Integrating the Pharmacy Curriculum: More to Consider Than Improving Learning

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The number of curriculum committees within schools and colleges of pharmacy that are implementing or considering integrating concepts within the professional curriculum is growing. With the dynamic nature of the knowledge in pharmacy and health care in general, some people have become convinced of the futility of building "siloed" curricula, leaving the student to integrate the information into the practice of the profession. To become professionally intelligent, i.e., making pertinent associations with information learned, students need help in analyzing, synthesizing, relating, and applying information to specific practice situations or problems. The associations that are made between information and practice should come about when there is a convergence of faculty from multiple disciplines, demonstrating to students how a particular topic is viewed and used by different disciplines. Disease state management, for example, is best taught when the pathologist, chemist, pharmacologist, clinician, and others come together to discuss not only the disease and the drugs that may be used to treat the disorder, but also how and why the choices are made and how these choices can be applied to patient care. This article reviews the benefits and problems associated with curricular integration, examines one school's approach, and discusses solutions and lessons learned.

INTRODUCTION

The purpose of this paper is to review the basic underlying premises on which consideration of integrating parts of a curriculum is developed and to discuss issues that one school encountered during implementation.

When planning a pharmacy curriculum, primary questions for the curriculum committee to consider following examination of institutional mission and programmatic outcomes are: Of all the things that could be taught, which should be? How should they be organized for maximal learning and retention? How should they be evaluated?

(1) Alverno College has organized a curriculum around specific professional competencies, particularly in nursing. McMaster University and Southern Illinois (2) University have organized knowledge in medicine around that considered necessary to resolve medical problems. Many schools of pharmacy have recently organized their curricula with principles from each of these institutional approaches and around competencies and problem solving. The legacy of organizing content around disciplines, entrenched in pharmacy curricula for decades, however, continues to persist.

Davis (3) has discussed the concept of disciplinary development leading to specialization and ultimately to trivialization. According to Davis, the expansion of graduate degrees in the United States in the 1800-1900s gave momentum to the preparation of disciplinary specialists who became college teachers and led to a shift from teaching to research. Research-driven specialization led to the development of a departmental system of organization within the colleges that further strengthened disciplinary specialization. Disciplinary specialization led to sub-disciplines and highly specialized areas of scholarly inquiry, even in the professions such as pharmacy (pharmacy → clinical pharmacy → pediatric clinical pharmacy → neonatology). In Davis' words, "Once the disciplines and professions emerged and specialization came to dominate, a pattern developed where professors would lecture on their subjects in their classrooms, as disciplinary specialists. Professors lecture on what they know, and, if possible, only on the special area that they know best." (3).

As the process of disciplinary entrenchment occurred and professional fields became more specialized, isolation became commonplace and specialized languages proliferated. Subsequently, overview courses in each discipline became more and more difficult to teach, leading to an increased need for curricular hours. These tendencies have often led to trivialization within individual courses and subsequently the curriculum. Specialists may lose sight not only of the big picture, but of the little picture as well, failing to establish any pharmacy perspective in what they are teaching. The trend is to lecture over ever-increasing specialized content. Often scholars use lectures to inform students of their latest research, for sharing large amounts of information, and inspiring them with their
enthusiasm for their specialty. With traditional teaching in pharmacy schools, whatever curricular integration takes place across the disciplines must be achieved by students on their own or on clerkship, if at all. Technology has now allowed faculty to present even larger amounts of information to students without the rate-limiting step of having to write on the chalkboard.

Since teachers are the lead designers for curriculum and instruction, pharmacy faculty members determine what content is presented. It would appear subject matter is usually chosen from some mix of what the instructor once studied or was taught and what the disciplinary textbooks contain. When an instructor of record organizes a syllabus, topic selection is usually based on their individual judgment. If there is an "integrated" approach, topics are selected by a group of faculty with content presented in serial segments by the individual members of the group. Each faculty member teaches his or her own segment, focusing on the content for which they are responsible. In this model there is little organized attempt to increase the student awareness of the relational nature of the course information or concepts. Students in this model do, however, benefit from multiple perspectives offered by having a larger number of faculty involved in presenting similar, but often unrelated, topics.

