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A Student-Initiated, Integrated Pharmacotherapeutics Learner-Centered Course

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Key Words: learner-centered, pharmacotherapy, discussion, discussant rubric, literature

Abstract

Objective: *To evaluate a learner-centered, elective course complementing pharmacotherapeutic instruction.*

Design: *A one credit-hour elective as developed. Enrolled students were responsible for article selection and to lead in-class discussions. A content-validated discussant rubric was use to peer review each discussant.*

Assessment: *Enrolled students kept current on the literature and nurtured an obligation to themselves and their peers to be prepared on a weekly basis to discuss the selected article. Discussion demonstrated varied opinions and provided ample opportunity for students to use technical/clinical language. Also, the course allowed for thinking at a higher level, discussing complex ideas/issues, and developing oral communication skills.*

Conclusions: *This learner-centered approach allowed the enrolled students to take ownership of their learning and complement their learning from the traditional mode of learning in two pharmacotherapeutic courses. It encouraged the students to investigate the clinical literature as a means to complement and enhance their knowledge.*

Introduction

The 2011 accreditation standards set forth by the Accreditation Council for Pharmacy Education (ACPE) for the professional program in pharmacy, effective February 14, 2011, explicitly stated "students should be encouraged to assume and assisted in assuming responsibility for their own learning. Students should also be encouraged to participate and assisted in participating in the education of others…" The standard further reads "the development of critical thinking and problem-solving skills should be supported through…guided group discussions" and "colleges and schools are encouraged to experiment in the design and delivery of the curriculum."[1]

A recent survey assessed the extent to which active learning was used by US College of Pharmacy faculty members. Over eleven hundred faculty at 114 US colleges of pharmacy provided responses. An overwhelming 87% of respondents indicated incorporating some level of active-learning techniques into their classroom activities.[2] However, when the details of the type of active-learning techniques were tabulated, the results were underwhelming and less than innovative. Examples of methods reported included: using audience clickers, using internet-based learning, breaking into small groups, patient simulation, and traditional laboratory experience. The common central theme still existed, i.e., the teacher standing in front of a group of students lecturing.

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In *Boomers, Gen-Xers and Millennials: Understanding the New Students*, Oblinger stated "the aging infrastructure and the lecture tradition of colleges and universities may not meet the expectations of students raised on the Internet and interactive games."[3] If this sentiment is true, how do we, as faculty, reconcile this thought even when attempting to be innovative as some other faculty are still falling short of our goal of providing the best education for our students? How do we step out of the old way of thinking and create a new path? How do we engage and challenge our students to embrace self-learning and become a lifelong learner? Simply, we must "think outside of the box" and be innovative, creative, and forward thinking.

One, surprisingly obvious notion, is within the accreditation standard, i.e., to help students teach one another. Cheang developed, implemented, and assessed a learner-centered approach to teaching students in a third professional year pharmacotherapy course in a doctor of pharmacy program.[4] This approach was effective in promoting students' motivation and learning strategies. Specifically, the approach according to Cheang improved students' attitudes and intrinsic motivation, as well as critical-thinking strategies. In addition, students reported their learning was enhanced by using the learner-centered approach. Harpe and Phipps redesigned a drug literature course to create a more learner-centered course.[5] Changes from former approaches included the use of optional assignments, opportunities for self-reflection, and a point-based grading system. This study demonstrated the successful approach in promoting student motivation and learning strategies. The students experienced reduced stress in the course and more control of the learning environment, and had multiple opportunities to demonstrate

their learning. However, more needs to be accomplished. As faculty we must challenge ourselves to be more innovative and dedicated toward students helping themselves learn in a competitive marketplace; we must help position students to prosper. Further, as faculty we must be selfless and willing to dedicate our time and effort to accomplish this task.

