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

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 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 the demands of current and future workforce, this article will focus heavily on how e-learning tools and blended PBL have impacted on MLS students studying at Griffith University and the challenges that were faced from both students and teachers.

BACKGROUND

Current electronic learning (e-learning) tools along with recent advances in Information and Communication Technologies (ICT) have significantly increased students access to evidence and problem based learning techniques (Clothey et al., October 2012). This has impacted on both designing and delivering education to health science students with a strong focus on e-learning (Gértrudix Barrio, Carmen Gálvez de la Cuesta, Álvarez García, & Valle, 2007; Kirkwood & Price, 2005; Salmon, 2011). Traditional teaching in classrooms accounted for conventional academic based didactic teaching, where investigator initiated and discipline based knowledge is taught in isolation. Today the face of learning and teaching is changing to context driven, problem based, work integrated, transdisciplinary and interprofessional knowledge, where the primary focus is on building an effective and efficient team to work for a short period of time on solving a specific problem from the real world (Gibbons, 1994)

E-learning technology can act as an active instigator for creating constructivist teaching methods and active learning strategies to enhance student knowledge and prepare them for the digital age. This mode of teaching can also enable the students to develop skills such as critical analysis and personal interpretation of knowledge (Cummings, Mason, Shelton, & Baur, 2015). E-learning has been a dynamic part of the educational landscape since the start of the 21st century and has been defined in various ways over time (Sangrà, Vlachopoulos, & Cabrera, 2012). Massy and Zemsky (2004) suggest three major categories of e-learning. The first category of e-learning described as distance education where courses are delivered almost entirely online via the internet. The second and third category of e-learning termed electronically mediated learning is where learning materials are digitally delivered through various technologies and e-learning is facilitated by transactions software. The software management systems organise and manage teach-

8 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/use-of-technology-in-problem-based-learning-in-health-science/184286

Related Content

Using Web Surveys for Psychology Experiments: A Case Study in New Media Technology for Research
Blaine F. Pedenand Andrew M. Tiry (2013). *Advancing Research Methods with New Technologies (pp. 70-99).*
www.irma-international.org/chapter/using-web-surveys-psychology-experiments/75940

Enhancing the Resiliency of Smart Grid Monitoring and Control
Wenbing Zhao (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 3056-3065).*
www.irma-international.org/chapter/enhancing-the-resiliency-of-smart-grid-monitoring-and-control/184018

An Interactive Ecosystem of Digital Literacy Services: Oriented to Reduce the Digital Divide
José Eder Guzmán-Mendoza, Jaime Muñoz-Arteaga, Ángel Eduardo Muñoz-Zavalaand René Santaolaya-Salgado (2015). *International Journal of Information Technologies and Systems Approach (pp. 13-31).*
www.irma-international.org/article/an-interactive-ecosystem-of-digital-literacy-services/128825

Context-Aware Computing for Persons with Disabilities
Najd A. Al-Mouhand Hend S. Al-Khalifa (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 328-335).*
www.irma-international.org/chapter/context-aware-computing-for-persons-with-disabilities/112341

An Integrated Systems Approach for Early Warning and Risk Management Systems
Walter Hürster, Thomas Wilboisand Fernando Chaves (2010). *International Journal of Information Technologies and Systems Approach (pp. 46-56).*
www.irma-international.org/article/integrated-systems-approach-early-warning/45160