

AACP CURRICULAR CHANGE SUMMIT SUPPLEMENT

Addressing Competencies for the Future in the Professional Curriculum

Paul W. Jungnickel, PhD,^a Kristi W. Kelley, PharmD,^a Dana P. Hammer, PhD,^b
Stuart T. Haines, PharmD,^c and Karen F. Marlowe, PharmD^a

^aHarrison School of Pharmacy, Auburn University

^bSchool of Pharmacy, University of Washington

^cSchool of Pharmacy, University of Maryland

This paper reviews the literature, analyzes current and future practice, develops a list of competencies necessary for future pharmacists, and provides recommendations to pharmacy's academic enterprise regarding curricula of the future. Curricula of the future will center around 3 functional roles for pharmacists: patient-centered care, population-based care, and systems management; and must also foster the development of 5 cross-cutting abilities in student pharmacists: professionalism, self-directed learning, leadership and advocacy, interprofessional collaboration, and cultural competency. Future curricula must be developed in an evidence-based manner, focus less on information storage and retrieval, engage student pharmacists in a variety of highly interactive learning experiences, and expand experiential learning opportunities throughout all years.

Keywords: competencies, curriculum, professionalism, cultural competency, self-directed learning

INTRODUCTION

Ongoing changes in pharmacy practice and pharmacists' roles will require practitioners to have a different and enhanced set of competencies if they are to seize future opportunities and catalyze the reforms needed in the healthcare system. To meet the educational needs of future practitioners, academic pharmacy must project future practice competencies. Only by doing this can rational plans for pharmacy curricula be developed. This paper reviews the literature, analyzes current and future practice, develops a list of competencies necessary for future pharmacists, and provides recommendations to pharmacy's academic enterprise regarding curricula of the future. We approached this work with the following underlying suppositions:

- (1) Curricula of the future will center around 3 functional roles for pharmacists: patient-centered care, population-based care, and systems management. Curricula must also foster the development of 5 cross-cutting abilities in student pharmacists: professionalism, self-directed learning, leadership and advocacy, interprofessional collaboration, and cultural competency.
- (2) Curricula of the future will prepare individuals for the next stage of their development. Pharmacy graduates are not "fully developed" to

move into their roles as autonomous, independent professionals and will likely require additional training following graduation. Curricula of the future will enable graduates to successfully identify and move into their next stage of development.

- (3) Curricula of the future must be developed in a systematic and evidence-based manner. The process of curricular revision should not be governed solely by the values, interests, and expertise of current full-time faculty members.
- (4) Curricula of the future will not focus extensively on information storage and retrieval, will expand experiential learning opportunities that are interwoven through all years, and will not focus solely on the patient-centered care role of pharmacists. Such curricula will involve student pharmacists in highly interactive educational experiences.

Mission and Societal Purpose of Pharmacy

Any discussion of the practice and educational programs of any profession must begin with an understanding of the profession's mission within society. Societies provide favored status to professions because their members possess specialized knowledge. Inherent in this is a covenant in which professionals use their expert abilities in the best interest of patients.

Over the years, pharmacy has struggled to receive full recognition as a profession.¹ This is largely due to the

Corresponding Author: Paul W. Jungnickel, 2316 Walker Building, Auburn University, AL 36849. Tel: 334-844-8348. Fax: 334-844-8353. E-mail: jungnpw@auburn.edu

responsibilities that pharmacists typically perform as part of their practices, that of fulfilling orders of physicians and other health professionals with prescribing privileges, as well as the commercialized setting in which most community-based pharmacists practice.² Beginning in the 1960s, the clinical pharmacy movement created a *reprofessionalization* of pharmacy that has impacted some segments of the profession far more than others.³ While the clinical pharmacy model has become a predominant component of practice in most hospitals and many organized health care systems, the advancement of clinical or patient-centered care services in community pharmacy settings has been far less pervasive. In 1990, pharmaceutical care was defined as “the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient’s quality of life. These outcomes are (1) cure of a disease, (2) elimination or reduction of a patient’s symptomatology, (3) arresting or slowing of a disease process, or (4) preventing a disease or symptomatology.”⁴

