

AACP Commission to Implement Change in Pharmaceutical Education

"Entry Level, Curricular Outcomes, Curricular Content and Educational Process"

Background Paper II

I. Preamble

The Commission to Implement Change in Pharmaceutical Education has been given a broad charge to provide guidance to pharmaceutical education as it evolves to meet the changing health care needs of society. In order to develop a common base of understanding of the pharmacy profession, pharmacy practice and pharmaceutical education, the Commission developed its views of the missions of the profession of pharmacy and of pharmacy practice. The Commission then developed and proposed a mission statement for pharmaceutical education. That mission statement was accepted by the AACP Board of Directors and adopted as policy by the AACP House of Delegates (July, 1990).

Pharmaceutical care, a new philosophy of pharmacy practice, (1) forms the basis of pharmacy practice as defined in the evolving mission of pharmacy practice (2). Pharmaceutical care is truly a revolutionary concept in the practice of pharmacy in which all practitioners assume responsibility for the outcomes of drug therapy in their patients. It encompasses a variety of services and functions (see page 7)--some new to pharmacy, others traditional--which are determined and provided by the pharmacists serving individual patients. Finally, it espouses CARING, an emotional commitment to the welfare of patients as individuals who require and deserve pharmacists' compassion, concern and trust.

The Commission believes that the mission of pharmacy practice is to render pharmaceutical care. Mission statements are necessary for strategic planning. Including pharmaceutical care as the mission of pharmacy practice lays out a strategy for the profession to position itself in the rapidly changing health care system to address major problems associated with drug therapy. At one time, the acts of deciding on drug therapy and implementing it were relatively simple, safe and inexpensive. The physician prescribed and the pharmacist dispensed. Enormous progress in pharmaceutical and medical research has been providing an array of new medications that are extremely effective and precise therapeutic tools, but they carry much greater risk and higher cost than the ones they are replacing. Substantial evidence shows that the traditional method of prescribing and dispensing medication is no longer appropriate to ensure safety and effectiveness of drug therapy. Too much can go wrong and the consequences are costly in terms of hospitalizations, physician visits, laboratory tests and remedial therapy (3).

The future of pharmacy as a health care profession lies in its ability to contribute to the rational use of medication in health care. Pharmaceutical care is the philosophy of practice that will facilitate this future. Pharmaceutical education has a corresponding responsibility to promote the philosophy within the profession and to the public and to prepare students who are competent to render pharmaceutical care in practice.

Varying definitions of pharmaceutical care, especially descriptions of the functions which comprise it, are beginning to appear in studies, reports and other statements. The Commission believes that its definition of pharmaceutical care is consistent with societal health care needs and the future of the pharmacy profession.

Consequently, the Commission encourages the profession (individual practitioners and professional organizations) to adopt the Commission's definition of pharmaceutical care including the breadth of services it encompasses and the outcomes it espouses.

The discussion of entry level, curricular outcomes, curricular content and curricular process, as described herein, is based on this philosophy and definition of pharmaceutical care.

II. What is Entry Level?

A. Introduction

The mission of pharmaceutical education states that pharmaceutical education prepares "students to enter into the practice of pharmacy." However, students who graduate from pharmacy schools sometimes choose nonpractice career paths within the profession such as academia, industry, government and association management, as well as careers unrelated to pharmacy. While the primary responsibility of pharmaceutical education is to prepare practitioners, it also has responsibilities with regard to some of these nonpractice career paths. A subsequent background paper will address these issues.

B. Entry Level

Entry level in pharmacy involves two major concepts: 1) the entry position is the position for the "beginners" in pharmacy; and 2) the person occupying the entry (beginning) position possesses an identified and described set of knowledge, skills, attitudes and values.

Webster defines "enter" as "to come in or go in"; "to be admitted (as to a school or profession)"; and "to make a beginning." This latter definition suggests a continuum and anticipated growth.

Three of Webster's definitions of "level" are (1) "A position with respect to a given or specified height"; (2) "A position or plane in a graded scale of values"; and (3) "An extent, measure or degree of achievement." All three of these definitions imply the existence of measures which define or characterize the "level."

C. To Enter Practice is To Render Pharmaceutical Care

Students prepared at the entry level must be capable of coordinating and rendering pharmaceutical care.

The mission of pharmaceutical education states that educators are responsible for preparing students to practice pharmacy at the entry level. The mission of pharmacy practice says that the purpose of pharmacy practice is to render pharmaceutical care. Consequently, entry-level pharmacy practice, for which pharmaceutical education prepares its students, is described within the concept of pharmaceutical care.