In the information age the teacher's role is not so much to transfer information, as to help students find, retrieve, understand, and use information. The disciplinary structure under which most of academic pharmacy developed has done an effective job of creating an often overpowering amount of information, so overwhelming in volume and detail that most students do not know what to do with it. Students need considerably more help in analyzing, synthesizing, relating, and applying information to specific situations or problems than is given in many traditional disciplinary-focused courses. Most problems in pharmacy practice don't come in tidy packages, but are unstructured and usually global in nature. Restak, in Mozart's Brain(4) approaches the head holistically. Increasing our intelligence, he says, depends on making associations in our brain. "We have to extricate ourselves from the confining and limiting idea that knowledge can be broken down into separate 'disciplines' that bear little relation to one another." Perhaps the analysis, synthesis, relation and application of information are better done in interdisciplinary integrated courses.

**BENEFITS OF INTEGRATING CURRICULAR CONTENT**

According to Erickson(5), the purpose of an integrated curriculum is to "illuminate more clearly the concept under study in relation to a significant theme, problem, or issue through the application of higher level thought processes." Integration focuses on the horizontal and vertical relationships within a curriculum to provide an opportunity to address each professional competency as a whole, rather than the "one-course-at-a-time" or "silo" approach. There is an effort to relate fundamental information to those competencies as they are used in professional practice. Integration of didactic knowledge and practice would then lead to the development of a broader perspective which may enhance both student personal growth and the development of a clearer identity in pharmacy. Students begin to understand the rationale for what is being taught and why it is important for their practice in pharmacy. Integration provides more opportunities, early in the student's experience, to master competencies that integrate several skills from multiple areas of study. For example, presenting not only the anatomy of an organ within the body such as the liver, but teaching the physiology of metabolism and the biochemistry of aerobic respiration during the same timeframe allows students to put together ideas about the big picture. An integrated curriculum develops depth of understanding by presenting a message through a variety of contexts and disciplines(6). Integration is not team-teaching, but the teaching and, hopefully, learning of materials as they might be applied in the practice environment.

An integrated course, by its very nature, is established to present content from multiple perspectives which cannot be accomplished in a disciplinary course. It is in some sense "anti-disciplinary"(3). Successfully integrated courses begin with a topic and develop it in ways that capitalize on the convergence of faculty, showing how the topic is viewed and used by different disciplines. Disease state management, for example, is best taught when the pathologist, chemist, pharmacologist, clinician, and others come together to discuss not only the disease and the drugs that may be used to treat the disorder, but also how and why the choices are made and how these choices can be applied to patient care. Instruction in disease state management can be accomplished within one or several disciplinary courses, but only after significant reviewing or re-teaching of information drawn from other courses, and all done from one discipline's perspective. When the disease is approached in an integrated forum, the student is better able to see the relational nature of the newly acquired knowledge. Various disciplines provide different ways of viewing the same phenomena. An integrated approach allows for multiple disciplinary perspectives that hopefully, are complementary.

Integrated courses are well suited to developing the problem-solving skills most needed in the profession because they emphasize the development of comprehensive perspectives. In academic pharmacy today there is a growing awareness that basic science, application and professionalism need to be intermingled very early within the curriculum, that it is not effective to separate these efforts into distinguishable tracks, and that reserving application and professionalism for later phases of the curriculum (e.g., the experiential program) is not effective(7). Often faculty and students forget that the professional program is also designed for personal growth and for reflecting seriously on issues that affect health care practitioners. The idea that a curriculum should allow for developing a philosophy of practice is extremely important and should be fostered by all professional pharmacy programs. Relating academic information to a wider world, to public issues and personal experiences can more easily occur within an integrated format.

**DIFFICULTIES OF INTEGRATION**

An integrated scheme may create some problems: (i) Faculties are still trained today as disciplinary specialists, they think about their disciplines first. Most pharmacy faculty members are accustomed to thinking about the subject of course content in the context of their own discipline and often become preoccupied with "coverage." Coverage may become problematic even in team-taught courses when faculties have strong beliefs about what students need to know. Students are often in awe of how much information can be compressed within a short lecture period. This point is discussed further in the Experience section of the paper; (ii) when faculties from different discipli-
tary perspectives begin to explore a topic, they find that they have differing points of view, which can lead to power struggles. These disagreements often boil down to language, basic science faculty using language as precisely as possible and clinicians using more practical terms; (iii) logistically, an integrated curriculum or course may demand special considerations. The following questions always arise:

- Who will do the teaching within a course or on a topic?
- What instructional strategies will be used?
- Will the development team also serve as the teaching team?
- Are course goals established by the development team being met?
- Should more than one instructor be involved in a single classroom session?
- How are teaching loads determined and quantified?

