

## Preface

Video games and edutainment began making an appearance in classrooms in the mid to late 1980s. Since 1980, a variety of technologies have been introduced into the classroom and used by preschool, elementary, secondary, and higher education students to augment their learning. These technologies included personal computers, edutainment, VCRs, video games, DVDs, CD-ROMs, the World Wide Web, digital cameras, mp3 players, PDAs, social networking sites, and cell phones. With the introduction of every new technology, instructional designers wonder how the technology in question may optimize learning. Most recently, instructional designers have been examining how best to use games for learning.

The issue of game use for learning is an important one. The field of educational gaming is currently undergoing a transformation. Factors such as economic recession, globalization, and the widespread adoption of a variety of technologies have changed the way we think, learn, and live. Our fast-paced, connected world has demanded that we consider new educational methods and media in order to meet the changing needs of our global society. In addition, an entire generation has been raised with games as a primary vehicle for learning. The purposes of this book is to examine the theories that underly effective educational games, how to apply these theories to game design, and how to use games in learning environments.

As editors, we come to this project with two different but connected perspectives on educational gaming. Being a rhetorician, one of us takes a primarily rhetorical approach to game design and implementation for learning, while the other comes to this topic mainly from the point of view of an instructional and multimedia designer. In the next few paragraphs, we'd like to explain why these two perspectives are important for the topic of educational gaming and how each of them adds to the meaning of this collection.

### Educational Games as Persuasive Artifacts

Ask anyone what makes educational games different from, say, instructional DVDs, and, more likely than not, people will mention the word «interactivity.» As the readers of this collection will, no doubt, know, the term «interactivity» has been notoriously difficult to define despite its popularity. One way to approach the task of defining interactivity in educational games is to look at ways in which they can be seen as persuasive artifacts.

In recent years, several notable works exploring the persuasive or rhetorical nature of games have been published. One such notable work is the book *Persuasive Games*, by Ian Bogost. In the book, Bogost, himself both a rhetorician and a game designer, argues that carefully crafted video games can persuade and move people to action in ways that traditional texts cannot.

In the book, Bogost proposes the term «procedural rhetoric» which can be explained as the kind of persuasion which relies upon and works when users (players) not only read, hear, or watch persuasive

messages, but complete series of steps which result in a new understanding of a problem or, at the very least, the raising of new and important questions.

To illustrate, how this kind of persuasion works, Bogost describes his five-year-old son playing the game *Animal Crossing*, which requires players to «move into a new village and settle into a new life» (Bogost 117). Players are required to interact with a «local real estate tycoon» who can provide them with material possessions, but also get them deeper and deeper into debt. (Bogost 117). Here is how Bogost explains the persuasive consequences of playing *Animal Crossing*:

*Animal Crossing* is a game about everyday life in a small town. It is a game about customizing and caring for an environment. It is a game about making friends and about collecting insects. But *Animal Crossing* is also a game about long-term debt. It is a game about the repetition of mundane work necessary to support contemporary material property ideals. It is a game about the bittersweet consequences of acquiring goods and keeping up with the Joneses. *Animal Crossing* accomplishes this feat not through moralistic regulation, but by creating a model of commerce and debt in which the player can experience and discover such consequences. In its model, the game simplifies the real world in order to draw attention to relevant aspects of that world. (Bogost 119).

According to Bogost, this and other games which he critiques in his book, are examples of procedural rhetoric because they make claims about «how things work» and «make claims about the world» (Bogost 125). And what is important about procedural rhetoric and what differentiates it from other kinds of rhetoric, according to Bogost, is procedural rhetoric's ability to make such claims through processes rather than through one-way messages from the writer or orator to a reader or listener (125).

Elsewhere in his book, Bogost argues not only in favor of the educational potential of procedural rhetoric implemented in carefully designed games, but also for the necessity for educators and parents to become «better critics» of such games, as the world increasingly moves away from replying primarily on linear media, such as books and movies to the use of «random access» media, such as computer software and games (Bogost 136). According to Bogost's argument, teachers and parents should play games with young learners, but do so critically, unlearning first their own decades old habit of seeing all video games as only mindless distraction (136).

Procedural rhetoric is an important concept for the design and implementation of educational games because it adds yet another dimension to our understanding of the elusive concept of interactivity. Procedural rhetoric may allow us to understand more precisely how «learning by doing» takes place. However, in order to do so, video games must be designed and implemented very carefully. As Ian Bogost says in the conclusion to one of the chapters of his book, «[games] are not *automatically* (emphasis in the original) rich, sophisticated statements about the world around us.» According to Bogost, both designers and players need to approach games carefully and critically, if those games are to fulfill their potential for persuasion and active learning.

## Balancing Instructional Objectives, Learning Principles, and Game Context

While procedural rhetoric may inform how learning by doing takes place in educational games, instructional design provides a framework for addressing audience considerations, the content or skills to be taught, instructional strategies and methods, and ways to evaluate the game player's learning. When designing games, the major challenge for instructional designers is how to balance the standard instructional design framework, which can be linear and regimented, with the creative process required to conceptualize, design, and produce a game that is useful, engaging, and fun. In the corporate sector, most instructional designers follow a 5-step instructional systems design process where each step validates and extends the prior step. As part of a design team, they are usually charged with the creation of

instructional objectives and the writing of the curriculum materials, and work with other members of the design team on the development of game play and media elements.