D. Generalists and Specialists in Pharmacy

Pharmacy is evolving into a profession of generalists and specialists. The following reflects the Commission's conceptual view of the direction of this evolution. Students prepared at the entry level are general practitioners who coordinate and render pharmaceutical care. A system of pharmaceutical care requires the participation of both generalists and specialists.

Throughout their practice careers, generalists acquire experience, and they practice in a variety of environments which may influence to some degree the nature of their responsibilities and functions.

General practice encompasses a variety of functions and responsibilities related to the delivery of pharmaceutical care. General practitioners are capable of resolving a large number and variety of drug therapy problems. Generalists recognize when specialist assistance is required to solve specific, complex problems and refer patients for such care.

Specialty pharmacy practitioners also render pharmaceutical care. Specialists require education and training in addition to that required of generalists. Specialists are capable of solving more complex problems within their focused area of practice than generalists, and usually focus on specific aspects of drug therapy. Specialization in pharmacy has meaning only around a strong generalist core. In the evolving system in which pharmaceutical care is the norm, an organized relationship between generalist and specialist will be essential for assuring optimal drug therapy outcomes.

Generalists begin their practices as entry-level practitioners and become experienced over time. Likewise, specialists begin their specialty practices at an entry level for the specialty and gain experience in their specialties. However, experienced and expert generalists are not specialists; and entry-level specialists are not necessarily experienced and expert generalists.

E. Efficiency, Proficiency, Breadth and Depth of Pharmaceutical Care at the Entry Level

Pharmaceutical education must prepare students to enter pharmacy practice with the knowledge, skills, attitudes and values to render pharmaceutical care to patients at a level defined by the evolving mission statement of pharmacy practice (2).

Generalists recently admitted to pharmacy practice have the same responsibilities to society as do generalists with 40 years experience. Pharmacists entering practice must have the knowledge and skills to perform all functions necessary to render pharmaceutical care. To the extent that these knowledge, skills and functions are necessary for the delivery of pharmaceutical care, they are "entry-level" knowledge, skills and functions. Unfortunately, this term frequently has been used in the pejorative to describe practitioners who have not progressed in practice. "Entry-level" knowledge, skills and functions are critical to the success of pharmaceutical care and are utilized and performed throughout a general practice career.

Entering practitioners may require considerable time to perform their tasks effectively because these are relatively new tasks and entry level practitioners may lack the necessary experience and confidence to proceed quickly. Experience breeds confidence among pharmacists in their skills and abilities to make decisions to perform needed services. Experienced practitioners perform services more efficiently because their experience provides them with an array of possible options for any given problem. This ready access to options provides opportunities to consider a variety of available and appropriate choices in selecting alternatives deemed most effective. Inexperienced practitioners generally can identify only relatively few options, and they may take considerable time dealing with each before discarding less appropriate ones.

Experience generally enhances proficiency in practitioners. Webster defines proficient as "highly skilled or expert." While entry-level practitioners must possess a defined level of skill, experience in practice confers an improvement in the skill level and speed with which skills are performed. Moreover, experience may confer on practitioners skills beyond those considered as entry level. Further, entry-level practitioners may perform some functions that comprise pharmaceutical care more skillfully than other functions.

Differences exist in the breadth and depth of pharmaceutical care when rendered by entry level and experienced practitioners. "Breadth" means the scope or range of services or activities which are required

for pharmaceutical care. "Depth" means the degree of complexity of problems that practitioners are able to solve efficiently and proficiently. Discussed below are the "minimum" activities associated with pharmaceutical care. Experienced generalists may have developed skills beyond those considered entry level to perform tasks that expand the scope of their care.

The level of pharmaceutical care to be rendered by entry-level practitioners is defined within the mission statement of pharmacy practice. The Commission developed a working statement of the mission of pharmacy practice in which the major functions of pharmaceutical care are outlined. These form the basis of the practice functions and competencies which follow.

III. Curricular Outcomes

A. Introduction

Considerable work has been done by AACP, other pharmacy organizations and groups outside the profession in defining desired outcomes of curriculums in general and the pharmaceutical curriculum in particular (4-12, 14). The AACP Argus Commissions and Academic Affairs Committees (4-11) have discussed curricular outcomes in great detail and the Commission has selected from these reports the key outcomes that are pertinent to this discussion. In addition, in 1990, AACP appointed a Focus Group on the Liberalization of the Professional Curriculum to begin development of a 10-year agenda for renewal in pharmaceutical education. The Focus Group has developed outcomes and competencies which are consistent with the Commission's views and will continue to elaborate upon them throughout its agenda.

