Chair Report of the Academic Affairs Committee

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According to the Bylaws of the AACP, the Academic Affairs Committee shall consider the intellectual, social, and personal aspects of pharmaceutical education. It is expected to identify practices, procedures, and guidelines which will aid faculties in developing students to their maximum potential. It will also be concerned with curriculum analysis, development, and evaluation beginning with the preprofessional level and extending through professional graduate education. The Committee shall seek to identify issues and problems affecting the administrative and financial aspects of member institutions. The Academic Affairs Committee shall extend its attention beyond intra-institutional matters of colleges of pharmacy to include inter-disciplinary concerns with the communities of higher education and especially with those elements concerned with health education.

The 1996-97 Academic Affairs Committee was charged by President Charles O. Rutledge to examine the above sphere of concern from the framework of the wonder and skepticism of science.

Specifically, the Committee was charged to:

- Study the CAPE Educational Outcomes and identify where the “science” is: not the facts or disciplines of science/pharmaceutical science, but the abilities of scientific thinking: observation and experimentation; analysis of data; problem-solving in light of evidence or lack of evidence (i.e., outcomes in which the wonder and skepticism of science is explicit or inherent). Recommend, if necessary, additional outcomes or modifications of outcomes;
- Provide for the academy suggestions as to how faculties might examine the curriculum for its ability to convey the wonder and skepticism of science. Assuming that students tend to think about science as distinct bodies of facts (e.g., pharmaceutics, pharmacology, chemistry, etc.);
- How might the spirit of experimentation be introduced into teaching and learning?
- How might development and coordination of a foundation in science (as a process, system, and context) across courses (e.g., horizontal and vertical integration) be accomplished?
- How might the curriculum be structured and delivered to facilitate student integration of ideas from a molecular basis to systems analysis?
- What approaches should be taken to begin the cultural and attitudinal change necessary for faculty to focus on helping students to know how faculty/scientists/clinicians think, not just what they know?
- How might the curriculum be structured and delivered to prepare students to function in situations when evidence is available (i.e., selecting relevant evidence, interpreting and analyzing evidence) and in situations where there is a lack of evidence?
- Investigate availability and use of instruments to test student attitudes about science; and
- Recommend for consideration by AACP program planning committees programs that will assist faculty in the development of approaches and processes to instruction to instill a spirit of experimentation in teaching and learning, and that will facilitate student development of an appreciation for the wonder and skepticism of science [i.e., help faculty teach students how they (scientists) think, not what they know].

SCIENCE IN PHARMACEUTICAL EDUCATION

Background

If we teach only the findings and products of science-no matter how useful and even inspiring they may be-without communicating its critical method, how can the average person possibly distinguish science from pseudoscience?

Carl Sagan in The Demon-Haunted World(1)

The issue of science in the pharmaceutical curriculum and discussions of the need for faculty attitude and behavioral changes with regard to the way students are taught are not new to AACP or pharmaceutical education. Indeed, much has been said about scientific inquiry skills and the need for students to understand, appreciate, and participate in the wonder and skepticism of science in both the pharmaceutical education and higher education literature.

The problem is that [the American college curriculum] offers too much knowledge with too little attention to how that knowledge has been created and what methods and styles of inquiry have led to its creation.

Integrity in the College Curriculum(2)

A solid science foundation is essential to the preparation of entry-level pharmacy practitioners who will be able to adapt to new concepts and new therapies over lifetime careers.

The Papers of the Commission to Implement Change in Pharmaceutical Education(3)

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1Committee members: Marie A. Abate (West Virginia); Thomas L. Lemke, Chair (Houston); Gail D. Newton (Duquesne); Norman J. Oppenheimer (California - San Francisco); S. William Zito (St. John’s).
The Association has considered these issues before in a variety of forums and the following two policy statements guide its activities:

- The important role of the basic pharmaceutical sciences in the pharmacy curriculum is affirmed and the Association encourages its member institutions to continue to emphasize the various components of their curricula at a level commensurate with the significant contributions of these sciences to pharmacy education. (Source: Policy Development Committee, accepted by the AACP House of Delegates July 1983)

- The leaders in our colleges and schools of pharmacy must assume the responsibility for developing an academic environment in their individual institutions. This environment should provide the opportunity for students and faculty to study, explore, question and discuss scientific, technical, professional, ethical and social issues and subjects pertinent to professional and graduate pharmaceutical education and to scholarship in pharmacy and its related disciplines. (Source: Academic Affairs Committee, accepted by the AACP House of Delegates July 1988).

