



How COVID-19 Transformed Problem-Based Learning at Carle Illinois College of Medicine

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Published online: 24 August 2020

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Abstract

The Carle Illinois College of Medicine is creating an innovative model for medical education that integrates engineering principles into an active learning curriculum. At the Carle Illinois due to the state order of social distancing during the COVID-19 pandemic, students were mandated to terminate in-person instruction. The goal of this work is to show the pros and cons of online versus in person Problem Based Learning (PBL) sessions. In the online environment, the sessions tend to run slower since we need to pause to allow time for people to speak and others to understand. There is more risk for students to become distracted by increased screen-time and access. Thus, the facilitator has a greater role in keeping the students engaged and focused while managing time. Despite these differences, we found that overall student performance with respect to generating and researching learning issues was similar between online and in-person PBL sessions.

Keywords In person · Online · Problem-based learning · Medical education

The Carle Illinois College of Medicine is the first medical school in the nation designed at the intersection of engineering and medicine. The curriculum integrates basic and clinical sciences with engineering and innovation. We use problem-based learning (PBL) pedagogy as our primary modality of curriculum delivery. PBL is a student-centered approach to learning where students work together on a medical case in a small group guided by a faculty facilitator. Due to the state order of social distancing during the COVID-19 pandemic, students were mandated to terminate in-person instruction. Consequently, we had to rapidly redesign our current PBL to an online format.

Our school has four PBL groups comprised of eight students and one facilitator. For each session, students rotate through eight roles: leader, innovator, searcher, scribe, reader, synthesizer, inquisitor, and audiovisual (AV)-tech. In-person PBL sessions were performed in small-group instructional classrooms equipped with whiteboards and audiovisual

equipment, with students and the facilitator positioned around a large table. The scribe used the whiteboard to document the patient's information, problem list, group hypotheses, action plan, and learning issues generated by the medical case. The AV-tech and searcher kept their laptops open to share slides and research group questions, respectively.

To implement online PBL during the COVID-19 pandemic, each facilitator created a Zoom® (<https://zoom.us/>) meeting with their group of students. Zoom® is a remote conferencing service that combines video conferencing and online meetings. The roles were maintained with students requiring a laptop with a webcam to participate in the online session. The AV-tech shared the documents with the group via the screen share in Zoom®. A virtual whiteboard replaced the classroom board, and groups approached its utilization differently. Groups used variations of Google Docs, a Web-based office suite, as their whiteboard and either shared it alongside the case information or had everyone simultaneously open the file on their individual computers.

After twelve 2-h sessions, several differences between the in-person and online-PBL have emerged based on facilitator perspectives. Online sessions tend to run slower as we need to pause and allow time for people to speak. There is also more risk for students to become distracted by increased screen time and access. In some groups, additional screen time also increased the tendency for passive participation and reduced

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questioning. Thus, the facilitator has a greater role in keeping the students engaged and focused while managing time. Despite these differences, we still found that overall student performance with respect to generating and researching learning issues was similar between online and in-person PBL sessions. Furthermore, students were generally engaged in both formats and online format reduced the number of side conversations. Students also found creative ways of participating through in-zoom “reactions” (emojis) and online chat (texting). In addition, facilitators were able to send private comments to the students during the online session providing more immediate feedback and instructions concerning roles, performance, and behavior.

These initial results demonstrate the success of our team’s adaptive innovation to online PBL. Not only did online PBL prove to be an effective mode of learning, it also presents opportunities for enhancement of medical education in the future. Inclusion of an online PBL component can complement in-person PBL, for example, by increasing remote accessibility for learners and instructors, creating the potential for bringing in guest speakers, and allowing students to participate when they cannot attend in-person. The online whiteboard lends itself to experimentation with new ways to reinforce learning. For example, addition of board categories focusing on pertinent positives and negatives can help students with reasoning through differential diagnoses as well as patient presentations. Comparing different aspects of online

versus in-person PBL has implications for improving the PBL process, for example, via examination of the impact on student roles and assessment and facilitator management. In addition, the PBL online model could serve as an alternative tool for instructor peer evaluation. During the in-person sessions, observations are done through a control room or pre-recorded videos. The peer instructor is not allowed to be physically present in the room with the facilitator and students to avoid distractions and dynamic disturbance. In the online version, the peer instructor could watch the session in real-time and could provide comments and suggestions through the chat feature during the session.

In conclusion, we present a viable model for online PBL that has the potential to help improve medical education and can be easily adapted by other institutions.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval NA

Informed Consent NA

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