Learning to “Think Like a Pharmacist”: Problem-Solving Activities for First-Year Pharmacy Students

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PROLOGUE
The purpose of this article is to describe an approach to incorporate a modified problem-based learning (PBL) format into a first professional year curriculum. For each case, groups of eight students meet with a faculty member and a community practitioner in two sessions to work through well-defined pharmacy problems using a method adapted from classical PBL. Cases are written from the perspective of a pharmacist practicing pharmaceutical care in a community pharmacy setting. A case writer designs scenarios to integrate content from across the curriculum and builds in dilemmas to encourage students to consider new roles in pharmacy. Early feedback from practitioners working with students who have participated in the first year is positive. In this article, the authors describe the instructional method, effective case writing for first year students and their experience in assessing and improving the activities.

INTRODUCTION
In 1992-93 when designing a new entry-level Doctor of Pharmacy program, the University of Kentucky College of Pharmacy curriculum task force considered a number of educational innovations in higher and health professions education, most notably problem-based learning (PBL). Additionally, the faculty conducted a series of interviews, focus groups and assessments with students, practitioners, and faculty members to understand their perspectives on the prior, traditional curriculum and their vision for the future of pharmacy practice. The purpose of this extensive data gathering was to make recommendations for building upon the strengths of the former program while addressing perceived needs.

A common recurring issue that surfaced during this time was that students viewed the first year of pharmacy school as a continuation of their pre-pharmacy curriculum. That is, students believed the first year of the program focused extensively on basic science and suggested that more practice and drug-based content be included in that year. As a result, fundamental changes in the new program include: (i) introducing pharmacy practice, the pharmaceutical care philosophy, and Pharmaceuticals from the very beginning of the program; (ii) developing group-based problem-solving activities in a modified-PBL format; and (iii) integrating basic science information with practice skills and clinical knowledge. Practice-based problem-solving group activities are a component of a comprehensive, highly adaptable six-semester course sequence entitled “Contemporary Aspects of Pharmacy Practice” (CAPP) that is taught across professional years one, two and three (PY1, 2, 3) of the entry-level Doctor of Pharmacy curriculum. The curricular design intentionally provides maximum support, or a “scaffold” of facilitated group activities, at the beginning of the program that is lifted over time by PY3 to move students from dependent to independent learners. These activities in PY1 modify the classical PBL approach.

CLASSICAL PROBLEM-BASED LEARNING
In classical PBL as originally implemented in medical schools, students are presented with ill-structured, multi-staged, professional situations and problems to solve(1). The format can include paper cases, computer patient-management problems, live patients, or standardized patients. In a PBL curriculum, these situations are designed to address carefully selected learning outcomes to guide students through their development in a program. Students use the cases to “discover” what they need to know and research to find information to address the situation and/or solve the problem. Classical PBL is typically conducted in small groups of six to eight learners and one faculty member. The group meets formally to address the case using a problem-solving structure, and the learners determine the schedule for working on the problem. Because formulating questions and researching information is an important component of the process, students spend considerable time outside of the formal class working on the problem. Therefore, the design of the curriculum must be structured to allow blocks of time for students to research and assimilate information. Faculty members serve in the roles of tutor, resource, mentor and advisor to facilitate the learning process by keeping discussion on track, providing information, reinforcing group decisions, and stimulating new thinking. To be effective educators, faculty members need to modify their approach to teaching and to move from the role of expert providing information to facilitator guiding learning.

At the beginning of a PBL session, students are given case learning objectives to provide structure for their group discussion and research. Faculty members then guide students in analyzing the problem, developing hypotheses, gen-

1This article is based on a portfolio submitted to the AACP Council of Faculties and presented during the Innovations in Teaching Awards Special Session, 99th AACP Annual Meeting, July 21, 1998, Snowmass Village, Colorado.

2Each author contributed equally to this article.
erating learning issues, constructing research strategies, and applying information as solutions to the case. After the group completes one portion of the case, the tutor provides another stage of the problem and guides the group in applying the problem-solving process again. At the end of the entire case, students engage in self, peer and case assessment.

A well-executed PBL curriculum requires that health professions education schools devote considerable resources in faculty time and effort to design and facilitate cases. Cases must be planned well and written to achieve desired learning outcomes. Additionally, a PBL curriculum requires an investment to support logistics of photocopying cases and scheduling an adequate number of rooms and facilitators to run PBL sessions.

