

Chapter XLIV

Experience, Cognition, and Video Game Play

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ABSTRACT

There is current interest from the field of education into the value of video games to support learning. Research investigating outcomes associated with video game play has just begun to scratch the surface of their educational potential. Further exploration needs to focus on the internal processes of the play, specifically the relationship between the utilization of cognitive skills, the learning process, and a player's experience with playing video games. Drawing support from the field of expertise, the research presented in this chapter looks at this relationship by comparing the processes used by video game players based on their level of experience. Results from this study add to the understanding of the relationship between experience, cognition, and learning from video game play. The results of this research also have implications for educational game design and the pedagogical techniques used to make effective learning opportunities available to all learners.

INTRODUCTION

Video game research has emerged as a topic of interest in many fields of study, drawing particular interest from those in education seeking to explore its potential value for learning. Current gaming research substantiates the educational value of video game play, indicating a relationship between their use and positive learning outcomes (Gee, 2004; Squire & Jenkins, 2003). Research into the educational value of video games also

identifies opportunities for informal learning during video game play which involve the use of mediating cognitive skills to analyze and navigate the game environment (Blumberg & Sokol, 2004; Pillay, 2003).

Although the educational outcomes of video game play has been studied, the internal processes associated with video game play is still in need of research. Exploring variances in the utilization of cognitive skills during video game play and their role in the learning process, relative to

characteristics of the player's can provide a deeper understanding for the potential of video games with diverse populations, such as in a classroom (Ko, 2002). Research on expert performance denotes experiential level as a critical factor of consideration for addressing variances in how individuals use cognitive skills to perform a task (Chi & VanLehn, 1991; Ericsson & Charness, 1994). Based on expertise research, experience and practice lead to the formation of domain based knowledge that influences the types of cognitive skills used when learning new information (Elio & Scharf, 1990; Snyder, 2000).

Considering video game play as a domain of expertise provides a context for investigating the role of experience on the types of cognitive processes player's use when navigating a game environment (VanDeventer & White, 2002). The defined categories of expert and novice provide a framework for looking at the relationship between experience, cognitive skill use, and the process of learning during video game play (Chi, Feltovich, & Glaser, 1981). Understanding the relationship between experience, cognition, and learning from video game play can provide a basis for determining best practices associated with their use in educational environments. This chapter reports results of a research study investigating this relationship, looking at the cognitive processes participant's use during game play relative to their level of video game play experience. Considering video games in this context, as demonstrated by the results of this study, can inform the design of educational games and pedagogical techniques used to make the opportunity for learning through game play available to all learners.

LITERATURE REVIEW

From an educational perspective, the learning process requires the consideration of several factors, the most important of which is the utilization of prior knowledge to support new knowledge

acquisition (Bransford, Brown, & Cocking, 2000; Bransford & Johnson, 1972). It is the quality and quantity of prior knowledge that accounts for the performance differences between experts and novices on domain-based tasks (Dreyfus & Dreyfus, 1986; Ericsson & Charness, 1994). The quantity of knowledge and experience an expert has achieved through deliberate practice forms foundational knowledge structures associated with a specific domain. The experience-based knowledge structures of experts directly impact their ability to perform domain-related tasks quickly and efficiently by guiding their attention processes to identify relevant information in an environment. Extensive domain-based experience not only directs the actions of experts, but also guides how they learn new information. When presented with new information, an expert's prior knowledge will direct attention toward patterns and cues that facilitates the integration of newly acquired knowledge into their existing structure (Allard & Starkes, 1991). As a result of the automatic nature of performance and learning associated with expertise, when confronted with a domain-based problem, cognitive processes are unburdened and available to process contextual information to facilitate resolution (Anzai, 1991).

Conversely, the cognitive processes of novices are burdened in comparison to an expert when performing a domain-based task. Lacking extensive experience and knowledge, novice processes are focused on superficial elements in order to develop and implement rules to guide action (Dreyfus & Dreyfus, 1986). This is evident in the learning process associated with novices, which is driven by a course of analysis involving the application of trial and error strategies to direct action (Chi, Bassok, Lewis, Reiman, & Glaser, 1989; Chi & VanLehn, 1991). Consequently, novices experience cognitive interference which hinders their perception of contextual cues and critical information needed to deal with obstacles encountered during the completion of a task. The ability to derive contextual information from an

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