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Commentary

Developing the Evidence-Base to Support the Integration of Technology-Enhanced Learning in Healthcare Education

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Abstract

Technology-enhanced learning is now almost ubiquitous across all healthcare curricula. From social media, through eBooks to virtual reality, technology is having an increasingly important role in supporting students to reach the desired learning objectives. However, while it is common to find reports on these interventions in the literature, there remains a paucity of meaningful evaluation on the actual impact these novel and innovative approaches to education have on student learning. This commentary pushes forward the need to continually evaluate the role of technology with healthcare curricula.

Technology is everywhere. The rise of digital technology into every facet of society has grown, and continues to, exponentially. It is embedded in our everyday lives and education is no exception; from simple PowerPoint slides in the lecture theatre to advanced augmented reality applications in collaborative learning spaces. In fact, it is in the discipline of healthcare education that a lot of this technological innovation is to be found. A cursory trawl through the healthcare education literature and popular media reveals an abundancy of examples that highlight how technology-enhanced learning (TEL) can be used to deliver healthcare programs (for an example in anatomy education see Trelease, 2016 (1)). This expansion of technology within education is concurrent with the desire to develop fully blended learning environments that combine the increased accessibility to digital tools, with traditional approaches to learning and teaching. Although teachers and physical learning spaces are still required to maintain face-to-face teaching, the benefits for the students to control the time, place and pace of engagement are clear; providing them with opportunities to engage and obtain the necessary knowledge base and skill set to successfully complete their program of study (2–6). This shifting landscape is particularly evident across the healthcare education sphere due to the continual drive to reform the delivery of basic science curricula, with TEL considered essential to enable these changes. An exemplar of this changing approach is in anatomy education, where is it is widely acknowledged that changes in relevance, level of detail and delivery approach are under scrutiny due to the limited space available within broadening curricula (7,8). In this regard, it is therefore not surprising that anatomical education scholarship is at the forefront of embracing the latest technological innovations, with anatomy teachers consistently developing new approaches to deliver their curricula to support student education. The educational scholarship literature is well populated with articles detailing how TEL has been

introduced into anatomy curricula to enhance student education, with such journals as Medical Science Educator providing useful outlets for such pedagogical developments. From social media, such as Facebook, YouTube, Twitter and Snapchat, through eBooks, podcasts and screencasts, to the latest virtual and augmented reality applications, anatomy teachers are embracing and adapting to the increased availability and accessibility of digital tools to support student education (1).

However, the desire to innovate and integrate the latest educational technology into all healthcare curricula must be counter-balanced with a full understanding and consideration of the actual need and potential impact on student learning. Far too often it is heard that "technology should not be introduced into curricula for its own sake," yet the level of meaningful evaluation to provide significant contributions on the effectiveness and efficiency of individual TEL resources is still under developed. Moreover, the justification for introducing technology into curricula is often based on the false assumptions that it can either support an individual student by providing content that matches their specific learning style (9), or, as students are 'digital natives' (10) there is the need to integrate this approach to meet their expectations and increased levels of digital literacy. At a time when additional demands are being placed on educational institutions and individual faculty members to develop curricula based on the most significant and reliable teaching evidence available, the paucity in empirically backed evidence to justify both learning styles (11–16) and 'digital natives' (17–19) as drivers to reform is particularly unhelpful and uninformed.

As healthcare educators, it is our role to assess, modify and update our curricula in response to the needs of the students - finding the problems we all commonly face and seeking the right solution. Every problem, and its potential solution, needs to have the student, not the technology, at the heart (20). In my opinion, it is inappropriate to

simply assume that technology is the solution to all our educational delivery problems (21). In order to make informed decisions on the use of technology, proportionate research and evaluation of educational impact need to co-exist with the innovation and product development. By ensuring that research and evaluation are equal partners with the innovation and product development, a balance can be found that matches solutionism (finding a technological solution to all problems), empirically derived data on the TEL resource's efficacy, and the ability to continually innovate and improve.

This desire to fully understand the impact technology has on our lives is not new. In 1986 Dr Melvin Kranzberg, a Professor in the History of Technology, published a series of laws around the use of technology (22), and it is his first law: "Technology is neither good nor bad; nor is it neutral" that is still particularly resonant today. The idea behind the law is one of comparison between the short-term and the long-term impact; the trade-offs between the good or positive and the bad or negative benefits. It is only when educators have a solid understanding of the impact such resources have on student education, meaningful and informed decisions on its introduction can be made. As many senior colleagues honestly and passionately reflect, teachers taught and students learnt a long time before tablet devices were developed. Measuring the efficacy of such technological interventions, however, is by no means an easy task despite a number of evaluation frameworks designed to support the acquisition of this evidence base (21,23,24). Moreover, with so many covariables contributing to the overall impact on student learning, it can be very difficult to isolate the specific impact a single TEL resource has (21). But, I do not believe this is a sufficient reason to shy away from such an endeavour – and it would not be tolerated in other disciplines. Can you imagine a new drug or car part being released into mainstream use if it hadn't undergone rigorous testing? Surely not.

It is clear, from the literature and media, that the general acceptance of technology into our lives is not necessarily straight forward (25–28). Despite the initial enthusiasm and adoption of new technologies, the eventual acceptance is not always as strong. This has been mapped out and visualised through the education hype-cycle, but the point is important and comes down to choice. With the widespread availability of technology, not just its use in education, but everyday life, the public have a choice. They can choose which technology to engage with, which ones to try, and eventually, which ones to commit to and buy. But, with the ever-increasing desire to integrate technology into our curricula and create fully blended learning environments, our students don't have this choice. It is therefore our duty as educators to ensure that the resources we integrate are suitable for the curriculum in which they are embedded. The obvious questions that usually follow this line of thought are: What does suitable mean and what is the tangible metric that can or should be used to make these meaningful decisions? The answer to these questions rest in the rationale for introducing technology into the curriculum in the first place. Firstly, healthcare education is dominated by vocational courses that lead directly into a specific role and within these roles a certain level of technological proficiency will be required. For example, over the last few years the introduction of ultrasound teaching throughout healthcare curricula has markedly increased as the image quality and affordability of probes improve. Such technology will be ubiquitous throughout healthcare systems by the time our current students graduate and enter the workplace. It is therefore essential that we teach and support them to utilize this technology as they will encounter it routinely throughout their careers. The second lies in the ability of TEL resources to support knowledge acquisition and retention. This can be measured along three domains: efficiency, effectiveness and enjoyment (29). If a resource is more efficient, the same amount of

information can be learned in less time; if it is more effective, more information can be learned over the same time period; and if it is more enjoyable, students and faculty will want to engage with it more often (29). Only by researching the impact TEL has on student learning gain across these domains, with an evidenced-based approach, can meaningful decisions be made on the introduction of TEL into our curricula. I believe this is the minimum we, as educators, should be doing to ensure that our curricula are evidence-based and supportive of student education. This is not, in any way, suggesting that technology should not be integrated into our curricula, but a plea to ensure that the latest technology is comprehensively evaluated to understand fully its role.

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