CURRICULUM DESIGN AND PHILOSOPHY

Two 1993 articles focusing on PBL influenced the University of Kentucky final curriculum plan(2,3). These authors recommended, based upon the research data at that time, that medical school programs take a conservative approach to curriculum design by integrating traditional educational approaches with PBL. As a result, the UK pharmacy faculty designed a curriculum that gradually introduces problem-solving activities into the program.

While classical PBL uses complex cases early in a curriculum, in the modified-PBL design the faculty members write cases that intentionally increase the difficulty throughout the program. Students work with well-defined problems (cases with one or few solutions) in PY1; moderately well-defined problems (cases with two or few solutions) in PY2 and ill-defined/complex problems in PY3(4). Problem-solving, case activities take place, especially in the beginning of the program, primarily in the CAPP course. Additionally, PY1 cases are written to help students utilize the content they are learning in the curriculum while PY3 cases introduce more ambiguous situations that require independent learning. In the first year in addition to traditional basic science courses such as medicinal chemistry, biochemistry and pharmacognosy, students begin the study of drug therapy such as antibiotics and non-prescription Pharmaceuticals from the first day of their pharmacy program.

During the first year of the CAPP course, the students learn the social science aspects of practice including pharmacy law, ethics, economics, behavioral science, pharmacist-patient communications, and an introduction to the health care system. The faculty members believe strongly that the classical PBL approach to patient cases during the first year would not work in the new curriculum. The basic assumption in this year is that students “cannot apply what they don’t know”—at this level, they know neither the content knowledge nor the framework used by pharmacists to solve patient problems. Therefore, case writers use PY1 course content and a modified version of the Barrows PBL approach in PY1 CAPP cases to facilitate student learning. The intent is to make course content “come alive” by using a pharmacy-specific framework to help students understand and remember essential content. Finally, CAPP problem-solving activities seek to instill in the PY1 students the values of pharmaceutical care as the new practice paradigm, and gradually socialize them into becoming professionals who practice accordingly. In summary, PY1 students begin to “think and act like pharmacists”.

DESCRIPTION OF PROBLEM-SOLVING ACTIVITIES IN PY1

Goals

The goals for students in PY1 problem-solving activities are to: (i) develop the knowledge, skills and attitudes of a pharmacist-in-training appropriate to practicing at the level of an advanced professional intern; (ii) apply a problem-solving process to well-defined patient problems; (iii) accept the pharmaceutical care model as the pharmacy practice paradigm; (iv) adopt professional attitudes and behaviors; (v) use information learned from a variety of individual classes to solve patient problems in a small group setting; (vi) work in a group setting with other students to prioritize tasks and cooperate in achieving the goal of solving a specific patient problem; and (vii) select and appropriately utilize a variety of textbooks and common pharmacy reference books to solve patient problems.

Cases

During PY1, students work on four patient cases set in an ambulatory pharmacy. The cases consist of well-defined problems integrating the content from CAPP lecture, laboratory and other courses taught concurrently or during the prior semester. Case writers structure problems to assist students to become familiar with the pharmaceutical care philosophy and model developed by the faculty based upon the literature and discussions. The cases guide students through the thought processes and actions used by pharmacists in contemporary practice. The cases written for the 1997-1998 academic year were:

1. Pediatric Otitis Media. The mother of a small child with otitis media presents a community pharmacist with an antibiotic prescription. The family has recently moved to town, and Medicaid data has not transferred from out-of-state. This case integrates topics from several first-year classes: antibiotics, suspensions, use of non-prescription analgesics and antipyretics, prescription reading, patient profile utilization, principles of behavioral science, pharmacoeconomics and basic communication skills.

2. Urinary Tract Infection. A community pharmacist receives a prescription from a friend’s daughter, teen-aged female with an uncomplicated urinary tract infection who has recently become sexually active. This case integrates material concurrently presented in other classes: renal physiology, antibiotics, non-prescription analgesics, pharmacy ethics of dealing with minors, patient confidentiality issues, prescriptions and profiles, behavioral science and communication skills.

