Virtual paediatrics: what COVID-19 has taught us about online learning

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WHAT IS ONLINE LEARNING?

Online learning, unlike traditional learning from face-to-face lectures, tutorials, ward rounds and private study of published materials, involves the use of internet-based technology to deliver educational content. Terms such as online learning, e-learning, web-based learning and distant learning are often used synonymously without clear distinction. Online learning can stand alone or be part of a blended model in which online content supplements face-to-face interactions. Content can be delivered synchronously (live video conferencing and chat rooms) or asynchronously (prerecorded lectures, podcasts, blogs and forums) with considerable variation in interactive and responsive content.

HOW EFFECTIVE IS ONLINE LEARNING?

There are many studies which evaluate approaches to online learning, but their heterogeneity makes direct comparisons challenging. There is evidence of equivalent gains in knowledge and skills acquisition online compared with face-to-face teaching. Further analysis suggests blended approaches result in even better learning outcomes. Course design, learner motivation and comfort with online technology are reported determinants of success.

Collaborative learning, in which group interaction is enhanced, is more effective than independent approaches. Learning collaboratively online can increase the quantity and quality of reflective discussions compared with face-to-face environments. Furthermore enhanced interaction is associated with improved test performance and student satisfaction.

Social presence, the projection of a participant’s true self online, is particularly important to establish meaningful connections and an online community.

Failure to establish this can reduce interactions, leading to students feeling isolated and stressed, with increased dropout rates and poor academic performance.

HOW HAS THE PANDEMIC IMPACTED THE USE OF ONLINE LEARNING?

Online learning prior to the pandemic was usually a part of a blended model in which online content supplemented face-to-face interactions. Content can be delivered synchronously (live video conferencing and chat rooms) or asynchronously (prerecorded lectures, podcasts, blogs and forums) with considerable variation in interactive and responsive content.

The pandemic necessitated wider use of online learning, in many cases replacing rather than complementing face-to-face teaching. This new, hastily developed content, sometimes called ‘Emergency Remote Teaching’, was distinct from traditionally developed online courses and varied considerably between countries, institutions and even departments in its success. Meanwhile free open-access medical education and subscription platforms proliferated, with online blogs, lectures and social media offering to plug gaps in medical school resources.

A lack of pedagogical input and technological infrastructure was particularly problematic, while creative thinking and innovative practice demonstrated what could be achieved when the principles of online learning were harnessed and traditional barriers overcome.

The authors designed and delivered an online undergraduate paediatric curriculum comprising 10 themed weeks in which asynchronous multimedia content and discussion forums were complemented by synchronous instructor and peer-led tutorials, communication and simulation workshops. This article evaluates this experience informed by student feedback (see table 1) and published literature.
Learning and teaching

Student questionnaire

1. What was good about today’s session?
2. How could the teaching session be improved?
3. Please share any other thoughts about this session or the online resources here.

What worked well?

* "Thank you for giving me structure to my day in this strange rudderless world!"
* "Great idea to do themed weeks, its made things so easy and manageable."
* "I love these sessions … We like that you push us to think about different answers and although we love knowing the right answer it’s nice that you make us think on our feet."
* "I’m loving these new sessions which are more interactive and aren’t just presentation based but have a range of resources."
* "Thank you so much this was very useful and really enjoyed the use of polls to vote."
* "It’s really useful knowing the topic so we can read about it and then we can contribute more to the session."
* "Love how the tutors always try to cheer us up (loved the magic tricks!)."
* "I like the nice catch up questions at the beginning…[they] bring a bit of lightness to the tone of this whole Covid thing."
* "I liked the reflective/discursive part of it, it was good to understand what people were thinking."
* "Honestly this teaching is probably a lot better than what we would receive if placements were still on because this way we all have access to the same teaching and it is done by a highly dedicated team who want to teach us!"
* "These sessions have really helped my learning and I have really enjoyed the community feel."

What were the challenges?

* "Please can you try to sort your mic; at times it was difficult to hear."
* "Quite time consuming to break into groups."
* "Keep to time."
* "To restrict the number of cases to 1 case only in the interest of time."
* "Even the practical sessions like the SIM session taught me so much even though it was over camera."
* "These things are really scary and not being on placement to experience them makes it more scary! So having a SIM was the next best thing."
* "I really enjoyed this teaching and it helps fill some of the gaps in practical teaching that we are missing. Thank you!"
* "Like videos/pics of equipment as I worry about not seeing that stuff in hospital!"
* "I think some kind of debrief would have been nice but works better in person I guess."

