OPINION ARTICLE

The 'Dark Side' of Technology in Medical Education [version 1]

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Abstract

This article was migrated. The article was marked as recommended.

Innovation in medical education has almost become synonymous with technology and its use in the field is growing exponentially. The benefits of technology-enhanced learning (TEL) are manifold; however, in this article some of the more contentious, potentially hazardous and oft unexplored aspects of TEL are highlighted - we have termed these the 'dark side' of technology in medical education. To further advance the application of technology in medical education, we contend that academics and educators need to turn their attention to the 'dark side' to complement the traditional focus on breakthroughs and innovation. Shedding light on the 'dark side' of TEL will help educators to develop a more nuanced understanding of the risks and benefits of the technology, that will then facilitate more judicious use of TEL in their teaching. Thus, within this article we outline some key areas for consideration, highlight barriers to exploring these and consider how we might shine a light on the 'dark side' of technology in medical education.
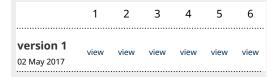
Keywords

Technology, Technology Enhanced Learning

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1. **Ken Masters**, Sultan Qaboos University

2. **Natalie Lafferty**, University of Dundee

3. **Trevor Gibbs**, AMEE

4. **Rebecca Grainger**, University of Otago Wellington

5. **Ronald M Harden**, AMEE

6. **Trudie Roberts**, Leeds Institute of Medical Education

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Any reports and responses or comments on the article can be found at the end of the article.

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Introduction

Hear the phrase "Innovation in Medical Education" and what comes to mind? Technology is the answer surely, but what was the question? Innovation in medical education has almost become synonymous with technology and the use of technology in the field is growing exponentially. It seems technology is everywhere - articles about it are frequently published in medical education journals, special interest groups are now firmly established, social media use appears ubiquitous amongst learners and technology-related content regularly features in conference proceedings. However, while the technology itself may appear benign, there are drawbacks and dangers associated with some of these innovations; after all, computers don't plagiarise, impersonate, cyberbully, steal identities or lurk. People do.

We set out to highlight these contentious, potentially hazardous and oft unexplored areas, which we have termed the 'dark side' of technology in medical education. We contend that to further advance the application of technology in medical education, academics and educators need to turn their attention to the 'dark side' to complement the traditional focus on breakthroughs and innovation. Within this article we outline some key areas for consideration, highlight barriers to exploring these and consider how we might shine a light on the 'dark side' of technology in medical education.

Limitations of TEL research

Although technology is widely used in medical education its effectiveness is still poorly understood (Wong et al. 2010). Published research is suboptimal and often incomplete, and what has been made public has often failed to inform practice (Cook 2009). Concerns with published research surrounding technology in medical education include narrow inclusion criteria, incomplete accounting of existing studies, limited assessment of study quality and no quantitative pooling to enable derivation of best estimates of the effect of interventions (Cook et al. 2011). Although there has been abundant published support of the educational utility of technology, much of what has been made public lacks rigour and robustness. More fundamental still is the issue of what has *not* been made public concerning technology in medical education. As academics and educators with an interest and enthusiasm for technology, we are aware of inconsistencies in the literature, of publication biases towards certain topics, of contentious topics that are not addressed, of negative or null results and of failed educational initiatives that are not disseminated.

So what exactly is the 'Dark Side'?

After holding a focus group at Newcastle University, we identified a series of questions, topics and areas. These findings have been categorised and are presented in the table below:

The impact of TEL on learners
Digital Distraction:
- Are we breeding shorter attention spans or 'butterfly minds'?
- Is technology eroding an acceptable knowledge base?
'Hacking' TEL:
- The 'gamification' of simulation by students: how can we ensure the theory to practice gap is bridged?
- Is 'playing' the portfolio now a pastime?
The bad
Failed medical TEL initiatives: the need for 'confession corner'?
The perils of learning in an interconnected world: can technology magnify problems as an educator?
Beyond the search engines: the rise of the deep web
The ugly
Identity theft in distance learning
Ghost writing: a phantom menace?
Accessibility of illegal/immoral content for academics and students
The potential for role confusion
How is the democratisation of knowledge changing the teacher's role?
Is the assumption that all junior learners are 'digital natives' valid?
The cost of TEL
How 'free' are free apps really?