3. Substance Abuse. Pharmacists are confronted with the dilemma of a female pharmacist with a substance abuse problem who accelerates illegal use of pain medication and forges prescriptions. This case integrates material on the central nervous system physiology, controlled substance pharmacy law, ethics, substance abuse issues, behavioral science, and communication skills.

4. Thyroid Replacement Therapy. A middle-aged male experiences multiple problems with stabilizing his disease and therapy over a period of a few months. This case integrates endocrine physiology, non-prescription laxatives, bioequivalence in pharmaceutics, prescrip-
tions and profiles, communication skills and generic substitution and therapeutic interchange pharmacy law.

Process

Two facilitators, an on-campus faculty member and a community volunteer practitioner lead a group of eight students in working through one case in two two-hour sessions. These sessions provide students with the opportunity to solve problems using their knowledge learned in CAPP large group sessions and other courses in the PY1 curriculum. The facilitators provide the students with the case materials, prescriptions and sample patient profiles in stages. Students bring to the session reference materials including textbooks from relevant courses in the professional curriculum, typical pharmacy references such as USP-DI and Facts and Comparisons and selected articles from the primary literature to assist them in the problem-solving process. Facilitators are trained to lead the students through the case using open-ended questioning that aids them in learning which questions to ask to elicit necessary information to resolve the patient problem. The steps in the problem-solving process used in PY1 cases (Figure 1) are adapted from the Barrows approach. These steps are:

1. **Observe the Situation and Interact with the Problem.** Students list the facts, or objective data and information supplied in the case materials without making any judgments. Facilitators help students to refrain from making premature judgments and inferences or jumping to conclusions. Next, the group brainstorms the subjective issues or gut impressions based upon the facts and their evolving pharmacy knowledge.

2. **Frame the Problem and Generate Hypotheses.** Students are guided to generate hypotheses, or statements of the possible causes for the issues, presented in the case. A student writes on the white board a list of all generated possibilities, and then the group prioritizes the list by ranking the most likely hypotheses to least likely hypotheses.

3. **Brainstorm and Prioritize a List of Learning Issues.** Based on the analysis of the generated hypotheses, students determine that more information is required in order to solve the problem. These areas, called “learning issues”, guide the research students will perform as part of the problem-solving process. Facilitators assist students in formatting learning issues as questions. Examples of learning issues are: “What is the likelihood of developing amenorrhea as a result of physical activity?” “What are the legal responsibilities of a pharmacist in reporting drug diversion?” or “What are the types of laxatives appropriate for this patient? Why?” Students prioritize learning issues according to the likelihood that the information generated during group research will solve the specific problem. This activity helps students focus their efforts on locating specific information relevant to the case.

4. **Identify Resources to Support Information Gathering.** Based upon the prioritized learning issues, the students identify sources of information to address the case. Possible information sources are communication with the patient and family members, discussions with other health professionals, patient records, observation, and research in the literature. If the appropriate resources are available during the session, such as interviewing the patient or using available reference books or Internet resources, the students gather information immediately. If the patient is the best source of information, the case writers build in opportunities for role-playing counseling sessions to simulate actual pharmacy practice. If resources must be located outside the session, group members research the learning issue for the next class session.

5. **Generate Solution Alternatives/Apply Information.** The group discusses how the researched information changes the view of the case. The most likely hypotheses are addressed in light of the new information, and the students determine whether more information is needed to understand and solve the problem. The hypotheses are narrowed to a short list of probable solutions. The group selects the most likely solution and discusses the rationale for this choice. If available, new case material is presented to the group to refresh the problem, and the process is repeated.

6. **Case, Group, and Self Assessment.** The students rate the case, their own performance, the group and the facilitator. The facilitator uses an individual assessment form to provide feedback to each student on his/her performance and group contribution. The feedback provides both the students and facilitators the opportunity for growth and development in their respective tasks.

After case assessment, each student receives a copy of the case objectives at the end of the final, second case meeting. These objectives are a contract of what students should know and be able to do as a result of participating in the case discussions. Receiving the objectives after the case is a departure from the format of classical PBL. The faculty members believe that because these cases draw primarily upon content learned in the curriculum, students do not need the type of structured guidance used in classical PBL.