In its second background paper, Entry Level, Curricular Outcomes, Curricular Content, and Educational Process(4), the AACP Commission to Implement Change in Pharmaceutical Education included the following in its discussions of the desired outcomes and competencies of graduates from professional degree programs in pharmacy. Two areas within the general Thinking Abilities section are particularly pertinent:

Scientific comprehension - Pharmacy school graduates must have a comprehension of scientific methods and be cognizant of their use to discover knowledge...Among many examples, pharmacy graduates must possess a fundamental knowledge of the unraveling of the genetic code; they must understand the importance of receptors in biological processes; they must be capable of evaluating clinical studies and be able to use epidemiologic and demographic data to reach conclusions regarding a variety of issues ranging from the effectiveness of therapies to identifying areas of practice needs.

Critical thinking - ...Although critical thinking is a universally desired educational outcome, professionals particularly need a repertoire of thinking strategies that will enable them to acquire, evaluate, and synthesize information and knowledge. Since much of professional practice is problem-solving, students need to develop analytical skills to make decisions in both familiar and unfamiliar circumstances. Critical thinking fosters a questioning attitude among professionals, and it is a prerequisite skill in making judgments.

THE TEACHING LEARNING PROCESS IN PHARMACEUTICAL EDUCATION AND THE WONDER AND SKEPTICISM OF SCIENCE

In its discussions of the charges, the Academic Affairs Committee recognized and agreed that pharmacy students and graduates of professional degree programs in pharmacy are not scientists and should not be expected to be scientists. Rather, they are professionals-pharmacists who use science, its findings and processes, in their practice to solve problems. Given that understanding, the Committee reviewed the AACP Center for the Advancement of Pharmaceutical Education (CAPE) Educational Outcomes to identify whether the abilities of scientific thinking, observation and experimentation, analysis of data, and problem-solving were included. The Committee agreed that the CAPE Educational Outcomes adequately and appropriately included the abilities. The problem with moving curricular change forward is not the desired outcomes, but rather how educators are facilitating student achievement of those outcomes. That is, the problem is not the academic goals for students, but rather how students are taught and how their progress and achievements are assessed (the process of knowledge transfer).

Teaching must be achieved through educational processes which involve students as active learners...Educational experiments in pharmacy and medicine are revealing useful strategies that facilitate the learning of science in association with rendering patient care by students. Such strategies integrate the excitement of scientific discovery with the warmth of providing care to human beings.

The Papers of the Commission to Implement Change in Pharmaceutical Education(5)

Understanding science is a way of viewing life, and faculty members have the responsibility of assisting students with that understanding. Yet, faculty members struggle to balance sharing a knowledge base and sharing their discipline’s way of thinking. Perhaps this results because, in general, faculty are scientists, but their students are not and do not usually intend to be scientists. Or, perhaps, it occurs because teaching facts is ‘easy’ and a short-term, focused process, whereas teaching concepts or ways of thinking is more difficult and a long-term process that goes beyond any one course. It is also easier to assess for the acquisition of facts and much more difficult to quantitate how well a student has grasped a difficult concept or an attitude. The latter can also make some students uncomfortable; grappling with a concept is much more difficult than memorizing a list of drug names. Furthermore, an uncomfortable student can poorly evaluate a teacher, thus establishing a negative feedback loop on more concept-driven teaching. Faculties at schools and colleges of pharmacy must distinguish between the outcomes that can result from short-term (e.g., within one course) efforts and those requiring continuous, long-term, integrated efforts across courses and disciplines throughout the curriculum. In resolving this tension, faculties must have a clear understanding of the mission of their institution and program and the outcomes toward which their students are working.

When what needs to be learned changes quickly, especially in the course of a single generation, it becomes much harder to know what to teach and how to teach it.

Carl Sagan in The Demon-Haunted World (6)

Given that the foundation for curricular and pedagogical change has been laid within pharmaceutical education by previous Academic Affairs Committees, the Commission to Implement Change in Pharmaceutical Education, and others, and the desired outcomes for the professional pharmacy degree program include an understanding of, appreciation for, and skills in scientific inquiry, why has more dramatic change not occurred in schools and colleges of pharmacy?

Nowhere is an outside idea-not even an outside expert-as vital in achieving high quality instruction as local initiative and control...much of the best of what works is internally generated and internally paid for.