Proposed Educational Innovation

In summer 2010, the student author (SH) shared his idea and concept of a true learner-centered approach to complement the existing teacher-directed style in the core pharmacotherapy course sequence with the faculty author (NP). The concept was to create an elective course which would be a hybrid between a journal club and a peer tutor approach to learning that would fit within the guidelines of the accreditation standards. The goal was to allow enrolled students to learn how to self-learn proactively, while providing the opportunity to share ideas and concepts with fellow classmates. It also allowed the students to use their drug information skills to secure evidenced-based clinical literature to complement what was being taught in the pharmacotherapy courses and teach one another. The faculty author embraced this opportunity as the cost to deliver the course would be minimal in facilitating its delivery, e.g., dedicating some faculty time, creating a course syllabus, arranging an agreeable weekly meeting time and place, copying course materials, providing dedicated individual student mentoring time. In addition, this project was unique in its use of an external panel to develop a tool for student evaluation.

Design

A one-credit hour learner-centered elective for the fall and spring semesters 2010-2011 was created. Class enrollment was limited to 12, third professional year doctor of pharmacy students to provide a controlled and manageable environment. The course was designed to mirror and build on the topics currently being taught within the semester's two core, pharmacotherapy courses. SH presented the course to the entire third year doctor of pharmacy class. Enrollment was on a "first come, first served" basis. The introductory email indicated enrolled students would be responsible to read the current literature linked directly to the doctor of pharmacy curriculum course work in pharmacotherapy and meet on a weekly basis to discuss the assigned reading. Specifically, enrolled students would select a recent article from a peer-reviewed journal, which would provide additional insights into what was being taught. The initial course design was to be just for one semester. However, because of its success with the students, it was offered again in the following semester.

During the fall semester, each student was charged with leading two discussion sessions and preparing 5 key questions 1 week beforehand for fellow students to consider when reviewing the article. The intent was to provide a framework for the discussant's session and inform the other students which direction the discussion was meant to proceed. This approach also encouraged students to read the article and be prepared to participate.[6] In addition, at the beginning of every session, enrolled students were required to submit a print-based copy of his/her question responses to the faculty facilitator. This latter requirement held the students' "feet to the fire" to ensure their participation.

The role of the faculty member was to serve as a passive facilitator. At the beginning of the fall semester course, the faculty member provided instruction on how to lead a discussion (Appendix 1). In addition, the faculty member coordinated the logistics of the course, e.g., discussant schedule, coordinated with individual students the selection of an assigned reading, disseminated the discussant's key questions to the enrolled students, collected students' responses to session questions, and collected peer evaluations of each discussion session. The faculty facilitator did not participate in the discussion until the last five minutes of the session. At this time, the faculty facilitator attempted to clarify/expand, whenever possible, upon other important points raised during the session and provide responses to unanswered questions brought up during the discussion. When this was not possible, NP engaged fellow faculty experts to answer the question(s) and then reported back to the group during the next session. This was meant to serve as a feedback loop to the students.

Each week, the scheduled student would be in charge of leading the discussion on the chosen published article. The five key questions, proposed and disseminated in the previous week, were not used as a roadmap for the discussion, but rather as a launching point for the day. Depending on the chosen article, the topic could be on new therapy innovations for a particular disease state, ethical considerations, evolution in standard of care based on new science, etc. And, the discussion could move tangentially as freely as the topic and the students allowed. The only requirements were the selected article was published within the previous twelve months, the topic was to be professional in nature, and that it related to the content taught in one of the two pharmacotherapeutics courses.

A Claim of Exemption was submitted to the UIC Institutional Review Board of the Office for the Protection of Research Subjects and subsequently approved.

Expected Outcomes and Learning Objectives

The intended outcome of this course was to help students "connect the dots" themselves through their active participation with peers. After participating in this course, the student was expected to be able to: integrate classroom and recitation learning with the current literature, evaluate the logic and evidence proposed by the article author(s) and fellow students, analyze scientific/clinical journal articles independently, constructively criticize articles on the basis of their value and application to real life situations, relate topics to real-world practice situations.