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1Barrows, H.S. and Myers, A.C., *Problem-Based Learning in Secondary Schools*, Unpublished monograph. Problem-Based Learning Institute, Lanphier High School and Southern Illinois University Medical School, Springfield IL (1993).
As the faculty members often explain to students, patients do not come into the pharmacy with learning objectives “on their foreheads.” In addition, having the learning objectives up front restricts the group discussion and robs the case of its impact, thus limiting the students’ learning potential.

Students then meet in a large group setting for a case wrap-up. The course coordinator gathers input from the facilitators prior to the wrap-up in order to determine if unresolved issues need to be discussed and whether the students may have encountered difficulty with background information. Faculty members teaching other PY1 classes that provide the underlying principles for the case can be invited for the purpose of reviewing essential information or answering questions. For example, following the thyroid case in the spring 1998 semester, the PY1 physiology faculty member who also teaches thyroid therapeutics during the PY2 semester came to the wrap-up to discuss some aspects of the basis of hypothyroidism and hyperthyroidism and how to establish a dose for replacement therapy. The law faculty member came to the wrap-up to discuss generic substitution and therapeutic interchange regarding levothyroxine preparations.

During the group sessions, the students are expected to simulate professional behaviors, including dressing professionally. The facilitators, especially the community practitioners, serve as role models for students in developing professional behaviors and attitudes for practice. They are instrumental in validating the importance of the emerging contemporary philosophy of pharmacy practice. The facilitators encourage students to take the lead in a variety of ways including reading aloud, using the blackboard, asking questions and using reference materials. The facilitators also assign unanswered questions to individual students as learning issues to be researched and answered for subsequent meetings. Students engage in role-playing to learn how to take medication histories and to counsel patients. Other activities have included tasting a wide range of pediatric antibiotic suspensions to determine the range of palatability and measuring liquid suspensions using a variety of household and dosing devices to determine accuracy of typical measurement devices.

**Facilitator Responsibilities and Preparation.** Faculty members designing PY1 CAPP recognized in the planning stages for these exercises that facilitator training and case preparation, while essential to the success of the process, must be time-efficient. Therefore, the Office of Curriculum and Faculty Development staff members design the cases to allow the facilitators to participate with a minimum of preparation. They work with the course director prior to the academic year to assist facilitators in learning the problem-solving process. Prior to each case, the course director holds a 60-90 minute pre-case meeting during which each facilitator receives a detailed facilitator guide for the upcoming case. The facilitator case notebook contains case material divided into three columns on the page. Column One contains the same information the students will receive. Column Two lists objectives for that section of the case. Column Three lists suggested questions to guide the student discussion. The case material also contains a set of readings to help facilitators prepare for the case discussions. A portion of the first PY1 case facilitator guide is presented in the Appendix.

The pre-case meeting allows facilitators to review the relevant case material and provides consistency between groups for the case discussions. Facilitators are reminded to openly discuss during case sessions the “ideal” view of pharmacy practice taught in the curriculum and to expect the discrepancy that may exist between this ideal and the practice viewed by students who work as pharmacy interns outside of the professional curriculum. The pre-case meeting is an essential step in the process since facilitators represent a variety of pharmacy backgrounds, experience and content expertise. Additionally, some facilitators require maximum support, particularly in the first semester of participation, to feel comfortable with the process.

**WRITING EFFECTIVE CASES**

Part of the success of the problem-solving activities in PY1 CAPP has been the emphasis placed on developing cases that use realistic situations in which pharmacists can make pharmaceutical care interventions. Often in PBL, one finds the problem written in facts-only style. In other words, the problem is written in a “medical grand rounds” format consisting of a simple statement of a complaint to provide the springboard for student investigation into the content material of the case.

As the goals of PY1 CAPP include having students investigate moral, ethical and social issues, the faculty have devoted considerable resources to writing cases that engage students beyond the intellectual level. That is, students must envision empathy and care about the people in the cases in order to confront their dilemmas with them. Some research has shown that such “storytelling” can be an effective way to model appropriate professional attitudes and behaviors. Therefore, the PY1 cases go to great length to present a patient that will take shape and emerge from the page as a real person. The faculty members and students refer to the cases by the name of the patient, not by the syndrome. The case writers feel especially gratified when students indicate that they can relate to these patients when they make such comments as “This is my uncle,” or a facilitator says “I had this patient last week,” or, as in the case of one of our facilitators, “This is me.” In another instance, one student wrote in a journal she was keeping for a behavior modification project that lack of caffeine was making her feel shaky and irritable “like Pat Berger,” a patient in a PY1 case.