The 1989 AACP Academic Affairs Committee (4) endorsed the outcome statements for professional education as developed originally by the University of Michigan Professional Preparation Network Project (12). The Commission reviewed these works and concluded that the outcomes are most appropriate for pharmaceutical education. The Professional Preparation Network identified four broad, minimum competencies for professional education:

- Conceptual Competence -- understanding the theoretical foundations of the profession.
- Technical Competence -- ability to perform skills required in the profession.
- Integrative Competence -- ability to meld theory and skills in the practice setting.
- Career Marketability -- becoming marketable due to acquired education and training.

The Commission lists below the major functions that comprise pharmaceutical care as rendered at the entry level. Then it offers its recommendations for the educational outcomes and competencies that are necessary to perform pharmaceutical care functions.

B. Practice Functions

These are entry-level practice functions that comprise pharmaceutical care which practitioners must be able to perform regardless of their practice environment.

- Participate in the drug use decision making process -- assist physicians, other prescribers and patients to establish therapeutic or diagnostic (e.g. related to radionuclides) objectives; compile and evaluate patient specific information; recommend appropriate drug entities to use in specific patients with specific diseases; participate in pharmacy and therapeutics committee deliberations; prepare and deliver educational programs to health professionals regarding drug therapy; participate in and perform drug use evaluations.
- Select the appropriate dosage form, formulation, administration and/or delivery system of specific drug entities -- assist physicians, other prescribers and patients to select the appropriate dosage form of specific drug entities which are to be used in the therapy or diagnosis of specific patients with specific diseases. Select the route and method of medication administration.
- Select the drug product source of supply -- judge the quality of products and select manufacturers based on appropriate data, such as biopharmaceutic, economic and quality control information.
- Determine the dose and dosage schedule -- apply the principles of pharmacokinetics to the determination and recommendation of appropriate doses and dosing schedules for patients; assess existing dosage schedules and recommend modifications.
- Prepare medication for patient use -- compound drug products that meet specific patient care needs.
- Provide drug products to patients -- develop and supervise management systems to ensure that adequate supplies of drug products are available to meet patient care needs; ensure that drug products are stored under appropriate conditions; ensure that products are delivered to patients in a timely, safe and efficient manner; ensure the security of the drug product inventory; ensure that medications are labeled appropriately.
- Counsel patients -- ensure that patients or their agents understand the importance, nature and scope of the therapeutic plans being implemented; are informed about the benefits and risks of such plans; agree to participate in the implementation of the plans; and understand the appropriate use of medication included in the plans.
- Monitor patients to maximize compliance -- determine the extent to which patients comply with their therapeutic plans and influence patients to become compliant.
- Monitor patients' progress with regard to therapeutic objectives -- follow patients and judge the continuing effectiveness of their therapeutic plans in achieving the outcomes of pharmaceutical care: 1) cure of a disease; 2) elimination or reduction of symptoms; 3) arresting or slowing a disease process; 4) preventing disease; 5) diagnosing a disease; and 6) desired alterations in physiology.

- Monitor patients to prevent adverse drug reactions and drug interactions -- follow patients throughout the course of their therapeutic plans and detect incipient adverse consequences to drug therapy and develop recommendations to revise therapeutic plans to reverse or prevent these adverse events.

C. Outcomes/Competencies

All practice functions contained within the definition of pharmaceutical care center on the patient. To perform these functions, pharmaceutical education must facilitate the acquisition by entry-level students of a relevant knowledge base, skills, attitudes, ethics and values.

1. General Outcomes/Competencies that Underlie the Education of a Professional Person and Citizen.

The Professional Preparation Network (12) derived from the literature ten outcomes or competencies as exemplifying an educated professional. The Focus Group on the Liberalization of the Professional Curriculum grouped these outcomes into six categories. To these outcomes, the Commission added several because of their importance to pharmaceutical education.

a. Thinking Abilities -- include logical thinking, analytical thinking, problem solving and decision making.

i. Scientific Comprehension -- Pharmacy school graduates must have a comprehension of scientific methods and be cognizant of their use to discover knowledge. It is more important that graduates understand some relevant, important scientific discoveries in depth even if it is at the expense of a breadth of understanding of many scientific subtopics. Educators must use discretion in deciding which scientific discoveries should be discussed in depth and those which can be acquired by self-education.

