Chapter 9
Examining Motivational Game Features for Students With Learning Disabilities or Attention Disorders

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ABSTRACT

Students with learning disabilities (LD) or attention disorders (AD) often require supplementary or alternative instruction to achieve their learning goals. Computer-assisted intervention (CAI) has been explored as a promising method for fostering students' success by providing an engaging learning environment. The following chapter examines publications employing empirical studies of computerized games designed for students with LD or AD conducted between 2006-2016. The goal of this chapter is to give a brief overview and critique of the current research on incorporating computerized games into modern education for students with LD or AD, and to identify the key game features that successfully motivate and engage students.

INTRODUCTION

An increasing number of students are relying on special education and personalized learning plans to achieve their academic goals. Serious computer games, or games that have a purpose in addition to entertainment, have become a widely-discussed topic in technology-based tools for education. Educational computer games seek to capitalize on the motivational aspect inherent in games to engage students in a

novel learning experience. It is hoped that by presenting educational content and learning objectives in an interactive medium, students will acquire knowledge on the subject matter. For students struggling in a traditional classroom setting, particularly students with learning disabilities (LD) or attention disorders (AD), educational computer games could provide a viable means for motivating students and helping them obtain their academic goals. This is facilitated using multimodal methods for delivering lessons, as well as providing the opportunity for students to participate in additional exercises to reinforce learning objectives.

Designing learning materials for students with LD requires consideration of common deficiencies in addition to addressing specific skills such as reading and mathematics. Deficiencies in executive function, generalizing information, and comprehending abstract data representations are common in students with LD. Along with this, LD has a high comorbidity rate with AD, which often manifests as an inability to maintain attention and hyperactivity. Assessing how to incorporate computer games into education for students with LD or AD raises several important questions. These include how to integrate learning objectives with gameplay, the logistics of implementing games in school environments, and how to design educational games that motivate students. The final question is the focus of this article. To address this question, 30 research studies published in English between 2006 and 2016 involving educational games for students with LD or AD were examined to assess the motivational features as well as the engagement of the participants. Details on participants and methodology are presented in Table 1. To get a multidisciplinary view of the research being conducted, generalized academic databases were queried, primarily Google Scholar and OneSearch. Prior to discussing these studies, an introduction to key motivational features in computer games is presented.

DISCUSSION OF ENGAGEMENT FEATURES

The goal of engagement features in educational games is to facilitate a state of being where the user is receptive to the game's learning objects. Like games for entertainment, educational games need to provide an experience that is rewarding, reduces frustration, and encourages the user to invest in the experience. Key engagement features used in educational games focus on creating individualized experiences, captivating stimulation, feedback on progress and performance, facilitation of social interactions, and novelty of the experience. Individualization can be broken into two core components - adaptation and personalization. Captivating stimulation is composed of narratives and sensory appeal. Feedback systems are comprised of rewards and reactions to actions taken in the game.

Adaptation

For educational computer games to successfully cater to an individual, they need to be able to adapt to the player. To accomplish this, the game needs to collect user specific data and augment the application in a meaningful way with the goal of creating a system that maximizes educational growth in users. The simplest form of this adaptation is the dynamic adjustment of the difficulty of the task or gameplay to suit the player's level of knowledge on learning tasks. Maintaining the appropriate difficulty prevents the player from becoming frustrated at difficult tasks, while ensuring the player is properly challenged and gains a sense of achievement after accomplishing in-game tasks or exercises. To adjust the difficulty of the game, it needs to be able to assess the player's knowledge and ability.

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