The overarching performance-based abilities addressed by participation in this course were adapted from "Background Paper II: Entry-Level, Curricular Outcomes, Curricular Content and Educational Process," Commission to Implement Change in Pharmaceutical Education.[7] These were conceptual competence, integrative competence, critical thinking/decision making abilities, oral/written communication abilities, self-learning abilities, and group interaction/interpersonal abilities.

Student Learning

It was necessary to create a discussant rubric for enrolled students to use to evaluate the discussant leader. Thus, items were created and focused upon the discussion facilitation and conceptual understanding of the article content. To best create the rubric, the faculty facilitator consulted a panel of six external pharmacy academicians with instructional design experience in the doctor of pharmacy curriculum. To content validate the proposed evaluation tool, the panel reviewed the proposed items and open-ended questions. The panel was asked to evaluate each proposed item on a five point scale ranging from a "highly pertinent/valid" item to a "highly invalid item." For item acceptance, a 67% decision rule was instituted, i.e., four experts had to indicate the item was either highly pertinent or valid.[8] Appendix 2 provides the validated discussant evaluation form.

For the Fall Semester, 6 students each lead 2 discussion sessions. Each student was allowed to select 1 article for each session. The original 6 students in the fall semester course were enrolled in the spring semester course. Because another student enrolled in the spring semester offering, each student could conduct only 1 session. This resulted in some alterations to the schedule. Specifically, in the spring semester offering, the course began in the second week to allow the students to get "off on a good footing" in their other coursework. The first session was devoted to recapping what was learned from the fall semester, a later session before spring break was cancelled because of a heavy examination schedule, and the last session was devoted to a course evaluation.

In addition, some discussions from the fall and spring semester resulted in the need for more in-depth answers to posed questions. For the final weeks, three practicing pharmacists, each with expertise in a previous topic, participated. This addressed some student questions and allowed students to demonstrate their comfort in speaking scientifically to a more experienced practitioner. It also brought another level of experience and perspective for students to think about critically.

After each session, fellow students used the rubric to evaluate the lead discussant and these were submitted to the faculty member. The completed rubrics were then provided to the discussant and he/she was required to write a self-reflection on his/her performance based on peer critiques. The students received a one-page guide on writing suggestions created by the faculty facilitator at the beginning of the fall and the spring semester courses. The students' self-reflection essays indicated student learning was taking place. For example, students' work demonstrated their ability to communicate in writing and demonstrate critical thinking.

A limitation in the course design was student learning assessment. Ideally, each of the learning objectives would have been formally assessed. However, due to the low enrollment numbers and inaugural nature of the course, a comprehensive student learning assessment plan was not constructed. Specifically, data from discussant performance was not collected.

Course Evaluation

At the end of the Spring Semester, students were asked to respond to several questions to evaluate the course as a whole (Appendix 3). Reviewing the responses, the students reported the courses were successful in keeping them current on the literature and forced them to do so because they felt an obligation to themselves and to their peers to be prepared for every session. When asked specifically what was gained from the two semester offerings, the following 4 themes emerged: 1) engagement [discussion engages the mind, no matter what the topic], 2) confidence [course helped develop communication skills], 3) exposure [gain a broad view of the literature and where current research is going; observe how different people focus on different topics, e.g. clinical issues, cost considerations; learn about different perspectives from different people], and 4) responsibility [forces one to take

time to read the articles which otherwise one would not dedicate time to read].

The students' written course evaluations indicated the discussions were quite productive, rarely going tangential and never digressing to argument. The students also reported the discussions provided good practice in using technical language and working it into their vernacular, a skill much needed for the Advanced Pharmacy Practice Experiences (APPEs) and future careers. This course also provided more thinking at a higher practice level allowing for discussion of complex ideas, while allowing the opportunity for the students to develop their speaking skills, e.g., eloquence, confidence, clear thoughts. Finally, it demonstrated to students the need to listen carefully to other's opinions, insights, and conclusions.