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.

ii. Mathematical Competence - Entry-level pharmacy graduates must be capable of utilizing mathematical variables to analyze physical, biological and socioeconomic phenomena. They must be able to use mathematics (e.g. pharmacokinetics, statistics) to understand processes and risk. Entry level graduates must understand mathematical modeling for use in such areas as pharmacokinetics and economic simulations. Graduates must be comfortable with the use of algebra and calculus in the resolution of problems related to drug therapy.

iii. Critical Thinking - Entry-level graduates must be able to examine issues rationally, logically and coherently. 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.

b. Communication Abilities -- include effectively sending and responding to communications for varied audiences and purposes including writing, reading, speaking, listening, and using data, media and computers. These abilities include aesthetic and scientific forms of communication and creativity of expression. Graduates must have a sufficient understanding of information systems to integrate computer technologies into their practices.

i. Communication Competence -- Entry pharmacy graduates must be able to read, write, speak and listen and use these processes effectively to acquire, develop and convey ideas and information. Most of critical-thinking competence (see above) is expressed through communication competence. Communications skills are means to an end; as such, they are tools with which pharmaceutical education should equip its entry-level graduates.

Entry practitioners must be sensitive to issues related to communicating with patients whose culture is not Western and whose native language is not English.

ii. Aesthetic Sensitivity -- Entry graduates must have an enhanced aesthetic awareness of arts and human behavior for both personal enrichment and application in enhancing the profession. Sensitivity to relationships among the arts, the natural environment and human concerns epitomizes aesthetic awareness. Through learning to approach life as an aesthetic experience and by viewing work as an act of aesthetic judgment, professionals can more effectively assess and understand the world and their roles within it.

Aesthetic competence helps practitioners express contextual competence (see below). Entry graduates must understand the human condition as expressed through literature, art and music.

c. Facility with Values and Ethical Principles -- includes developing sensitivity to and facility with personal values and ethical principles in professional and social contexts.

i. Professional Ethics -- Pharmaceutical care is based on pharmacists' responsibilities for the outcomes of drug therapies in patients. Entry-level graduates must understand and accept their duties and responsibilities to patients and apply these in every day practice. Liberally educated individuals are expected to have developed value systems and ethical standards that guide their behavior. In every field, professionals face choices and responsibilities in the process of making decisions and must appreciate the consequences of their actions.

Entry-level graduates must have value systems and incipient ethical standards (13). Graduates must be able to reach and render decisions even when their personal values may conflict with ethics (e.g. the decision to withdraw life support from a patient or selecting appropriate drug therapy in the face of economic constraints). Graduates must deal with these conflicts while assuring that patients are afforded optimal care. At the same time, the graduate must have a sense of the obligation which pharmacists owe their patients and their duty to ensure that obligation is carried out.

The Commission believes that pharmaceutical education must exert the leadership in the profession to develop a statement of ethical principles which articulates the pharmacist practitioners' responsibilities for the outcomes of drug therapies in their patients.

d. Personal Awareness and Social Responsibility -- includes developing an appreciation of self, of the strengths and problems of cultural diversity, and of historic understanding of a society in rapid change.

i. Contextual Competence -- Graduates must have an understanding of the societal context (environment) in which the profession is practiced. The capability to adopt multiple perspectives allows graduates to comprehend the complex interdependence between the profession and society. An enlarged understanding of the world and the ability to make judgments in the light of historical, social, economic, scientific and political issues is demanded of the professional as well as the citizen.

Entry-level graduates must understand the variety of cultures in which they may be rendering pharmaceutical care. This understanding must include a knowledge of cultural differences and a sensitivity to the way various cultures deliver health care and respond to health care provided by those outside the culture.

Contextual competence also refers to an understanding and appreciation of the roles that pharmacists play in the health care system as well as the problems faced by the profession as it strives to render care within a changing health care system in a changing world.

ii. Professional Identity -- The entry-level curriculum must infuse the entry graduate with a desire to improve the profession by advancing the knowledge, skills and values of the profession. The curriculum must develop within the entry graduate a pride in the profession. Professional identity parallels and supplements the liberal education goal of developing a sense of personal identity. The sense of personal worth and self-confidence that develops from experiencing success in professional practice, often including a contributing or altruistic relationship with patients, is an effective vehicle for gaining a sense of one's place in the world as an individual and citizen.

Pharmacists entering the profession must understand the nature of the profession, including its major successes as well as failures.

e. Self-learning Abilities and Habits -- include ability to self-assess and satisfy learning needs on an ongoing basis.

i. Adaptive Competence -- Entry-level graduates in pharmacy must be able to anticipate, adapt to and promote changes important to pharmacy's societal purpose. A liberally educated person has an enhanced capacity to adapt and to anticipate changes in society. Graduates must understand that professional practice is not static. Graduates must be comfortable with change and be capable of using change to further the goals of the profession as well as individual careers.

