Innovations in Teaching

Mock Proposals and Other Group Assignments: Bridging Didactic Research Evaluation Skills to Research Applications[1]

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An educational strategy was developed to create a means for students to connect skills introduced in a course sequence during the second professional year with the evaluative PharmD project conducted later in the curriculum. Fifty-seven students were divided into ten groups. Using a published article, each group developed a mock project proposal and accompanying human subjects forms following prescribed PharmD Project Guidelines. The student groups also critiqued research designs used in previous PharmD projects using skills applied in the earlier courses. Application of the procedure outlined in the PharmD Project Guidelines to group assignments provided a means of rehearsing the process without the intimidation of working alone. The uncertainty and anxiety typical of task initiation was decreased for this group of students as they began work on their evaluative PharmD projects.

INTRODUCTION

As outlined in the CAPE educational outcomes, in order for pharmacy students to successfully practice pharmaceutical care, they must be able to evaluate their endeavors(1). This need was recognized in our college during the planning stages of our PharmD program and addressed by the requirement that each student complete a formal evaluative project. Since the process can be agonizing for students and faculty, faculty members continually search for ways to better prepare the stu-dents for the process of conducting a PharmD project.

The faculty members who have worked extensively with PharmD students in courses related to research, have discovered that many students have difficulties making the transition from the evaluation of published work to the application of
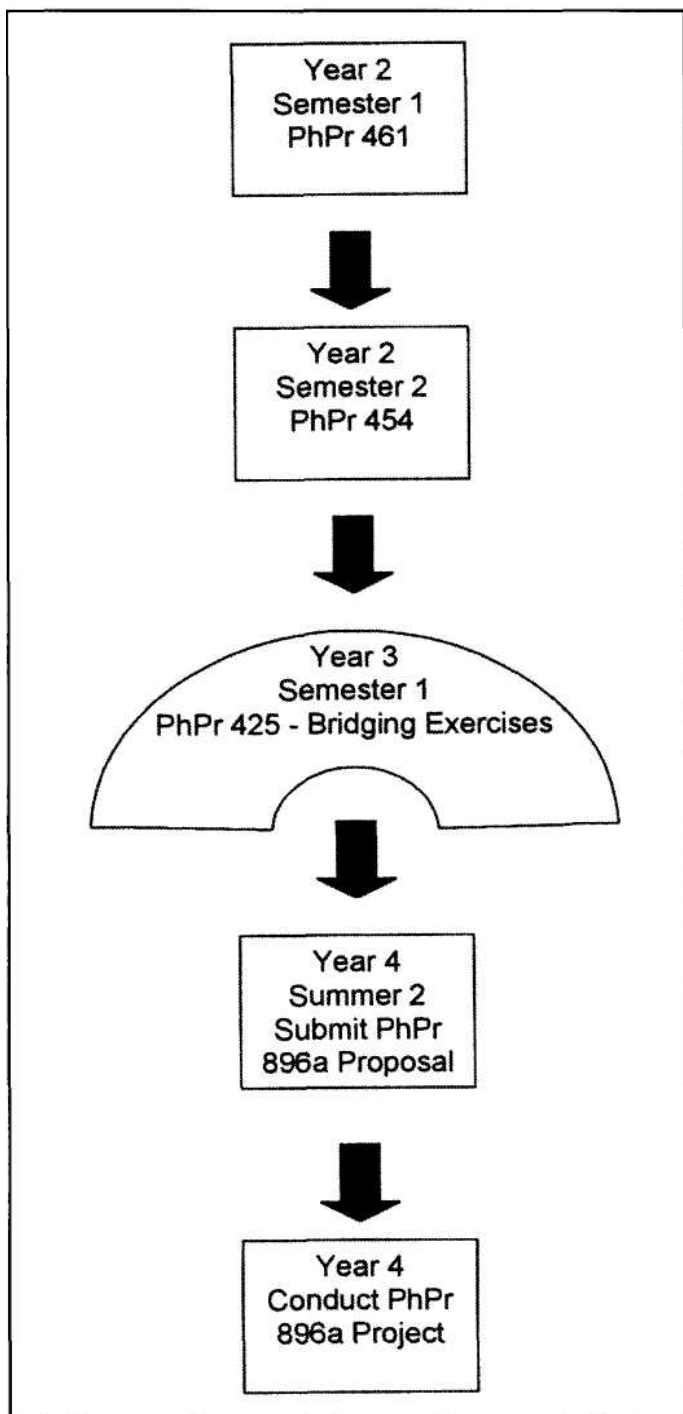
Fig. 1. Relationship of bridging exercises to sequence of courses.

