Chapter 11
What is the “Learning” in Games-Based Learning?

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ABSTRACT

This chapter explores the nature of “learning” in games-based learning and the cognitive and motivational processes that might underpin that learning by drawing on psychological theories and perspectives. Firstly, changing conceptions of learning over the last few decades are reviewed. This is described in relation to the changes in formal learning theories and connections made between learning theory and GBL. Secondly, the chapter reviews empirical research on the learning outcomes that have been identified for GBL, with specific focus on cognitive benefits, school attainment, collaborative working, and the motivational and engaging appeal of games. Finally, an overview of the dominant theoretical perspectives/findings mostly associated with GBL is presented in an attempt to broaden understanding of the potential for GBL in the classroom.

INTRODUCTION

One of the most debated changes in education in recent years has been the proposed use of computer games for learning purposes. Despite the great interest in the topic of games-based learning (GBL), the full potential of games for learning purposes is not often realised (Pivec, 2007). To appreciate the learning potential of games, it is important to understand how they fit within learning theory and the reported learning benefits documented in the research literature.

This chapter will adopt a psychological perspective on GBL. Firstly, the chapter will review changing conceptions of learning over the last few decades, noting the shift from passive and individual learning to active and collaborative learning. The associated developments in formal learning theory will also be reviewed and connections will be made between learning theory and new digital technologies, with specific reference to GBL.

Thereafter, existing research literature on the learning outcomes that have been identified for GBL will be reviewed. Specifically, the review
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will focus on evidence in the literature which addresses the following research questions:

- What value does GBL hold for general school attainment?
- What are the cognitive benefits of using GBL? For example, what are the specific benefits for cognitive functioning and higher-order thinking?
- How can GBL harness collaborative working?
- Is there evidence to support the motivational and engaging appeal of games?

LEARNING THEORY AND GBL

Over the past few decades, there have been several notable shifts in the conceptions of learning that are evident in learning theories – from a focus on passive learning to more active forms of learning and from an emphasis on individual learning to collaborative learning. These conceptual shifts are recognised in practice, for example, Garris et al., (2002) have noted the shift from ‘learning-by-listening’ approaches towards a more learner-centred, ‘learning-by-doing’ approach. Additionally, they are mirrored in changes in formal theories of learning, from learning behaviour and re-enforcement (behaviourism), to cognition and understanding (cognitivism, constructivism) to collaborative and socio-cultural learning (social-constructivism, learning communities).

It is widely recognised that digital technology has facilitated this more active and social view of learning, by transforming the role of learners from passive receivers to active constructors of knowledge (Fu, Su & Yu, 2009) and by affording more participatory experiences of learning and the co-construction of knowledge (Selwyn, 2008). Several writers have provided similar accounts of these shifts in learning theories and how they interact generally with e-learning (Holmes & Gardner, 2006) and more specifically with the development of games for learning (Egenfeldt-Nielsen, 2006). Each learning theory will now be reviewed in the context of their origins, and in terms of how they relate to the practice of GBL.

**Behaviourism**

Behaviourism focuses on individual learning behaviour. Drawing on the theories of Pavlov, Thorndike and Skinner, it proposes that learning occurs through repetition of specific stimuli and specific behaviours coupled with reward and reinforcement, associating learning with automation as opposed to active cognition.

Egenfeldt-Nielsen (2006) comments that many edutainment titles adhere (sometimes implicitly) to a behavioural learning approach, where the games offer a drill and practice style of learning, and where the focus is on the player learning to provide the correct response to a particular stimulus, with consequent rewards. He proposes that such edutainment titles rely more on extrinsic rather than intrinsic motivation, through the appeal to arbitrary rewards such as getting to the next level in the game. He offers the example of the game ‘Math Missions: The Amazing Arcade Adventure’, where money and playtime in an arcade are the rewards for the correct math answers provided. Egenfeldt-Nielsen (2006) points to the disadvantages of adapting such a learning approach to GBL, as he warns that such games can lead to the player focussing more on the goals of the game (rewards) as opposed to the goals of the learning experience.

**Cognitive Constructivism**

Unlike behaviourism, cognitive constructivism focuses on internal mental events such as cognitions and understandings. Building on theories such as Piaget and Bruner, and the cognitive revolution in psychology, the underlying assumption of this theory is that learners actively construct their own knowledge by building upon their current
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