Adaptive competency is frequently referred to as the "entrepreneurial spirit." It focuses on taking risks, while emphasizing the skills of assessing and evaluating potential outcomes.

ii. Scholarly Concern for Improvement -- Entry-level pharmacy graduates must recognize the need to increase their knowledge to advance the profession through systematic, cumulative research on problems of theory and practice. The heart of the intellectual process is attention to a spirit of inquiry, critical analysis and logical thinking. Many critical analytic skills are developed as theory

and practice are integrated. However, the professional curriculum must be designed to foster among graduates an obligation to participate in inquiry and professional improvement.

iii. Motivation for Continued Learning -- Pharmacy practitioners expand personal, civic and professional knowledge and skills throughout their careers. The curriculum must instill in students the spirit of intellectual inquiry and curiosity and the motivation for learning and equip students to learn throughout their professional lives.

A profession dedicated to continued learning enhances the profession's ability to serve the public.

f. Social Interaction and Citizenship -- includes effective, interpersonal and intergroup behaviors in a variety of situations and circumstances.

i. Leadership Competence -- All education carries with it the responsibility to develop leadership capacity. This is particularly true for professional education where the problem-decision-action cycle may have broad environmental, social and individual ramifications. Not only does leadership imply functional and status obligations, it requires the intelligent, humane application of knowledge and skills.

Graduates must exhibit the capacity to contribute as productive members of the profession and assume leadership roles as appropriate in the profession and in society. The profession will continue to meet its obligations to society only in so far as it can change to meet societal needs. Change will not occur without sound leadership, and pharmaceutical education must foster the development of leaders among the student population.

2. Professional Outcomes/Competencies

Practice at the entry level demands that pharmacists draw upon pertinent competencies and other outcomes that enable them to perform the functions that support practice.

a. Solve problems and make decisions -- Patients present an array of drug therapy or diagnostic problems. Pharmaceutical care involves a series of problem-solving exercises to achieve the outcomes of care. In order that practitioners be successful in rendering pharmaceutical care, they must have the skills of inquiry, abstract logical thinking and critical analysis to separate real from illusionary problems, make judgments and decisions based on available data or identify additional data that may be required.

i. Gather and organize data and information pertinent to specific patients under their care.

ii. Interpret and analyze data.

b. Manage -- Pharmaceutical care encompasses a significant amount of management skills. Pharmacists develop and implement pharmaceutical care plans. They manage patients' drug therapies, supplies, personnel, departments, practices, money and their careers. Pharmacists must be able to measure therapeutic outcomes. The efficient and effective delivery of pharmaceutical care requires the effective and efficient management of a pharmacy practice. Students at the entry level must be able to use management theory in any of these activities as they organize, plan, direct and control pharmaceutical care systems.

c. Learn -- Practice is, in essence, a learning experience. Pharmacists must enter practice with the skills of learning from their problem-solving experiences. Moreover, entry-level practitioners must use the health-related, professional and disciplinary literature as a means of acquiring a continuing flow of new knowledge.

d. Communicate/Teach/Educate/Collaborate -- The results of pharmacists' problem-solving activities (their decisions) must be communicated to colleagues, other health professionals and patients. Moreover, as responsible members of society, pharmacists communicate with other citizens about health. Pharmaceutical education must prepare pharmacists who have the basic knowledge, confidence, attitudes and skills to read, write, listen and speak in an effective manner.

Communication skills must equip entry graduates with the ability to deal effectively with dissent. Graduates should be able to disagree articulately and persuasively regarding patients' therapeutic plans.

In the process of delivering pharmaceutical care, practitioners educate their patients, their colleagues, students, other health professionals and the public.

Pharmaceutical care is, by its nature, collaborative. It must be provided in collaboration with patients and other health professionals. Pharmacists advise, and seek advice from, other pharmacists and health professionals.

e. Participate in policy formation/professional governance -- Pharmacists must enter practice prepared "...to take active roles in shaping policies, practices and future directions of the profession." (2) This requires graduates to look beyond their immediate practice settings to the environment of the profession of pharmacy and the health care system.

Pharmaceutical education must prepare pharmacists to deal analytically with issues related to the organization, financing, delivery, reimbursement, access, quality and regulation of drugs and pharmaceutical services from a policy perspective as well as from a concrete practice perspective.

Graduates must be aware of methods of shaping change in the profession through policy formation in both the public and private sectors, working through local, state and federal governments, private organizations and institutions, and professional associations and groups.