Pharmaceutical care, however, was not widely known outside of the pharmacy profession and did not radically transform practice as many had hoped. The profession is now focused on the concept of medication therapy management (MTM). A coalition of pharmacy organizations has developed a definition of MTM services and criteria for MTM programs.⁵

The contrasts between pharmaceutical care and MTM are significant, with pharmaceutical care articulating a core responsibility and purpose for the profession of pharmacy. MTM is a more clearly focused set of tasks that pharmacists can perform with the goal of improving patients’ drug therapy. Recent reports focusing on the future of pharmacy practice do not use the term pharmaceutical care, but use language that embraces the pharmaceutical care concept.⁴ For example, the Joint Commission of Pharmacy Practitioners’ (JCPP) Vision Statement for Pharmacy Practice in 2015 states “Pharmacists will be the health care professionals responsible for providing patient care that ensures optimal medication therapy outcomes.”⁶ For the profession of pharmacy to move forward and achieve this vision by 2015, pharmacy organizations and individual pharmacists will need to convince other health care providers, payers, legislators, and the public of pharmacy’s value to individuals and the health care system. From the standpoint of pharmacy education, it will be necessary for pharmacy schools to prepare graduates with the competencies to enable the profession to assume responsibility for drug therapy outcomes, as well as the desire and skills to advance the profession. These require development of a statement of competencies that are necessary for future practice and

curricula that will prepare pharmacy graduates with these competencies.

FUTURE PRACTICE COMPETENCIES

Over the past 2 decades, various pharmacy organizations have developed lists of competencies and position papers that are useful in providing future direction for pharmacy practice and education. In Background Paper II, The Commission to Implement Change in Pharmaceutical Education issued the first listing of outcomes/competencies that formed the basis for its recommendation in 1992 that pharmacy move toward the doctoral degree as the first professional degree.⁷ As a follow-up to the Commission’s work, the American Association of Colleges of Pharmacy (AACCP) founded the Center for the Advancement of Pharmaceutical Education (CAPE) in 1992. In 1994, CAPE published its first set of educational outcomes “which were intended to be the target toward which the evolving pharmaceutical curriculum should be aimed.”⁸ Revised sets of CAPE Educational Outcomes were subsequently published in 1998 and 2004. The 2004 CAPE Outcomes provide listings of practice-specific outcomes (or competencies) in 3 major areas: (1) pharmaceutical care (provided to individual patients and populations of patients), (2) management (of human, physical, medicinal, informational, and technological resources, as well as medication use systems), and (3) public health (focusing on the availability of health and disease prevention services and public health policy).⁸

The JCPP Vision Statement for Pharmacy Practice in 2015 identifies similar themes and pharmacist competencies.⁶ The first theme is that pharmacists of the future will consistently provide patient-centered and population-based care that improves drug therapy outcomes and will have a significant role in wellness and disease prevention activities. A second theme is that pharmacists will have the authority and autonomy to manage drug therapy and will be held accountable for the outcomes achieved. The final theme, though not explicitly stated, is that pharmacists will be recognized and paid for practice functions that improve drug therapy outcomes irrespective of whether a drug product is dispensed or distributed to the patient. Various JCPP member organizations including the American College of Clinical Pharmacy (ACCP), American Society of Health-System Pharmacists (ASHP), American Pharmacists Association (APhA), National Association of Chain Drug Stores (NACDS), and National Community Pharmacists Association (NCPA) have developed position papers and initiatives that extend the JCPP’s vision for practice.⁹⁻¹²

Future practice competencies for pharmacists cannot be developed in isolation from the functions of other

health professionals and must consider the health care delivery systems in which they will practice. In this context, the Institute of Medicine (IOM) has evaluated future practice roles in what will be more organized and systematic health care delivery systems, and has developed 5 core competencies that are required of future members of all health professions.¹³ Health professionals of the future must (1) provide patient-centered care to diverse populations, (2) work effectively as members in interprofessional teams, (3) employ evidence-based practice to optimize care, (4) apply quality improvement techniques, and (5) utilize informatics in practice.