From a programmatic perspective, the issue of an increase in total faculty time to teach a course must be addressed. Additional time is needed for coordination of the multiple instructors and the participation of two or more faculty in each classroom session. Training and support of faculty in this different instructional model is necessary to prevent faculty from reverting back to their "comfort zone" of previous instructional style and habits. Individual faculty members are likely to experience difficulties also as they experience an increased demand on their time for planning and preparation while sensing a loss of autonomy in designing, executing, and assessing their own courses. As a curriculum transitions to integration, students may also complain because they are unaccustomed to this new approach.

ONE SCHOOL’S EXPERIENCE

The Bernard J. Dunn School of Pharmacy at Shenandoah University instituted an integrated approach by combining pathophysiology, pharmacology, medicinal chemistry, clinical pharmacokinetics, and therapeutics into a single 29-hour sequence of courses on disease state management. Twenty-six semester credit hours were allotted to the didactic coursework and three hours were allocated to a laboratory for case studies and problem-solving. The didactic component was divided into 11 independent system modules, each two or three semester credit hours in length focusing on a particular body system or disease group, e.g. the respiratory system or infectious diseases. Each module was delivered in block fashion, with the class meeting for two hours/day for three to five weeks, depending on the number of credit hours. In this model the modules were both planned and delivered by a group of faculty working together closely as a team. The development team members, in concert with the academic dean, prepared a common syllabus, worked to integrate their various perspectives, and taught different aspects of the modules depending upon expertise. Faculty often attended each other's classes and provided feedback and support. A typical module was taught by two or three basic science faculty members and three or four practice faculty members.

The delivery of this integrated sequence required greater faculty resources when compared to a more traditional delivery. Initially, during course development, practice and basic science faculty members along with practitioners came together to develop goals and decide what was and was not important in meeting the goals of each module. After course goals, objectives, and topics were clearly delineated by this development team, a team of faculty was brought together to deliver the course. Decisions as to what faculty would be asked to deliver content were made by the development team. Many members of the development team were also members of the delivery team, but differences also occurred. Once the delivery team was established, these individual faculty members made the decisions regarding pedagogy for individual lectures. Coordination of the teaching was accomplished by using dual coordinators, one basic scientist and one clinician. It was their responsibility to oversee the basic functions of scheduling lecturers, developing assessment instruments, and assigning grades. Initially, coordinators intended to attend all lectures and participate in class discussions. However, because of the excessive time required to do this, coordination now alternates between a clinician and basic scientist each time the course is offered. Since course development was undertaken by a multidisciplinary group, course goals and topical delivery remain unchanged now even though only one coordinator is in the classroom at any one time. Even with this change, the module coordinator attends all lectures and participates in class discussions.

The "laboratory" component of this sequence was initially organized as small-group sessions (six students with one faculty facilitator) that used a problem-based approach and focused on the problem-solving process as content was discussed. Like the didactic portion of this sequence, the problem-based sessions soon were restructured because of the faculty resources required. The first semester of the three-semester laboratory is now taught to large groups with clinical faculty modeling their thought processes for solving patient problems. The second semester still consists of small group sessions as described and the third semester requires individual student case presentations in groups of 12 to 15 students. This sequence allows students to transition from dependent to independent learners. The laboratory course also allowed the integration of disease states that had not been previously addressed within the didactic modules.

