Tips for medical educators on how to conduct effective online teaching in times of social distancing

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Abstract
During the current coronavirus disease 2019 (COVID-19) pandemic, with the Singapore government mandating social distancing, all educational activities in medical schools have been affected. Medical students from our three medical schools have been banned from all clinical environments (polyclinics and hospitals). Online teaching and meetings became the norm. Although medical educators are generally good clinicians and educational tutors and mentors, many are not used to teaching and learning on an electronic platform due to various barriers such as time constraints, poor technical skills, inadequate infrastructure and a lack of institutional support. In this article, we collate tips from published work in online learning, and we also share our own experiences in conducting online teaching.

Keywords
Online teaching, video conferencing, social distancing, medical education

During the current coronavirus disease 2019 (COVID-19) pandemic, with the Singapore government mandating social distancing, all educational activities from preschool to universities have been converted to full home-based learning. Medical education has not been spared either. Medical students from our three medical schools have been banned from all clinical environments (polyclinics and hospitals). Lectures, small-group teachings and grand rounds at medical schools have been completely suspended in order to comply with social distancing. Similar to other professions, healthcare education quickly switched gears and tapped into technology for medical students, residents and specialists. Online teaching and meetings became the norm.

Although medical educators are generally good clinicians and educational tutors and mentors, many are not used to teaching and learning on an electronic platform due to various barriers such as time constraints, poor technical skills, inadequate infrastructure and a lack of institutional support.¹ Prior to the COVID-19 pandemic, the online learning experience of busy clinicians was essentially limited to attending a webinar or joining a videoconference call with colleagues in distant locations. Clinical teaching is considered high-stake teaching, as graduates are expected to deliver safe and effective patient care. It is therefore crucial for medical educators to be familiar with effective delivery of online learning when on-site clinical learning is being compromised.

It is in this spirit that we have collated the learning points from published work in online learning and that we share our own experiences so far.

Which online teaching tools to use?
There are various teaching tools available on the Internet, with most having mobile versions. The best one should be the one that is most fitting to your specific need(s). Like any technology, online teaching programmes can be challenging for novice users. So, you have to be comfortable using whichever one you choose. Always keep students (your target audience) in mind while selecting the tool. During the COVID-19 pandemic, students have expressed worry about whether they can get sufficient clinical exposure, and if the teaching they receive online is as effective as face-to-face teaching. So, it is important to select a tool which is easy and beneficial for students to use. We reviewed...
several commonly used online learning tools and compared them based on the features pertaining to online teaching. All these tools cater for online conferences, webinars and seminars, and most offer screen sharing and web co-browsing. Based on our experience and reviewing the published work, we selected a list of key features for effective online learning, and assessed each tool based on these features (Table 1).

How to prepare for an online teaching session?

Teaching online is different from regular classroom teaching or clinical teaching in an outpatient clinic, a ward and the operating theatre. Due to the COVID-19 pandemic, faculty and students are under lots of stress and have had to switch to online teaching. The restrictions posed by the national measures yet the need for continuity of the medical curriculum created unprecedented pressures for the medical community. This necessitated preparing for online teaching to mitigate these stressors. The first thing to appreciate about an online teaching session is the lack of a physical teaching environment (the clinical setting) and the physical object of clinical teaching (a real or simulated patient). Second, students are not physically in the same place as you — you will lose visual cues of their responses to the teaching, even if you can see students through the cameras. Considering these obvious barriers, how are you going to conduct effective teaching? Preparation is the key.

1. Define and communicate early the minimum technological set-up required by the teaching session, and direct students to online tutorials or support from the school if it is available.6
2. Hold a practice session either with the students themselves or with your administrative staff who will log in as students.
3. Share the reading materials and possibly the presentation slides as well as any other preparatory material (such as questions, assignments) with students, establishing the expectation that they should prepare ahead of the session.

Should I deliver a pre-recorded lecture or give a live teaching session?

There are pros and cons to pre-recorded lectures and live teaching sessions. The success of an online teaching session depends on student engagement. Many education research studies have explored strategies to engage online students, such as asking each student to respond to questions or using audio and visual elements.6,7 If you plan just to give a lecture, you will be better off recording them. Students can then watch the pre-recorded lectures. Do not make students log in at a fixed time just to listen to a lecture. A live session should be more discussion based and require interaction between the students and teacher and among the students themselves. The strategies below have been shown to be effective.8 Strategies to manage live sessions will be elaborated on in following sections.

How to manage students remotely during video conferencing?

