Chapter 8
Play Teaches Learning?
A Pilot Study on How Gaming Experience Influences New Game Learning

Hao Wang
Department of Computer Science, National Chiao Tung University, Taiwan

Wen-Wen Chen
Department of Computer Science, National Chiao Tung University, Taiwan

Chun-Tsai Sun
Department of Computer Science, National Chiao Tung University, Taiwan

ABSTRACT

To provide ideal learning environments for a wider audience, game designers must understand differences in how experienced and less experienced players learn new games. Using a sample of players with different experience levels, our goal is to understand learning processes for a simple real-time strategy game. Data from observations, post-game interviews, and eye movement recordings indicate that the majority of study participants relied on a trial-and-error approach, with more experienced gamers using a structured mental model involving feedback and expectations about making progress. Specifically, experienced gamers in the sample tended to use a top-down learning style emphasizing connections between goals and available actions, and to focus on the functions of game objects. There are also interfaces in which all experience levels of participants share the same opinion. For example, alarming voices/sound effects can catch their attention and be helpful while pop-ups are largely annoying.

INTRODUCTION

Digital games are increasingly being used for non-play purposes such as education (Mitchell and Savill-Smith, 2004; Prensky, 2007; van Eck, 2006; Perez-Colado, Alonso-Fernandez, Freire, Martinez-Ortiz, and Fernandez-Manjon, 2018), health care (Bandura, 2004; Basak et al., 2008; Bavelier et al., 2012; et al., 1997; Primack et al., 2012), and communication (Bogost, 2007; Flanagan, 2009). Digital game

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playing is believed to exert positive influences in terms of spatial cognition (Feng et al., 2007; Green and Bavelier, 2003; Greenfield, 2009; Subrahmanyam and Greenfield, 1994), social skills (Steinkuehler and Williams, 2006; Taylor, 2006), and cooperative learning (Gee, 2007), among other abilities. Greenfield et al. (1994) are among many researchers asserting that the ability to understand graphically presented information during gaming experiences benefits reading skills for objects such as charts.

Despite the large body of research on the positive learning aspects of playing digital games, few efforts have been made to understand the processes involved in learning a new game. For commercial game designers it is important to understand how individuals in specifically targeted populations learn to play their products to provide pleasant learning experiences. Without such experiences, players may quickly move on to other games that offer faster and more pleasing results. Further, in game-based learning (GBL) and health care environments, it is important to ensure that the interests of users are quickly captured and held. Such efforts require an understanding of player learning style, with prior experience possibly influencing how players learn in other environments. If gaming does in fact exert an effect on player learning models, understanding the underlying mechanisms may support the design of more suitable curriculums, especially for students with considerable gaming experience. In this chapter the authors address two issues—learning behavior and the use of game information interfaces (i.e., interfaces that provide alerts and text regarding game rules)—to determine how gaming experiences affect learning behaviors, and how players use interfaces to learn. The authors invited study participants to learn a game they had never played before, and gathered data on their learning techniques (especially those associated with in-game information) by conducting post-game interviews and recording eye movements with an eye tracker.

BACKGROUND

Learning How to Play

In their study of children's game play behavior, Blumberg and Sokol (2004) found that most players use internal reliance strategies such as repetitive practice and trial-and-error. They reported that this was especially true for the older children in their sample (fifth graders compared to second graders), with no differences between genders. In a study of how players use a puzzle game interface, Sancar et al. (2007) also reported trial-and-error as the most basic game-learning pattern, again with no significant gender-based differences. Hamlen (2011) analyzed how players use various strategies to advance in different game genres, and concluded that trial-and-error is often used in action-oriented games, while imagination is preferred in adventure games. Blumberg and Randall (2013) analyzed young teenagers' game-related problem-solving processes and found that boys were more likely to evaluate various aspects of games, while girls were more likely to talk about their personal strategies. They did not find any significant differences between self-described frequent and non-frequent players.

While these and other researchers have addressed differences between male and female players and among various age groups in terms of learning processes, they have not proposed any theories describing differences in learning models between experienced and inexperienced players—the motivation for this chapter. The authors used the idea of concept maps to analyze structural aspects of learning processes, an approach that has been used to improve many types of learning (including game-based learning) via knowledge organization (Coller and Scott, 2009; Hwang et al., 2013; Novak et al., 1983). However,