The students reported that only motivated and committed students should enroll in a course of this nature. Otherwise, an uncommitted student would gain nothing from the discussion and be unable to contribute to its effectiveness. When asked about the ideal class size, the students indicated enrollment should not exceed 12 students. A larger class size would provide less opportunity to participate and/or engage in the discussion. Further, some students may elect not to participate and/or only provide minimal input during the sessions. Recognizing there might be a calling to enroll more students because of interest, an option might be to link 2 students together to facilitate a discussion.

When asked about an optimal time to introduce this elective into the doctor or pharmacy curriculum, the students indicated it would be better after the students had completed the core drug information and statistics course. If it were introduced before this course, the students indicated there would be a need to concentrate on different types of literature, e.g., review *vs.* clinical trials. Further, students would need to be provided a brief overview to literature searches, e.g., conducting PubMed searches, exposing students to drug information resources accessible through the College.

A very important consideration and possibility would be to convert this elective course into a core curriculum requirement. Students agreed if it were a core course, there would be a need for in-class facilitators. Facilitators could be faculty, clinical fellows/residents, or fourth professional year students on APPEs. The clinical residents/fellows could provide the needed "real world" perspective in response to student questions and ideas. The students felt aspects of this course process could potentially be integrated into existing core therapeutics courses, e.g., during recitation/discussion sessions. The selected article would be assigned as a pre-recitation homework. It would convert the standard recitation from a more intimate lecture into a learner-centered opportunity. A strong sentiment from the students was that some students might oppose this learner-center approach as a core requirement. The likelihood would be some students would put forth very little effort and detract/hinder the discussion. Thus, the student recommendation was for this type of course to remain an elective offering until it had been trialed for a longer period of time.

With regard to changing the course format, one suggestion was to have the entire group develop discussion questions after the discussant's questions were provided. It was felt members can incorporate their questions with the discussant's questions and bring them up during dialogue as an addition to the main questions. It would be a good way to help the discussion continue. This, however, occurred naturally throughout the article discussions. Another suggestion was for each student to formulate one question beforehand on the assigned article for discussion instead of the discussant creating five questions initially. This was suggested because the students indicated, as the discussion leader, it is sometimes difficult formulating five questions. However, the difficulty with this suggestion is securing the questions ahead of time from every student and providing them to the other students in a timely manner. Further, overlapping question content might be coupled with an increased workload and time constraint. Another downside might be the discussant's inability to lead the discussion based on others' submitted questions.

Discussion

Although the idea of this course is rooted in the Socratic method, it is relatively novel within the doctor of pharmacy curriculum. The goal of this integrated learning course was to help students transition into being capable practitioners. Specifically, the course was designed to require students to develop conceptual competence, demonstrate integrative competence, recall facts and statistics, think critically, engage peers through communication, develop interpersonal skills, and learn to self-teach. Further, it was designed to allow enrolled students to assume responsibility for their own learning and develop skills through this active learning strategy.

Of note, the concept for this course emanated from a student. Faculty must be open and accepting of students' ideas to improve how student learning is achieved and be willing to sacrifice time to implement the concept. Then, one can determine if the concept is viable.

This student-learner course was distinct from the learner-centered courses developed by Cheang[4] and Harpe and Phipps[5]. Cheang's findings demonstrated those students with a clinical practice orientation or who prepared frequently for classes and scored higher on the Motivated Strategies for Learning Questionnaire benefitted most from the learner-centered strategy. However, the authors assumed enrolled students already embraced the learning-centered approach and had motivation. A sense of heightened attitude and intrinsic motivation were never in question. When comparing outcomes to the Harpe and Phipps drug information course, it was redesigned to create a more learner-centered course through various approaches. This resulted in students valuing their control to determine their final grade and having optional assignments reinforcing class material. This resulted in less pressure to perform well on every examination or assignment. The course described in this paper was an elective course, less stressful, but the students were in control. Students embraced this opportunity to be in control of the learning environment. However, some stress did occur when a student was the discussant leader and had to create discussant questions beforehand. The other students encountered stress, too, as they had to submit their responses to the discussant's questions for each session at the beginning of the session. The feeling of the faculty member was this experience overall was "hard fun" for the students.

