



E-learning in medical education: problems with research

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ABSTRACT

E-learning has become a widely accepted modality in medical education. However whilst it is true that the adoption of e-learning continues to grow, there are ongoing questions as to its effectiveness and as to whether or not it can achieve good outcomes for learners. The research has broadly shown that e-learning is no better than traditional forms of education. This suggests that there is a problem with e-learning, or with the research, or perhaps with both. In this short article I look at some of the problems with existing research into e-learning. Perhaps the foremost difficulty of conducting research into e-learning and of analysing and summarising research is the variety of forms of e-learning and the problems of defining these different forms. Another related problem for e-learning research is the pace of change of technology in this field. This pace has continued for the past twenty years and has accelerated in recent years. A third issue is the research methodologies used to evaluate e-learning. There are a variety of different methodologies described in the literature - but this very variety makes it difficult to draw overall conclusions from the research base. A fourth issue is the question of what constitutes "effectiveness" - as proved or disproved by research. A fifth issue is the extent to which research up to now has attempted to evaluate e-learning as an isolated learning activity: this is a problem because we know that it is an artifice. A sixth issue is the reporting of research. A seventh issue relates to the purpose of research - its implementation in routine e-learning practice. Rolling out proven e-learning methodologies requires funding and evidence that e-learning will be cost effective as well as effective. Yet there are few studies that evaluate the cost and value of e-learning.

KEY WORDS: Medical education; E-learning; Research

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Received: April 28, 2016

Accepted: October 07, 2016

Published: October 16, 2016

MAIN TEXT

E-learning has become a widely accepted modality in medical education [1]. It is undoubtedly convenient and its potential for cost savings have made it popular amongst medical learners and teachers alike [2]. However whilst there is no question but that the take-up of e-learning continues to grow, there are ongoing questions as to its effectiveness and as to whether or not it can achieve good outcomes for learners. In its early years e-learning was certainly subject to much hype - but subsequent educational research into its effectiveness has questioned the foundations of this hype [3]. The research has broadly shown that e-learning is no better than traditional forms of education [4]. This suggests that there is a problem with e-learning, or with the research, or perhaps with both. In this short article I look at some of the problems with existing research into e-learning and the difficulties of doing research into e-learning and how to overcome these difficulties.

Perhaps the foremost difficulty of conducting research into e-learning and of analysing and summarising research is the variety of forms of e-learning and the problems of defining these different forms. E-learning can mean everything from text-based point of care decision and learning tools, to interactive multimedia learning resources, to university courses that can be conducted online [5 6]. Thus research that purports to answer the question as to whether e-learning

"works" or "works better" than other forms of learning are frankly too simplistic and reductionist to be useful. It is time to move the agenda on from this question. As a corollary, systematic reviews that seek to group together research studies on different forms of e-learning are equally bound to produce conclusions that are at best unsatisfactory and at worst tendentious. Indeed there is an argument for abandoning the term e-learning completely and insisting that providers of and researchers into this form of medical education define exactly what they are talking about. For example one e-learning resource might provide round-the-clock decision support to doctors who provide emergency care; another resource might provide interdisciplinary resources for all healthcare professionals to help them provide holistic, whole person care to elderly people. A trial to compare the different resources would be impossible as the resources are so different, and their aims are so different also.

Another related problem for e-learning research is the pace of change of technology in this field. This pace has continued for the past twenty years and has accelerated in recent years. Research that looks at different e-learning formats rapidly becomes out of date - at the same pace as the formats become out of date [7]. Currently that pace of change is very fast. Much of the research published on e-learning and analysed in systematic reviews of the field were published before the advent of broadband or web 2.0 or multimedia formats or social networks. When we say e-learning today, we mean

something completely different to what we meant ten years ago, and yet the research is based on what we meant ten years ago. This is frustrating for those at the cutting edge of technology; however it is equally frustrating for sceptics who see e-learning enthusiasts who are constantly moving on to the “next big thing” - which today might be massive open online courses or mobile learning [8]. Researchers feel that they are aiming at a moving target and developers feel that they are being held back by pedantic pedagogues. The way forward may be much faster development and evaluation cycles that so that research quickly evaluates the effectiveness of interventions and the outcomes of this research are used to drive the next intervention. At present it feels like development and research into e-learning run on separate train tracks that are sometimes going in the same direction and sometimes not. Let’s look at the following example. An integrated care provider wishes to provide education for its staff so that they will be better equipped to deliver whole -systems healthcare. They conduct a review of the literature to decide what forms of e-learning that they should provide. Systematic reviews suggest that text based learning resources are amongst the most efficient forms of e-learning. However the e-learning developers suggest that multimedia resources that can engender caring attitudes and professional behaviours are more appropriate. Taking all things into account the provider decides to progress with the multimedia resources as these will be a better fit with the learning outcomes intended.

