ILLUMINATIONS

Lessons learned while creating an effective emergency remote learning environment for students during the COVID-19 pandemic

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The COVID-19 pandemic is forcing many institutions to consider remote, virtual instruction for the safety of employees and students. Based upon the authors’ experiences in transforming preclerkship medical science courses to virtual platforms, this paper shares tips for faculty rapidly establishing remote medical science instruction. With planning and support, faculty can create engaging, high-quality educational experiences for learners.

COVID-19; emergency remote learning; online; virtual

INTRODUCTION

The novel coronavirus disease 2019 (COVID-19) pandemic has required many educators to deliver content remotely with little time to transition content and delivery to distance learning. The integrated organ system-based curriculum at Western Michigan University Homer Stryker M.D. School of Medicine (WMed) includes a mix of didactic lectures, guided independent learning events, laboratory events, and team-based learning (TBL) events (3). The preclinical Nervous System course, delivered at the end of the first year of the 18-mo curriculum, was the first course to be delivered entirely remotely at WMed. This paper describes observations made after the delivery of this course via emergency remote learning (ERL) and provides advice for medical educators preparing to deliver content remotely or who may need to transition quickly because of physical distancing requirements in the future. This commentary is not a best practices list for how to create a fully developed online course, which can take months or years, but rather provides practical tips on an emergency response to transition a previously in-person course to a remote learning model for medical students. Although there is clearly a difference between planned online learning and ERL (1, 2), we hope that our experience in creating an ERL plan and the lessons we learned from it will provide useful information to others preparing to deliver their own courses in this new remote learning environment.

EMERGENCY TRANSITION TO REMOTE LEARNING

Because of the COVID-19 pandemic, we had ~2 wk to transition the traditional in-person integrated Nervous System course for first-year medical students to a completely remote experience. One of the largest changes to the course was the shift from live, synchronous events to asynchronous events (75% synchronous before COVID-19 down to 36% synchronous during COVID-19). Live, synchronous events were defined as those occurring live during which students participated in the events in real time, whereas asynchronous events contained faculty-guided instructional materials with detailed learning objectives, recorded lectures, readings, or activities that were uploaded to the learning management system for students to complete flexibly throughout the week. In addition, the percentage of events with mandatory attendance dropped substantially during the remote course (15%) compared with the traditional course (42%).

Remote, live, synchronous events were delivered with Microsoft Teams (Microsoft, Redmond, WA). Virtual classrooms were created before the course start, including breakout rooms for TBL and other group work events. Student groups formed before ERL were maintained. Breakout rooms were created for each group, and students were added to those rooms before the start of the course.

Several polling platforms, including TurningPoint (Turning Technologies, Youngstown, OH), Poll Everywhere (Poll Everywhere, San Francisco, CA), and Polly (Polly, Seattle, WA), a free application within Microsoft Teams, were tested for the TBL application exercises requiring simultaneous reveal. We ultimately used Polly for the Nervous System course (discussion below).

Before COVID-19, students attended the neuroanatomy/gross anatomy laboratory once per week for 3–4 h and learned from prosected cadavers, brain specimens, and models. During COVID-19, content was provided to students before an optional weekly synchronous laboratory drop-in session. Content consisted largely of narrated video demonstrations on models and brain slices and PowerPoint presentations of cadaver photographs along with weekly application exercises. Students could work through content asynchronously but were encouraged to meet with their preformed laboratory group to complete or review application exercises during the synchronous laboratory drop-in sessions. Optional 2-h weekly synchronous laboratory drop-in sessions provided an opportunity for students to virtually call an instructor into their breakout room to answer student questions, confirm student knowledge, or provide additional content and clarification.

Students regularly expressed their understanding of the difficulties associated with transitioning and delivering content online rapidly, yet deidentified student evaluations indicated that the course was considered adequate but less than ideal.
Although grade performance in the course was similar overall to that in previous years, it is important to note that student perception of learning in this course was that it was significantly more difficult, and several students mentioned heavier use of outside resources than during in-person courses before the pandemic. Student patience will likely decrease the longer courses are being run in this environment, and it will be important for course directors to put in the time and effort necessary to allow their courses to run as smoothly as possible. Below we highlight a few suggestions based on our experiences in creating an ERL for the preclinical Nervous System course.

SUGGESTIONS FOR THOSE PREPARING FOR EMERGENCY REMOTE LEARNING

WMed has now delivered content for the Nervous System course and the Cardiovascular System course, as well as the final week of the Musculoskeletal System course, entirely remotely. As such, we believe we have valuable insight into delivering an emergency remote course that others preparing for the fall term may find valuable. Below are several key takeaways from converting a traditional preclinical in-person medical school course to a remote learning environment.

