Chapter 11
Educational Games as Software Through the Lens of Designing Process

Mifrah Ahmad

https://orcid.org/0000-0002-7908-6657

Deakin University, Australia

ABSTRACT

Educational games (EG) as learning software have become more dominant in the educational industry and have gained immense popularity. However, a constant battle between designing an EG that combines fun and educational content in delivering learning objective is a prominent challenge through the designing phase for various stakeholders involved, especially game designers. This chapter discusses three major contributions to game design fundamentals and principles and unpacks their concepts on designing EG. Moreover, an in-depth discussion of game design models/frameworks is understood. This analysis highlights issues and problems raised through the gaps existing between models/frameworks against them. This chapter proposes a combined prototyping process adopted from the discussion and emphasizes aspects required in documenting game design. With the process documented and aligned, game designers will be able to reflect a better understanding of a game design process in the industry.

INTRODUCTION

Over the past decade, educational games (EG) as learning software and the usage of game-based learning (GBL) has become more commonly used for educational deliverance, as opposed to pure entertainment, has gained immense popularity. With that, reports discussing both positive and negative impacts on usage of GBL in education and variety of ways in which the learning outcomes have been achieved. A constant battle between designing an EG that is a combination of fun and educational in delivering learning objective is a prominent challenge through an implementation phase for designers (Azadegan et al., 2014; Romero, 2015; Serrano-Laguna, Manero, Freire, & Fernández-Manjón, 2018). Games-based learning (GBL) is a pedagogical approach that utilizes EGs to support learning (Prensky, 2003). As explained,

GBL utilizes an appropriate set of game mechanics (the rules of EG), provides freedom for learners to recreate scenarios without having a fear of adverse reactions, and provides a problem-oriented learning process to allow learners achieve learning goals in the EG (Poulsen, 2011).

The guidelines for designing an educational computer program including (games) and make learning with computers exciting and motivating have proven to be captivating (Malone, 1983). Malone (1983) provides a checklist for designing enjoyable educational programs that include: (1) challenge (goal, uncertain outcome) (2)fantasy, (3) Curiosity (sensory curiosity and cognitive curiosity). Despite the consideration of multiple challenges discussed in this work, Malone (1983) does conclude that the capabilities of computers in making learning exciting and engaging, but designing those learning tools (games) is undoubtedly tricky when programming is considered. This shows one of the very first groundbreaking guidelines provided in educational games creating as a checklist and the consideration of programming, which leads to its relevance with game designers and designing EG. As Malone (1983) mentioned the importance of constructive feedback provided to the players, a later study painted a flow of transformation of the computer from a "work" tool to directly linking towards children, learning, and play (Ito, 2009). Ito (2009) described three main genres with descript towards academic achievements, software designed to support school content, allow children to be a part of the designed software, and lastly, engaged and explore the construction and instruction of the possibilities of using digital media. The third genre draws upon 'construction' where an emphasis on empowering kids in creating their artifacts through interactivity with the software and technology, but the work is limited to 5thD:' a system where children play a diverse range of educational software in an informal afterschool setting.' Noticeably, it doesn't focus on how to achieve the negotiation between designers, children, industries, media, or education; however, it is useful for current 21st-century digital media and the impact it has on children's learning.

Despite the research has managed to accomplish a large range of EGs that has delivered its function successfully, there have been many EGs that have reported to be a failure or unsuccessful. It is definite that game designers do not create replicas of the games that are well-recognized. With that, recent articles published has addressed the rising tension between stakeholders of the game designing process, i.e. game designers, teachers, developers, learners, students, players. Designers are required to enhance the educational tools by integrating game elements and core concepts to maximize the tools' effectiveness, to increase the possibilities of achieving learning outcomes, levels of engagement and motivation (Kalmpourtzis, 2018; Schell, 2008). Not only that, designing EG required multiple consideration of multiple stakeholders such as game designers, developers, educators, teachers, and software engineers.

Understanding the game design is a complex job. As defined: "*Design is a process by which a designer creates a context to be encountered by a participant, and from which meaning emerges*"(Zimmerman & Salen, 2004, p. 41). With game design (GD) defined a variety of game design elements and learning theories that establish and define an EG. Table 1 for examples of game design elements that are crucial (Shi & Shih, 2015). Similarly, GD is equipped with learning characteristic that adds the value of providing a good learning experience to learners. Some of the characteristics are learning outcomes, usability, user's experience, motivation, engagement, game design, user satisfaction, usefulness, understandability, performance, playability, pedagogical aspects, efficacy, social impact, cognitive behavior, enjoyment, acceptance and user interface (de Aguiar, Winn, Cezarotto, Battaiola, & Gomes, 2018; Lameras et al., 2017; Wouters & van Oostendorp, 2017). The innovative learning approach derived from EG possesses educational values or even different kinds of software applications that compile into knowledgeable aspects such as teaching enhancement, assessments, and evaluation of learner (Tang & Hanneghan, 2010).

Related Content

Relationships Between Teacher Presence and Learning Outcomes, Learning Perceptions, and Visual Attention Distribution in Videotaped Lectures
Qinghong Zhang, Xianglan Chen, Yachao Duanand Xiaoying Yan (2022). *International Journal of Technology-Enhanced Education (pp. 1-15).*
www.irma-international.org/article/relationships-between-teacher-presence-and-learning-outcomes-learning-perceptions-and-visual-attention-distribution-in-videotaped-lectures/304079

Student Satisfaction Approach for Enhancing University Competitiveness
Booysen Sabeho Tubulinganeand Neeta Baporikar (2020). *International Journal of Technology-Enabled Student Support Services (pp. 31-54).*
www.irma-international.org/article/student-satisfaction-approach-for-enhancing-university-competitiveness/270262

Virtually Authentic: Storytelling and the Engineering Design Process in Online Learning
Kari M. Eubanksand Scott T. Lamie (2022). *Research Anthology on Makerspaces and 3D Printing in Education (pp. 265-284).*
www.irma-international.org/chapter/virtually-authentic/306720

The Promotion of Self-Regulated Learning Through Peer Feedback in Initial Teacher Education
Elena Cano Garcíaand Laura Pons-Seguí (2020). *International Journal of Technology-Enabled Student Support Services (pp. 1-20).*
www.irma-international.org/article/the-promotion-of-self-regulated-learning-through-peer-feedback-in-initial-teacher-education/255119

Utilization of Digital Technologies to Enhance Assessments, Practices, and Equity in Inclusive Education: The Constraining Factor
George Areba Ngwacho (2022). *Handbook of Research on Digital-Based Assessment and Innovative Practices in Education (pp. 295-317).*
www.irma-international.org/chapter/utilization-of-digital-technologies-to-enhance-assessments-practices-and-equity-in-inclusive-education/303505