Continued

The cost, burden and sustainability of MOOCs
Are inequalities exacerbated by TEL?
The 'who's watching who' dilemma
Lurkers online: Lonely? Or Learning?
The ethics of student and academic surveillance
Security and privacy risks in online learning
Social media safety for staff and students

Exposing and Exploring the 'Dark Side'

This 'dark side' is presently hidden from academic community's view - we propose three reasons for this. Firstly, individual educators doing practice-based work tend to perform small-scale local research, which rarely garners the academic esteem needed for publication. Secondly, unflattering aspects and the sensitive nature of these issues, may preclude individuals from acknowledging potential limitations of the 'cure-all' that technology in education has become. Thirdly, educators may be loath to share their experiences of unsuccessful technological initiatives, as it is well documented that with failed or delayed implementation of such initiatives, the academic is often blamed for ill will, indolence or ineptitude (Knight and Trowler 2001). Even if such results are shared, it is recognised that only 10% of published literature suggests null or negative results (Franco et al. 2014). More troublingly, these same authors caution that researchers rarely even write up results that 'did not work.. and the failure to do so ..adversely affects the universe of knowledge' (p. 1504). We suggest that by ignoring these topics, we are collectively contributing to the general lack of content knowledge in this field, as the issues remain unobservable to the wider scholarly community.

We contend that sharing these topics would be an invaluable learning experience for medical educators and learners. There is currently no public platform where these issues might be put under the spotlight, in order to inform our practice as educators. We suggest a couple of approaches to address this issue. First, we call on institutions to consider how they can create and develop outlets to improve transparency with null results and with contentious issues in research. Second, having considered these issues within our institution, we have identified priority areas for research, inquiry and case studies, with the goal of exploring and exposing the themes described above. In light of these discussions and reflections, we are hosting a free, inter-professional conference with the intention of exposing, sharing and learning from these less visible issues - you can find out more about it here: http://conferences.ncl.ac.uk/thedarkside/

Conclusion

We have a responsibility as academics to encourage difficult conversations, to facilitate student and inter-professional discourse and to challenge conventional and accepted views. We call for light to be shed on the 'dark side' of technology in medical education. Through the development of a deeper, more balanced understanding of the risks and benefits of the technology, we will be better equipped to shape future implementation of technology-enhanced learning and bring on a new era of enlightenment in medical education.

Take Home Messages

- The benefits of technology-enhanced learning (TEL) are manifold, but there are contentious, potentially hazardous, oft unexplored aspects of TEL which require greater attention.

- Shedding light on the 'dark side' of TEL may help educators to develop a deeper, more balanced understanding of the risks and benefits of the technology.

Notes On Contributors

Laura Delgaty is a Senior Lecturer at Newcastle University in the Masters of Medical Education Programme with an interest in, and academic responsibilities related to, technology-enhanced learning.

James Fisher is a Consultant Geriatrician at Northumbria Healthcare NHS Foundation Trust, U.K. James is an advocate for the use of technology-enhanced learning in medical education and has developed innovative, simulation-based teaching for geriatric medicine topics. He also co-founded the Association for Elderly Medicine Education.

Richard Kerr Thomson is a Consultant Gastroenterologist at Northumbria Healthcare NHS Foundation Trust, U.K and Clinical Sub-dean at Newcastle University. His interests include learning in the clinical workplace, faculty development, communities of practice and technology-enhanced learning.