IV. Curricular Content

A. Introduction

Both curricular content and process are critical to the successful achievement of the curricular outcomes just identified.

Over the past 15 years, numerous reports have been produced that deal with pharmaceutical education in general and the curriculum in particular. In 1977-78, the AACP Academic Affairs Committee (6) discussed curriculum components for competence attainment. The APhA Task Force on Pharmacy Education, in 1984 (14), issued a comprehensive report containing recommendations related to the pharmaceutical curriculum. In the years since the APhA Task Force report, AACP committees, principally the Academic Affairs Committees and the Argus Commissions (4-11) have focused on broad curricular problems confronting all of academia and outlining their relevance to pharmaceutical education. These reports provide a comprehensive analysis of the major issues facing education generally and pharmaceutical education specifically.

B. The Curriculum

A strength of pharmaceutical education is its diversity and innovation. Differences exist among pharmacy schools which govern the emphasis they place in curricular areas.

The APhA Task Force on Pharmacy Education (14) outlined a broad description of the curriculum ("Core Curriculum") to prepare a practitioner to enter practice. With minor modifications and additions, those curricular elements are as valid today as they were in 1984. The Commission has revised the "Core Curriculum" and presents it in Appendix A. An item listed in the Core does not necessarily mean that a course should be required to cover the indicated item.

The curriculum outline in Appendix A should be viewed as a guide to pharmacy school faculties about the content of the curriculum. Because faculties have generally been responsive to content changes in the curriculum, the Commission considers it most important for faculties to change the processes by which the material contained in a curriculum are translated into the competencies and outcomes necessary to enter practice.

V. Educational Process

A. Introduction

The AACP Focus Group on Liberalization of the Professional Curriculum is devoting considerable time and attention to educational process. It will greatly magnify the process described in the following. Moreover, the Focus Group will provide comprehensive assistance to pharmacy educators through reports, programs, workshops, seminars and other means.

The outcomes described in the preceding portions of this Background Paper occur as a result of the material contained within the curriculum and *the way in which students are taught*. A number of the outcomes cannot be taught by discrete courses; many are inculcated into students across the curriculum through a variety of techniques (15, 16). Professional pharmacy students must learn in school in the same manner in which they will learn throughout their careers: they will learn by solving patients' drug-related problems; they will learn facts as necessary for them to understand processes; and they will integrate new material with information already known.

Most students enter health professional schools, including pharmacy schools, as dependent learners; that is, they enter with the perception that it is the teachers' responsibility to teach students while de-emphasizing, if not ignoring, the responsibility of students to learn on their own. Students come to health professional schools adept at memorizing facts and the teaching methods at most professional schools readily focus on this ability. In practice, the practitioner must rely on his or her ability to interpret data in order to reach conclusions and solve problems. There is no "teacher" in practice (except other practitioners and the

patient). Consequently, in practice, the responsibility to learn must reside with the learner/practitioner. And so it must be while in school: the responsibility to learn must rest with the learner/student, not with the teacher.

It follows, then, that a major responsibility of pharmacy educators is to shift the burden of learning from the teacher to the student. The transition from a dependent learner to an independent learner must occur as the student progresses through the pharmacy curriculum. Students must understand that to become educated is to know what questions to ask and where the answers may be found.

Teaching must be achieved through educational processes which involve students as active learners. Teachers must view themselves as coaches and facilitators rather than merely as providers and interpreters of information.

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.

B. Teaching Problem Solving

Mastering the process of solving problems must occupy the focus of the teacher, not the content or nature of the problems themselves.

Because pharmacy practice is primarily a process of solving problems on behalf of patients, the education of entry-level practitioners must ensure that they are adept at problem solving.

Donald R. Woods (17) identified a number of skills necessary for problem solving:

- a knowledge base pertinent to the content of the problem;
- the ability to identify, locate, obtain and evaluate missing information;
- the ability to learn on one's own;
- such thinking skills as analysis, creativity, ability to generalize and to simplify and broaden perspectives;
- attitudes of motivation and perseverance;
- ability to cope with ambiguity, fear, anxiety and procrastination;
- interpersonal and group skills;
- communication skills; and
- an awareness of how one thinks, one's personal preference or style when learning or processing information.

Woods offers several suggestions related to the process of teaching problem solving:

- help students see the structure of their discipline;
- require students to acquire knowledge basic to the discipline;

- focus on problem solving as a skill;
- increase students' awareness of the processes they use; and
- continually question students about their progress.