When asked the benefit of the course, the response from participants was exposure to content material not covered in course work, the ability to engage in meaningful discussion with peers, and the development of personal confidence to communicate professionally with others in their discipline. Further, the students were challenged to think through their responses "on the fly," defend their rationale, and recognize differences in opinions. All of these outcomes are instruction goals for a dedicated and motivated faculty member who desires his/her students to increase their knowledge and develop their performance-based skills to employ their knowledge.

The benefit of invited guests with expertise germane to previous article discussions resulted in engaging and interactive sessions during the spring semester. Further, it provided the opportunity to allow students to use the skills being nurtured within the course to interact with the expert. For the faculty facilitator, both semesters provided a rich opportunity to get to know the students, their aspirations, and career goals. Ultimately, several students requested letters of recommendation from the faculty facilitator and this was easy to fulfill based on the experience gained in the two courses. Truly, the end result was a "win-win" outcome.

From the faculty perspective as a facilitator, it became clear over the course of the two courses that the students were developing their performance-based abilities, e.g., critical thinking/problem solving, interpersonal communication skills, self-learning abilities. Challenging the enrolled students to teach one another helped encourage this with every session. Students were responsible to one another and to help one another. Given the intimate nature of the sessions, all students participated. In addition, some students provided more input on a consistent basis than others. Initially, one student seemed reluctant to share her point of view and participate in the class discussions. This afforded an opportunity for the facilitator and other students to provide encouragement to participate. This approach worked.

Also, learning occurred as evidenced by the faculty member's observation of students' active participation in class sessions and their peer evaluations and personal reflections based upon leading (a) discussion session(s). The "conceptual understanding of the article content" in the evaluation rubric illustrated the student's ability to integrate and/or relate the article to therapeutic course content. Further, peer evaluations also demonstrated the individual discussant's command of the subject material and his/her ability to clarify the content of the article when necessary. Only occasionally was there an inability to clarify article content.
The limitations of this course included the lack of comprehensive measures of the value of and outcomes of student participation. In future iterations of this work, it would be possible to collect discussant evaluation data to better assess student learning outcomes. Furthermore, it would be helpful to examine other benefits suggested by this initial work, such as enhanced student learning and positive faculty-student relationships. In addition, it may be possible to review test scores within the pharmacotherapeutics courses of enrolled students *versus* non-enrolled students.

Another limitation was the low enrollment number, i.e., six students fall semester, seven students spring semester. Further, the course content was linked to existing core pharmacotherapeutics courses. The content of the course was not linked to another discipline, e.g., pharmacology, medicinal chemistry, biopharmaceutical science, pharmacovigilance/pharmacoeconomics, within the curriculum. It is conceivable this teaching approach could easily be linked to any of these disciplines. Indeed, students demonstrate interest in a variety of different disciplines. This approach taken in a basic science course could inspire some enrolled students to consider postdoctoral graduate studies.

Conclusion and Summary

Given the overarching student satisfaction with the course, the goal would be to incorporate this learner-centered course on a larger level within the curriculum. In addition, a second offering would enable incorporation of a comprehensive plan for measurement of all learning objectives. Statistical inference notwithstanding, this course achieved its intended purpose. Given lower numbers of students in a class, this concept in student self-learning is possible and achievable. However, in colleges/schools with large class enrollments, this approach might need the involvement of several motivated and dedicated faculty to conduct it.

