Cross-disciplinary perspectives on the transition to remote education

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ABSTRACT

The COVID-19 pandemic has prompted the cancellation of clinical attachments and face-to-face teaching at medical schools across the world. Experiential learning—through simulation or direct patient contact—is essential for the development of clinical skills and procedural knowledge. Adapting this type of teaching for remote delivery is a major challenge for undergraduate medical education. It is also an opportunity for innovation in technology enhanced learning and prompts educators to embrace new ways of thinking. In this article, the authors explored how educators from different disciplines (medicine, music and performing arts) are using technology to enhance practical skills-based learning remotely.

The authors, five experienced educators from different fields (surgery, medicine, music and magic), jointly documented the transition to technology enhanced remote teaching through a series of five structured conversations. Drawing from literature on distance learning in medicine and professional experience in education, the authors identified seven practice-enhancing recommendations for optimising teaching of procedural knowledge and skills. These are: (1) make a virtue out of necessity; (2) actively manage your environment; (3) make expectations clear; (4) embrace purposeful communication; (5) use digital resources; (6) be prepared for things to go wrong and (7) personalise the approach. The authors argue that widening the discourse in technology enhanced learning to include cross-disciplinary perspectives adds richness and depth to discussions. This article demonstrates a cross-disciplinary approach to addressing challenges in technology-enhanced medical education.

INTRODUCTION

In early 2020, the arrival of the COVID-19 pandemic obliged educators (from all disciplines) to shift rapidly to remote teaching and learning.[1] To successfully deliver high-quality teaching in an online environment, educators must recognise the impact of this shift on their practice and adapt.[2] This is particularly true for medical educators who teach not only declarative knowledge (what you know) but also procedural knowledge (how to apply what you know in order 'to do').[3] Procedural knowledge includes essential skills such as clinical reasoning, physical examination and performing practical procedures. Procedural knowledge is often challenging to describe verbally; this makes it more complex to teach remotely.[4] In medical education, procedural knowledge has traditionally been gained experientially through supervised direct contact with patients or simulation.[5] The safety risk associated with the COVID-19 pandemic has led to a cancellation of clinical attachments and simulated face-to-face learning sessions in many undergraduate medical courses.[1] This poses a major challenge for medical educators: can we teach our students how to do from a distance?

Clinicians are not the only educators who face this challenge. Recent work from RK has focused on the benefit of exchanging ideas with professionals who have high levels of practical expertise outside of the world of medicine (artists, craftspeople, performers) and explores how this can enhance clinical practice.[6–12] Many of these experts also specialise in teaching procedural knowledge. In this article, five experienced educators from different fields (surgery, medicine, music and magic) explore cross-disciplinary perspectives on remote teaching of procedural knowledge. We highlight key challenges and provide practical advice on how to successfully adapt to this remote teaching environment. We argue that collaborating with educators across disciplinary boundaries will strengthen educational practice and promote excellence in technology-enhanced teaching.

Several higher education institutes have developed comprehensive guidelines to help educators select appropriate pedagogy for remote teaching.[13 14] We do not seek to replicate these resources and instead focus on optimising technology-enhanced teaching of procedural knowledge via audio–visual conferencing with a single learner or a small group of learners.

METHOD

In April 2020, the authors (all experienced face-to-face educators who specialise in teaching procedural knowledge to single learners or small groups) set out to explore and jointly document the transition to remote teaching and learning. Five structured conversations between April and August 2020 were undertaken and analysed. Conversations lasted between one and 2 hours. Key insights were implemented after each meeting with reflection and feedback in subsequent meetings allowing for iterative refinement of strategies. We briefly describe the background of each author as it is relevant to our methodology and conclusions.

RK is professor of Surgical Education at Imperial College London (ICL) and codirector of the Centre for Engagement and Simulation Science. He was a trauma surgeon, then a general practitioner before specialising in simulation and surgical education. NH is a physician in training with the Royal

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Australasian College of Physicians and a simulation fellow at ICL. She investigates how simulation-based innovations can enhance the translation of knowledge to practice. WH is an international award-winning magician and instructor with a PhD in the history of magic education and extensive experience teaching. SY is one of Britain's leading harpsichord recitalists. She teaches privately and has held positions at conservatoires including the Royal College of Music. Bill Badley, originally a lutenist, has worked as a performer, television documentary producer, and over the last two decades as a secondary school teacher in music.