Strategies which facilitate the acquisition of relevant knowledge and the development of skills necessary to provide pharmaceutical care follow:

1. Formal Lectures -- include formal lectures on decision making and logic.
2. Developmental Discussions -- These can be used in both the basic and clinical sciences. These discussions involve formulating and clarifying the problems; suggesting hypotheses; obtaining relevant data; and evaluating solutions. Discussions that are centered around clinical or management case studies and scientific situations help students with problem solving, communications, critical thinking, transfer of knowledge to new situations and integration. Because such discussions are viewed by the student as "relevant," they can help students retain material and motivate them to study with a different perspective. These discussions give students insight into the instructor's approach to the problem and often place the students in the situation in which they are teaching their peers.
3. Simulations -- Develop simulated environments where the student must evaluate data and make decisions. This may be done in small group discussions, on computers, role playing or by Guided Design (18). These simulations should allow the student to compare his or her thought processes to those of a professional.
4. Questions -- Faculty are encouraged to ask questions in all teaching situations, courses and environments. Questions that encourage students to think critically and to make comparisons and connections can be particularly useful.

The White Paper from the 1985-86 Academic Affairs Committee (5) identifies a number of ways to develop skills in inquiry; abstract, logical thinking; and critical analysis.

5. Early Practice Experience -- Introduce students into practice environments under controlled situations early and often during the curriculum.
6. Presentations -- Require frequent written papers and oral presentations assessing the ability of students to evaluate data and form conclusions.
7. Examinations -- Develop and use examinations and other assessment methods that evaluate abstract, logical thinking and critical analysis; measure progressive student growth throughout the curriculum; and allow students to self-assess their needs and progress.

Of special significance for pharmaceutical education is the question of how critical thinking is taught and evaluated. As with several other skills to be discussed in this section, critical thinking is a skill developed in many courses including the experiential portions of the curriculum. Faculties must ensure that didactic courses provide opportunities for students to examine and analyze controversial issues, reach conclusions and defend them.

C. Teaching Fundamental Information

Emphasis must be placed on fundamental biological, chemical and social mechanisms and systems rather than learning long lists of isolated facts.

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. Teachers must concentrate on the concepts on which science is based and on the importance of the scientific process in solving patients' problems. Teachers must deemphasize the relating of isolated scientific information via lectures. Most, if not all, of these "facts" of basic science are available in texts. Video and computer formats are growing as means of conveying science information to students. Students must be held accountable for the knowledge of facts while science faculty assist students to solve science-based problems in tutorial sessions or laboratories.

Common instructional strategies to impart fundamental information include:

1. Lectures -- Lectures provide a context to update textbook and literature information, summarize information, connect ideas, adapt material to pharmacy practice and to address controversy. Using questions and case studies in the lecture and tutorial settings can place students into an active learning mode.
2. Reading Assignments -- Reading assignments provide a frame of reference for material that is presented in the classroom. Reading is one of the most efficient methods of acquiring and understanding descriptive information.
3. Problem Sets -- Well-designed problem sets (on paper or on computer) can hone problem solving, critical thinking, application and integration skills.
4. Laboratories -- Laboratories provide opportunities for self discovery, and specific skill development. Properly planned and implemented, laboratories can teach as well as sharpen observation, problem-solving and analytical skills. Laboratories are efficient means to familiarize students with the scientific method:
 - Question dogma
 - Examine the unusual
 - Look for extremes
 - Use data
 - Understand the literature
 - Develop hypotheses
 - Conduct experiments
5. Experience in Research -- Opportunities to engage in research enables students, first hand, to learn the fundamentals of science and the scientific method of thinking.

D. Teaching Communications Skills

Acquisition of communications skills must be integrated throughout the curriculum.

1. Recitation -- Students must have many opportunities throughout the curriculum to present information to a wide variety of audiences (peers, the public, faculty and other health professionals). These opportunities should involve a mix of informal and formal presentations. Combined with videotaping, recitations provide students with teaching, summarization, verbal communication, organizational and resource-identification skills.
2. Writing -- Assigned papers and other projects develop the same skills as those in recitation but provide added dimensions. Students must be prepared to write persuasive, well-documented, informative and lucid papers and consult reports.

Most, if not all, courses should require written assignments. Examinations should provide for written analyses of problems. Because written works usually require several revisions before excellence is achieved, the educational process must reflect this and students should be provided the opportunities to revise their papers based on constructive criticism from faculty and peers.

Using other students to react to and criticize papers provides an educational opportunity for them as well as a means to implement time-consuming, but necessary critiques of written works.