A third issue is the research methodologies used to evaluate e-learning. There are a variety of different methodologies described in the literature - but this very variety makes it difficult to draw overall conclusions from the research base or to use conventional synthesis techniques to create systematic reviews. Another problem is that much of the research is of poor quality and lacks a firm underlying theoretical basis. The remedy here is straightforward to describe, if difficult to implement. Research into e-learning needs to be more strategic; it needs to have solid theoretical foundations; it needs to build on the existing research base; and it needs to be comprehensively reported - regardless of the results. Education research funding bodies and education research ethics committees should insist on research proposals meeting such criteria before they are allowed to go ahead.

A fourth issue is the question of what constitutes “effectiveness” - as proved or disproved by research. Effectiveness might mean improved knowledge or better clinical skills or even concepts that are more difficult to teach and to assess - such as clinical reasoning skills or professional identity formation. Just as it is difficult to draw conclusions from a research base with multiple methodologies, it is also difficult to draw conclusions from a research base with multiple, diffuse and sometimes unrelated outcomes. Here once again research strategies and research reporting must improve in quality - the outcomes that are being aimed at must be explicit to all stakeholders - most especially the readers and users of research.

A fifth issue is the extent to which research up to now has

attempted to evaluate e-learning as an isolated learning activity: this is a problem because we know that it is an artifice. Learners use a variety of methods to learn and increasingly blend these methods to achieve outcomes that are important to them. Similarly educators attempt to create blended learning solutions for the students [9]. It is not clear at present how best to do this and so the research strategy should address this gap in the literature [10]. This will require collaboration between researchers into e-learning and other medical education researchers: research and educational institutes must be set up to answer questions such as this. In this context, let us revert to the previous example of the integrated care provider that wishes to provide multimedia education for its staff so that they will be better equipped to deliver whole -systems healthcare. Six months into the project they conduct an interim evaluation. The multimedia resources are popular amongst learners; however the learners also think that they need to attend at least some face to face small group meetings to discuss what they have learned and to have confidential discussions on holistic, interprofessional care for individual patients. It would be appropriate therefore for the provider to set up such face to face education and also to ensure that the face to face education is a good fit with the e-learning. This should result in better outcomes for the provider, learners and ultimately patients.

A sixth issue is the reporting of research [11]. Here there are problems in almost all the expected criteria of excellence in the reports of educational research. The introductory sections of such reports vary from being short and superficial to attempting to describe all the research ever done in this field. Even when the methodology is sound it is rarely described in sufficient detail to be reproduced with fidelity. Results are usually described well - but conclusions are all too often insufficiently linked to the results. Authors exaggerate the importance of their results. They stress the importance of their results for educators, researchers and policymakers - both nationally and internationally. They highlight the strengths of their research and weaknesses of others’ attempts at research in their field. They inevitably call for more research and for more funding for more research - but without defining exactly what further research is needed. These phenomena are not unique to e-learning and yet e-learning research seems somehow to have been labelled with a reputation for hype. At least some of this reputation is likely to be justified. Finally as with other research fields the e-learning research literature is likely to be subject to publication bias - however just like the literature in other fields it is difficult to tell how many studies remain unpublished or what the results of these unpublished studies might be [12].

A seventh and final issue relates to the ultimate purpose of research - its implementation in routine e-learning practice. Rolling out proven e-learning methodologies requires funding and evidence that e-learning will be cost effective as well as effective. Yet there are few studies that evaluate the cost and value of e-learning. Without such studies there is a danger that e-learning research will produce ever more high

technology and high cost formats with limited applicability outside of the research environment because of the lack of funds to disseminate them. New e-learning formats that are subject to research should be costed and should be evaluated using suitable analytic tools for their cost effectiveness, cost benefit or cost utility ratios. Once again let us return one final time to the integrated care provider that is delivering blended learning to its staff. It has gradually developed a successful model for healthcare professional education in this area of need. It decides now to develop a strategy for roll out. It discusses what it has done with neighbouring institutions. These institutions agree to contribute to the hosting costs if the resources are provided free of charge to their staff. This results in an economy of scale whereby more staff are educated for a lower cost.

The problems with research into e-learning are multiple and yet none are insurmountable. With a more strategic approach and improved tactical implementation, e-learning research can improve and can start to give us results that will enable us to improve medical education and to drive clinical quality improvement for patients.

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Source of Support: Nil, Conflict of Interest: None declared