Table 1 Questionnaire and sample of student responses

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ADVANTAGES OF ONLINE LEARNING

Online courses offer improved flexibility, convenience and accessibility and can improve quality and consistency of teaching by sharing resources across time and locations. Experts can be viewed from home offering inspiring lectures and new global networking opportunities. Online learning environments use mixed media to cater to different learning styles and enable course content to be clearly structured, easily updated and modified following feedback.

Teaching online requires commitment to a new approach. Use of quizzes, polls and interactive whiteboards stimulates interaction (see figure 1). Thought-provoking questions, prompt feedback and a good personal rapport are also important. Virtual clinical teaching has shown high levels of student engagement, increased clinical reasoning skills and positive student feedback while avoiding the risks of clinical exposure during the pandemic. Flipped classroom approaches are effective online, offering self-directed, problem-based learning favoured by students.

Student anonymity can increase interaction, flatten hierarchies and encourage open discussion. Writing answers on-screen can stimulate deeper thought than face-to-face teaching and is advantageous for complex discussions when a range of opinions can be expressed simultaneously.

Student feedback can be captured using quick links to online forms, while teaching experiences can be shared among faculty members with recordings enabling critical reflection and improvement of teaching techniques.

CHALLENGES OF ONLINE LEARNING

Technological difficulties are a common barrier to online learning. Family distractions, limited space, inappropriate timings and unreliable internet connections have been reported by students at UK medical schools. Globally inadequate access to web-based learning has been widely reported.

The vastness of online resources can be overwhelming. Students need preparation for interaction in the online environment with explicit guidance on expected virtual competencies. Students have reported increased physical discomfort as well as concentration and motivation difficulties with long periods online. Without visual or audio cues, tutors cannot see when students are struggling, while failure to recognise students’ frustration can further reduce engagement.

Extraneous cognitive load can be reduced by creating themed weeks mapping relevant and concise online resources to the curriculum. Learning environments need to be well designed and easily navigated, with content kept short and simple to maintain engagement and encourage interaction.
Learning and teaching

Students have reported difficulty asking questions online. Psychological safety is essential for students to contribute without fear of unfavourable judgement. Establishing this trust online can be a slow and fragile process, particularly where students are geographically dispersed and unlikely to have informal conversations.
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Body language, eye contact and pauses are less useful in building a sense of safety online. Instead, verbal communication should convey curiosity, acknowledge participation and normalise mistakes.\textsuperscript{18}

Introductions, icebreakers and cofacilitation, using an informal conversational style, promote psychological safety. Use of humour, vulnerability and shared experiences help establish trust, reduce anxiety and minimise both tutor and student apprehension. ‘Ground Rules’ should set student expectations before online sessions, while tutors can benefit from a ‘How To’ guide.

Innovative approaches in online simulation and clinical teaching have shown promising results. However, widespread experience suggests online teaching cannot replace clinical teaching, with students’ confidence and competence in practical procedures and their professional growth reportedly inadequate following online learning in the pandemic.\textsuperscript{14,15}

Online discussion forums have been used to teach professionalism and encourage reflective practice\textsuperscript{19} but require supervision, with low instructor involvement correlated with reduced learning outcomes and increased student frustration.\textsuperscript{4,5,7} Developing a community of practice can improve psychological safety, professional identity formation and a sense of belonging. Discussion forums, peer-led team-based learning and drop-in mentoring sessions can be used with a strong instructor presence to create and foster connections.

Identifying less engaged students and understanding their circumstances are difficult online, with further support needed for socially isolated students.\textsuperscript{10} Virtual peer mentoring schemes have been shown to provide psychological support as well as improved examination success.\textsuperscript{14} The rise in mental health concerns during the pandemic underlines the importance of providing support for students in psychologically safe online or face-to-face environments.\textsuperscript{20}

CONCLUSION

Online learning requires content which is distinct in design and delivery from face-to-face teaching. Establishing psychological safety is essential to optimise interactive and reflective learning. Teaching practical aspects of clinical medicine is possible using innovative approaches but cannot replace hands-on experience.

Identifying students who need support requires heightened vigilance, as cues that raise concern can be easily missed online. Students must have access to mentoring schemes, personal tutors and psychological support.

Ward attendance is necessary, particularly to teach and fully assess clinical skills and aspects of professionalism. However, having gained mainstream status, online learning can continue to have an important and widespread role, delivering interactive, reflective and accessible medical education.

Takeaway tips for online learning infographic. Image created by the authors.

KEY TAKE HOME MESSAGES

► See infographic.

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