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Are fishbowl activities effective for teaching pharmacotherapy and developing postformal thought in pharmacy students? A pilot study

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ABSTRACT

Background and purpose: Case based learning is a commonly used pedagogy to facilitate active learning and development of problem-solving skills, however its utility may be limited in a large lecture environment. Fishbowl activities have been utilized in higher education to encourage discussion and postformal thinking and may be useful in engaging large class sizes in collective problem-solving activities.

Educational activity and setting: The fishbowl activity took place in a second-year six-credit hour infectious disease course delivered in the spring of 2017, consisting 95 students. A pre-post survey was administered via Google® forms and consisted of demographic items (age, race, gender), students' self-reported level of preparation, perceived benefits of the activity, strengths and weakness of the fishbowl activity, and postformal thought using the Complex Postformal Thought (PFT) questionnaire.

Findings: Aggregate mean postformal thinking score was 51.98 in the pre-survey and 56.26 in the post-survey ($p < 0.05$). A majority of respondents agreed or strongly agreed that the activity helped them learn, was better than traditional lecture, and helped them prepare for material that would be on the exam.

Discussion: Overall, this activity was generally well received by the students and may have positively impacted their postformal thinking. It appears that the fishbowl activity concept may transfer easily to pharmacy education and be an additional active learning tool for pharmacy educators based on these limited pilot results.

Summary: Fishbowl activities may be a valuable educational tool for the development of postformal thinking skills in pharmacy students. Further studies are needed to evaluate the effectiveness and applicability of using this active learning approach in pharmacy education.

Background and purpose

The Accreditation Council for Pharmacy Education (ACPE) Standard 3.1 emphasizes the teaching of problem-solving in schools of pharmacy.[1] The Center for the Advancement of Pharmacy Education (CAPE) Educational Outcomes further provide example learning outcome 3.1.3, which highlights exploring multiple solutions and defending each possible solution as an element of problem-solving.[2] Case based learning consisting of small groups of students discussing an instructor created patient case is one commonly used teaching methodology leveraged to help learners achieve this goal of becoming better problem-solvers.[3,4] Unfortunately, not all

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teaching environments currently found in schools of pharmacy lend themselves to small group learning, specifically in the setting of traditional fixed seating large classroom environments.

The large classroom environment, defined in this paper as an approximate class of 100 students, has many pros and cons that are beyond the scope of this article. Specific challenges when attempting to include small group case based activities in a fixed seating, large classroom setting include limited space for learners and faculty to move and simply the sheer number of students, potentially limiting individual student engagement, participation, and attentiveness in classroom based activities. Too often a small subset of engaged and active students will adequately prepare and participate in activities while other students are seemingly content simply being bystanders.[5]

One novel teaching strategy, the "fishbowl discussion", has been described and utilized in elementary and secondary (K-12) education, with limited published application in medical education, and may hold promise to solve many of the above mentioned issues.[6] The basic tenets of a "fishbowl activity" are that a small group of students are placed in a circle or group, "the fishbowl", and discuss responses to a scenario/topic while the rest of the students who are outside the fishbowl listen, take notes, and write responses to conceptual questions that are prepared and distributed before the activity.[6–8] Fishbowl activities have the potential to help faculty members transform a large classroom environment into a group discussion environment. This smaller group discussion environment ideally promotes sharing of ideas, active participation, and affords students the opportunity for metacognition in self-regulated learning (e.g. "I don't remember that from the reading how did you know that answer") that can often be missing in large classroom environments.[7] Fishbowl activities' impact on postformal thinking has been studied in higher education and may have particular relevance to pharmacy education and meeting ACPE Standard 3.1.[9] Postformal thought is the process that involves a person developing an appreciation for equal but differing opinions and the "grey areas" of life, essentially seeing things as less absolute or "black and white" and as more non-absolute or "grey".[10] Evidence indicates that one way to develop postformal thought in learners is through fostering interactions that challenge a student's views or beliefs about a certain topic.[11] Once postformal thinking skills are developed, this type of complex thought can be applied in a variety of contexts where higher levels of thinking and problem solving are required.

One way fishbowl activities may enhance postformal thinking is by allowing multiple viewpoints to be brought forward, discussed, and defended during the activity.[10] A parallel in pharmacy education would be bringing forward, discussing, and defending opposing yet equally acceptable approaches to treating patients. Encouraging and formally recognizing this type of postformal thought during an in class activity may help students appreciate rather than loathe appropriate alternative treatment strategies that contrast with their personal preferred treatment of choice. The research hypothesis of this study is that using fishbowl activities in large lecture environments may aid in developing postformal thought and critical thinking skills in pharmacy students. The primary outcome of this small pilot study was to evaluate the effects of a fishbowl activity on students' postformal thinking.

Educational activity and setting

The fishbowl activity described below took place in a second-year six-credit hour infectious disease course delivered in the spring of 2017, consisting of ninety-five students. The infectious disease course is an integrated systems based module that focuses on the pathophysiology, pharmacology, medicinal chemistry, clinical pharmacokinetics, and pharmacotherapy of infectious diseases. It provides students core knowledge and skills to formulate rational antimicrobial regimens for the treatment of common human infectious diseases.

The activity was utilized for in class application of pharmacotherapy concepts during the second of a two-part lecture series on pneumonia pharmacotherapy, each lecture period lasting two hours. The first lecture was a standard didactic lecture utilizing Microsoft Powerpoint®. All students were introduced to the fishbowl concept, classroom activity, supplied the first patient case, and an "outer circle key questions" document at the conclusion of the first lecture to prepare for the next class meeting activity the following day (See Appendix 1 and 2). The decision to provide only the first case prior to class instead of all cases was made to facilitate a smooth first fishbowl experience for students and allow sufficient time to fully workup one complex case without overburdening students with additional cases given that there were only 24 hours between lectures. Approximately 30 min of the second lecture period was used to review and complete new pharmacotherapy material not finished in the previous lecture with the remaining one and one-half hours being used exclusively for the fishbowl activity.

The fishbowl activity was chosen and designed in order to encourage postformal thinking and classroom engagement using a case based pneumonia activity in a large lecture setting. To accomplish this goal, researchers implemented three separate tactics. First, six students were randomly assigned to be inside the fishbowl for each of the three cases. Students were told they would be randomly assigned to be in the fishbowl but were unaware of their assignments until announced in class. Second, active participation inside the fishbowl was encouraged by allowing students to exit the fishbowl immediately based on subjective facilitator perception of involvement along with depth of knowledge and preparation displayed in case discussion and responses. Lastly, to stimulate greater participation outside the bowl the instructor explicitly stated that students not participating via taking notes, asking questions of the fishbowl, etc. could be selected for and would be more eligible to enter the fishbowl when a seat became available. It was hoped that this randomization and the potential of exiting or entering the bowl at any time would increase student accountability, engagement, and participation.

Only one fishbowl was run at a time in an effort to limit classroom chaos and student confusion. Each fishbowl consisted of six students working on the case in a central grouping of chairs in the classroom, with the remaining students in the "outer circle", and a new fishbowl group was formed at the start of each new case. Equivalent time was not afforded to each case as the instructors goal was small group discussion and not covering a specific number of cases. The instructor also intentionally chose three real world