The IOM Report clearly supports the need for health practitioners to possess the cross-cutting abilities stated at the outset of this paper. These abilities also serve as a medium through which practice-specific competencies may be developed. As they prepare practitioners, pharmacy schools must ensure that each of these cross-cutting abilities are taught, assessed, and measured in a systematic manner.

Professionalism

All professionals need to be ethical, honest, selfless, and demonstrate the utmost integrity. Despite pharmacy's lack of "full profession" status, pharmacists have been widely known as trustworthy professionals in society, ranking at or near the top of the Gallup Poll's Honesty and Ethics annual ratings.¹⁴ Maintaining this status is becoming difficult, however, as reports of unethical and even harmful behaviors by professionals and role models regularly appear in the media.

At the heart of professionalism is the concept of putting others' needs above your own. The American Board of Internal Medicine's Professionalism Project described 6 tenets of professionalism: altruism, excellence, duty, accountability, honesty and integrity, and respect for others.¹⁵ These tenets have also been described for pharmacy, with the notion that the true purpose of colleges/schools of pharmacy is to develop practicing professionals who provide care for patients, not just technically competent drug experts.¹⁶ The late Bob Chalmers described professionalism as:

...displayed in the way pharmacists conduct themselves in professional situations. This definition implies a demeanor that is created through a combination of behaviors, including courtesy and politeness when dealing with patients, peers, and other health care professionals. Pharmacists should consistently display respect for others and maintain appropriate boundaries of privacy and discretion. Whether dealing with patients or interacting with others on a health care team, it is important to possess—and display—an empathetic manner.¹⁷

The concept of professionalism is so broad that the other cross-cutting abilities discussed in this paper could be subsumed in it. What is most important, however, is that schools should define professionalism specifically and explicitly for their students, faculty members, preceptors, administrators, staff members, and others so that expectations are clear and strategies for its development and measurement are possible.

Self-Directed Learning Competencies

The literature related to pharmacy and medicine is increasing at an astronomical rate. Schools of pharmacy cannot teach or assure knowledge of all relevant topics for pharmacists. According to the ACCP White Paper on Clinical Pharmacist Competencies, "Providing quality patient care requires a knowledge base that is continuously expanded and being updated."¹⁸ The tools available to assist pharmacists with managing information are improving, making access to new and emerging knowledge easier. Thus, each practitioner can and must remain a dedicated learner throughout his/her years in practice. A lifetime of self-directed learning will be required for pharmacists to be viewed as pharmacotherapy experts by other health care professionals.¹⁹ Development of these skills through a learner-centered curriculum should be assessed in every school. A survey of pharmacy professors and administrators regarding outcomes important to lifelong learning found self-reflection to be an important outcome that most schools could teach and evaluate.²⁰ Respondents also believed it was reasonable to expect student pharmacists to collect evidence of their accomplishments and to collaborate with peers and instructors, utilizing them as a resource to validate and bolster self-directed learning. Pharmacists who have been trained in a predominately faculty-centered model will not develop these skills as efficiently.¹⁹ Student pharmacists should also be encouraged to critically assess their own developmental needs in various domains. Reflective journaling and the use of portfolios can assist student pharmacists in development of this competency. However, to be effective, portfolios and journaling should be implemented with adequate planning for assessment, including measures of validity.^{20,21}

Assessing self-directed learning skills is difficult. Schools of pharmacy can assess drug information skills of student pharmacists related to information retrieval and analysis.^{20,22} The current model of continuing education has failed to meet the ongoing needs of patients and to move new knowledge into practice. Other continuing education models, such as continuing professional development, supplemented by credentialing and certification, can be helpful in this process of encouraging lifelong

learning and promote further knowledge acquisition and skill development. Self-directed learning can perhaps best be demonstrated during practice experiences and in the credentialing process after graduation.