these same principles to their own PharmD projects. Modifications over the years have produced modest improvements. The latest effort is described in this article.

Throughout the article the educational strategy is referred to as "bridging exercises." This phrase was chosen because the exercises bridge or connect skills between courses and years in the curriculum. It is hoped that by providing the "bridges" our students will be less likely to "drown" in their PharmD projects.

BACKGROUND
The educational strategy was implemented in PhPr 425,

Preparation for Pharmacy Clerkship. This course was developed to cover a potpourri of topics prior to the selection of advanced practice rotation sites. The PhPr 425 course coordinator is also the course coordinator for PhPr 896a, Pharmacy Practice Project (also known as the PharmD project). The PharmD project requires students to submit a proposal, conduct an evaluative project, report the findings in a written report, and present the projects to faculty members and students in a formal setting. This process has been previously described[2].

The challenge was to create a means for students to connect (or bridge) skills previously introduced in the curriculum to those subsequently used. The sequence of courses involved in the bridging exercises is diagrammed in Figure 1. The purpose of PhPr 461, Methodology in Pharmacy Research, is to provide the students with the skills and principles of clinical research design and biostatistics needed for evaluation of the medical literature and assessment of research reports and proposals. Draugalis, Carter, and Slack have previously described the course[3]. The following semester, students enroll in PhPr 454, Drug Information and Literature Evaluation. The purpose of this course is to provide the skills needed to prepare patient-specific responses to drug information questions, to conduct effective literature searches, to evaluate various types of literature, and to apply the concepts of medication misadventures, quality assurance, and formulary management.

The students had been previously provided with extensive course materials in PhPr 461 and PhPr 454. Course objectives such as "Discuss ways to formulate a research or evaluation question," and, "List ten steps in planning a project proposal" were added to PhPr 454 in an attempt to push the students to commence thinking about PharmD project ideas as well as provide some reference sources.

In PhPr 454, five subtypes of evaluation approaches were defined and discussed in lecture format. The students then completed a group exercise where five separate abstracts from previously completed PharmD projects were distributed. The group assignment was to categorize the type of evaluation conducted. It was followed by a class discussion regarding the various methods. Eventually, the class was debriefed via dissemination of two handouts which contain all five abstracts labeled as "Needs Assessment," "Program Planning," "Implementation Evaluation," "Progress Evaluation," or "Outcome Evaluation." The students saw five actual projects and also noted the variety of topics ripe for evaluation and study. Upon completion of the evaluation topic, specifics regarding the students' conduct of the evaluative PharmD project were covered. These included: "Identifying a Topic," "Formulation of the Research Questions," "Ten Steps in Planning a Good Project," and "PharmD Project Proposal Format." The final topic was a very brief introduction to the PharmD Project Guidelines.

GOALS AND OBJECTIVES
The goal of the innovation was to provide a bridge between the passive use of research skills needed to review and evaluate articles with the active use of research skills needed to prepare a project proposal.

The objectives of the innovation included:
1. Bridge the skills and principles introduced in PhPr 461 and PhPr 454 (Year 2) to the PharmD project in PhPr 896a (Years 3 and 4). While the focus of both PhPr 461 and PhPr 454 related to evaluation of the literature, the skills

and principles were similar to those required to formulate and conduct the PharmD project. After graduation, these skills and principles are also used for practice and system evaluations in the provision of pharmaceutical care as outlined in the CAPE educational outcomes(1).