**Select Scenario According to Objectives.** To write a case to promote the intended student learning, case writers must always keep in mind the target or purpose of the case. The well-designed course has certain objectives, and the cases are means to fulfilling those objectives. A case is not an end in itself. Therefore, the case scenario must be written to enable the students to access all the objectives through the case narrative whether “it really happened that way” or not. Case writers often debate the merits of using a “real” case or a “made-up” case—did this really happen or is it just a story written for the students’ benefit? The important point to keep in mind when choosing a case scenario is that the activities of the case must match the objectives of the course and target the appropriate level of students.

Planning for the PY1 cases begins when the course director chooses a topic area by surveying activities taking place in the rest of the PY1 curriculum. She reviews the drug topics which the students have studied (antibiotics and OTCs in the first semester, endocrine therapy and con-
trolled substances in the second) and begins to design the cases, keeping in mind the auricular level of problems for students to face. Thus, to return to the debate posed at the beginning of this paragraph, real case or created case, it is important to note that all cases, when targeted to the “well-defined problems” of PY1 students, must be contrived at some point. Even a “real” case must be adapted when dealing with beginning pharmacy students who have had little experience in “thinking like a pharmacist.”

Specify Objectives. The facilitator guides include the specific objectives for each page, or stage, of the case. Even though the facilitator has a copy of the objectives on one sheet, the course director provides the specific objectives for each page only to the facilitator. Linking the objectives to the case material that addresses them helps the facilitators keep the group on track and provides a semblance of consistency between groups.

Construct Suggested Questions. The suggested questions in a case not only address the objectives but also take the facilitator through the problem-solving process described earlier in this article. Students begin by noting the actual facts of the patient’s case then defining inferences that arise from the case. For example, the case may state “A young girl who appears to be about 16 years old approaches the counter.” The students must identify that the girl appears young, but that we really do not know her actual age.

Open-ended questions comprise the majority of the suggested questions in the guide. Part of a facilitator’s responsibility is to promote discussion, and having open-ended questions written out helps the facilitator as he or she attempts to engage students in a discussion. It is important to note that not all closed-ended questions are answered by a “yes” or a “no.” Closed-end questions can elicit a specific answer and seek a definition. In certain instances, when the case can be used to reinforce student learning facts and definitions, the use of closed-ended questions may be entirely appropriate.

Gather Facilitator Materials. As described earlier, the case writers attempt to make these cases easily accessible to faculty. Therefore, case writers must research and gather materials that the facilitators, regardless of their background, can use to become familiar with the syndrome and patient situation.

Student Performance Assessment

Assessment in PY1 CAPP cases is formative; facilitators provide students with a written assessment of their performance after each case. Facilitators rate the students on their contributions in problem-solving discussions and provide feedback on their group participation. Additionally, facilitators suggest improvements for future sessions. Student knowledge of relevant material from each case is assessed by examination throughout the semester using a variety of testing formats including multiple choice examinations, short answer and essay-style questions. The final examination is a case similar to the two cases discussed during the semester. The purpose of the examination is to measure each individual student’s ability to apply relevant facts and available references to solve a problem of similar complexity to those solved in the group setting during the semester.

Evidence of Student Learning

The PY1 CAPP course has been offered for three years. Measures of student learning at this point are informal and consist of comments from CAPP small group facilitators and practitioners who currently employ the PY1 students. These practitioners also employed students from the prior curriculum and can, therefore, make a subjective judgment of the problem-solving skills of both types of students. Examples of quotes from practitioners who have reported a significant
change in the capabilities of PY1 professional students when
compared to students in the previous curriculum are:

“First year students have become more proactive in
dealing with patients. They are better prepared
than in the past and are less influenced by pharma-
cists who choose to practice in the old model. They
provide information that patients can use and are
influencing the practice of pharmacists who super-
vice them.” — Manager of Pharmacy Operations,
regional chain corporate office, Louisville KY.

