Technology enhanced learning in Medical Education: What’s new, what’s useful, and some important considerations

Poh Sun Goh[2]

Corresponding author: Dr Poh Sun Goh dnrgohps@nus.edu.sg
Institution: 2. National University of Singapore
Categories: Technology

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Abstract

The intention of this personal reflection is to complement a Pecha Kucha session presented on the same topic on the closing day of AMEE 2016. Three “new”, topical and trending areas to reflect upon are Virtual Reality (VR)/Augmented Reality (AR)/Mixed Reality (MR); Machine learning or Artificial Intelligence (AI)/big data/data analytics; and Robotics. Four interrelated “useful” features of Technology enhanced learning (TeL) relate to the utility of digital content, the connectivity provided by the internet, the use of mobile devices, and the functionality provided by software and digital applications or Apps. Some “important” considerations using TeL relate to usability, cost, the conscious use of instructional design and pedagogical best practices and evidence, and maintaining a scholarly mindset.

Keywords: eLearning; Technology enhanced learning; Virtual reality; Augmented reality; Mixed reality; Artificial intelligence; Robotics

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VR/AR/MR provide users with new ways to experience and interact with digital content, with VR allowing immersion within a digital space, and AR/MR layering digital information over reality. These technologies are not new, and have been successfully used for many years as part of the training program for military pilots, and for combat training in the military, using expensive simulators and simulation paradigms. Recent more widespread consumer interest in VR/AR/MR has come about due to the release of relatively low cost platforms and devices, including VR headsets (e.g. Microsoft HoloLens, Oculus Rift, Samsung Gear VR, Google Cardboard), and increasing commitment by industry (including media and gaming companies – e.g. with immersive gaming, and AR mobile games like...
Pokémon Go), and educational teams to develop content. Some current uses of VR and AR in medical education are in anatomy education, and training of surgical skills, with gradual increasing development of usable content, and progressively more publications in the literature over the last 10 years (PubMed and Google search). While there is positive media coverage and some hype in this area, more widespread mainstream adoption of VR/AR/MR in medical education will ultimately be determined by the quality and usefulness of the digital content, the ability of the VR/AR/MR experience to engage the user, and the availability of both low cost devices, and software development platforms to allow low cost or free access to a much larger number of individual educators and education teams to progressively develop more and better content. This increasing access to and availability of low cost devices and software platforms will also encourage many more educators to try out, work with, and critically evaluate the role of VR/AR/MR in medical education. VR/AR/MR must add value to what is already available. This includes current initiatives in TeL using existing widely available mobile and high resolution screens to access and display a wide variety of both useful and engaging digital and multimedia content.

Machine learning and AI/big data/data analytics is another topical area, as can be seen from media headlines earlier this year proclaiming "Google AI beats Go world champion again to complete historic 4-1 series victory" (on TechCrunch), and over the last few years not only that "IBM's Watson goes to medical school" (reported on BBC), that "IBM's Watson has passed first milestone" (reported on ZDNet) and last year that "IBM Watson "graduates" medical school in Haifa" (reported on Israel21c). What is interesting about these two examples is not only the dramatic learning ability and performance skill level demonstrated by AI, but also some of the follow up headlines, highlighting that training and working with AI can improve human performance - "A Go player increased his global ranking by 300 places by playing Google's Deep Mind computer" (reported on Wired.com); and that IBM's Watson is now being tasked with analysing thousands of medical records as well as medical journal articles to assist clinicians in clinical decision making (reported on IBM website – "Watson is now going to work"). It is also a little disconcerting to read a recent headline that "Google has set up an AI group called "Magenta" to see if a computer can produce original art and music" (reported on Business Insider); as creativity and artistic expression has been described as a unique human attribute, helping to set us apart from, and allowing us to add value to what a computer/AI system can produce. Nevertheless, and despite these misgivings, it is likely that similar to "blended learning" (where the best features of eLearning/TeL and face to face learning are combined), the advances of AI/big data/data analytics will be combined with human input to increase our ability not only to care for our patients as clinicians, but increasingly to perform better as educators, to provide a more personalised and adaptive learning experience for each individual student.

Robotics adds to the capability of AI and machine learning to allow the computer to physically interact with the real world. Its widespread adoption in industrial manufacturing to produce zero defect products tirelessly is already here, though a small number of human operators are still required to oversee the production process. Robots will increase our physical capability to care for our patients. What is interesting is the potential ability of Robots to "teach" and instruct. A recent headline this year "Robots will train doctors in the next 10 years says a MIT expert working on one" (reported on Tech Insider) is an interesting prediction of what is to come. Similar to the use of AI, it is likely that we will find ways to blend and combine the useful features and capabilities of Robotics with our current practice, through empirical experience, experimentation and evaluation.

While there is considerable excitement about the potential of VR/AR/MR, AI/big data/data analytics, and Robotics, what we must always focus on its utility, usefulness and evidence. With TeL, what is useful is the quality and utility of digital content, the ability of the internet to connect us to information and each other, mobile devices allowing us to access digital content through the web and connect with others wherever we might be, and the ever increasing proliferation of low cost and free software and Apps which allow us to produce, access and use content, as well as interact with each other in easier and better ways (Goh 2016).
Important considerations to be kept uppermost in our minds relate to the usability of any current or "new" technology or platform to support and enhance learning, and our teaching (Sandars, 2010); the cost of access and cost of development (in money, time and effort) of useful and high quality educational content (Cook 2014); the requirement to have a firm pedagogical grounding and use best practices in instructional design, and finally to always have a scholarly and experimental mindset – to try, to experiment, to keep improving and innovating, and to engage our fellow educational scholars by disseminating and building on each others efforts. What is "new", must be shown to not only be "useful", but also to add value to what we already have.

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Take Home Messages

Notes On Contributors

POH SUN GOH, MBBS, FRCR, FAMS, MHPE, is an Associate Professor and Senior Consultant Radiologist at the Yong Loo Lin School of Medicine, National University of Singapore, and National University Hospital, Singapore. He is a graduate of the Maastricht MHPE programme, and current member of the AMEE eLearning committee.

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Appendices

The online address of the website/blog used to deliver the AMEE 2016 Pecha Kucha presentation on the same topic is http://telatamee2016.blogspot.sg

Declarations

The author has declared that there are no conflicts of interest.

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