Declarations

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

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Reference Source

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Reference Source

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Reference Source

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Version 1

Reviewer Report 09 January 2019

https://doi.org/10.21956/mep.19295.r28099

Mildred López

Tecnologico de Monterrey, School of Medicine and Health Sciences

This review has been migrated. The reviewer awarded 3 stars out of 5

I found the article interesting because it addresses very clearly concerns that everyone has. It is written very provocatively and has even already engaged a fair amount of comments. I would emphasize that "the bad" topics that are addressed about problems of quality in research are not specific or exclusive about educational technology, it can be generalized as a medical education problem. Getting your work published it's already an arduous process, I wonder who would publish a full-paper of a quality study if it provides null or negative results? Maybe we should design specific forums in conferences to provide a dynamic interchange with medical educators, and we could share "what didn't work".

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 08 June 2018

https://doi.org/10.21956/mep.19295.r28093

Anthony David.M

Soho

This review has been migrated. The reviewer awarded 4 stars out of 5

A good read. It is necessary for us to be aware of the dark side of technology too. The various

components detailed by the focus groups help us to keep our minds open and be aware of the possibilities.It is a gloomy article but a necessary warning of becoming too technology dependant. Technology should be a tool we can use as we need and not a crutch we lean on.

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 23 June 2017

https://doi.org/10.21956/mep.19295.r28097

Laura Delgaty
Newcastle University

This review has been migrated. The reviewer awarded 5 stars out of 5

First of all, thank you to all who took the time to respond to our article. This is my first time publishing in this format, so great to see people's thoughts and to respond. Also, so wonderful to have the opportunity to begin a dialogue.Yes, I think that technological initiatives, as expressed by Professor Harden need to be shared so we can learn from them. Personally, I don't see this as gloomy whatsoever! I see it as honest and forward thinking. I mean, those who forget the past are condemned....., right?Secondly, as can be seen by the bios, we are all advocates and promoters of TEL. However, we have seen the effects of blind acceptance and a lack of critical thinking in implementation. I would also suggest to Trudie, that, yes, failed initiatives in TEL for academics can be very different. The roles and responsibilities of academics, historically, have been pretty clear- to write and deliver content (or facilitate learning however one chooses) autonomously. Literature suggests that the advent of TEL has caused role confusion and an erosion of autonomy.Furthermore, before we relax in the comfort of anti plagiarism software keeping our standards safe (Trudie and Susmita) one can easily create a document that passes the plagiarism check regardless of how much copied material it contains. When there are loopholes that can be exploited, they give the operator a dangerous false assurance that a submission is original.Next, at no point did we suggest, nor do we think this is exclusive to medical education. However, that is the context in which we work and educate, so our focus was directed here. In our upcoming dark side conference, indeed, we have targeted mainstream education at all levels. Finally, I would argue that medical research and medical education traditionally move in different paradigms. Appreciate Ken's point about one potentially informing the other, however, this link, in this context, for us is tenuous. So, overall, the comments are great and have given us (including Jo Matthan from NU who is not listed here) food for thought. This was a brief overview and introduction of our ideas. We will collate the findings after our conference, focus on informing and improving practice, and share this with the medical education, and more broadly education community freely.

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 19 May 2017

https://doi.org/10.21956/mep.19295.r28096

Neel Sharma

Albert Einstein College of Medicine, Montefiore Medical Center

This review has been migrated. The reviewer awarded 4 stars out of 5

I congratulate the authors in taking a critical look at TEL. I am surprised we don't see more such pieces when a new teaching or assessment strategy is suddenly brought into the arena. Having initially been drawn to the presumed more wealthy institutes in my nomadic med ed journey I decided to visit those less fortunate and I was amazed by the positive outcomes gained when resources were less plentiful. TEL in many cases is expensive! Money may open doors but does it open our minds?