In 2011, Comas-Quinn posited that a major challenge for the transition to online education was the transformation of professional identity involved when teachers become 'online teachers', and that educators need to view online teaching as a core part of their practice and professional identify to succeed.[15] In chronicling our own journey of becoming 'online educators' from a cross-disciplinary perspective we hope to add richness and depth to this discussion.

LITERATURE ON DISTANCE LEARNING IN MEDICINE
The recommendations in this article are informed both by professional experience and the literature on e-learning in medicine. The latter is reviewed here briefly.

The benefits of e-learning are well established, with a rich pedagogy supporting the development of accessible, scalable, consistent and cost-effective online programmes.[16] Yet distance learning was less extensively adopted in medicine than other disciplines.[17] In clinical education, the importance of direct contact between learner, educator and patient has long seemed unquestionable.[5] After all (the argument goes), how can you teach a student to examine and interpret clinical signs when they can't touch the patient? How can you correct errors during a procedure when you aren't standing next to the trainee? The view that e-learning cannot provide a substitute for traditional methods in clinical training, especially for procedural knowledge and skills, is common.[18]

Yet online medical education has been growing.[19] For instance, Mid-Western University (USA) has been using web-based virtual classrooms since as early as 2004 for didactic teaching[20] and recent years have seen increasing numbers of publications evaluating online interventions with undergraduates.[21] In 2019, Turk et al at the University of Vienna detailed a virtual case-based learning intervention which explicitly aimed to expedite the transfer of declarative knowledge to procedural knowledge (communication and clinical reasoning) in psychiatry.[3] The authors assessed the efficacy of a new e-learning programme for undergraduate medical students using final OSCE (objective structured clinical examination) grades. Participants scores were compared with previous cohorts who completed the same course before e-learning was introduced. A statistically significant improvement was demonstrated. Though limitations of methodology (absence of randomisation and use of a historic comparison group) call for some caution, such results are promising. At the same time, it is important to note that this intervention included a face-to-face consolidation session where students put procedural knowledge into practice after the e-learning course had been completed. In fact, much of the evidence supporting the efficacy of e-learning in medicine assesses blended learning, where face-to-face consolidation is an essential component.[22] Prior to the COVID-19 pandemic fully online programmes for clinical teaching thus remained relatively uncommon.[23]

Necessity has prompted innovation as the arrival of the COVID-19 pandemic obliged institutions around the world to shift to fully remote education. Many are now delivering content remotely that would previously have been taught face-to-face.[24] For example, at York University (Toronto) a group of simulation instructors developed a programme aimed at improving communication, interpersonal skills and clinical reasoning using a simulated patient methodology completely adapted for video conferencing. Their approach is detailed in their feasibility study exploring the intervention with instructors acting as participants.[23] However, evaluation of implementation with students is not yet available and the efficacy has not yet to be established. Gomez et al at Johns Hopkins transformed a radiology elective from in person to remote delivery. Not only did they find that registration increased 10-fold, but the elective was rated positively, and all students were able to meet the standard required to pass the course based on prepandemic criteria.[25] We expect to see many similar publications appearing in the coming months.

CHALLENGES IN THE TRANSITION TO REMOTE EDUCATION
We begin by reflecting on challenges of the online transition. Common challenges across our disciplines can be categorised into four areas: (1) understanding learners' needs, (2) correcting errors, (3) reduced privacy and (4) reduced spontaneity.