1. Set your tone. You can set a formal and professional tone versus a relaxed conversational tone for semi-formal friendly engagement. This can help you address several pointers for student engagement, such as how students are going to communicate with you, how you are going to build the online community and what the atmosphere of the community is going to ‘feel like’ to participate in.
2. Set your rules. Ground rules help the session to flow smoothly, for example muting microphones when someone is talking, identifying suitable times to interrupt or ask questions, setting break times or keeping the video on or off. Many presenters recommend a useful practice to mute all the participants while they are presenting so as to reduce the static noise (personal observation).
3. Look into the camera. This helps students to concentrate. Engage the audience by showing your passion via eye contact. You can use hand gestures, varying intonation or just the conviction of your words. Remember why you became a healthcare educator and use the energy — that sense of purpose — and convey that gusto to your students! When using hand gestures, be mindful that you do not move your hands too fast or too often, considering the Internet connection can be interrupted. Do use the ‘pointers’ as you share your screen so that students can track what you teach.
4. Set high standards for students. Online teaching does not mean that you should expect less from students. Do innovate and consider alternative ways for students to demonstrate their knowledge and skills through the online platform.
5. Allow for time lag. Internet connections are not always going to be perfect. When you speak, pace yourself. If you ask a question, take a deliberately longer pause than in face-to-face encounters in order to give all students a chance to hear and internalise it. Also, consider asking reflective questions and guide students in the process. Do not rush to give students answers. If you need to demonstrate a procedure, be mindful of the pace of your movement, as there may be lag time due to variations in Internet speed.

How to engage students in an online session?

1. Engage as many students as possible. Make sure that you call on different students and use their names — even those students whose cameras on their devices are ‘faulty’ (and you may not be able to see their faces).9 Or you can use multiple channels such as ‘chat box’ or ‘breakout room’ discussions.10
Table 1. Comparison of teleconferencing tools for medical education (valid at the time of writing on 22 April 2020).

| Features                | Google Hangouts Meet | Microsoft Teams | Blue Jeans | GoToMeeting | WebEx | Zoom (Education) |
|-------------------------|-----------------------|----------------|------------|-------------|-------|------------------|
| Security features       | Hangouts are private (only you and invited people can join and see the chat history), but Google has full access to chat history and personal data, enabling sharing with a third party | Include security measures in place | No security concerns reported so far | No security concerns reported so far | No security concerns reported so far | Security and privacy breaches have been reported |
| Cost                    | Free; a fee for increased storage space; allows up to 10 users at the same time | Free (only available to Microsoft 365) | Free – US$1.99/month (one-month free trial) | US$1 3.50/month for basic version (one free trial for a conference call) | Free version allows 40 minutes per meeting; up to 100 participants; US$2.695/month (one-month free trial) | Free version allows 40 minutes per meeting; up to 100 participants; US$1.99/month for basic version |
| Platform                | Web, mobile app       | Web, mobile app, downloadable version | Downloadable software, mobile app | Web, mobile app | Web, mobile app | Web, mobile app, downloadable version |
| Additional features     | In addition to Hangouts, Google School serves as an online learning management system, which can be a step up to organise a series of teaching sessions through Hangouts | Ability to integrate online platforms/apps such as PDFs, YouTube, polls, chat bots and Twitter in one single interface; shared calendar; embedded in Microsoft Office, Teams allows users to collaborate on all Office software | Basic screen sharing, chats and videoconference | Drawing tools, polls, surveys, event management | No HD audio; basic screen sharing, chats and videoconference | Toll-free call-in from many countries, annotations, embedded polls, ability of closed captions |

User feedback (the feedback came from clinical educators in Sengkang General Hospital. During COVID-19. These educators used the programmes to teach medical students on medical knowledge, clinical reasoning and patient care)

- ‘If you are familiar with Google products, you will easily understand Google Hangout Meet interface. If you have a Google account, you can easily install and set up.’
- ‘The video and audio quality is decent.’
- ‘If you have a Google account, everything is within a click in that single platform.’
- ‘Great for Microsoft Office users who want a secured platform whilst working with a professional and regular team.’
- ‘Very useful, highly functional environment to support learning.’
- ‘Multiple advanced options.’
- ‘Good quality of images and audio.’
- ‘Steep learning curve.’
- ‘Great for Microsoft Office users.’
- ‘Very easy to use, with simple interface but highly functional’. ‘Sound and video quality not the best’. ‘Switching between interfaces is not smooth’.
- ‘Other GoTo products are available, i.e., GoToConference, GoToWebinar. It’ll be better if all functions were included in one product, as each product offers different functions’. ‘Easy to use’, ‘Great customer service’, ‘Occasional interruptions with connections’. ‘Would need to call my IT support if I need to set up any meeting, can’t do it automatically myself’.
- ‘Easy to use’. ‘Probably the best video and audio quality but problematic if connected on limited bandwidth’. ‘Very user friendly, easy to learn’. ‘Smooth switching between interfaces’. ‘Love the breakout rooms’.