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 19 May 2017

https://doi.org/10.21956/mep.19295.r28094

Anne McKee

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This review has been migrated. The reviewer awarded 3 stars out of 5

This paper highlights an important issue in both medical education and medical education research. In giving attention to the 'dark side' of using technology the authors challenge unexamined enthusiasm for the latest trend or fashion in medical education and highlight the importance of thinking about the drawbacks or limitations of new approaches. In arguing for the reporting of what has not worked, they encourage more transparent and full accounts of what happens within the research process. Medical education has emphasised the importance of doctors learning from mistakes. This papers asks medical

education researchers to do the same. For this alone it is worth reading. The paper itself has limitations and many of these have been described. For me, the opportunity to improve the paper is to expand upon the 'Exposing and Exploring the 'Dark Side' which begins to consider the limitations of small scale local research and the state of medical education research as a field of inquiry.

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 16 May 2017

https://doi.org/10.21956/mep.19295.r28088

Susmita Reddy Karri
Topiwala national medical college and BYL nair charitable hospital, mumbai. india

This review has been migrated. The reviewer awarded 3 stars out of 5

A good article and it highlights most of the negatives of technology.However, as we all know, that it is always the risk-benefit ratio that we need to consider, and if we look at the scenario in most of the countries, especially the developing/underdeveloped ones, the benefits are far more than the risks. I would have liked if the authors commented on the social status too.Also, I feel that with technology, "ghost writing" or plagiarism is much easy to pick up

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 07 May 2017

https://doi.org/10.21956/mep.19295.r28087

Richard Hays
James Cook University

This review has been migrated. The reviewer awarded 4 stars out of 5

This is an interesting and timely paper. From the perspective of medical school leadership, it is not

uncommon for encounter some students who become involved with not-so-nice posting on social media of poor jokes, ill-advised photos and bad-taste comments. A few spend too much time playing computer games and others store assessment items remembered by colleagues to create 'underground, resources for students. These behaviours can be dangerous for future careers. However, I am not sure that I have seen most of the behaviours or issues listed here. Perhaps my techno-naivety has blinded me! I agree with some of my co-reviewers that the paper is a little gloomy. I agree that big IT systems are expensive, but the potential power of information management seems to make this worthwhile. It would be interesting to read reports from others who have had both negative and positive experiences as we need to develop a balanced view.

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 06 May 2017

https://doi.org/10.21956/mep.19295.r28092

Trudie Roberts

Leeds Institute of Medical Education

This review has been migrated. The reviewer awarded 3 stars out of 5

An interesting article but far too gloomy. The has always been worry and comment about reduction in attention span and yet then moan that young people spend endless time playing games which require significant time spent on mastering the different levels.. Erosion of an acceptable knowledge base - what is an acceptable knowledge base and where should it reside? Is knowledge to be found only within skull and skin? The whole of knowledge since the dawn of civilisation can now be access on your phone. Assessment of this knowledge and its veracity and validity is one of the many new skills we should be teaching students.Failed TEL initiatives - is this anymore a problem than other failed educational initiatives - i think not. Ghost writing - yes a problem but plagiarism much likely to be picked up now using technology. I could go on.However this piece does set out areas that should form the basis of new research and as such can be applauded particularly if the authors start the ball rolling.....

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 05 May 2017

https://doi.org/10.21956/mep.19295.r28095

Ronald M Harden
AMEE

This review has been migrated. The reviewer awarded 4 stars out of 5

The use of technology is on today's agenda in medical education and features on lists of trends.. I have recommended this article as it draws our attention to possible problems. I would have liked more details on the issues raised in the table. I like the suggestion that we should publish not only descriptions of successes but also failures. A topic for a future AMEE conference!

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 04 May 2017

https://doi.org/10.21956/mep.19295.r28091

Rebecca Grainger
University of Otago Wellington

This review has been migrated. The reviewer awarded 3 stars out of 5

This short editorial type piece highlights some considerations for medical educators and their institutions before they dive into TEL. I had hoped that the issues noted in the Table might have been discussed in more detail. I am unsure of the relevance of promoting a conference within this short piece.Some interesting ideas that I would have been keen to have a detailed discussion presented.

