

E-learning in New Zealand Undergraduate Medical Education: Trends and Directions

Heba Farooq
Faculty of IT
Aspire2 International
Auckland, New Zealand
heba.farooq@aspire2.ac.nz

MD Athar Imtiaz
Faculty of IT
Aspire2 International
Auckland, New Zealand
athar.imtiaz@aspire2.ac.nz

Alaa Aljanaby
Faculty of IT
Aspire2 International
Auckland, New Zealand
alaa.aljanaby@aspire2.ac.nz

ABSTRACT

This paper investigates literature on the adaptation of Educational Technology (ET) and discusses current use of e-learning within the Undergraduate Medical Education (UME) programme in New Zealand. Although there are few studies from New Zealand, the survey identifies barriers to and facilitators of curriculum integrated e-learning. This study demonstrates potential areas for further research and innovation. The aim of this study is to discuss the following question: ‘To what extent is ET used in the New Zealand UME?’

Keywords: educational technology; e-learning; undergraduate medical education;

1. INTRODUCTION

This paper examines published literature on the use of Educational Technologies (ET) within the scope of Undergraduate Medical Education (UME) in New Zealand. In this paper, e-learning refers to electronically mediated or internet associated communication technologies that are used for constructing and confirming knowledge (Garrison, 2011). According to (Ruiz, Mintzer, & Leipzig, 2006) the integration of e-learning into UME will accelerate the shift towards the use of ET to enhance knowledge and performance, such that educators become facilitators of an active learning process and assessors of competency. E-learning will have a significant impact on the learning environment of future medical students (Huynh, 2017).

To support and enhance education of medical students, e-learning has gained popularity among medical educators in the past two decades. However, there exists a variability of its use. Strategic efforts are being taken by institutions to advance the use of educational technology. According to (Candler, 2007) the three prominent categories for the usage of ETs in medical education continuum are Computer-aided Instruction (CAI), Virtual Patients (VP) and Human Patient Simulation (HPS).

ETs vary extensively in their complexity and cost. Educational technology tools include resources that can portray complex anatomical and physiological processes, allow learners to practice skills by interacting with technology enhanced learning environments, online multimedia tutorials, simulated patients, tailor personalized instruction to learners and channel access to standardized curricula. E-learning in UME breaks the isolation of learners and offers learners materials for self-instruction and collaborative learning (Ruiz et al., 2006).

The New Zealand government has identified that, to maintain their relevance over the coming decades, there is a need for tertiary institutions to make effective use of ET (Marshall, 2012). E-learning guidelines have been identified as direct benefit to facilitate implementation and delivery of e-learning, however, tertiary institutions need resources and support to

implement ETs and work within such guidelines (Gordon Suddaby & John Milne, 2008). Professional development is an identified facilitator of the mainstreaming of e-learning in New Zealand (Rosenberg, 2007). Research suggests that lack of appropriate ETs are barriers to IPE occurring with health professional students in Australian and New Zealand Universities.

2. E-LEARNING IN UME

In New Zealand, for entry into the Bachelor of Medicine, Bachelor of Surgery (MBChB) degree, around 1500 students enroll into a common ‘health science’ first year at university, with a total of 425 domestic students enrolling for medicine after application and selection. There is a scope to use educational technologies within the ‘health science’ first year, which is perceived as highly competitive, because of large class sizes (around 1500 students), it is hard to deliver completely student-centered learning. Lectures are simultaneously video cast to other lecture theatres and laboratories, uploaded and repeated across many streams (Mckimm, Wilkinson, Poole, & Bagg, 2010).

Also, alongside international trends, more student-centered methods of teaching and learning are being adopted with increasing use of case-based learning, e-learning, small group work and diminishing use of lectures. The students at the Faculty of Medical and Health Sciences at one university, access an online internet application web browser extension, CIMMS ZINC (Continuum Mechanics, Image analysis, Signal processing and System identification). CIMMS is a modular mathematical modelling environment that has been used for many years in research, engineering teaching courses and undergraduate student projects (C. Stevens, C. E. Diebel, S. C. Malpas, & P. J. Hunter, 2003). ZINC software extension has been developed to help medical and health science students understand the heart’s electrical activity and electrocardiogram (ECG). Such a teaching application, based upon computational models, appears to be beneficial for educational purposes and provide a pathway from research to teaching (Stevens, Blackett, LeGrice, & Hunter, 2006).

Another example of a system proposed, is that of a virtual environment based medical simulation system for non-verbal communication within clinical teamwork. This is a camera

This poster appeared at the 8th annual conference of Computing and Information Technology Research and Education New Zealand (CITREnz2017) and the 30th Annual Conference of the National Advisory Committee on Computing Qualifications, Napier, New Zealand, October 2-4, 2017.

based face tracking system. This is an inexpensive framework that has received a positive feedback from medical professionals and developers of teamwork simulations about the use and the potential of the application. The system is being developed in cooperation with researchers and educators from the medical school, and aims to design surgical training scenarios to be used with the application. (Marks, Windsor, & Wunsche, 2008).

