Chapter 29
Use of Technology in Problem-Based Learning in Health Science

Indu Singh
Griffith University, Australia

Avinash Reddy Kundur
Griffith University, Australia

Yun-Mi Nguy
Griffith University, Australia

ABSTRACT

Recent advances in the field of digital technology have had a significant role in changing the concept of learning and teaching for both students and teachers. These developments have enabled educational systems to move from their traditional classroom-based teaching models to a more enhanced blended/e-learning approach including an array of electronic learning tools such as digital microscopy, electronic cell counter, 3D virtual reality, and demonstration videos. An integration of these digital tools along with contemporary face-to-face teaching can significantly improve student learning outcomes and provide convenient and flexible access to education and training. This model demonstrated a positive impact on laboratory-based courses such as Laboratory Medicine at Griffith University. The objective of this chapter is to highlight the impact and advantages of this particular model from the student- and teacher-based perspective. This chapter will also discuss some of the challenges of implementing this mode of teaching and provide future directions.

INTRODUCTION

In current tertiary education environments, Information and Communication Technologies (ICT) has impacted on both the design and delivery of education to students with a strong focus on e-Learning (Clothey et al., October 2012). Interactive technology incorporating e-Learning has the ability to promote active learning, seeking information through accessing multiple modes of information and self-directed

DOI: 10.4018/978-1-5225-7489-7.ch029

individually paced learning (Dede & Fontana 1995: Kahn 1993). Tertiary education faces a number of common challenges such as increasing class size, diverse cultural backgrounds, limited resources and teaching space facilities as well as concerns around the alignment of course curriculum for graduate capabilities (Gunn & Harper, 2007)(Smyth, Andrews, Caladine, & Bordujenko, 2011). To meet these demands, institutions such as Griffith University have had to employ existing technologies to increase learner autonomy. Through the introduction of e-learning activities, students have more flexible access to education and training, whilst avoiding increasing costs to campus infrastructure, laboratory staff and resources. This article will discuss the current use of technology to deliver various innovative forms of e-learning and blended problem based learning (PBL) as well as some models that are being developed and trialled at Griffith University to train undergraduate Medical Laboratory Science (MLS) graduates for the global health workforce. Some of these technological models were designed and developed by the authors from Griffith University. These include digital slide microscopy, introduction of computerized cell differentiation counters, 3D virtual reality (a 360 degree panoramic view of a live pathology laboratory), demonstration videos and the use of electronic portfolios (e-portfolios). Throughout the 4 years of the degree program, simulated and real world case studies have been developed and scaffolded across the courses within the program both vertically across the year levels and horizontally across courses within same year level. This strategy of mix mode use of technology aligns with the cognitive learning principles identified by Swann (2013) suggesting that inclusion of multimedia requires learners to split their attention between different means of instructions and helps mentally integrate the learning.

Although digital microscopy has been widely used in laboratory based teaching for some time, its advantages have been limited due to its restricted access of images for students. With the recent development of Image Scope, this software platform has allowed students to view Aperio scanned slide images on multiple computers across campus and off campus and has enabled students to access their dedicated course pathological slides without having to enter into a physical containment 2 (PC2) laboratory facility. Standardisation of training materials and extending the life capacity of rare and exotic case based slide sets that can degrade over time (such as loss of staining intensity due to long term storage) have also been achieved through the use of digital microscopy.

Simulation computer based morphology programs using Raspberry Pi mini computers have also enabled institutional laboratory facilities to incorporate electronic cell counters into haematology based practical sessions. This allows students to familiarise themselves with current cell counter technology found across private and public pathology laboratories. The computer system has been able to enhance educational learning and permits software development to be tailored to intuitional needs, without the burden of having to outlay large financial costs.

Furthermore, use of short demonstration videos showing different laboratory techniques have shown to improve student experience in understanding the techniques in detail. The demonstration videos had a significant impact through saving time and reducing the teaching load during laboratory sessions. Additionally encouraging students to develop their e-portfolio, a collection of their learning, accomplishments and experiences can greatly increase their employability. The use of e-portfolio has been recommended by a number of universities as it helps the student to develop their cognitive skills from self-directed learning. As the emergence of new technologies transform our traditional classrooms into virtual educational facilities, key challenges faced during the process, and issues yet to be addressed will also be highlighted in this article. As the demands for education and training continue to increase to meet