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 02 May 2017

https://doi.org/10.21956/mep.19295.r28090

Trevor Gibbs

AMEE

This review has been migrated. The reviewer awarded 4 stars out of 5

I enjoyed reading this article which looks at TEL from an opposite angle. It bodes healthy that we look towards the negative effects of new educational approaches and opposed to constantly promoting the benefits.I would agree with one of my co-reviewers that some of these issues relate to non TEL, but that doesn't mean we should avoid the issues in totality. Given that this an opinion piece, I hope that it promotes deeper discussion into the real pros and cons of TEL

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 02 May 2017

https://doi.org/10.21956/mep.19295.r28098

Natalie Lafferty

University of Dundee

This review has been migrated. The reviewer awarded 4 stars out of 5

Although very short, I think this paper is timely. Whilst it would have been good to see some unpicking of the issues highlighted in your focus group it's encouraging to see these points reported. There's a pressing need to see some critical discourse around the use of technology in medical education and higher education more generally. Whilst we can apply and use technology to enhance learning it can also reduce the quality of the learning experience for example death by PowerPoint bullet points or clicky, click, click online learning. It's fair to say this isn't always the fault of the technology but rather the individuals or organisations using it. Similarly, the lack of robustness and rigour in the published literature around TEL could be applied to many areas of educational research. There are wider debates going on around the use of technology and the ethics around learner analytics etc. in higher education. I look forward to seeing a growing discourse around #thedarksideofTEL in medical education.

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 02 May 2017

https://doi.org/10.21956/mep.19295.r28089

Ken Masters

Sultan Qaboos University

This review has been migrated. The reviewer awarded 3 stars out of 5

Although the paper is rather pessimistic, it does set out to warn about problems with technology in medical education, and so, is necessarily pessimistic. There are few points, however, that need to be taken into account:Some of the problems referred to in the paper are not restricted to medical education research, and are also currently an inherent part of pure medical research. Two examples: 1. Lack of reporting of negative results. This is standard in most medical research; in fact, a known weakness of EBM is that negative results are seldom published, both for the reasons advanced in this paper, and for the fact that most medical (and scientific) journals are loath to publish negative results. This problem is compounded by commercial sponsorships of EBM research.2. Irreproducibility of results. Again, this is a problem in medical research: one of the greatest concerns in EBM is the number of RCT studies in medicine that cannot be reproduced or, worse, show conflicting results. Often these are also a result of extremely narrow inclusion criteria in trials. This is a problem not only of medical education research, but of research in general, especially when dealing with human subjects.So, while the authors are right in their concerns, medical researchers might be encouraged to examine the plank in their own eye before looking to the speck in that of the comparatively new field of technology in medical education. It would have been useful for the researchers to refer to this, as medical research does form an important context for medical education research.On a positive note, the authors have shown a way for some possible solutions. In addition to these, there is another: allowing and encouraging researchers to publish their raw data so that others may compare results at a deeper level than tables, and meta-analyses can use raw data from several studies. Again, however, this is something from which medical research could also benefit, so, again, we look to medical research to set the pace in this. (As a side note, we should also note that MedEdPublish is happy to publish negative medical education research results, so this journal could a wonderful place for these negative results to be shared)In addition, I think the authors have incorrectly used the term "gamification". Gamification is not the same as "gaming", which is the manipulation of a system's rules and processes for dishonest gain. Gamification is the (generally positive) activity in which principles of games are applied to other situations in order to encourage participation and increase understanding (e.g. the computer game Re-mission, which takes the principles of a "shoot 'em up" game to teach patients about cancer treatment, or using the design of a monopoly board game to teach patients about the value of nutrition, etc.).Related to this, the authors have rather unfairly lumped the gaming of portfolios to the use of technology in medical education. Portfolios have been around for a long time, and were gamed for a long time before e-portfolios were designed. If there is a problem with e-portfolios, then the technology is unlikely to be the problem – the technology is merely the storage container. Finally, I was also somewhat disappointed that the authors seemed to get started, and then the paper ended rather too soon. I would have liked them to expand a little further on their ideas.

Nevertheless, an interesting read and food for thought.

Competing Interests: No conflicts of interest were disclosed.