2. Review research design topics covered in PhPr 461 and PhPr 454. When students are asked to recall principles throughout the curriculum, actual learning takes place. Applying the information regarding research design to previous PharmD projects not only serves as a review, but also alerts students to the types of designs used successfully by previous students.

3. Apply the steps outlined in the PharmD Project Guidelines to two group assignments - a mock proposal and the associated mock human subjects forms. The development of both documents using the PharmD Project Guidelines provides a rehearsal to the process as a group member. Use of a published article keeps the assignment focused on the process, rather than the creative aspect of PharmD project development. Working in a group provides a means of increasing understanding without the intimidation felt working alone.

4. Stimulate students to begin work on PharmD project prior to their advance experience rotation year. Once the advanced rotations begin, students are overwhelmed with the demands of that learning experience. In addition, students who begin their PharmD projects during the third professional year have better recall of skills and principles studied in PhPr 461 and PhPr 454.

DESCRIPTION OF THE INNOVATION

Content. The bridging exercises were part of the course PhPr 425, Preparation for Pharmacy Clerkship. The exercises consisted of four steps:

- An in-class walk through of the PharmD Project Guidelines
- A group assignment in which a mock project proposal was created following the PharmD Project Guidelines and using material from a published article
- A group assignment in which mock human subjects forms were completed using material from a published article
- A group assignment critiquing research designs used in previous PharmD projects

Student Audience/Level of Student. The students were at the intermediate level having completed PhPr 461, Methodology in Pharmacy Research and PhPr 454, Drug Information and Drug Literature Evaluation.

Point in the Curriculum Where Used. PhPr 425, Preparation for Pharmacy Clerkship is offered in the fall semester of the third professional year of four years in an entry-level PharmD program.

Process. Using the bridging concept a four-step approach was developed for use in PhPr 425. The sequence of events contained in Steps 1 - 4 is graphically presented in Figure 2.

Step 1 - PharmD Project Guidelines

- The PharmD Project Guidelines were revised to incorporate references to course materials used in PhPr 461. These materials included an extensive set of course notes (360
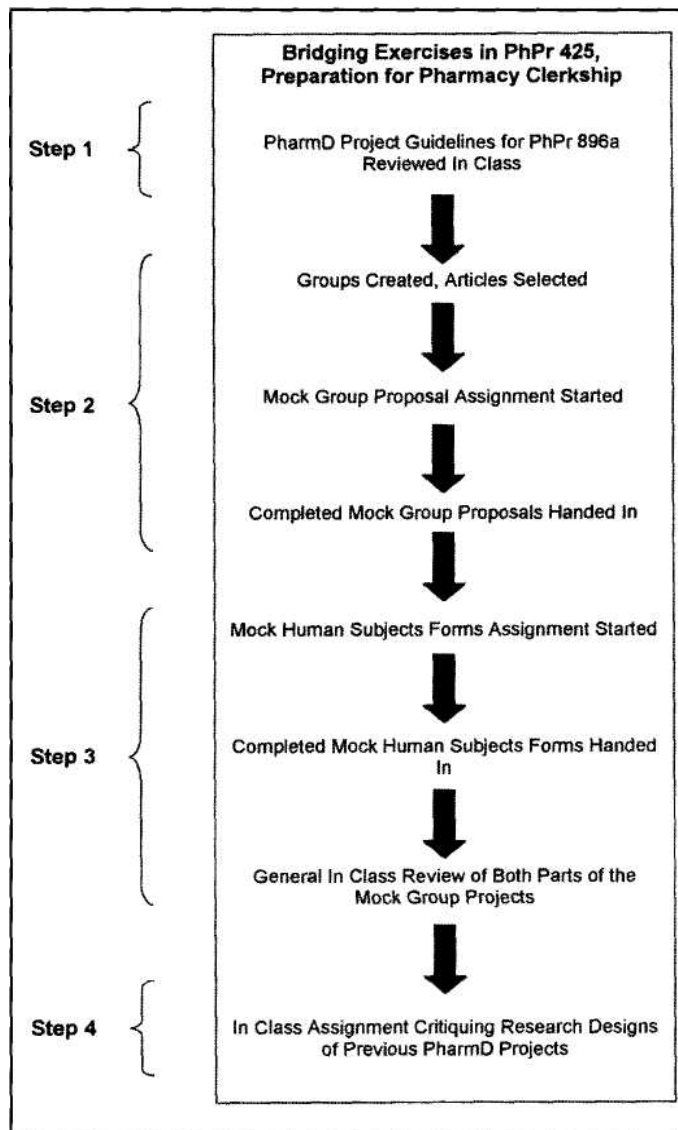