Within the instructional design methodology, it is possible to be creative, but all too often the instructional designer may subordinate his or her creativity to the instructional requirements of the project because of time or resource constraints. When this happens, the end result may be a dull, lifeless game, which fails to achieve its educational goals because the learners are not engaged. For this reason, instructional designers must equally balance their instructional objectives with a consideration for the techniques they will use to capture the imagination of the learners and keep them engaged in the game. This can be accomplished by employing a good, compelling narrative that draws in game players; exciting, interactive game play that provides both context and immediate feedback; and a clear, unified, organized, aesthetically pleasing interface that features carefully designed and judiciously used media elements. When these factors are considered equally, the instructional focus of the game is less apparent as the game context provides a suspension of disbelief, enabling the player become immersed in the imaginary game world. Thomas Malone's (1981) study of what makes computer games intrinsically motivating describes the fantasy, challenge, and curiosity typically associated with the suspension of disbelief required to immerse and engage the learner in the game world.

In addition to creating a motivating game context, instructional designers also need to consider how the game play, interactivity, and media elements support the learning process, as some uses of multimedia in games may inhibit rather than promote learning. For example, designers may assume that more is better when it comes to multimedia, so complex animations may be used with narration and on-screen stationary or scrolling text without regard to the effect on learning. In this case, the simultaneous display of on-screen text, narration, and animation has the potential to overload working memory and make information more difficult to understand, thus slowing the learning process. Educational games designed without attention to learning principles, specifically how the different media assets affect working memory, may miss the mark entirely when learning is the goal.

Those of us who value, design, and use educational games think they can make a difference in student learning, but the evidence from research studies examining the learning effectiveness of games is not so clear cut. In the second edition of *E-learning and the Science of Instruction*, Ruth Colvin Clark and Richard E. Mayer (2008) describe several reviews of research on gaming that failed to show an advantage for games when compared to traditional instruction. In other words, some studies indicated that games were more effective than traditional instruction, while other studies showed just the opposite. These mixed research findings are not surprising given the fact that games are frequently designed by teams of people with competing objectives who may or may not understand the importance of carefully designed instruction or the effect of media on learning. For instructional designers, the question is not whether games are more effective than traditional instruction, but how do we apply learning principles to game design to maximize learning?

One way to answer this question is to follow a typical instructional systems design procedure: conduct a content analysis, and then choose a game format, game play, and multimedia elements that facilitate the target audience's learning of the content. The challenge to this type of approach is that games are typically designed by project teams consisting of individuals from a variety of backgrounds, perspectives, and design approaches. The programmer may be concerned with writing elegant and efficient code, but may not be knowledgeable about how a particular interface inhibits or promotes learning. The graphic designer may be skilled in creating graphics and animation, but may not understand how a particular combination of graphics with text or narration may impede learning. The audio engineer may be an expert in creating high fidelity audio that creates a mood for the game, but may not understand how some sound effects can be distracting when paired with certain animations or learning challenges that involve problem solving. The necessity for a balance between the art and science of game design

cannot be overstated, and it is the instructional designer's job to ensure that all components of the game work in concert to facilitate learning. If not, the team may opt to use multimedia features that are «sexy» rather than instructional, thus minimizing the educational utility of the game.

Another way to answer the question of how to design games that maximize learning, is to follow the five principles for designing games and simulations outlined by Clark and Mayer in Chapter 15 of *E-learning and the Science of Instruction*. These principles include matching the game type to the learning goal, making learning integral to progress in the game, using features that support the learning process, building in guidance that provides explanations and feedback, providing opportunities for learner reflection and explanation, and finally, and finally minimizing complexity, especially for the game interface. If designers incorporate these five principles when designing educational games, the end result should be a game that promotes learning. Regardless of the design approach used, designers may create a *fun and motivating* educational game if they incorporate fantasy, challenge, curiosity, good narrative, interactivity, context, structure, feedback, the appropriate use of media. Balancing the application of learning principles with context and appropriately used media elements may lead to game design that is both effective and engaging.

## Brief Overview of the Book's Sections

In the following paragraphs, we briefly review the three sections of the book. The purpose of this brief review is to provide readers with an overall impression about the structure of this volume and guide them towards those chapters which may be of particular interest to them.

### Theoretical Considerations

The first section of the book, entitled Theoretical Considerations, tackles conceptual and theoretical issues in educational game design and deployment theory. With titles like «Educational Simulations: Learning from the Past and Ensuring Success in the Future,» and «Explaining the Educational Power of Games,» the chapters included in this section take a broad view of the subjects they cover. Reading the selections in the first section of the book will prepare the collection's audience for more practical and hands-on discussions of educational game design and deployment which they will encounter in the following two sections.

### Applying Theory to Game Design

As its title suggests, the second section of this collection deals with applying game design theory to practical design situations. While all the selections in this section will be of interest to most readers, notable chapters here include «Moving to the Next Level: Designing Embedded Assessment into Educational Games,» «The Design of a Health Literacy Game: Face the Case,» and others. Considering the chapters included in the section will help readers to transition from the consideration of broad theoretical concepts in educational game design to the topics in the third and final section of the book.

### Using Games in Education

The third and final section of this collection considers instances of educational game use in real-life learning and teaching settings and for teaching specific subjects. It is the largest section, containing ten

chapters. Notable essays include «Animated Computer Education Games for Students with ADHD,» «Quests and Achievements in the Classroom,» and many others. Our hope is that the chapters in this section of the collection, as well as the book as a whole, will give readers a solid understanding of issues in educational game design and deployment in the classroom.

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