

Chapter 12

Using Digital Games in Virtual Classrooms to Make Attitudinal Learning Motivating and Engaging

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ABSTRACT

The COVID-19 global pandemic has made it difficult for schools to conduct in-person learning, pushing educators to think innovatively to create digital classrooms and engage K-12 learners. This chapter will provide best practices and pedagogical reasoning into the use of digital game-based learning (DGBL) for attitudinal instruction in virtual classrooms of middle and high school students. When it comes to teaching socio-scientific topics, providing cognitive knowledge is not the only goal of education. Young learners need to develop appropriate attitudes and behaviors to ensure the holistic development of their personality. This is where DGBL has been found to be an effective instructional activity. Although the focus of this chapter is on using DGBL in environmental sustainability education, it provides implications that are applicable to other socio-scientific topics as well.

INTRODUCTION

The COVID-19 global pandemic disrupted in-person learning and many schools are still struggling to keep their schools open safely. Educators have the responsibility to help children continue to learn through other paths. Fortunately, the growth in educational technology and the advent of online teaching have made it possible to achieve some of the goals for K-12 education. Online learning has been growing rapidly across the United States and it is not an unfamiliar situation in higher education (Seaman et al., 2018). However, when COVID-19 struck, K-12 teachers found themselves in uncharted territory. Most K-12 educators have never taught online before, and now they had to create digital classrooms. Simply transferring strategies from an in-person class to an online platform has been clearly demonstrated as

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not working. Teachers have to go the extra mile to engage their students using new and novel strategies (Rockey, 2020). Educators, including school administration and teachers, have to find and implement digital tools that can help their young students learn in an engaging way and complete assigned tasks on time.

Research studies and the application of digital game-based learning (DGBL) in real classrooms have shown that DGBL is an effective instructional strategy to engage and motivate students to learn various subjects (Adams et al., 2012; Gee, 2008; Gros, 2014; Habgood & Ainsworth, 2011; Prensky, 2003; Wen et al., 2018). Considering virtual classrooms, implementing digital games will not only help students learn, but can also reduce the burden on teachers and add some fun moments. Games can reduce Zoom fatigue connected to burnout from overuse of conferencing platforms (Lee, 2020; Schroeder, 2021) and can also be provided as a homework activity or earn credit.

This chapter focuses specifically on teaching socio-scientific topics to K-12 students using DGBL in virtual classrooms. These approaches are different from implementing educational games that are designed to provide cognitive knowledge in subjects like math, science, social studies, languages, and others. First the importance of socio-scientific topics and the need for attitudinal learning is explained using environmental sustainability education (ESE) as an example. Following this example, how DGBL can be an effective pedagogical tool for attitudinal learning, how DGBL can be implemented in virtual classrooms, and how attitudinal learning can be assessed in virtual classrooms are elaborated upon.

TEACHING SOCIO-SCIENTIFIC TOPICS

In addition to teaching subject knowledge, many schools strive to incorporate socio-scientific topics in their curriculum that include real-world problems like environmental, social, and economic sustainability, pollution, use of pesticides, drug abuse, healthy food habits, and so on. There have been considerations about how to include such issues within the school curriculum, and about the pedagogical skills that are required of science teachers to teach such topics (Lewis & Leach, 2007). Socio-scientific topics involve ill-structured problem solving where there are no single correct answers, and the learning cannot be achieved by memorization (Sadler, 2009). These topics have local, national, and global dimensions (Ratcliffe & Grace, 2003). Such issues directly impact people who have competing perspectives and priorities making them controversial in nature, because of their undetermined status and connections to society (Sadler, 2009). Learners are exposed to these issues through media mostly and the way these issues are interpreted by them is impactful (Ratcliffe & Grace, 2003). Hence when teaching such topics, providing cognitive knowledge should not be the only goal; young learners need to develop appropriate attitudes and behaviors, making attitudinal learning very important.

Attitudinal learning comprises cognitive, affective, behavioral, and social learning. Gagne et al. (1992), define an attitude as the psychological evaluation a person has regarding an object, person, or event. Attitude comprises of three components: cognitive component based on information, knowledge, and thoughts; affective component based on emotions or feeling, and behavioral component, the pre-disposition to act (Kamradt & Kamradt, 1999; Simonson, 1979). In addition, social learning also influences attitude change, where discussions or interactions with others influences attitudes (Watson et al., 2018; Janakiraman et al., 2021b).

The goal of attitudinal instruction is to influence learners' existing attitudes positively or negatively leading to attitudinal learning (Watson et al., 2018). This challenge is possible if learners are made to

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