Fig. 2. Flow diagram of bridging exercises.

pages) and a required textbook.
- The copies of the PharmD Project Guidelines were distributed in PhPr 425. An hour of class time was used to go through the PharmD Project Guidelines and explain the process in detail.

Step 2 - Mock Proposal Group Assignment

A selection of articles similar to topics used for past PharmD projects was assembled. More articles than needed were selected to provide options to the student groups.
- Students were asked to break into groups of six members. The groups were given information on grading and suggestions for carrying out the assignment. Each group was required to choose a different article. Students began the mock proposal assignment during class time allowing the instructor an opportunity to provide guidance in the early stages. Mock proposals were due three weeks later.

Step 3 - Mock Human Subjects Forms Group Assignment
- Upon turning in the mock proposal assignment, student groups began completing the mock human subjects forms using the same article as used for the proposal. Class time

was used to start the assignment. A computer disk with the appropriate human subjects forms was provided to each group. The mock human subjects forms were due four weeks later.

Step 4 - Research Design Critiques

• A session on "Research Designs Used in Senior Investigative Projects" was scheduled toward the end of the semester. The session began by reminding students that the previous spring in the PhPr 454 course, they discussed five types of evaluation methods and compared and contrasted examples of five PharmD projects exemplifying the methods. A packet of 30 abstracts (based on projects conducted by graduates in the Classes of 1993-1999) was provided to all students. The abstracts were picked to demonstrate a wide variety of projects - some were quite stellar, others pretty typical, there were no horror stories portrayed. Working in the same groups as in Steps 2 and 3, each group was asked to consider three abstracts. The group work consisted of comparing and contrasting the designs, data collection and analytic approaches, and other relevant points. Each group then reported their findings to the entire class. Other interesting side notes were addressed such as pointing out that one student in the Class of 1993 was later the project advisor for a student in the Class of 1996, relating why a student selected a particular topic, and the stumbling blocks that some students faced.

EVIDENCE OF STUDENT LEARNING

During the mock proposal assignment, students asked many questions related to procedures outlined in the PharmD Project Guidelines. They also became aware of the example timeline and budget contained in the guidelines. All groups inappropriately completed parts of both the mock proposal and human subject forms. Errors made in this setting were turned into learning opportunities when discussed in class. Mistakes made in this environment prove less costly than if made later during the conduct of actual PharmD projects.

The primary evidence of student learning was the completion of the group assignments. In addition, as the students prepared the PharmD project proposals they asked questions regarding the procedure. Often times, they answered their own questions with, "Oh, like we did in the group projects during class."

Anecdotal information from faculty indicated learning as well. Students who had been through the bridging exercises appeared to have an improved grasp of how to approach the process of developing a PharmD project proposal.

EVALUATIVE DATA

At the conclusion of the fall semester, students completed both course and instructor evaluations. The course coordinator received high ratings for effectiveness of teaching, presentation of materials in a way that facilitated learning, communication of expectations, and use of examples and relevant application in explaining concepts and ideas. On the course evaluation form, students favorably rated the usefulness of handouts and assignments, and felt the course to be well organized. All these items were rated 4.3 or higher on a 5 point response scale.

This was the third time PhPr 425 was taught. The initial offering did not include any assignments related to the PharmD project. The course does cover a variety of other topics and one other major assignment (*i.e.*, professional portfolio develop-

ment). The group projects accounted for 100 points of the 200 points available from assignments in the course.

Students were asked to provide comments on the participation grading sheets used for the mock proposal and mock human subjects form assignments. Most remarks related to high level of involvement of all group members. One student, who had started work on his PharmD project proposal offered the following observation.