Sheila Tobias in Revitalizing Undergraduate Science(7)

No matter what tools, resources, or development opportunities are provided for colleges, schools, and individual faculty members by the AACP, higher education and professional associations, or the parent institution, individual faculty members need to make the commitment and put forth the effort to change the educational process.

RECOMMENDATION 1: The Association’s Program Committee and the Program Committees of the seven Academic Sections should include as part of the regular Annual Meeting programming opportunities for faculty members to share and discuss, both within their own disciplines and across disciplines/sections, inno
ative teaching and assessment approaches that have been developed and used.

The Committee offers the following ideas for enhancing critical thinking and active learning by students, most of which have been included in previous works(8-11), and many of which are the result of an individual faculty member’s or department’s initiative and experimentation.

- Revolutionary changes in how faculty teach, what constitutes teaching, and how students are assessed is essential if the burden of learning is to shift from faculty (passive student learning) to students (active student learning).
- Students need to recognize how they learn, and faculty modeling of the learning process for students will facilitate this recognition.
- Case studies and problem-based learning exercises within and across disciplines can help students discover the nature of scientific inquiry, the process of critical thinking, and application of these skills to real-life situations.
- Courses that are truly integrated (as opposed to courses that include a series of instructors from different disciplines who act independently of each other) provide an environment in which the desired outcomes for the professional program may be modeled, learned, and practiced by students. However, having been trained to function independently, most faculty need to learn how to work together. Therefore, there should be local and national opportunities for faculty development.

RECOMMENDATION 2: The Association should establish newsgroups/listservers on the AACP Internet Home Page to allow for sharing and dissemination of teaching tips and innovative education ideas among those interested. Examples include:

- Use of multidisciplinary faculty syllabus teams for curriculum revision and the development of integrated courses;
- Use of electronic mail to facilitate student:student and student:faculty interactions in response to specific assignments, to expand classroom discussions, respond to individual questions, etc.;
- Concept mapping as a tool for assessing student knowledge, to facilitate student learning, and for course/curriculum development;
- Development and use of integrated, multidisciplinary laboratory exercises to facilitate scientific inquiry and critical thinking. Laboratories, both traditional and nontraditional, that stress discovery and questioning of knowledge are an essential component of pharmacy education;
- Use of computer simulations, exercises, and cases to teach students conceptual knowledge, to promote critical thinking, inquiry, and analysis, and as assessment tools;
- Development of student self-assessment skills. Student self-assessment should become an integral part of the total assessment process through which faculty become aware of students’ perception of learning.

The Committee also recognized that the prepharmacy curriculum can establish expectations and contribute to the readiness of students for understanding science. Assessment of the scientific inquiry and critical thinking skills of entering students is critical for establishing baselines from which the professional curriculum can produce the desired outcomes.

RECOMMENDATION 3: A future Academic Affairs Committee should be charged to examine the prepharmacy requirements and experiences of students to determine how the minimum requirements and actual experiences (e.g., core courses, undergraduate degree requirements, etc.) influence: (i) student readiness for the professional curriculum; and (ii) student and faculty expectations regarding teaching methods, learning, and assessment in the professional curriculum.

In pharmaceutical education, as in all human endeavors, there must be awareness of the feedback being given for individual efforts. In an academic environment, faculty will not change behavior, especially behavior that has been successful in the past, or engage in new activities unless they are perceived to be important to the achievement of appropriate recognition, promotion, and other rewards. Therefore, change must take these factors into account and also involve concomitant changes in the academic culture.

RECOMMENDATION 4: The Chair of the Council of Deans should appoint a task force to: (i) assess the faculty recognition and reward system at institutions with schools and colleges of pharmacy; and (ii) compile information from the schools and colleges, including indicators of success, of cases in which demonstrated scholarly activity in the areas of curriculum development and teaching have led to promotion and tenure. The results of the task force’s work should be shared at a future COD meeting.

STUDENT ATTITUDES ABOUT SCIENCE

The Committee did not address this issue as charged. After its review of the literature and discussions, the committee concluded that students’ negative attitudes toward science, if they exist, are not directed toward the science itself as much as how science is taught. To the extent that instructional approaches can change, so too may student attitudes.

Am. J. Pharm. Educ., 61, 115-135(1997); received 10/1/97.

References
(5) Ibid. p. 382.