Leadership and Advocacy

Perhaps the most important competencies/skills needed for the future of pharmacy are those related to leadership, advocacy, entrepreneurship, and serving as a catalyst for positive change. Some argue that pharmacy has yet to reach its potential in the US health care system because many pharmacists are complacent.²³ Various groups of nonphysician healthcare practitioners (eg, nurse practitioners, optometrists) have successfully lobbied and obtained prescribing privileges, while pharmacists, who have more training in drug therapy than these other providers, have not consistently pursued prescribing authority. A related example is the emergence of minute-clinics in retail pharmacies that are staffed with nurse practitioners and physicians assistants, while pharmacists remain behind the counter filling prescriptions. Another facet of leadership is the acceptance of responsibility, including legal liability. Are pharmacy graduates willing to shoulder the responsibility and liability that come with a greater clinical role? Since pharmacists already receive high salaries, it is easy for them to be complacent because there is no real or direct incentive to promote change in practice or accept greater responsibility.²⁴ Also, many student pharmacists' personalities are not geared toward being proactive.²⁵⁻²⁸ Although there are hundreds of pharmacists and student pharmacists who are leaders and agents of change, there have not been large-scale outcries, strikes, or movements among pharmacists to promote change in practice.

In their series on practice change, Nimmo and Holland describe *professional competence* as a competence that pharmacists must have to reach their practice potential.²⁹⁻³³ However, the caveat is that "...the practitioner wishes to make a change in practice, has the opportunity to learn any required new knowledge and skills, and functions in a work environment where the change in practice will be welcomed."³⁰ Student pharmacists must develop the skills and desire to create positive change in their current and future practices.

Interprofessional Collaboration

Interprofessional care centers around the concept that health care providers will approach and provide coordinated care to patients through "mutual goals, resources, and responsibility."³⁴ Although *interprofessional* and *interdisciplinary* may be used interchangeably in health professions education and practice, interprofessional refers to what's occurring in clinical practice while interdisciplinary

refers to the educational process associated with interprofessionalism.³⁴ It is important to distinguish interprofessionalism/interdisciplinary from *multidisciplinary* which refers to "different aspects of a patient's care...handled independently by appropriate experts from different professions" and often "delegated from one profession (usually a physician) to another (eg, pharmacists, nurse practitioners)."^{34,35} In Remington's *Evaluation of Evidence for Interprofessional Education*, the definition of interprofessional care is "...a joint assessment and/or management of patients by health professionals from more than one discipline...closely linked in time and space."³⁵

Whether examining ACCP's definition of clinical pharmacy or looking to the initiatives and long-range plans of pharmacy organizations, many recognize the need for pharmacists to serve as members of interprofessional teams.⁹⁻¹¹ To work in collaboration with other health care professionals requires knowledge of others' roles as well as the ability to communicate and interact with them. As pharmacists assume their roles as part of the health care team providing patient-centered care, they will need to be competent in interprofessional collaboration.³⁶

Interprofessional education (IPE) in its simplest form occurs on "occasions when 2 or more professions learn with, from and about each other to improve collaboration and the quality of care."³⁶ IPE is in contrast to multiprofessional education which has been defined as "...members of 2 or more professions learning alongside one another in parallel rather than interactive learning."³⁷ To achieve interprofessionalism in practice, students need to learn about and participate in interprofessional care during their education.

Cultural Competency

Cultural competence is "a set of congruent behaviors, attitudes, and policies that come together in a system, agency, or profession that enables that system, agency, or profession to work effectively in cross-cultural situations."³⁸⁻⁴¹

Various pharmacy organizations have recognized the need for pharmacists to be culturally competent, realizing pharmacists must draw on information that is not just scientific when dealing with patients, caregivers, and other healthcare providers from diverse cultural backgrounds. Although the literature has revealed several risks of allowing pharmacists without cultural competency to provide pharmaceutical care, the ultimate concern is poor patient outcomes.^{41,42} The literature on cultural competence acknowledges that being culturally competent is a choice that both pharmacists and student pharmacists must make.^{40,43} Achieving cultural competence should be the ultimate goal of all pharmacy practitioners. Since

achieving cultural competence is an ongoing process, it will not be fully developed at the time of graduation from pharmacy school.