"Good way to introduce proposals. Most papers we have written are retrospective so not much experience with proposals."

Student evaluations and comments are an example of activities we use as a means of formative evaluation for our courses. Involvement in the PharmD projects as course coordinator and project advisor also facilitates the monitoring of educational outcomes across the curriculum in a summative fashion. The College has adapted the CAPE educational outcomes as our program outcomes.

PERSONAL REFLECTIONS

Both authors hold certain beliefs regarding teaching and learning. Many are addressed by the "Seven Deadly Assumptions"(4).

• *Students will apply the content on their own after class.*
While for some topics this may be true, it is unlikely that pharmacy students will look for opportunities to apply research evaluation skills on their own. Students have been heard categorizing courses into important (*e.g.*, pharmacology and therapeutics) and not important to a real world pharmacist (*e.g.*, research design and health care delivery systems). Students must understand the relevance to future practice. It is our job to use learning activities to tie these topics to actual practice and pharmaceutical care. Otherwise students will choose to label the information as "unimportant" and immediately hit the mental delete button. By applying the content information in several different settings across the curriculum, students are forced to revisit the topics and make an association with the benefits of learning the material to their later needs. This association is reinforced by the use of experiential preceptors as PharmD project advisors. Many of these preceptors are former students with real evaluation needs at their pharmacy practice sites.

• *Students don't need instruction or tasks to be structured.*
We have found students to crave structure in both didactic and experiential assignments. It is difficult to focus on learning if constantly guessing what the instructor is expecting. This is particularly important when first exposed to a topic area or working with a particular instructor. The bridging exercises were developed to clarify the PharmD proposal process in a controlled setting.

• *Students learn best by hearing the expert version first.*
Not all students engage in the learning process easily. If they have attempted an activity, then hear the "expert version," the activity whether failed or successful provides a point of reference. More questions are generated. If listening to the expert first, the experience is passive. A related issue is the level of information provided in the expert version. Some instructors fail to differentiate between general and esoteric information leading to confusion on the part of the student.

• *Students can integrate new information by just listening well.*

Some students can integrate new information by listening. However, research has shown that active learning increases retention of the information(5). The ability to integrate also benefits from the hands on approach. This is one reason why pharmacy education contains the experiential component. Also, learning styles vary. Information, when disseminated verbally, may benefit the auditory learners, but not the visual, tactual, or kinesthetic learners. By attempting to assemble the mock proposal and mock human subjects forms, the students were actively applying the new information.

- *Students should do their own work during class time.*
  Group work stimulates the learning process. Not only does the group generate more ideas, more ground can be covered by sharing the work. The idea behind the bridging exercises was not to increase the burden on students or instructors but for the students to help each other with instructor support readily available.

- *Students don't need much guidance from the instructor.*
  Guidance is very important particularly at the early stages of a new activity. If the student has a slightly different interpretation of the instructions the instructor can provide clarification. The assignments included in the bridging exercises all included class time to allow for guidance from the instructors.

- *Students overcome complexity gaps between class work and tests.*
  Students are traumatized by complexity gaps between class work and tests. It tends to cause the student to revert to the system of memorize and regurgitate. In the current example, the students were to bridge the complexity gaps between previous coursework and their PharmD project proposals. While some students may not require a bridge to make the connection, others become overwhelmed with both the content and process.

Both instructors apply the concepts of continuous quality improvement to their courses and the PharmD project process. Not only are evaluation rating items tracked over the years, but dialog is maintained across courses with appropriate adjustments made each year. As a result of continuous quality improvement the bridging exercises were developed to improve process problems seen in previous PharmD projects.

WHAT MADE THE STRATEGY INNOVATIVE

While the use of group exercises is not innovative, the use of a published article to develop a mock proposal and the accompanying human subjects forms is uncommon and we believe innovative. It is also uncommon in our College to have course coordinators collaborate across courses that are not a sequence. In this situation, we not only provide feedback to one another, we also explore ideas for improvements. In addition, course materials are shared to enable consistency and reaffirmation of principles. The bridging process and faculty cooperation could be applied to any set of courses with related topics.