3. OTHER HEALTHCARE EDUCATIONAL TECHNOLOGIES

Optometry students are taught the process of subjective refraction through lectures and laboratory-based practicals before progressing to supervised clinical practice. The use of Simulated Learning Environment (SLE) as an e-learning tool, has had a positive impact on optometry learning (Woodman-Pieterse, De Souza, & Vincent, 2016) and such SLEs are also embedded into medical curricula (Mckimm et al., 2010). The University of Otago has introduced into its Bachelor of Radiation Therapy programme a virtual learning environment known as Blackboard, the e-learning tool that supports a blended learning environment. It is a web based learning management system to facilitate the curriculum resources to students, a platform to communicate with each other and with staff, maintain yearly academic records as well as manage assessments.

(Kane, 2012) describes that although this system is reported useful by radiation therapy students, there is no evidence that it enhanced student performance. According to the author, New Zealand could develop more specialized e-learning tools, such as computer based radiation therapy planning systems, to keep pace with global trends and enhance student learning experience. A Postgraduate Certificate in Health (Allied Mental Health) was developed to address poor staff retention and respond to the workforce demand for a skilled experienced allied mental health workforce. 'Blackboard', an Internet platform with a problem-based learning (PBL) approach enabled students to study from their workplaces (Pack, 2010).

4. CONCLUSION

This study, analyzed available literature on the use of e-learning in UME. It is evident that there is very little work in this area with only 5 studies in over 10 years and these are spread across many subjects, only two of which report the use of an ET resource. Furthermore, e-learning literature from New Zealand is focused on e-learning organizational change and others are on professional development and IPE. Studies are needed to report the benefits to and challenges of the use of ETs in UME.

There is a potential for collaboration and contribution to UME from the ICT education sector. The research has highlighted the need for support from ICT tertiary institutions' expertise in New Zealand to contribute to development of ET and e-learning in the UME domain. Innovative approaches have the potential to allow contribution to UME from the ICT industry.

This study did not involve qualitative analysis via interviews or surveys of learners and educators that use ET based resources within the UME curriculum, this will be considered for future work to enriched the findings of the study.

5. REFERENCES

- Stevens, C., Diebel, C. E., Malpas, S. C., & Hunter, P. J. (2003). Applications of computational models in education, *Proceedings of the 25th IEEE Annual International Conference on Engineering in Medicine and Biology Society* (Vol. 4, pp. 3497-3498).
- Candler, C. (2007). Effective use of educational technology in medical education. *Colloquium on Educational Technology: Recommendations and Guidelines for Medical Educators*. Washington, DC: AAMC Institute for Improving Medical Education.
- Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and practice*, Taylor & Francis.
- Suddaby, G. & Milne, J. (2008). Coordinated, collaborative and coherent: Developing and implementing e-learning guidelines within a national tertiary education system. *Campus -- Wide Information Systems*, 25(2), 114-122.
- Huynh, R. (2017). The role of e-learning in medical education. *Academic Medicine*, 92(4), 430.
- Kane, J. (2012). Making square pegs for square holes: Utilising the e-learning resources at our disposal. *Shadows: The New Zealand Journal of Medical Radiation Technology*, 55(2), 11.
- Marks, S., Windsor, J., & Wunsche, B. (2008). Camera based face tracking for enhancing surgical teamwork training with non-verbal communication. *The 23rd International Conference on Image and Vision Computing New Zealand*.
- Marshall, S. (2012). E-learning and higher education: Understanding and supporting organisational change in new zealand. *Journal of Open Flexible and Distance Learning*, 16(1), 141-155.
- Mckimm, J., Wilkinson, T., Poole, P., & Bagg, W. (2010). The current state of undergraduate medical education in new zealand. *Medical Teacher*, 32(6), 456-460. doi:10.3109/0142159X.2010.486427
- Pack, M. (2010). Allies in learning: Critical-reflective practice on-line with allied mental health practitioners. *Social Work Education*, 29(1), 67-79.
- Rosenberg, W. (2007). What's needed for e-learning to take off? designing a suitable national and institutional policy runway. *Journal of Open Flexible and Distance Learning*, 11(1), 6-17.
- Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of e-learning in medical education. *Academic Medicine*, 81(3), 207-212.
- Stevens, C., Blackett, S., LeGrice, I., & Hunter, P. (2006). Internet applications for computational biology, the CMISS web browser extension and use in education. *Engineering in Medicine and Biology Society*, 2005.