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Appendix 1. Faculty Facilitator Instruction on "How to lead a discussion"

Integrated Group Learning of Pharmacotherapeutics
How to lead a discussion

I. Discussion is appropriate when the intent is to:
A. help the students developing thinking skills on course content and affording them the opportunity to do so.
B. help students to learn from one another and evaluate the logic of and evidence for their own and other's opinion(s).
C. provide opportunities to students to apply principles/content learned in the lecture portion of a course.
D. light the lamp for further learning.
E. help students develop their oral communication skills.
F. provide a forum to gain prompt feedback of student understanding or misunderstanding.

II. If we elaborate our learning by thinking about its relationship to other things we know or by talking about it-explaining, summarizing, or questioning-we are more likely to remember it when we need to use it later.[1]

III. Encountered problems in using discussion to teach
A. Securing student participation.
B. Making progress toward accomplishing the course objectives.
C. Handling confrontation/emotional outbursts of students.
D. Making sure to be supportive and Alisten@ to the participants= opinions, comments, etc.

IV. Starting the discussion - Beginning the session with:
A. a common experience.
B. something controversial.
C. with questions.

V. Facilitating the discussion:
A. by breaking to overall problem of article discussion into sub-problems.
B. by utilizing the Socratic Method.

VI. Barriers to discussion:
A. Student passivity.
B. Failure for students to realize the value of discussion.
C. Fear of criticism or appearing stupid.
D. Not allowing alternative points of view to emerge and/or be considered.
E. Having the impression the task is to provide an answer the discussant wants rather than to explore and evaluate all of the possibilities.

VI. How do we deal with nonparticipants/discussion monopolizer/those who are not prepared? Ideas?

VII. Continuing the discussion? Ideas, e.g., on-line?

VIII. Summary and conclusions

References: 1. McKeachie WJ, Svinicki M. McKeachie's Teaching Tips, 12th edition, 2006, p. 36-56.

Appendix 2: Discussant Evaluation Rubric
Integrated Group Learning of Pharmacotherapeutics

Student Name:

Manuscript Discussed:

Directions: Respond to each of the statements below by checking the appropriate evaluation which most clearly corresponds to your observation. Write specific comments in the space provided on the reverse side of this evaluation.

	Strongly Disagree	Disagree	Agree	Strongly Agree	Not appropriate
Discussion Facilitation					
The discussant:					
1. created effective questions to encourage classmate preparation for the session.					
2. prepared questions helped me develop confidence by preparing me for the discussion.					
3. could be easily heard.					
4. demonstrated vocal variety (e.g., not a monotone).					
5. used an appropriate rate of speech, neither too fast nor too slow.					
6. avoided distracting vocalizations, e.g., "uh's."					
7. made appropriate eye contact with fellow students**.**					
8. appeared comfortable interacting with fellow classmates.					
9. did not read directly from the article and/or his/her prepared notes.					
10. seemed well-prepared to facilitate the discussion.					
11. encouraged me to participate in the discussion.					
12. was able to engage the entire peer group in discussion.					
13. allowed the discussion to proceed uninterrupted when appropriate.					
14. was able to get the discussion "back on track" when needed.					
15. helped me develop confidence by “thinking on my feet” during our session.					
Conceptual Understanding of the Article Content					
The discussant:					
16. selected an appropriate article to complement the "in course" content.					
17. demonstrated command of the subject material.					
18. was able to integrate and/or relate the article to the course content.					
19. used appropriate terminology.					
20. used outside material to embellish the article's concepts when necessary.					
21. was able to clarify the content of the article when necessary.					

Comments/Suggestions:

Signature: _____ Date: _____

Appendix 3. Integrated Group Learning in Pharmacotherapeutics Course Evaluation Questions

1. What class activities and instruction techniques have been most helpful to you in meeting the objectives of the course?
2. What specific format changes can Dr. Popovich implement to make you more completely achieve the learning objectives for this course?
3. When should this course be introduced into the pharmacy curriculum as an elective offering? How could it be implemented for all students?
4. If you had a classmate who was going to enroll in this course, what advice would you provide him/her about this course?
5. Additional comments?