WHY THE INNOVATION WAS IMPLEMENTED

Both instructors have been intimately involved with the PharmD project process for many years. Although the extensive PhPr 461 course notes provided excellent background material for the PharmD projects, many students neglected to refer back to the notes once beyond that course. Students also had difficulties understanding the expectation of the PharmD

project even after receiving the project guidelines. The PharmD Project Guidelines had been written to direct our students through the process of developing a proposal and reporting the results. Since all students receive the PhPr 461 course notes, information need not be repeated in the PharmD Project Guidelines.

The PharmD project is viewed by a majority of students as a huge and unpleasant task. This leads some students to put off the initial steps of their PharmD project proposal in hopes the requirement will disappear. Further complicating the issue is that fact that the project advisors range from very skilled researchers to practitioners with very basic research skills. These individuals cannot be relied upon to provide the same degree of guidance leading to a lack of consistency in student mentoring.

The bridging exercises were implemented to serve as an intermediate step to assist students in overcoming the complexity gap between the course sequence related to research evaluation (PhPr 461 and PhPr 454) and the PharmD project (PhPr 896a). The steps of the bridging exercises allowed students to revisit skills, topics, and materials introduced the previous year of the curriculum. It also provided a means to learn the process of developing a proposal and accompanying human subjects forms without complicating the effort with the creative aspects of the PharmD project.

If we are preparing students to practice pharmaceutical care, it is important for them to evaluate their practice sites and methods in a systematic fashion. In our curriculum these abilities are stimulated in our graduates by the requirement of the evaluative PharmD project. The skills applied in the bridging exercises are intended to better prepare our students for a meaningful experience when conducting their projects.

CONCLUSIONS

The bridging exercises were successful in forcing students to think about the PharmD Project Guidelines and ask questions regarding the process. The exercises also forced a review of research design methods while providing examples of previous PharmD projects. The major flaw in the exercises was that students were not required to review the sections of the mock proposal and human subjects forms completed by other group members; that is, they were only familiar with the section they worked on with their partner.

General comments were provided in class regarding problems seen with the mock proposals and the associated human subjects forms. Written comments were provided to each group member at the end of the semester and copies were available from all groups for individuals to review as needed. Since students were not required to review the comments as a part of the course, there may be a substantial lag in time between the assignments and the students' self-assessment of this portion of the bridging exercises. In the future, groups will be required to present their mock proposals and human subjects forms to the rest of the class.

A benefit of the bridging exercises was the stimulation of early work on the PharmD projects. Six students or ten percent of the class submitted their proposals by the first week of May. An additional eleven students were in the initial steps of their proposals by the mid point of the spring semester. The project proposal due date is July 1. These numbers account for 30 percent of the Class of 2001.

Rather than teach in isolation and expect students to automatically connect all the pieces, we have made the effort to tie

learning activities together in a meaningful way using the bridging exercises. We will continue to collaborate in our work towards curricular improvement and encourage others to do so as well. To move the profession forward, we must teach our future practitioners to work towards improvement and change. What better way than to do so by setting an example in the classroom.

References

(1) American Association of College of Pharmacy, "CAPE educational outcomes," Alexandria VA (1998).

(2) Murphy, J.E., "Faculty attitudes toward required evaluative projects for Doctor of Pharmacy candidates," *Am. J. Pharm. Educ.*, **61,** 73-78(1997).

(3) Draugalis, J.R., Carter, J.T. and Slack, M.K., "Survey course on research methods: Integrating statistical analysis and study design," *ibid.*, **62**, 17-23(1998).

(4) Johnston, S., "Supporting student success in the classroom," *Cooperative Learning and College Teaching*, **8**(3), 11-14(1998).

(5) Bonwell, C.C. and Eison, J.A., *Active learning: Creating Excitement in the Classroom.* ASHE-ERIC Higher Education Report No. 1 The George Washington University, School of Education and Human Development, Washington DC

(1991).