Consider Learners in Different Time Zones

During a pandemic or other emergency situation, it may be in the best interest of learners’ physical, emotional, and financial well-being to move back in with their families. This may result in learners living in different time zones. To accommodate students in various time zones, nearly two-thirds of instructional events were delivered asynchronously, whereas one-quarter of events are delivered asynchronously in normal circumstances. Student feedback indicated that students appreciated this change. However, students also reported valuing the “normalcy” provided by synchronous events. Live, synchronous events provided accountability for students to stay on schedule with course content, allowed students to ask questions about content delivered in real time, and facilitated interactions with peers and faculty. In addition to many synchronous events being moved to an asynchronous format, attendance at nearly all of the synchronous events became nonmandatory. Despite this change, 35–40 students (~45% of the class) regularly attended nonmandatory live, synchronous events. The only synchronous events with mandatory attendance were weekly TBL events. No single format works best for all students, and learners appreciate the flexibility to complete coursework in a variety of ways, allowing them to adapt to the new learning environment.

Variability in Internet Connections

Most modern virtual teaching requires high-speed internet; however, learners and instructors have varying qualities of internet connections at their homes and may be competing for internet bandwidth with other members of the household. Asynchronous events can help alleviate this need, as students can complete modules when they have reliable internet access. During synchronous events, we preserved bandwidth for all participants by asking students to only turn on their video cameras when speaking during classwide events or when they were in small group discussions. This worked well and helped avoid internet bandwidth issues for most participants.

Increase the Faculty-to-Student Ratio for Team-Based Synchronous Sessions

Synchronous sessions that included working in teams followed by discussions with the whole class, such as TBL, case-based learning, and tutorials, were particularly challenging. First, time management was more difficult (see Everything Takes Longer Online below).

From this ERL experience we also learned that the faculty-to-student ratio for these types of events needs to be greater. This can be done by increasing the number of faculty/staff available to visit breakout rooms or by reducing the overall number of students in a session. At a minimum, we recommend that one support staff member be present during any synchronous event to help with polls and monitoring the chat. Different faculty or support staff members had a variety of roles including facilitating the event, running the PowerPoint presentation, creating polls, handling student technical problems, and monitoring the meeting chat. In particular, we found that during TBL a single faculty member likely would only be able to visit two to four groups (6 students/group) depending on the length of a breakout session. Thus, increasing the number of available faculty for these events from two to four or more added to their success in reaching all 14 breakout groups. In contrast, within our curriculum we have always previously split our class in half for laboratory experiences (2 sessions of 42 students), and that organization was maintained for our laboratory drop-in sessions. This resulted in smaller numbers of students divided into even smaller groups, allowing instructors to better serve the students who were present. Additionally, we often had a greater number of instructors available during these sessions (4–6 faculty/staff). Although we recognize the challenges of doing so, we encourage those preparing a remote course to increase the instructor-to-student ratio for live, synchronous events either by increasing the number of instructors present or by breaking students into smaller groups or sessions. In either case, having support staff available to help with unexpected problems is critical to quickly resolving student issues without disrupting the entire event.

Instructor Availability for Student Questions

To ensure that students had opportunities to discuss content with faculty, some instructors established virtual office hours. Although only a small minority of students regularly took advantage of this resource, students used faculty office hours in different ways. Some used the time to discuss challenging content and ask content-specific questions, whereas a few students dropped into office hours without any specific questions and used the time to connect with faculty, seek encouragement, and receive advice on coping with remote learning during a stressful time. Most students e-mailed their questions to instructors or asked for private meetings in lieu of attending scheduled office hours. Holding virtual office hours may be beneficial for some courses and students, but in our experience students continue to prefer e-mailing questions or scheduling individual appointments, which mirrors their communication preferences during on-campus courses.

Everything Takes Longer Online

Because of factors ranging from technical issues to delays when sharing the screen to transitioning from small to large
groups, more time is used when providing synchronous instruction online. Faculty who are preparing to do so should be aware that although you may previously have been able to seamlessly transition from small group to large group discussion in a few seconds, it will likely take closer to 1–2 min for each transition.

Some virtual platforms allow the presenter to end small group discussions and automatically bring participants back into the large group, but for those using platforms for which this is not an option, we present tips for smoother transitions: Provide a specific time at which small groups should return to the larger group; rather than saying, “Come back in 5 minutes,” state, “Return to the large group by 12:49.” If your platform allows you to send messages to all groups simultaneously, messaging students when to conclude their small group discussions and return to the large group can be helpful, although we found that students would rely on that notification rather than monitoring the time, and some would disregard the notifications. Students who followed instructions became frustrated when instructors would wait for other students who were not following instructions; therefore, we recommend clearly communicating that the discussion will resume promptly at the listed time, with or without all groups present.

To reduce time lost during transitions, limit the number of transitions between the small groups and the whole class. For TBL-style events we now group larger numbers of questions together for small groups to work through before coming back. Carefully consider the timing of your events and assume that what you could accomplish in 50 min face to face is likely to take at least 5–10 min longer depending on what challenges arise during the session.

