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Experiences in Teaching and Learning

Using a course pilot in the development of an online problem-based learning (PBL) therapeutics course in a post-professional PharmD program

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ABSTRACT

Background and purpose: To assess whether the traditional problem-based learning (PBL) process can be replicated in an online environment, and to identify any barriers and facilitators to learning using a course pilot.

Educational activity and setting: Eight alumni and one experienced tutor participated in a two-week simulated PBL course comprised of two three-hour synchronous online tutorials. Blackboard Collaborate® software was used to permit audio and visual interaction. The PBL tutorials were recorded and observed by the researchers. Participants completed satisfaction surveys after the pilot, and were invited to take part in a focus group to debrief about their experience.

Findings: Once the steep learning curve with the technology was overcome, the quality of the PBL process was similar in the online course as it was in the face-to-face course. Several key factors for success were identified through analysis of the videotaped sessions, and interviews with the participants in the course pilot.

Summary: Conducting a course pilot study demonstrated that an online PBL course is feasible, and identified some considerations to facilitate success

Background and purpose

The School of Pharmacy at the University of Waterloo created a bridging program to allow their bachelor of pharmacy graduates to earn a doctor of pharmacy (PharmD) degree via distance learning. Our preference was to utilize a problem-based learning (PBL) approach in the delivery of the Advanced Topics in Patient Focused Care course (PHARM 495).

PBL is pedagogy that uses a problem to guide student learning.¹ When reviewing the literature, it is important to note that the term PBL lacks a universal definition.¹ Several studies that purport to evaluate PBL may in fact be evaluating pedagogies that more closely resemble a modified case-based approach.^{2–6} The PBL approach employed in the final therapeutics course delivered in the undergraduate pharmacy curriculum at the University of Waterloo was developed using Barrow's concept of a closed-loop, problem-based approach.⁶ This concept involves five steps: (1) students are placed in teams of six to eight, 2) meet to develop learning objectives for the problem under the supervision of a pharmacist tutor, 3) independently research their learning objectives, 4) meet again with a pharmacist tutor present to discuss the learning objectives and how they apply to the problem, and 5) reflect on their learning and process to identify areas for improvement. There is some evidence that pharmacy students perform better on

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examinations when material is introduced using PBL compared to traditional, lecture-based methods.⁷ However, the main reason why we implemented PBL in our final bachelor of pharmacy therapeutics course at the University of Waterloo was to foster skill development in the areas of literature searching, critical appraisal, evidence-application, and clinical problem-solving. Delivering the bridging PharmD therapeutics course using any methodology other than PBL would be a regression from the student-centered, active-learning approach that graduates of the University of Waterloo had grown accustomed to.

We recognized that significant modifications would be required to transition from the face-to-face interactions in the on-campus, undergraduate PBL course to an on-line module delivered via distance learning. A search of Medline (OVID 1946 to March 14, 2017) combining the MeSH headings “internet” < or > “online systems” < or > “computers” with “Students, Pharmacy” < or > “Education, Pharmacy” < or > “Education, Pharmacy Graduate” < and > “Problem-based learning” failed to find any articles describing a transition from a course that is delivered using the closed-loop PBL to one delivered using a synchronous online PBL format for post-graduate pharmacy learners. To understand the scope and types of possible modifications required, we believed a pilot study would help determine how to tailor the traditional PBL process into a fully online learning environment. Our primary goals were the following: (1) establish whether participants could achieve the required learning outcomes with currently available resources; (2) identify any barriers or facilitators that could impact usability and participant learning; and (3) establish what, if any, additional forms of support were required by participants and/or facilitators to ensure successful completion of the course.

Educational activity and setting

The final therapeutics course of the undergraduate bachelor of pharmacy program at the University of Waterloo is delivered using principles of PBL. Students are placed into groups of seven or eight by the instructor, and meet once weekly for a three-hour tutorial under the supervision of a pharmacist tutor. In the first tutorial, students develop learning objectives for a paper case that they are provided at the start of the tutorial. They are then given five hours of protected time in the curriculum over the next week to independently research their learning objectives. Each student is required to research every learning objective. The students reconvene in their tutorial groups a week later to discuss their research using the framework of the learning objectives, and to work as a team to apply concepts and data to the patient described in the paper case. They finish the tutorial by developing learning objectives for the case that will be discussed the following week, and the process continues for the remainder of the course. The pharmacist tutor does not teach; rather, their duties are to ensure the students develop appropriate learning objectives, discuss the information at suitable depth, and use critical appraisal skills when evaluating and applying information. The tutor also performs assessments of individual student performance at the midterm and final evaluations.

Eight alumni of the bachelor of pharmacy program and one tutor were recruited to participate in a two-week simulated PBL course comprised of two three-hour synchronous online tutorials. The alumni, who served as the students for the pilot, and the tutor all had experience with traditional face-to-face problem-based learning. The course pilot was delivered using LEARN® (D2L), the learning management system employed by the University of Waterloo, and Blackboard Collaborate® software, to permit audio and visual interaction. During the first tutorial (day 0), the students met online at a mutually agreed upon time to develop learning objectives for the PBL case under the supervision of the tutor. Two weeks later (day 14), they met online to discuss the learning objectives they had researched during their independent study. This process mirrors the PBL model used in the undergraduate PharmD program at the University of Waterloo, with the exception that an extra week was provided in between tutorials to accommodate work schedules of the distance students. The PBL live sessions were recorded for later observation and analysis.

A post-pilot user experience study design was employed to further understand the implications of the initial course design. The user experience study was based on Nielsen's⁸ usability engineering methods (commonly used to assist with improving website design, applications, and other products) and his premise that five users will typically identify the majority of usability issues. Nielsen⁹ states that while there may be circumstances that require fewer or more users, in most cases five users will suffice. Four sources of data were used, all compiled within four weeks of the completion of the pilot: (1) student participants completed satisfaction surveys; (2) student participants were invited to take part in a focus group to debrief about their experience with one of the researchers (B.J.); (3) the tutor was debriefed independently from the students about his experience by two of the researchers (B.J. and J.N.); and (4) all researchers reviewed both of the recorded tutorial sessions to describe how students and the facilitator interacted, as well how the software impacted those interactions.

Investigators analyzed the four sets of data using a modified developmental evaluation approach to inform final course production decisions.⁹ This technique involves a consideration of what was seen (i.e., what are the indicators of the phenomena? what patterns are emerging?), the implications of what was seen (i.e., what are the possible impacts on learners, faculty, or the program currently, what are the possible impacts on learners, faculty or the program in the future?), and what should be done (i.e., what are the options, what are our resources or what resources do we need?). It is a new and emerging approach “in which those involved discover answers to their own situationally specific questions.”¹⁰ No software was used for data analysis. Approval for this study was obtained from the Office of Research Ethics, University of Waterloo, Waterloo, Ontario, Canada.

Findings

Seven out of eight students completed the satisfaction survey (87.5% response rate) and seven out of eight students participated in the focus group. The one student who could not attend the focus group provided an email copy of their answers to the questions.

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