“If our student here is any indication of the curricu-
lum, it's working quite well. The curriculum gets
down to the nitty-gritty of what pharmacy is all
about. Other students we've had in the past seemed
to dally around in what they learned in the first
year. They might be a little better after the first year,
but not too much. There was an immediate
response with our current student even just after
the first semester. I've noticed a big difference in
our student's knowledge base from when he began
here in the end of the summer to Christmas break.
He knew a great deal about antibiotics, and
expressed a purpose and interest in what he was
doing rather than just mechanically putting pills in
a bottle.” — Independent pharmacist, Georgetown
KY.

“Our students seem to be very attentive to counsel-
ing. The old curriculum taught dispensing skills, but
counseling patients is the way the world is going
now. — Independent pharmacist, Dry Ridge KY.

“As an employer, I find the first professional year
students in the new curriculum to be more produc-
tive than first year students in the past. They have a
good idea of what happens in the pharmacy and can
perform at a higher level. They are more capable of
patient counseling than previous students are.” —
Chain pharmacist, Lexington KY.

Student Evaluation of Activities

To provide feedback to improve implementation of
problem-solving activities, PY1 students complete evalua-
tions after each case. This information is helpful to faculty
for reworking cases and to provide feedback to facilitators
and staff supporting the activities. Additionally, these data
are used to track trends in student perceptions of the cur-
riculum longitudinally. The same four topics have been used
in all three years because they represent the best situations
to integrate the basic science at the level of the student’s
knowledge of practice and social science.

Since the first year of using modified-PBL, student rat-
ings of quality and realism have generally increased over
time (Figure 2). This improvement is likely attributed to
changing the number of sessions per case from three to two
after the first year. Additionally, the faculty and case writer
have reworked some of the cases to improve the effective-
ness. Finally, as with other aspects of the new curriculum,
faculty members note that the second and third classes
accepted the pharmaceutical care practice philosophy read-
ily from the beginning of the program. This reality probably
influenced the student ratings of the cases.

The class of 2001 rated the substance abuse case substantial-
ly lower than the other two classes. This rating is especially
interesting because the case is virtually the same as the pre-
vious two years. Qualitative data support the skepticism of
this class that substance abuse is a problem for pharmacists.
This finding represents unexplained social variables that can
become the basis of future longitudinal study.

PERSONAL REFLECTIONS

The case-based, problem-solving process used with PY1
pharmacy students is interesting and challenging for all
involved in these activities. The authors, consisting of the
course coordinator, primary case writer and a faculty mem-
ber with expertise in curriculum and instructional design, are
committed to continuing and improving the process. Some
of the more difficult problems to solve in developing and
implementing this activity have proven to be administrative
rather than academic. These are scheduling rooms, arrang-
ing facilitator meetings, providing sufficient copies of all of the pieces of the case (i.e., case materials, prescriptions, profiles, articles, objectives, assessments, props when required, and facilitator packets), and scheduling faculty and community practitioners.

While many faculty members are interested in collaborating on integrated activities for students, they often lack either the time or knowledge to construct an effective student learning activity. The process has worked well in this curriculum because the responsibility for developing integrated activities is centered in one course whose leadership reaches out to other faculty members for case ideas and links to other disciplines. The authors believe the subjective and objective data indicate that we have made progress in our stated objective of enabling students to better understand and value the importance of learning basic science and social science concepts. Students are beginning to develop a framework for seeing and solving practice problems through the eyes of the pharmacist-in other words, they are learning how to “think like a pharmacist.”

What Has Been Successful?

1. Students solve realistic patient problems. The small group patient cases are written and addressed from the pharmacist’s point of view rather than the traditional “grand rounds style” of problem-solving. Each case starts at a common entry point for the pharmacist usually presentation of a prescription by the patient. The patient’s profile is accessed for additional information.

2. The faculty members are comfortable that integration of material has been quite successfully accomplished.

3. From day one of pharmacy school, students are learning a logical thought process for problem-solving. Students use appropriate reference materials to answer remaining questions and list and evaluate potential solutions to the problem. Each case includes patient counseling and follow-up procedures.

4. Students are exposed to model practitioners in the group problem-solving process. This is particularly valuable to students who work as interns prior to or early in the pharmacy curriculum and who may be exposed to models of practice which are in conflict with the model taught in the curriculum. Exposure to other practitioners through the CAPP cases allows students to see more than one view of practice. Practitioners can help students resolve the conflict between pharmacy practice as students experience it in some work sites versus the pharmacy practice as depicted in the pharmaceutical care model taught in the curriculum.