CORE PRACTICE ROLES

Most pharmacy educators and practitioners believe that there are 3 core domains of pharmacy practice. These domains are articulated in AACP's CAPE 2004 statement on educational outcomes, namely: pharmaceutical (or patient-centered) care, systems management, and public (or population) health.⁸ We believe that these core domains will remain key functional areas in pharmacy practice and that all pharmacy graduates will need to attain at least a modest degree of competency in all 3 domains. While the authors have provided a proposed list of future competencies in each of these core domains (Appendix 1), we do not believe that articulating a complete, exhaustive, and universally adopted list of competencies that all pharmacy graduates should possess is productive. Rather, individual colleges and schools of pharmacy must develop a list of competencies that meet nationally accepted standards, address local and regional needs, build on their institutional strengths, and enable their graduates to move forward into practice well prepared for the next stage of their development.

While the terminology used to describe the patient-centered care activities of pharmacists (pharmaceutical care vs. medication therapy management vs. pharmacist) continues to evolve, this core practice role is likely to grow in the foreseeable future in terms of expanded scope and amount of time that most pharmacists commit to engaging in these functions. While there are several core competencies that all pharmacists should possess, specialization in this role is inevitable (as we have witnessed in medicine, nursing, and other fields). A pharmacist of the future cannot be expected to manage the entire array of complex therapies available. Nor can a future pharmacist be expected to expertly address the medication-related needs of all patient populations (neonates, pediatrics, adults, elderly) in all care settings (community-based pharmacies, clinics, hospitals, long-term care facilities, psychiatric facilities, hospice, etc). Thus, in the future, specialization will be the norm rather than the exception.

The second core domain of pharmacy practice is public or population health. This includes a variety of professional functions that improve the health of populations, not merely individuals. The use and cost of medications are likely to increase; therefore, so will the roles and responsibilities of pharmacists to develop policies, implement programs, and monitor data that lead to enhancements in the population's health. Similar to the patient-centered care

roles of pharmacists, the population-based functions of pharmacists will become increasingly specialized.

The third core domain of pharmacy practice is systems management. The authors of CAPE 2004 envisioned this core domain to include pharmacist management of people and other resources to achieve the profession's mission. In practice, there are a variety of systems and programs that pharmacists manage. In nearly all settings, pharmacists are expected to take a leadership role in overseeing the integrity of drug products and drug delivery systems. However, many of the day-to-day functions of drug delivery are increasingly delegated to pharmacy technicians and/or accomplished through the use of technology. We believe this trend will continue, but this shift in responsibilities will require pharmacists to develop a new set of competencies. Here, too, specialization will emerge.

While each of the core domains of pharmacy practice (patient-centered care, population health, and systems management) are important, should each be given equal weight, time, and resources within the curriculum? Each college or school of pharmacy is likely to answer this question differently based on the institution's strengths (and weaknesses) and input from its stakeholders. The amount of time and resources allocated to achieve specific competencies will largely depend on the degree of mastery expected. The level of mastery, however, is left to institutions to define, at least until such time as national standards emerge.

