

## Chapter 2

# Electronic Games Improve Adult Learning in Diverse Populations

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### ABSTRACT

*Impressed by the motivation and effort displayed by players of complex and highly interactive electronic games, psychological researchers seek to apply gaming techniques to enhance globalization of diverse populations in problem solving and decision making. Researchers are interested in identifying characteristics of entertainment games that influence player motivation and learning. From the perspective of Interactive Cognitive Complexity theory, researchers need to examine how game variables relate to key learning components, including learner affect, cognitive strategy, and knowledge/skill acquisition. From a learning perspective, video simulation games are primarily a series of problem solving interactions set in a specific virtual context and using various learning aids that support the solving of problems to achieve the object of the game. Cognitive problem solving factors and strategies are; therefore, key independent variables for learning game studies. In creating such a framework, the authors propose five conceptual categories of instructionally relevant game variables: (1) virtual context, (2) problem specification, (3) interaction and control, (4) learning support, and (5) social interaction. Proposed is that electronic gaming methodology, founded in cognitive learning theory, will enhance efficient and effective development efforts to improve learning of global management strategies.*

### INTRODUCTION

The popularity of video and computer-based entertainment games, the high level of player effort displayed in learning the games, and the amount

of learning that occurs in mastering a game, have led learning researchers to hypothesize that the techniques of such electronic games can be used to increase motivation and learning of decision making and problem solving outcomes (Garris, Alhers, & Driskell, 2002; Gee, 2005; Habgood, Ainsworth, & Benford, 2005; Prensky, 2001). Adult educa-

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tors are also interested in learning via electronic games because of the instructional trends toward learner-centered education wherein adult learners have increased involvement in learning activities and are given more control over learning goals and resources (Breuer, Molkenthin, & Tennyson, 2006; Dembo, Junge, & Lynch, 2006).

Designers of learning activities (learning resources) hope to significantly improve adult learning by merging the content of education (or training) with the format and techniques of entertainment games, thereby designing electronic or instructional games that often are computer-based. Educational researchers are interested in identifying the characteristics of entertainment games that influence player motivation and promote learning that could be incorporated into electronic instructional games. In addition, researchers are interested in how instructional games can be used to promote *higher level* learning outcomes such as problem solving and decision making (Kafai, 2001). To help instructional designers in the task of creating electronic games that are intrinsically motivating and enable players to achieve desired learning outcomes, educational researchers want to establish how variables of game design and play affect learning.

## **ELECTRONIC GAME DESIGN AND USE**

Electronic games are not new, but research into the effectiveness of gaming is not extensive. Some empirical evidence suggests that games can efficiently promote learning (Cordova & Lepper, 1996; Henderson, Klemes, & Eshet, 2000; Moreno & Mayer, 2005; Ricci, Salas, Cannon-Bowers, 1996), but research into electronic game characteristics has been unfocused in regard to how games can promote learning (Dempsey, Lucassen, Haynes, & Casey, 1996; Habgood, et al., 2005; Kafai, 2001; Moreno & Mayer, 2005). Much of past and current research into the effects of games

tends to look at social factors suspected of being detrimental, such as whether video games increase violent behavior of players or socially isolate them (Anderson & Bushman, 2001; Emes, 1997; Mitchel & Savill-Smith, 2004).

While the fact that entertainment games are highly motivating and are often successful at helping players achieve game mastery is clear, just what makes them so, and whether or not those factors can be applied to improve adult learning in decision making and problem solving is not clear. Educators and instructional game designers would like to see students apply a similar amount of effort to learning school subjects as they see applied to entertainment games, but they are not sure how to use game techniques to achieve high learner motivation and also achieve meaningful learning. The current situation is summarized by Garris, et al. (2002, p. 442): “Unfortunately, there is little consensus on game features that support learning, the process by which games engage learners, or the types of learning outcomes that can be achieved through game play.” Educators and instructional game designers need the input and direction of information provided by empirical studies to make good choices about applying the lessons of video games to learning activities. To design studies that answer key questions about learning via game play, researchers need to focus on characteristics of games that are suspected of playing a role in motivation and learning. The identification of such characteristics is not easy because games are complex and include many variables.

## **Conceptual Framework in Designing Electronic Games**

A conceptual framework that identifies key variables of games that affect learning outcomes and relates those variables to learning theory can help focus design on factors that lead to the effective use of electronic games for adult learners in diverse global populations. The value of such

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