classroom. A study in the article *Educational Video Game Design: a Review of the Literature* by Dondlinger discussed a scenario where learners completed a greater number of problems at an increased degree of difficulty whereas those using paper worksheets completed less.

Educational games “require strategizing, hypothesis testing, or problem-solving” which tend to highlight upon the idea of higher order thinking (Dondlinger 2007). These types of games go beyond the realm of simple comprehension, engage students by interactivity, and do not stress memorization. Characteristics included in such gaming range from having goals and rules to having content that is applicable to the story, the class, and the real world.

When designing educational games, it is important to factor in higher-order thinking skills to foster a positive learning experience and engage students for real-life situations. Skills students must have in any job situation include decision-making, problem-solving, creativity, special sense, and collaborative work. School is a place where students acquire the skills they need to use in the world for any functioning job or career. Gaming can catch the minds of those students who do not learn traditionally, engage students who feel bored, and challenge students who want succeed.

### **Interactivity in Educational Games**

“The main characteristic that differentiates edutainment and video games is interactivity,” states Dondlinger 2007. Games need to provide a balance of interaction between the player(s) and the game environment. Gaming situations where a player has complete freedom can seem boring and unchallenging. On the other hand, games where the player has little to no control over their actions

place the player in an observation situation where learning is minimal or often times not even taking place. "Providing a balance to these extremes, effective game design gives players the perception they have free will, even though at any time their options are actually quite limited" (Dondlinger 2007).

"Effective games weave objects and characters into a game environment that provide feedback and hint structures for successful game play" (Dondlinger 2007). Not only should participants interact with the gaming environment through moving objects and characters, but also participants should be able to interact with other participants. Effective game design should stimulate social interaction with cooperation or even competition.

### **Feedback within Educational Games**

*"Feedback:* As in education, feedback in games is important in providing players with timely and relevant information on their progress towards goals and identifying their level of achievement so far," states Charles, M, Bustard, D, and Black, M. 2009. Feedback is one of the key aspects to gaming that creates learning experiences for students. The more relevant the feedback, the more the student learns. Charles, M, Bustard, D, and Black, M. also states that "the feedback is also crucial as in the variations in level of challenge" (2009).

Most often students in the classroom do not receive feedback on a daily basis from their teacher in a timely manner. Tests take time to be graded and teachers have little time to give individual advice to students everyday. Within educational games, feedback is built in and allows students to know what is expected of them as they play. Students are free of criticism and able to make mistakes, which create an environment that enhances learning. Learning from mistakes is often a large form of feedback in games. "This approach is to encourage student involvement by rewarding desirable behavior, including the completion of optional challenges, and giving regular feedback on performance, measured against others in the same class" (Charles, M, Bustard, D, and Black, M. 2009).

## **Conclusion:**

In conclusion, educational games have a place in the classroom and when designed properly can assist students practice the skills they learn in school. Educational games are no longer ways by which teachers pass the time.

"Educational video games require strategizing, hypothesis testing, or problem-

solving, usually with higher order thinking rather than rote memorization or simple comprehension," (Dondlinger 2007). Through the inclusion of goals, content, interactivity, and feedback, educational games can make a substantial impact on education. They combine 21st century skills with higher levels of thinking and help motivate students to perform at their best. As gaming becomes more common in classrooms, the research behind it will help it grow and develop further. "Design and development will likely generate further research on the learning outcomes afforded by educational game play," (Dondlinger 2007). Design of games and simulations will stem from research of its uses in the classrooms and their most productive aspects.

## References:

Charles, M, Bustard, D, and Black, M. (2009) "Game Inspired Tool Support for e-Learning Processes"

*Electronic Journal of e-Learning Volume 7 Issue 2, (pp101 - 110), available online at [www.ejel.org](http://www.ejel.org)*

Dondlinger, Mary Jo. (Summer/Spring 2007). Educational Video Game Design: A Review of the

Literature. *Journal of Applied Educational Technology, vol. 4 num.1*. Retrieved from [http://www.eduquery.com/jaet/JAET4-1\\_Dondlinger.pdf](http://www.eduquery.com/jaet/JAET4-1_Dondlinger.pdf)

Klopfer, E., Osterweil, S. & Salen, K. (2009). Moving learning games forward: Obstacles, opportunities, and openness. The Education Arcade: Massachusetts Institute of Technology.

Retrieved from <http://www.educationarcade.org/>

Moreno-Ger, P. et al.(2008) Educational game design for online education, Computers in Human

Behavior. Retrieved from [http://merlin.germinus.com/c/document\\_library/get\\_file?folderId=12452&name=DLFE-2705.pdf](http://merlin.germinus.com/c/document_library/get_file?folderId=12452&name=DLFE-2705.pdf)