PREPARING THE NEXT GENERATION OF PHARMACISTS

Role of Postgraduate Training

There has been significant debate among pharmacy educators and practitioners regarding what can be realistically achieved in first-professional degree PharmD programs and what the appropriate role of postgraduate training should be. Many pharmacy educators argue that doctor of pharmacy programs should sufficiently prepare graduates to enter pharmacy practice in most settings as autonomously functioning practitioners. Conversely, many practitioners, including a majority of pharmacy practice faculty, believe that postgraduate training should be required before pharmacists assume patient-centered care roles.^{44,45} Pharmacists, they argue, like physicians, need a guided transition period before assuming patient-centered care roles. Moreover, recent graduates need a period of intensive training in a specific practice environment before they can practice independently in that environment. Pharmacy degree programs cannot provide this degree of depth. Lastly, proponents for residency training point out that pharmacists will be asked to assume

Table 1. Growth in PGY1 Residency Programs, Positions, and Applicants 1998 to 2008

	1998	2002	2008
PGY1 Residency Programs (Accredited)	247	380	711
PGY1 Residency Positions (Accredited)	582	887	1769
PGY1 Residency Applicants (in Match)	737	802	2092

Data source: Janet L. Teeters, MS, RPh, Director, Accreditation Services Division, American Society of Health-System Pharmacists, personal communication.

responsibilities in the future practice model that will require considerable judgment.

Whether postgraduate training will be required or a general expectation for those entering patient-centered care roles in the future remains to be seen. Regardless, pharmacy practice is becoming increasingly specialized. Specialization will fuel the growth of postgraduate education, training, and credentialing as the number of graduates who seek residency training (Table 1), and subsequently become board certified, is substantial and growing.

Specialization is not limited to patient-centered care roles. Specialization has begun to develop in systems management and population-based health roles as well, and postgraduate education and training aimed at developing pharmacists for these roles is sorely needed. While residencies have become the dominant model for achieving specialization in patient-centered care roles, it seems likely (and desirable) that other models for education and training will emerge for those who pursue other specialized roles in pharmacy practice.

Colleges and schools of pharmacy should not exclusively prepare individuals for a specific practice role or practice setting. Society needs a variety of well-educated individuals with advanced training to fulfill the wide variety of pharmacy practice roles in patient-centered care, population-based care, and systems management in all settings of care (community, acute care, long-term care, managed care, etc). Mastery in each of these roles likely requires additional training beyond the first professional degree. Moreover, some of the competencies required for autonomous, independent practice are setting-specific. If the majority of pharmacists in the future will need specialized knowledge and skills to be competent in their chosen role and practice environment, the professional curriculum of the future will need to focus on developing the fundamental competencies needed for pharmacists to successfully move into the next stage of their development, rather than immediately entering practice as a fully prepared and autonomously functioning professional.

Required Knowledge, Skills, Values, and Attitudes

The complexity of pharmacy curricula should encourage a professional approach to learning. During their time in pharmacy school, students should be considered *student pharmacists*, in line with an attitude that other health professionals have had for longer time periods compared to pharmacy. The term *student pharmacist* sets a tone that differentiates professional education from undergraduate learning. More traditional student mentalities, such as a focus on acquiring information primarily for test results, lead to poor outcomes within professional curricula. Such mentalities lead to information and skills not being viewed as cumulative across the curriculum. In turn, pharmacy curricula should be designed so that student pharmacists encounter concepts and skills in multiple contexts to allow them to integrate/synthesize relevant information and skills in a progressive fashion.

Prepharmacy Education

The prepharmacy preparation of student pharmacists prior to pharmacy school greatly impacts the nature of the professional program that can be offered. There are, and will continue to be, differing opinions on what pharmacy school entrance requirements should be. This paper is written from the framework that colleges and schools of pharmacy need to have preprofessional prerequisite requirements that are sufficient to ensure that entering student pharmacists are prepared to engage in curricula that consist primarily of the pharmaceutical disciplines and practice experiences. Thus, prepharmacy education should provide an adequate foundation in the humanities, social sciences, physical sciences, and biological sciences, as well as prepare entering student pharmacists with adequate problem-solving and communication skills.