5. Students learn to work cooperatively in groups and get to know a subset of fellow students very well.

6. Students begin to develop a tolerance for the ambiguity of pharmacy practice and the concept that there is not always one right answer but rather a range of answers, some of which are better than others.

7. Faculty and practitioners have more contact with students early in the curriculum and develop an appreciation for the knowledge and skills developed by first year students. Students have direct, personal contact with very senior faculty (i.e., the dean as facilitator) beginning early in the first year.

8. Practitioners report that they learn from the cases also. New advances in therapy and changes in law, for example, may be discussed in the case and can be implemented in the practitioner’s daily work.

What Has Not Been Successful?

1. Although students are demonstrating to faculty and practitioners that they are developing and effectively applying a logical problem-solving process, students frequently do not understand the process that is occurring. Such students sometimes comment that CAPP small group sessions are redundant and could be accomplished more quickly. We believe that these students express that opinion because they tend to focus only on the content of the cases without understanding the value of the important element of problem-solving occurring in the small group activities.

2. In our early enthusiasm to provide a meaningful experience in the CAPP course, we tried to do too much and sometimes overwhelmed the students.

3. Students struggle with ambiguity in the activities that have been designed for CAPP small group. Even though the problems are well-defined, cases force students to address moral and ethical issues that, no matter how simple, have no single black-and-white-solution.

4. Students report (and data support) inconsistency in grading among facilitators.

Modifications Executed to Date

1. During the College orientation process, which takes place over several days prior to the beginning of classes, students are now prepared for the problem-solving activities that occur in CAPP small group. Students are introduced to their group members for the semester, oriented to the problem-solving process, introduced to the pharmaceutical care process, and work on a sample problem in a facilitated group to begin the process of working with the group to which they are assigned for the semester.

2. Because of the overwhelming nature of early activities, faculty modified the number and scope of PY1 CAPP small groups during the second and third years the course was taught.

3. The dilemma of ambiguity in problem-solving activities has no solutions; it is a fact of life for professionals. Students will gradually develop tolerance for the ambiguity of practice. The only modification currently underway is to permit students to discuss their frustration over issues that contain ambiguity and to provide support and explanation of the “real life” issues involved.

4. Facilitators discuss criteria for grading student participation in small groups at pre-case meetings to increase the level of consistency from group to group.

5. The ratio of students to facilitators in each group has been reduced. The first year ten students and two facilitators were assigned to each group. Currently there are eight students and two facilitators per group. This structure allows a larger role for individual students to participate in group activities.

Modifications Planned for the Future

1. PY3 and PY4 students will participate as small group facilitators for PY1 students. This peer-to-peer teaching will allow senior students to refine their problem-solv-
ing skills and develop skills as facilitators and mentors. The primary obstacle to date has been logistical: scheduling case meetings at a time convenient to both groups of students.

2. To date, students have performed self and peer assessment only in counseling activities. The CAPP faculty have delayed the implementation of these types of assessment until they felt the group process was at an optimal stage. Now that the majority of faculty who participate in PY1 cases are trained well and experienced in small group facilitation and student feedback, the faculty plan to implement the self and peer assessment part of case assessments.

CONCLUSION

A problem-solving activity was developed to teach first year students how to “think like a pharmacist” using the pharmaceutical care philosophy. The process has adapted the classical problem-based learning activity; however, rather than a “discovery” approach, it makes use of the professional knowledge the students are developing across many courses in the curriculum. The method facilitates the attainment of a number of outcomes of the overall curriculum and lays a foundation for teaching students contemporary pharmacy practice. The student evaluations are favorable, and practitioners who have worked with first year students in both the former and new curricula comment positively about early student professional development.


References
(3) Berkson, L., “Problem-based learning: Have the expectations been met?” ibid., 68, 579-588 (1993).

APPENDIX. PHR 919 CONTEMPORARY ASPECTS OF PHARMACY PRACTICE

The Case of Taylor Jones: Session I - Part 2

Students should bring Facts and Comparisons and the Pharmaceutical Care Flow Chart to class.