Understanding learners' needs
Face-to-face educators rely on unobtrusive verbal and non-verbal cues to assess engagement and understanding.[2] The reduction in non-verbal cues during remote interactions may result in misunderstandings.[19] This has been recognised as a major challenge for medical education during the COVID-19 pandemic by both staff and students.[26] For example, on audio–visual platforms you cannot look directly at someone and appear to be looking at them simultaneously. When demonstrating a technique, you cannot watch your student to assess their comprehension while still giving the impression of watching them. This is a particular challenge for Houstoun, as the use of eye contact and gaze to direct attention is a key component of performing magic. Teaching music, SY struggled with the reduced sound quality which commonly available digital platforms provide. More problematic still is her inability to verbally direct her students while they are playing, or to play with them, as only a single audio strand can be readily understood during audio–visual conferencing. During simulation debriefing, NH always found attentive silence to be an effective at drawing opinions from her students, yet unexpected silence during remote sessions is easily mistaken for signal loss or other technical problem. The inability to easily gauge responses from our learners results in a higher cognitive load, imposing the need to work harder throughout each lesson to fill in the gaps.

Correcting errors
When teaching students to apply knowledge, we often ask them to demonstrate skills. We identify learners' errors and correct them. Traditionally, we have relied on guiding students physically, making adjustments to body position or hand movement—whether at a musical instrument, in a simulator, a clinic room or a card table—to show them just how it should look or just how it should feel. In the absence of this, we find ourselves searching for a verbal description of what is seldom articulated. In remote sessions, we rely on our students listening attentively and working to understand what is seldom vocalised. In doing so, we ask them to take more responsibility for their own learning.

Reduced privacy
Before the transition to remote working, we taught in a variety of places, such as a clinic room, a simulation suite, a concert hall,

a private residence, a school or a theatre. All are places where education is expected and accommodated. Now we have had to rethink our space, examining what an online encounter may say about us to our students. When working from home, we must consider how we might separate work from personal life. This is an important part of building new identities as remote educators. Lack of privacy is as great an issue (if not greater) for students, many of whom have no dedicated learning space of their own and it is essential that we remain mindful of how this impacts them as learners.

Reduced spontaneity

We have also noted a loss of spontaneity associated with the loss of a physical learning space. Spontaneity is reduced at an interpersonal level with a notable decrease in conversational interactions, both related and unrelated to the lesson. Though this has obvious benefits in terms of maintaining focus, it also risks reducing that informal interactivity, engagement and connectedness which is so valuable to student learning and satisfaction.[2] Spontaneity can also be lost at a practical level. Educators and students are unable to jointly access the additional resources typically available in our physical learning spaces (such as simulator models, musical scores, surgical instruments or magic props). Once a lesson plan is set and specific resources acquired, educators are unable to deviate. This reduces those opportunities for improvisation which often prove invaluable in addressing learners' needs in real time.

RECOMMENDATIONS

We identified seven practice-enhancing recommendations for practitioners. These are: (1) make a virtue out of necessity; (2) actively manage your environment; (3) make expectations clear; (4) embrace purposeful communication; (5) use digital resources; (6) be prepared for things to go wrong and (7) personalise the approach.

Make a virtue out of necessity

During the early weeks of remote teaching, we shared a common sense of being adrift, a feeling of loss and a yearning for the quality of teaching we were accustomed to providing. As time passed, we began to reframe our perspective. We realised that simply transposing our usual lessons onto a remote platform would result (at best) in a second-rate version of face-to-face teaching. To optimise remote teaching, we needed to reframe our usual practice and make positive changes which take advantage of what technology can provide. We recommend returning to basic principles and considering what should happen rather than how this is usually achieved. For example, if NH is preparing a learner to perform a magic trick where coins need to be successfully hidden from the audience, he cannot assess how well this is achieved via a single video stream. NH would suggest the student perform the trick and record it from several different angles. The recording can be checked by the learner as well as the teacher. The additional opportunity for students themselves to assess progress and identify necessary changes can enhance reflective learning. A similar technique could be used for medical simulation.

Actively manage your environment

Where possible, sessions should occur in private space to allow for uninterrupted engagement. This is equally important for the learner and their teacher. However, we recognise that some students will not have access to have a private area. It is helpful

to acknowledge this at the start of a lesson so that interruptions are expected can be managed with minimum distraction, embarrassment, or offence. We recommend the use of the same designated learning space on each occasion. Consistency helps teachers and learners to enter an appropriate frame of mind and reduces unnecessary cognitive load. Finally, do not underestimate the importance of effective lighting and high-quality sound. Learners understand better when they can see and hear clearly, further alleviating extraneous cognitive load.