Pharmaceutical and Clinical Sciences

Traditionally content for courses was developed by individual faculty members based on knowledge and interest areas as well as available literature. Curricular mapping of content was completed after content was delivered to students and not linked to either evaluation or assessment. As discussed previously, the breadth of information in healthcare cannot be covered in any pharmacy school curriculum. It is more appropriate for the identification of core content to occur much later in the curricular development process. Curricula begin with a finite amount of time and outcomes. Time should be allocated across endeavors, courses, or competencies depending on the teaching and learning approaches selected by the school to best achieve these outcomes. Once the identification of course intent or mission occurs, clear learning outcomes should be established for each course in the curriculum

and time allocated for each outcome within the courses. Delivery of content, activity types, and assessment types should flow from prioritization of learning outcomes. This should occur with the realization that the content included is representative of, but not inclusive of, all available material. If students are taught using inquiry-based models and required to synthesize information, they will be better prepared to be self-directed learners for life. After initial delivery, results of peer and student evaluations, assessments, and instructor reflections should be used to refine content and integration of material between courses. Ideally this review process would occur as a continuous quality improvement process within the school and, in some cases, could include external review to improve curricular validity.

The development of professional competency extends far beyond the mere acquisition of knowledge. Lecture-oriented classes generally result in students being passive learners, with information memorized in the short term for an examination but forgotten afterward. Lectures provide little opportunity for students to engage in thinking or problem-solving activities, and are limited in their ability to elicit traits of professionalism. Faculty members need to extensively implement active-learning strategies that will improve retention of knowledge, thinking abilities, and problem-solving, and foster development of professional traits.

Learner-centered instruction. Learner-centered instruction is an educational paradigm where the focus of education shifts to the needs of learners, rather than rigid structures solely designed by institutions and their faculty members. Learner-centered approaches recognize that students learn differently and at different rates, thus approaches that are solely teacher-directed or utilize one predominant teaching approach will limit the learning of a significant portion of students in a class. Barr and Tagg have described how learner-centered approaches can impact and change higher education.⁴⁶

Inquiry-based learning. Inquiry-based approaches are learner-centered, focusing on the concept that learning should be based around discovery and constructivist approaches.^{47,48} Students learn by discovery, as they ask questions in response to problems they are given, with the teacher serving as a guide rather than a source of knowledge. As they develop and answer questions in the context of prior knowledge, students are able to create new knowledge and solutions to problems. Inquiry-based approaches may have particular value in health professions education by allowing students to learn material in the process of applying it to solving actual patient care problems.

Problem-based learning. Problem-based learning (PBL) can be characterized as a type of inquiry-based

learning. As applied to health professions education, a patient care problem is encountered to initiate the learning process, and learning occurs in the context of solving the problem. Thus, learning occurs in contexts that will be subsequently used in practice.

In the United States, PBL has been used by a number of schools of medicine and veterinary medicine to teach major portions of their preclinical curricula.^{49,50} In pharmacy education, classic PBL has been used in the third year to teach clinical therapeutics at the University of Mississippi School of Pharmacy, and more recently at the Auburn University Harrison School of Pharmacy.⁵¹⁻⁵³ Other pharmacy schools have used variations of PBL in different educational contexts including large classrooms and various types of experiential learning.⁵⁴⁻⁵⁷

In classic PBL, groups of 6 to 8 students work in conjunction with a tutor or facilitator whose role is not to serve as a source of knowledge, but instead to guide students in the learning process. Student groups are presented with a problem, identify knowledge needed to solve the problem (referred to as learning issues), engage in self-study, and in the next group session, apply their learning towards the resolution of the problem. Students teach each other in this group-learning process and, in conjunction with the facilitator, hold their group mates accountable for performing their fair share of the work.

When considering the incorporation of PBL and other learner-centered and inquiry-based strategies for use in their educational programs, pharmacy schools need to understand the rationale for utilizing such strategies. As knowledge continues to increase, it simply cannot all be added to a doctor of pharmacy curriculum. PBL and other inquiry-based approaches should be used to develop thinking abilities and problem-solving skills, and foster self-learning and a commitment to lifelong learning. In addition, the nature of the PBL group process can help student pharmacists develop responsibility and accountability for their assignments, as well as professional commitment, thus better preparing them for practice experiences.