Early in the development of the course didactic sequence, course coordinators met collectively to determine process and policy for the entire sequence. A matrix management model developed where the coursework was not managed by a particular department, but by the departmental chairs working with the academic dean to assure that course administration was consistent with the mission of the school. Final decisions about the sequence were made by the academic dean. Departmental faculty members were still administratively responsible to the departmental chair. However, during an integrated module, participating faculty members were now administratively responsible to the academic dean as well as the course coordinator for course delivery. The matrix model of management, where there are horizontal as well as vertical lines of authority is an apparent violation of the unity of command principle, where one receives orders from one and only one individual in the chain of command. This approach of clear lines of authority brought continuity to the modules and minimized student confusion/conflict regarding mechanics such as scheduling, assignments, and assessments. It appears that the more extensive the integration effort among participating faculty, the higher the level of organizational structure needed to administer the course(3). The converse is also true, the clearer, or perhaps higher, the administrative support, the greater the degree of integration.
Experiences at Shenandoah have shown that teaching within an integrated curriculum may not only be complementary with regard to content, but also may help bring practice and basic science faculty closer together, leading to a more harmonious interdepartmental relationship, one that is often adversarial in more traditional programs. Disagreements that occurred regarding content were quickly resolved by the individual faculty and never became major issues.

The method of assessing faculty member teaching loads in this course sequence also required intensive development. Within the Shenandoah model, teaching loads were determined in cooperation with departmental chairs and faculty. The academic dean developed a schema in which faculty reported lectures and other activities annually. Formulas were agreed upon to reflect time spent on each activity. Information regarding faculty time spent in course coordination, student practicum advising, lecturing, or facilitating was passed along to departmental chairs to ensure equity in faculty teaching responsibilities. The time spent in delivering the curriculum was greater during programmatic years where the greatest integration takes place, i.e., P2 and P3 years, (see Figure 1). Integrated Care (ICARE), which is the integrated course for disease state management, accounts for 38 percent of the total P3 level faculty teaching load during the fall semester and 51 percent of the P3 load and 40 percent of the P2 level load in the spring semester. Testing and evaluation issues were addressed by the collective body of course coordinators who made decisions regarding assessment. A common course syllabus was developed, stating course assessment policies. Module coordinators, following course policy decisions, worked with lecturing faculty soliciting lecture objectives and questions reflecting those objectives to develop assessment instruments. Students taking the integrated course at Shenandoah University for the first time it was offered identified several problems that needed to be investigated and resolved. Issues identified were: (i) intensity of the course; (ii) lack of coordination between lecture objectives and questions on the exams; (iii) lack of revisiting diseases at any other point in the curriculum; and (iv) feelings of inadequacy when quizzed on compartmentalized information, e.g., "name all of the benzodiazepines" by practitioners who had been taught in the "silod" approach. The high intensity was thought to result from each instructor, not yet comfortable in the model, attempting to include content about all aspects of individual topics much as they would in a more traditional format. This resulted in a high content volume (coverage) and confusing redundancies. This issue has been addressed through faculty development and alleviated somewhat by faculty as they gain experience and comfort in teaching in an integrated model. There has also been some restructuring within the sequence to better balance the volume of content across modules. Faculty workshops were conducted to review the basics of writing objectives and correlating them to evaluation, addressing the student concern of the lack of correlation between objectives and assessment. Using case examples in the laboratory courses for the integrated sequence allows students to reflect back on previous content and apply knowledge to patient care, addressing the issue of revisiting diseases at other points in the curriculum.

Issues of feelings of inadequacy by students when quizzed on compartmentalized information by practitioners have not been adequately addressed. Experiential preceptors have been familiarized with the curriculum and concept of integration through development workshops. However, until such time as practitioners approach patients from a disease or problem perspective, there will continue to be confusion regarding the knowledge base of students that are taught in the integrated model. In the model that we have established, drugs are not learned by chemical or pharmacologic class, but instead as entities related by how they are used to treat disease.

CLOSING COMMENTS
Integration of curricular content that cuts across multiple disciplines has many advantages in the modern pharmacy curriculum. Most importantly, it allows students to view problems as the multi-faceted issues they are, bringing to bear their education from many disciplines, interconnected from the start in their learning process. It allows creative faculty from varied specialties to interact with each other to improve educational outcomes. It may decrease issues of territorialism within faculties and models inter-professional collaboration for faculty and students. The perspective at Shenandoah University is that it improves curricular efficiency by reducing unnecessary and unintentional redundancy. Integration does, however, require a large investment of faculty time. Each school and college of pharmacy must decide if the benefits are worth the costs.

References