3. Teaching Communications to Students Whose First Language is not English -- The massive demographic shifts occurring in the U.S. portend that increasing numbers of pharmacy students will have a language other than English as their first language. Because communications play such a critical role in the delivery of pharmaceutical care, and, consequently, in the curriculum, major efforts will be required of pharmacy faculty to develop strategies to ensure that students, no matter what their primary language, are competent to communicate effectively in English with patients, health professionals and the public.
4. Teaching Students to Communicate with Patients Whose First Language is not English -- These same demographic shifts are presenting the U.S. health care system with patients from an array of cultures. The curriculum must provide strategies so that students are able to learn to communicate with patients from other cultures.
5. Role Playing -- This is an effective technique to assist students to practice communications techniques and sharpen conflict resolution skills. Role playing also focuses students' attention on their future roles as educators and the process is useful in raising the comfort level of students in the role of educator.

E. Teaching Practice Skills

Many practice skills which support the entry-level practitioner are taught and refined in educationally sound and rigorous practicums called clerkships and externships (19-21).

Experiential education courses permit students to integrate their knowledge, skills, and attitudes into patient care behaviors. Clerkships and externships expose students to a variety of pharmacist role models and a variety of practice environments in which pharmaceutical care is rendered. While most clerkship and externship rotations are in pharmacy practice areas, some may be in nonpharmacy practice locations such as research, management and marketing.

In practice clerkship and externship rotations, students must render pharmaceutical care under the close supervision of preceptors. In rendering such care, it is expected that students will take drug histories, participate in drug therapy decisions, and monitor, educate and counsel patients. They must also have the opportunity to evaluate drug therapy and present and justify their findings/conclusions to preceptors and other health professionals. Examples of such appropriate activities include the presentation of inservice programs, participation in grand rounds and the presentation of patients seen in community practice clerkships and externships.

VI. Recommendations

1. The Commission recommends that the AACP adopt pharmaceutical care as the philosophy of pharmacy practice on which practitioner education must be based.
2. The Commission recommends that AACP member schools and faculty immediately commit themselves to curricular change which:
 - a. engenders competencies and outcomes essential to pharmaceutical care; and
 - b. strengthens the effectiveness of the process of pharmaceutical education.

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APPENDIX A

Core Curriculum

This curriculum outline should be viewed as a guide to pharmacy school faculty about the content of the curriculum. An item listed in the Core Curriculum does not necessarily mean that a course should be required to cover the indicated item.

1. General Education -- The purpose of general education in the curriculum is to prepare educated, professional practitioners who are capable of understanding and appreciating society and their role in it as health care providers. General education, traditionally, has been provided to students in the initial phases of their education (pre-pharmacy). More recently, it has been recommended that elements of general education be interspersed throughout the professional pharmaceutical curriculum (4,5,9,10).
 - Oral and Written Communication Skills
 - Social Sciences
 - Behavioral Sciences
 - Humanities
 - Computer Literacy and Information Technology
 - General Science -- Students must learn how knowledge is created and be introduced to the scientific method.

2. Basic Physical and Biological Sciences and Mathematics. Chemistry, physics, biology and microbiology course elements should contain associated laboratories or field experiments.
 - Mathematics Including Calculus
 - General Chemistry
 - Organic Chemistry
 - Physics
 - Cell Biology and Microbiology

3. Biomedical Sciences
 - Anatomy
 - Physiology
 - Biochemistry/Molecular Biology
 - Immunology
 - Biostatistics

4. Pharmaceutical Sciences
 - Medicinal and Natural Products Chemistry
 - Pharmaceutics and Pharmaceutical Chemistry (includes basic principles and applications of dosage forms, drug standards, quality control, biopharmaceutics, and pharmacokinetics)
 - Pharmacology and Toxicology

- Pharmacy Administration (includes management, marketing, leadership, behavioral science, and knowledge of drug distribution and health care delivery systems)

5. Clinical Sciences

- Epidemiology
- Health Promotion and Disease Prevention
- Pathophysiology
- Clinical Laboratory Medicine
- Clinical Pharmacokinetics
- Clinical Pharmacology and Therapeutics
- Physical Assessment

6. Practice Experiences (All Students)

- Drug Information and Literature Evaluation
- Ethical Principles Pertaining to Professional Practice
- Laws
- Experiences in Ambulatory, Inpatient and Managed Care Environments

7. Practice Experiences (Optional Tracking Opportunities)

- Differentiated Practices (long term care, home health care, hospice)
- Specialized Practices (nuclear pharmacy, pharmacotherapy, nutrition support)
- Outpatient Health Care Settings (community health clinics, satellite settings)
- Medical Specialties (outpatient or inpatient)
- Nontraditional Experiences (industry, wholesale, management)