Woodman-Pieterse, E. C., De Souza, N. J., & Vincent, S. J. (2016). The influence of a novel simulated learning

E-learning in New Zealand Undergraduate Medical

Education: Trends and Directions

Heba Farooq

Md Athar Imtiaz

Alaa Aljanaby

Faculty of IT, Aspire2International



Introduction

To support and enhance education of medical students, e-learning has gained popularity among medical educators in the past two decades. However, there exists a variability of its use. Strategic efforts are being taken by institutions to advance the use of educational technology. According to Ruiz, Mintzer, & Leipzig (2006) the integration of e-learning into Undergraduate Medical Education (UME) will accelerate the shift towards the use of Educational Technologies (ET) to enhance knowledge and performance, such that educators become facilitators of an active learning process and assessors of competency. E-learning will have a significant impact on the learning environment of future medical students (Hyunh, 2017).

The New Zealand government has identified that, to maintain their relevance over the coming decades, there is a need for tertiary institutions to make effective use of ET (Marshall, 2012). This research reviews literature on the adaptation of Educational Technologies (ET) and discusses current use of e-learning within the UME programme in New Zealand.

Methodology

To identify relevant studies, we did a systematic literature review, according to the process outlined by Kitchenham (2004) using databases such as IEEE Xplore, EBSCOHost, Pubmed and Springerlink. Studies pertaining to e-learning in undergraduate medical programmes from New Zealand were selected. Literature reviewed was within the period of 2007-2017. After implementing the above scope boundaries, approximately 5 studies were deemed relevant to the study. Figure 1 describes the areas of surveyed literature.

E-Learning: the institutional integration

- The New Zealand government has identified that, to maintain their relevance over the coming decades, there is a need for tertiary institutions to make effective use of ET (Marshall, 2012)
- To facilitate higher order pedagogy activities, moodle is considered an effective learning management system by New Zealand tertiary instructors (Barr, Gower, & Clayton, 2007)
- Professional development is an identified facilitator of the mainstreaming of e-learning in New Zealand (Rosenberg, 2007)
- Research suggests that lack of appropriate ETs are barriers to Inter Professional Education occurring with health professional students in Australian and New Zealand Universities

Educational Technologies in UME in NZ

- E-learning activities include lectures that are simultaneously video cast to lecture theatres and laboratories, uploaded and repeated across many streams, videoconferencing (McKimm et al., 2010).
- An example of a system proposed, is that of a virtual environment based medical simulation system for non-verbal communication within clinical teamwork. This is a camera based face tracking system for training of surgical skills (Marks, Windsor, & Wünsche, 2008).
- The students at the Faculty of Medical and Health Sciences at one university, access an online internet application web browser extension, CIMMS ZINC (Continuum Mechanics, Image analysis, Signal processing and System identification) which has been developed to help students understand the heart's electrical activity (Stevens, Blackett, LeGrice, & Hunter, 2006).

Conclusion

- There is a drive to develop flexible E-learning activities that promote student centred pedagogy methods.
- Innovative approaches, from the Information and Communication Technologies (ICT) industry, have the potential to allow contribution to UME.
- The study has highlighted the need for support from ICT tertiary institutions' expertise in New Zealand to contribute to development of ET and e-learning in the UME domain.
- Overall, it is evident that there is very little work in this area with only 5 studies in over 10 years and these are spread across

References

- Barr, H., Gower, B., & Clayton, J. (2007). Faculty response to the implementation of an open source learning management system in three tertiary institutions in New Zealand. *Computers in the Schools*, 24(3-4), 125-137.
- Stevens, C., Blackett, S., LeGrice, I., & Hunter, P. (2006). Internet applications for computational biology: the CIMMS web browser extension and its use in education. In *Proceedings of the 2006 IEEE Annual International Conference on Engineering in Medicine and Biology Society* (Vol. 4, P. 3407-3408).
- Hyunh, R. (2017). The role of e-learning in medical education. *Academic Medicine*, 92(4), 432.
- Kitchenham, B. (2004). Procedures for performing systematic reviews barbara kitchenham. July 2004. *Keene University Technical Report*.
- Marks, S., Windsor, J., & Wünsche, B. (2008). Camera based face tracking for enhancing surgical teamwork training with non-verbal communication. *The 23rd International Conference on Image and Vision Computing New Zealand*.
- Marshall, S. (2012). E-learning and higher education: Understanding and supporting organisational change in new Zealand. *Journal of Open Flexible and Distance Learning*, 16(1), 141-155.
- McKimm, J., Wilkinson, T., Poole, P., & Raag, W. (2010). The current state of undergraduate medical education in New Zealand. *Medical Teacher*, 32(6), 454-460. doi:10.3109/02694727.2010.486427
- Rosenberg, W. (2007). What's needed for learning to take off? designing a suitable national and institutional policy runway. *Journal of Open Flexible and Distance Learning*, 11(1), 8-17.
- Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of e-learning in medical education. *Academic Medicine*, 81(3), 207-212.



Fig 1. Areas of Study