Make expectations clear

During the initial transition to remote teaching, SY found that her students unsettled and prone to distraction. The first minutes of each lesson were lost in setting-up, so she could see both her learner and their harpsichord. This reduced the progress made during each lesson. Then SY designed a set of instructions (how to set up the session) and provided written expectations (what needed to be achieved during the session) and sent these to her students before each lesson. This improved focus and time management. We encourage educators to make expectations explicit, even if this had not been their previous practice.

Embrace purposeful communication

The blunting of non-verbal cues imposed by remote interaction can be compensated for by identifying information that must be conveyed and deliberately articulating as much of the content as possible. For challenging topics, educators will need to think carefully about how best to express this information, and additional preparation may be required. This purposeful verbal communication can feel clumsy and exaggerated, at least initially. This can be alleviated by acknowledging it openly with learners. Actively checking to ensure essential concepts are understood is important, as implicit understanding is harder to monitor. Designating a short period for 'warm-up' chat before content teaching can also alleviate tensions. By embracing overt verbal communication, encouraging our students to do the same, and purposefully giving others space to speak, we can overcome potential miscommunications.

Make the most of digital resources

The move to remote education provides us with new resources to facilitate learning. For example, the ready availability of recording functions has been beneficial. SY has found that asking her learners to record themselves while playing a difficult passage of music can act both as a pseudoperformance and as a tool for reflective practice. This technique could be similarly applied to medical procedures. NH prompts students to record instances where key learning points are explained, ensuring that vital information is saved with minimal interruption to lessons. This makes best use of limited time. Since recordings of lessons are unlikely to be revisited in their entirety, we advocate selective (not indiscriminate) recording.

Be prepared for things to go wrong

In addition to their usual preparation, educators must now become familiar with remote platforms or risk displaying embarrassing ineptitude. Session resources also need to be made available in advance for both learner and teacher. Practice helps, but even the best preparation does not guarantee protection against technical failures. A clear contingency plan can mitigate this risk. Contingency plans might include an alternate platform to change to, an alternate time or self-directed activity that can be completed until the issue is resolved. Sharing this plan with

students at the start of a session will allow for structure to be maintained in the event of an unforeseen complication and may alleviate educator stress. If things do go wrong, as they inevitably will at some point, we endorse the call from Samuels for educators to respond with self-compassion in these challenging times.[27]

Personalise the approach

Specific approaches will vary between disciplines, between learners and even between sessions with any given learner. This is as true for remote education as it is for face-to-face encounters. However, the additional barriers and comparative unfamiliarity with the online environment, justify a more purposeful approach to personalisation. For example, a student attending a short series of case-based lessons will have vastly different needs to a student receiving long-term supervision for professional and technical development. In face-to-face teaching the educator can often embed professional development around technical skills teaching. This may be more challenging in remote teaching due to technical difficulties, loss of spontaneity or reduced privacy. In this situation, students who require professional development may benefit from having a portion of the session assigned specifically for this purpose. Another consideration is the pre-existing relationship between the educator and learner. An educator and a long-term student are likely to have a shared vocabulary and a relationship of trust and care. This mitigates some of the barriers during the transition to remote education. Conversely, building an effective teaching relationship with a new student can be more challenging remotely than it would be face to face. Patience and a personalised approach will be needed to achieve this.

CONCLUSION

The duration and extent of COVID-19 restrictions remains uncertain, but it is clear that much of the educational innovation during this period will have a long-term impact.[19] Technology-enhanced learning will be used far more extensively moving forward with accompanying opportunities for us to develop as educators.[28]

The rapid transition to remote education continues to be challenging particularly for teaching procedural knowledge. Yet there are unexpected benefits and barriers which can be overcome when we are willing to deviate from the comfort of routine practice and embrace new ways of teaching and learning. Sharing insights with other educators is invaluable if we are to succeed on this journey. Educators from outside the world of medicine who specialise in the application of knowledge for skills-based domains have insight of great potential benefit to medical educators. We hope that these suggestions will be useful for new remote educators in medicine and encourage further collaboration across disciplinary boundaries in educational research.

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