

Chapter 16

The Efficacy of Games and Simulations for Learning

Louise Sauvé
Télé-université, Canada

Lise Renaud
University of Quebec in Montreal, Canada

David Kaufman
Simon Fraser University, Canada

ABSTRACT

This chapter presents a synthesis of the literature (1998-2008) on the efficacy of games and simulations for learning. Based on definitions and sets of essential attributes for games and for simulations, the authors examine the contributions of each to knowledge structuring and the development of problem solving skills. Noting that games and simulations have positive learning outcomes in various situations, the authors present variables to measure the knowledge and skills developed by learners who use games and simulations. This work is intended to contribute to the development of an analytical framework for future studies on the efficacy of games and simulations for learning.

INTRODUCTION

Game and simulation research on learning has been characterized by a large variety of approaches, as well as discrepancies in the presentation and interpretation of results. These have led to contradictory and confusing results on their educational efficacy. To begin to address these issues, we undertook a literature review based on a validated analytical framework to gauge the efficacy of educational games and simulations on learning (Sauvé, Re-

naud, Kaufman, & Sibomana, 2008). This review identified 2,244 articles on games, simulations and simulation games published during the period 1998 – 2008 and analyzed in detail 806 relevant English and French articles to reach our conclusions.

To ensure that the activities in the reviewed literature were truly “games” and “simulations,” we initially determined the essential attributes of these concepts, as presented in Chapter 1. This work enabled us to identify specific impacts as arising from games, simulations, or simulation games, based on descriptions or definitions of the learning activities as written by the article authors. Based

DOI: 10.4018/978-1-61520-731-2.ch016

on our definitions, some of the activities studied were rejected (if the learning activity was neither a game nor a simulation); if they were labeled as games but fit our definition of simulations, they were reviewed as such.

This chapter introduces a synthesis of the publications (1998-2008) that treat the most significant contributions of games and simulations on learning. Additional results can be found in an extensive research report (Sauvé et al., 2008). In this chapter, we first discuss the main motivation for the systematic review. Next, we describe the methodology underlying our study, including the analytical framework, database searches, data collection and organization, and analysis. We then outline the efficacy of games on learning in the areas of knowledge structuring and problem solving. Finally, we discuss the most prominent learning efficacy of simulations that emerged from the review. We hope that this chapter will contribute to establishing a frame of reference for future research on the efficacy of games and simulations for learning.

THE PROBLEM

Because authors seldom distinguish among games, simulations and simulation games, the debate on the efficacy of (broadly-defined) “games” for learning, as well as their impact on other aspects of life (e.g., health, sedentary lifestyle, violence), draws many confusing comments on what games and simulations can achieve, not only for learning, but also as a societal phenomenon. Feinstein, Mann, and Corsun (2002) comment on their reaction to this amalgamation of terms:

This article arises from frustration, the frustration from reading a wide variety of papers each using words like simulation, games, role playing, gaming, and symbolic modeling either without definition or inconsistency from one work to another. (p. 732)

Some studies have shown that games and simulations provide favorable learning conditions, in particular through feedback, interaction and active learner participation; for examples, see Baranowski et al. (2003), Becker (2007), Egenfeldt-Nielsen (2005), and Jones (1998). Others (e.g., Bottino, Ferlino, Ott, & Tavella, 2006; Facer et al., 2004; and Garris, Ahlers, & Driskell, 2002) have demonstrated that games and simulations have an unquestionable efficacy for cognitive and emotional learning as well as motor skills.

In contrast, other authors¹ claim that it is difficult to gather strong evidence on the effectiveness of games and simulations on learning because of certain research obstacles:

- factors related to the research, such as weakness of studies’ theoretical framework, defective or overly varied methodology, and lack of a continuum between theory and practice
- factors related to learner characteristics: for example, his/her past experiences—school, social, cultural and economic, age, and gender
- procedural factors: for example, the way in which the teacher/instructor introduces the game or simulation, the involvement of the teacher/instructor during the course of the game or simulation (before, during, and after), and the way in which the teacher/instructor hosts the wrap-up discussion (face-to-face or at distance)
- factors relating to game and simulation characteristics and the learning context, including: pedagogical aspects (feedback, motivation, interaction, quality, authenticity, adequacy of the contents in light of the learning goals, etc.), organizational factors (class time limits, lack of verification, lack of support materials, lack of time to learn a game, curriculum unsuitability, etc.) and technical aspects (consistency, appearance, simplicity, adaptability, etc)

17 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/efficacy-games-simulations-learning/40886

Related Content

The Effects of Using On-Screen and Paper Maps on Navigation Efficiency in 3D Multi-User Virtual Environments

Hakan Tüzünand Dilek Doan (2019). *International Journal of Gaming and Computer-Mediated Simulations* (pp. 21-41).

www.irma-international.org/article/the-effects-of-using-on-screen-and-paper-maps-on-navigation-efficiency-in-3d-multi-user-virtual-environments/252171

Role-Playing Game as a Pedagogical Proposition for Story Co-Construction: A Brazilian Experience with Deaf Individuals in an Educational Context

Priscila Staroskyand Maria das Graças Dias Pereira (2013). *Student Usability in Educational Software and Games: Improving Experiences* (pp. 274-292).

www.irma-international.org/chapter/role-playing-game-pedagogical-proposition/70251

Gamification for Stakeholders in the Product Life Cycle: Holonic Platform With Kansei Engineering

Antonio Córdoba-Roldán, María Jesús Ávila-Gutiérrez, Susana Suarez-Fernandez de Mirandaand Francisco Aguayo-González (2022). *Handbook of Research on Gamification Dynamics and User Experience Design* (pp. 138-160).

www.irma-international.org/chapter/gamification-for-stakeholders-in-the-product-life-cycle/311134

Effect of Social Environment on Brand Recall in Sports Video Games

Ho Keat Leng, Ibrahim Mohamad Rozmand, Yu Hong Lowand Yi Xian Philip Phua (2021). *International Journal of Gaming and Computer-Mediated Simulations* (pp. 1-11).

www.irma-international.org/article/effect-of-social-environment-on-brand-recall-in-sports-video-games/272587

Understanding the Relationships Among Various Design Components in a Game-Based Learning Environment

Yuxin Ma, Douglas Williamsand Louise Prejean (2012). *International Journal of Gaming and Computer-Mediated Simulations* (pp. 68-85).

www.irma-international.org/article/understanding-relationships-among-various-design/66073