Chapter 2
Using Simulation in Radiographic Science Education

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ABSTRACT

Students in radiographic science education programs must master both the didactic education and psychomotor skills necessary to perform radiographic examinations on patients in a clinical setting. Simulation is the most common method of helping radiographic science students prepare to perform such examinations. Simulation can be performed either in live or virtual environments. Recently there has been a trend to adopt virtual simulation in medical education because of the reduced adverse effects virtual simulation provides as opposed to live simulation and real-world practice. Though there is a paucity of literature available discussing virtual simulation's use in radiographic science education, recent studies in this field and related medical imaging modalities have shown the benefits of using virtual simulation. The purpose of this chapter is to discuss the current use of virtual simulation in radiographic science education and characteristics to consider when implementing a simulation program.

DOI: 10.4018/978-1-7998-0004-0.ch002

INTRODUCTION

Radiographic Science (RS) education, like all healthcare education, is uniquely different from education in other professional fields. While education for other professional fields (e.g., engineering, history, English, education, biology, etc.) focus solely on didactic or schoolwork learning, healthcare education is dually split between didactic and clinical education (Densen, 2011; Scheckel, 2009). Students are not only expected to acquire the technical, cognitive learning required, but they must also master the psychomotor skills necessary to apply didactic knowledge to patients in a clinical setting.

Historically, for adult learners, pedagogical techniques (i.e., teacher-directed methods) are often preferred by those who have progressed the furthest in formal education, as is the case with students in higher education (Cross, 1982). This is not surprising as the majority of organized education is based on pedagogical principles, and those with more education have more experience with and feel comfortable in well-structured classes and lectures (Hulse, 1992).

In contrast, modern learning theories for adult learners include self-pacing and the ability for repetition, real-time and learner-controlled feedback, and on-demand accessibility to education at the convenience of the learner (Cook et al., 2012; Decker, Sportsman, Puetz, & Billings, 2008; Kong, Hodgson, & Druva, 2015; Olxaewski & Wolbrink, 2017). Traditional pedagogical techniques are not suited for modern adult learners in radiographic science education. There is a need for academic transformation and pedagogical innovation in RS education, because students are required to learn radiological and medical theory and technical information before being able to apply that knowledge to a clinical setting. Educators must find ways to adapt modern learning theories for adult learners to successfully educate the next generation of healthcare professionals. Simulation, both real-life and virtual simulation, has been found to be the most common educational tool used to train and prepare modern students in healthcare (Motola, Devine, Chung, Sullivan, & Issenberg, 2013; Shanahan, 2016).

Real-life simulation, a common practice in radiographic education, is the use of high-fidelity mannequins, disarticulated phantoms, and real-life people for the practice of radiographic positioning (Ahlqvist et al., 2013; Berry et al., 2007; Cook et al., 2012; Gordon, Oriol, & Cooper, 2004; Kasprzak, 2016; Kong et al., 2015; Wright et al., 2006). Virtual simulation, technology-enhanced simulation performed through the medium of a computer software program, offers the added benefits of self-paced learning, repetition, constant access, and instant feedback (Issenberg & Scalese, 2008; Kasprzak, 2016; Shanahan, 2016). This form of pedagogy is especially attractive to adult learners because they prefer interactive, hands-on learning with immediate feedback (Decker et al., 2008). More recent research is turning from

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