How to Engage Students Virtually

When lecturing or facilitating a live session in the classroom, many educators can “read the room” and tell when things are going well and when they are not. Using a video chat platform left many instructors struggling to use this skill. The combination of not having visual cues and the awkwardness of interrupting with questions made communication particularly difficult. Two things can greatly increase the ability to gauge student engagement and understanding. First, ask students for questions more frequently, with significant pauses (at least 10 s) to provide time for students to turn on their microphones and actually ask their questions. Second, build assessment into synchronous events that allow the instructor to ensure that core concepts are clearly understood before moving on. Asking for volunteers to answer questions verbally in this setting with a large number of participants was more awkward than in a face-to-face classroom. Replacing those check-in style questions with polling using platforms such as Polly, TurningPoint, or Poll Everywhere allows for greater class participation. Anecdotally, students liked polling questions and asked for more of them. In choosing a polling platform the instructor should consider the level of classroom support they will have available to them. To run Polly smoothly, for example, a staff member or faculty member was given the sole job of creating these polls in real time, particularly when they were utilized frequently as in TBL events. TurningPoint and Poll Everywhere, on the other hand, allowed for an individual instructor to run the polls, albeit with more time set aside before the event to create them. With the rapid rate of change in these software options during the pandemic, we encourage instructors to look into what these various platforms currently offer and how these offerings fit with their needs. Instructors adapting their materials for a remote learning environment should increase low-stakes assessment of student understanding and be deliberate in building this into their events and their course.

Flip the Classroom When Possible

Asynchronous delivery of content followed by an optional live, synchronous session with an application exercise was quite efficient and provided important feedback for instructors. Although laboratory drop-in session attendance was made optional, roughly half of students chose to complete the provided assessments during the optional laboratory drop-in period with their groups, having instructors at the ready to guide their learning. These drop-in sessions, in combination with a mandatory weekly formative laboratory quiz, proved to be particularly valuable in gauging student progress through the anatomy content and allowing instructors to address any misconceptions. Presenting content asynchronously before an application exercise allowed students to work through the material at their own pace and to ask questions as needed via e-mail or other methods. Providing a time and space for students to join small groups to work through application exercises helped to alleviate some of the problems that exist in larger video chat groups, with some small groups turning on their cameras, allowing them to actually read some body language. Second, after some short initial instruction, groups worked through the material at their own pace, only calling on the instructor when they wanted clarification or needed assistance. This removed some of the timing challenges seen in other group events such as TBL and CBL during which all students need to be kept on the same schedule. If possible, providing a lower student-to-faculty ratio is beneficial to both students and faculty to engage with material and connect socially. Creating a safe student environment for small group or team activities should be done early in any remote learning environment. Finally, if the application exercise allows for answers to be collected or responses to be recorded, instructors can better understand where student misconceptions may be arising. If this is not an option, a low-stakes assessment could be utilized for this purpose. Thus, providing content asynchronously along with an application exercise to work through individually or as a group followed by an instructor-led synchronous debrief appears to be a very useful model for remote learning. Tutorial style events delivered this way later in the Nervous System course were well received by students and helped instructors to understand which concepts continued to be difficult for students. With this in mind, instructors should carefully consider whether this flipped format may be well suited for events in future courses.

Maintain Reasonable Expectations

Stressors such as sickness, uncertainty, stay-at-home orders, lack of childcare, and the blurring of work-life balance can compound the difficulty of adjusting to remote education. Although the highest quality of education possible should be maintained, expectations must be reasonable during unprecedented times. Neither educators nor learners can perform optimally if their basic human needs are not met. Sleep, nutrition, exercise, and work-life balance continue to

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be important for effective teaching and learning, especially during ERL. Institutions, faculty, and students should work together to support well-being during ERL. Providing flexibility in schedules, weekly time off from work, nonmandatory attendance at live events, asynchronous events, and clear communication can help promote well-being.

CONCLUSIONS

Completely overhauling content delivery is never an easy task, and adding new technology to the mix further complicates the situation. As more faculty undergo the process of creating an emergency remote learning plan for their courses it is important to remember that although the content should remain the same, the delivery of that content will likely change. Technical and administrative support provided by institutions is especially important for faculty and students during remote learning. Although none of the faculty involved would argue that the ERL experience was equal to an in-person experience, in the time frame provided both students and faculty felt that the course was adequate given the circumstances. The authors encourage faculty to carefully consider the needs of their students and what will work best to facilitate learning. A mix of both asynchronous and nonmandatory live, synchronous events provides some level of normalcy and an ability to assess student progress, while providing students the ability to determine what works best for them given the new circumstances of their learning environment. Our advice to those preparing to deliver content remotely or developing a contingency plan should physical distancing be necessary includes remembering that everything takes more time, increasing the faculty-to-student ratio, incorporating more real-time assessment into learning events, flipping the classroom and providing more application-based experiences during synchronous events, and remembering to maintain work-life balance as much as possible.

Although intended for ERL, some of the suggestions above may be incorporated into a “new normal” to provide greater flexibility and safety for instructors and learners. While we are eager to enter back into the physical classroom, recent events have allowed us to take a step back and carefully examine our own course. We are hopeful that this examination, occurring across the globe, will lead to pedagogical advances throughout educational systems and specifically medical education.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the authors.

AUTHOR CONTRIBUTIONS

P.J.V. drafted manuscript; P.J.V., K.A.P., and W.L. edited and revised manuscript; P.J.V., K.A.P., and W.L. approved final version of manuscript.

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