All the tools share common functions viz. one-to-one/one-to-many teaching, screen sharing, breakout room for discussion, white board for collaboration, sharing documents and recording of the session. All offer free and paid versions. All offer online technical support. This comparison focuses on the differences between the tools.
(2) Include mini discussions or ask questions. It is perfectly natural for some students to become distracted or drift away during online teaching, without peers and teachers physically being around them. Pause at least every 15 minutes to ask a question or to have a small group discussion. This will wake students up and re-engage them.

(3) Create polls in response to discussion. You can create polls ahead of time to use during class or write them on the spot if something interesting comes up during the discussion. Poll everywhere is one of the most popular tools which can easily be incorporated into PowerPoint presentations.

(4) Use the flipped classroom style. Give students reading materials and assignments early. Then, use the online platform to facilitate discussion and for feedback purposes.

(5) Use various interactive activities. It is also useful to employ a variety of activities to engage students so that they do not get bored. You can include snippets of videos, polls and surveys, and use white boards, annotation function, word clouds, social media and gamification to engage students.

(6) Summarise. When you sense students are getting distracted or losing interest, summarise what you have been discussing – or better still, ask students to do so.

(7) Feedback. Give students timely feedback on their performance during the online teaching session and also on their overall progress. Then, ask for feedback on the teaching session, materials and engagement methods.

How to manage a large online class?

(1) One way to encourage students to be more actively involved in a large group (more than 25 students) is to use breakout sessions, in which students are expected to talk to one another. Most of the tools we reviewed (i.e. Google Classroom, Microsoft Teams and Zoom) offer this functionality. You can set the groups up before the session starts. The tools will allow you to enter the number of groups and assign students immediately. The ideal breakout size for each group is around four students. You can enter these groups intermittently to monitor progress and to redirect accordingly if you sense that students are going off-track.

(2) Use the chat window so everyone gets a chance to participate by typing their answers or comments, even if they are not all heard in the large group discussion. But be sure to check what is being typed in the chat box, so that students know you are including their queries into the discussion. While it takes enormous effort to split your attention between your live lecture/discussion and the chat box, the results are often quite gratifying because students feel included, connected and appreciated.

(3) Open a shared document so that students can type into it for collaboration.

(4) Utilise polls, surveys, gamification and other platforms to augment interactivity.

How to manage shy and reticent students?

(1) Passionately explain why online engagement is important.

(2) Make it clear that online engagement is required. Make participation a significant part of the final grade if possible. Some schools have implemented peer assessments, including assessment of each other’s engagement and participation during teaching.

(3) Check on students regularly outside of the teaching sessions through emails so that all students understand that they are under your radar, which can motivate their participation.

(4) Use polls, collaborative documents, brief writing exercises or chat to help draw students’ contribution.

(5) Use group work before or during class to prime discussion.

(6) Consider implementing formative pre- and summative post-lesson quizzes so that students have to participate and concentrate on your teaching.

How to ensure confidentiality and security for online learning?

Digital platforms are constantly subjected to a risk of hacking and manipulation by nefarious users, as has occurred with one popular videoconferencing tool. Medical schools have shared tips with faculty members on how to safeguard online teaching sessions. For example, it is important to select a platform with security measures in place, especially when the teaching involves patients’ cases. In addition to selecting secure platforms, educators can ask students to use their real and full names when joining the online teaching sessions, and to keep the video on during teaching so that you can verify their identities. Additional tips to enhance security include:

(1) Make sure the computer you use has firewalls and antivirus software installed.

(2) Safeguard the login process:
   a) Generate a ‘complicated’ password to join the session.
   b) Instruct students not to share the meeting information with anyone who is not supposed to be in the session.
   c) Do not allow students to join the session before you do.
   d) Only allow invited participants to join the session.
   e) Lock the session once all participants have joined the session.

(3) Limit screen sharing to those who request to share essential information relevant to the teaching session.

(4) Ask everyone to use the blurred or virtual background so that hackers will not be able to use the environmental cues to obtain sensitive information.

(5) Remove all identifiable information pertaining to any patient case.

(6) Update your videoconferencing tool as regularly as possible. Most of the tools have built-in security measures.
and have regular updates. So, make sure you have the latest version of their security features.

(7) If the session is recorded and online discussion is archived, make sure you delete the information, as it sits in the cloud of these commercial tools, which may not comply with the Personal Data Protection Act 2020 (PDPA) guidelines.

The benefits of convenience and versatility will likely elevate online teaching in medical education to the new norm when this pandemic is over. As much as educators can achieve mastery of the necessary skills to conduct online teaching effectively, the process is still beholden upon the safe, secure and reliability of the online platform. An unpredictable technological interference can suddenly displace one’s confidence and sense of control over a planned online lesson. We therefore encourage our readers always to be mindful of this possibility and to prepare to execute a plan B if the need arises.

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