Factors to Consider When Designing Multimedia CBL Tools in Health Professional Programs

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ABSTRACT

Multimedia case studies are effective constructivist instructional tools that can help to design contextually authentic scenarios while also scaffolding instruction to help students move beyond their current skill and knowledge base. Although there are many advantages of using multimedia case-based learning, there are also many challenges associated with designing technology-enhanced case studies for constructivist learning. The research described herein presents the advantages and challenges that emerged from three unique learning environments in health professional education programs. In each of these environments, a multimedia educational tool (named the multimedia case-based learning sports injury assessment educational tool) was designed to engage students in authentic sport injury case scenarios. Feedback was gathered from multiple stakeholders in each learning context and used to explore the effectiveness of this technology-enhanced pedagogical approach.

KEYWORDS

Case-Based Learning, Constructivist Learning, Constructivist Teaching, Multimedia Case Studies

INTRODUCTION

The purpose of this article is to present the findings that emerged from three research projects, each one exploring the impact that a technology-assisted educational tool had on the nature of teaching and learning within unique health professional learning environments. For each project, a technological intervention (named the Multimedia Case-Based Learning Sports Injury Assessment Educational Tool (M-CBL SIAET)), was employed to engage students in authentic sport injury assessment scenarios. The purpose of this tool was to guide students through a number of theoretical and skill-based competencies required to perform comprehensive orthopedic injury assessments. The primary interest of each project was to explore the factors that influenced the use of technology-assisted teaching tools, rather than attempt to statistically demonstrate that the intervention better promoted specific learning outcomes. For each research project, this article: 1) describes the health professional learning environment; 2) provides an account of how data was collected; and 3) offers a summary of the results, including the advantages and challenges of designing multimedia-enhanced educational tools that emerged from each study.

Identifying the Research Problem

Health professional programs are extremely complex learning environments because of the expectations for students to acquire a mixture of theoretical knowledge and practical skills in classroom settings, while also demonstrating competence in real-life clinical environments (Wald et al., 2015). Further
adding to the complexities of these learning environments is the emergence of digital technologies and high-fidelity simulation in training health professionals (Doolen et al., 2016). Multimedia technologies are commonly used within health professional programs to simulate various scenarios, injuries, or illnesses. By creating realistic simulations through innovative technologies, students are able to practice their skills in a safe environment at any time, and in any place, eliminating the risks associated with practicing on actual patients (Issa et al., 2013). Within the literature, implementing multimedia case studies have resulted in many positive outcomes in health professional education, including: enhancing the authenticity of the learning environment by telling a narrative from a patient’s perspective (Schell & Kaufman, 2015); developing cognitive skills through active learning (Harris & Bacon, 2019); and bridging the gap between theoretical knowledge and clinical practice (Flood & Commendador, 2016).

Effective teaching in the 21st century requires health professional educators to have more than just extensive content knowledge (Savery, 2015). These educators must understand the complex interplay between teaching and learning (pedagogical knowledge), subject matter (content knowledge), and knowledge of instructional technologies (technological knowledge) (Wright & Davis, 2017). More importantly, to leverage the potential of technology effectively, educators need to develop a specialized body of knowledge that uses technologies in pedagogically meaningful ways (Mishra & Koehler, 2006). This type of evolutionary pedagogical knowledge is less common within the health professions, as it is not necessarily part of their academic preparation (Dent, Harden, & Hunt, 2017). Many health professional educators use technologies in superficial ways (e.g. using technology to deliver course content) without considering how the technology can be integrated to enhance learning or empower competence development (Burbules, 2018). Technology should not be implemented to simply educate differently, rather it should enhance the delivery of the content by providing unique possibilities for learning that could not be accomplished without that technology (Barry, Tierney, & O’Keeffe, 2015).

Exploring this problem, the research projects described herein involved a specific multimedia educational tool for use in health professional programs. This tool used technologies in pedagogically meaningful ways to facilitate learning in several theoretical and skill-based competencies required to perform effective orthopedic injury assessments. Each research project explored the impact that the educational tool had on the nature of teaching and learning within unique health professional learning environments.

RESPONDING TO THE PROBLEM

Designing the Technological Intervention: M-CBL SIAET

The M-CBL SIAET was designed to include four multimedia enhanced case studies (one shoulder, one elbow, one knee, and one ankle scenario) to engage students in authentic injury scenarios (Figure 1). This tool development followed important tenets of constructivist design (Admiraal et al., 2017), and was rooted in Technological, Pedagogical, Content Knowledge (TPACK) (Mishra & Koehler, 2006) theory to guide the integration of technologies in pedagogically meaningful ways.

Each scenario template was designed with Adobe Acrobat® because of the programs ability to be edited and interact with all types of portable document format (.pdf) content, including various forms of multimedia. Using this interface also made the tool readily accessible for students, as Adobe Acrobat® Reader is a free program that can be downloaded to any computer, tablet, or smartphone that has an internet connection.

Within the M-CBL SIAET, the template for each injury scenario included:

1. An injury scenario with a mechanism of injury video. This section also included initial brainstorming questions and peer activities such as “based on the mechanism of injury demonstrated in the video, what specific anatomical structures could be injured?”