<table>
<thead>
<tr>
<th>Case Material</th>
<th>Objectives</th>
<th>Suggested Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>You determine that the Taylor Jones in your computer is not the Taylor Jones on the prescription. You introduce yourself as the pharmacist and tell the woman you need to get some more information on the patient before you process Taylor’s prescription. She glares at you and says, “Do we really have time for that? The doctor just gave as the prescription, and I want to get Taylor started on it as soon as possible. oor, we just moved here from out of state and I have never had a pharmacist ask me questions before. Can’t you just fill it and let us get on our way?”</td>
<td>• Discuss the patient/caregiver issues related to illness behavior in this case. • Conduct a patient interview for medication. • Develop a patient profile. • Discuss the pharmaceutical care process and legal requirements when interviewing a patient. • Describe the relevant anatomy and physiology of the ear and the implications of this for young children. • Describe payment issues in this patient.</td>
<td>New Facts: Woman “glares” / Just moved from out of state / In a hurry and no pt. profile in system New Issues: Possibly hostile / No regular pharmacy / How important is profile? / Should pharmacist take time to make one? Hypothesis: It is “our” responsibility as the pharmacist to respond empathetically to this patient and to provide Pharmaceutical Care according to the model.</td>
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<td><em>Because this case deals with pediatric dosage forms, which are usually liquids, students should be familiar with the accuracy of household measuring devices. Please ask students to bring a household teaspoon, tablespoon or measuring spoon from home to Session 2</em></td>
<td>Work outside of class: Between sessions, students will need to research the relevant anatomy and pathophysiology of the ear. They can use the Internet——a good site is: <a href="http://www.healthgate.com">http://www.healthgate.com</a>; their OTC handbooks (Otic Products chapter) or the “One Minute Counselor” from American Pharmacy now known as the Journal of the APhA. Also, assign learning issues that have been raised during the session. Have all students look up some general, overall earning issues about the case (such as the anatomy of the ear) to promote student discussion at the next session.</td>
<td>1. Learning Issues: Describe the anatomy and physiology of the ear. What are the implications for young children? What is the incidence of otitis media in children of this age? 2. Issues: How should the pharmacist respond to the woman and her concerns? What questions would display an “empathetic response”? 3. Lists/Solutions: Pharmacy needs profile information in order to provide “pharmaceutical care.” Interview the “mother” and fill out the information on the profile. 4. Issues: You have discovered that Ms. Jones is a single parent and on welfare. How do you feel about providing pharmaceutical care to this family, knowing that they are Medicaid patients? Discuss, in behavioral science terms, principles demonstrated in this situation. Students may also relate experiences from their own work in pharmacies about dealing with Medicaid and Medicaid patients.</td>
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Problem Solving Activities for Adults. Move It! Divide your group into two teams. Line up the two teams front to back. Have the two
groups face each other. Using chalk, spray paint, or masking tape (depending on the play surface) mark a square space for each person
to stand on with one extra empty space between the two facing rows. You may also use a piece of paper for each person. The goal is
for the two facing lines of players to change places. The first team to complete their tower wins this challenge. Problem Solving
Activities for Kids. The purpose of problem solving activities for kids is to get kids to think about a problem in a different way and have
fun while solving it. Children will develop their creativity as they seek to implement a solution. Walking the Plank. Experiential learning
activities can help students: Remain focused â€” Students who are engaged and learning actively are less likely to become bored and
disinterested. Learn differently â€” When students are involved in the learning process they are more engaged emotionally, helping
them experience learning in a dynamic, new way. Learn faster â€” Learning firsthand requires deep problem-solving and critical thinking.
These processes boost student engagement, accelerating learning and improving content retention. And, like all effective experiential
learning activities, this activity will help teachers learn more about students, too. 2. Cross-Age Peer Tutoring. Language problem solving
is first done under teacher guidance, with explanations of each step, such as in the situation described below. Students could not
understand the difference between â€œanswerâ€ and â€œresponseâ€. The teacher suggested them to view the following contexts and
to come to conclusion. â€” name the materials / the color / the size, etc. - compare it with something. The teacher should recommend
the students to name only essential characteristics of the object, such as â€œthe substance used for removing stains from clothesâ€,
â€œthe bird which cannot fly like an ostrich, but which is not as big and has no wingsâ€, etc.