Skills Development

To best learn how to be a pharmacist, students should begin practicing early and often in their professional training with plenty of accurate, constructive feedback. Thus, introductory practice experiences, simulations/proxy experiences, and learning about the profession and pharmacists in general should occur early in the curriculum. This can be done concurrently and integrated with basic pharmaceutical sciences curricula upon which students will build therapeutic knowledge later in the curriculum.

Ideally, pharmacy students should serve as “apprentices” to role model practitioners — those pharmacists who truly care for patients in a way that produces positive outcomes that are also financially and practically feasible. These practitioners would also need to be good teachers, allowing students opportunities to practice their skills while providing them with constructive feedback. Apprenticeships like this are unrealistic, however, due to a lack of these role models for each individual student as well as the lack of standardization across experiences. A next best option, which should be coupled with some sort of introductory practice experience, is participation in simulated pharmacy environments. Most often this takes place in “skills labs,” or dedicated facilities and curricula to directly prepare students for their roles as pharmacists. Curricula in these laboratories often mimic the wide variety of pharmacist role functions, from preparation, dispensing, and administering medications; to physical assessment and triage; to interactions with other health care providers. Curricula often also include interactions with standardized patients for consistent simulated patient encounters, and “integrated” activities where basic science knowledge is applied to patient care. Many laboratories use objective structured clinical examination (OSCE) experiences to measure students’ progress toward learning various skills, which might include standardized patients. OSCE-type measures are better suited than traditional pencil-paper examinations to measure skill acquisition, but are also time and resource-intensive. Skills laboratory curricula and practice experiences along with simulations should be integrated throughout the didactic experience. Some schools may even choose to employ OSCE-type examinations during advanced pharmacy practice experiences (APPEs) to measure skill acquisition.^{58,59}

Experiential Education

As with any health professional education program, an experiential component of the educational experience is vital to students’ learning and preparation for entering practice postgraduation. ACCP’s White Paper “Quality Experiential Education,” defines experiential education “. . . as a methodology in which educators engage learners in direct experience and targeted reflection in order to increase knowledge and to develop skills, behaviors, and values.”⁶⁰ Experiential education encourages students to be active, motivated, self-directed learners, which will be essential to fulfill future practice roles.

Duration and scope. ACPE’s Standards 2007 currently require 300 hours of introductory pharmacy practice experiences (IPPEs) as well as 1440 hours of APPEs.⁶¹ However, when planning curricula for the fu-

ture, if the competencies outlined above are to be achieved, more time will be needed to develop higher-order skills. Practice-based experiences are often the best place for this to occur. To accomplish this, the experiential portion of a 4-year PharmD program may need to be expanded to as much as 2 years (or 4000 hours). Since experiential education should occur throughout the curriculum, the current distinction between IPPE and APPE seems arbitrary and stifles curricular innovations that seek to integrate optimal practice experiences at appropriate times. Although most academicians/educators believe that didactic coursework must precede application in the form of practice experiences, there is little empirical data to support this supposition.

The 2005 AACP Academic Practice Partnership Initiative “Summit to Advance Experiential Education in Pharmacy,” recommends that “students should enter the final professional year adequately trained to begin providing patient-centered care as outlined in the JCPP ‘Pharmacy Practice in 2015’ vision.”⁶² However, this recommendation addresses only the patient-centered care role. Student pharmacists need to have experiences in population-based care and system management as well. Because of the considerable time that it takes to develop proficiency in providing population-based care, system management, working in interprofessional settings, and achievement of cultural competence, it is not reasonable to expect student pharmacists to consistently develop proficiency in all of these areas in a single year.

Pharmacy education does not appear to be well served by the current ACPE mandate of 300 IPPE hours, with the majority of these hours being in community and institutional practice venues.⁶¹ The current IPPE requirements lead to IPPEs that are primarily distributive in nature and located in traditional practice settings, thus limiting the ability of colleges and schools of pharmacy to implement approaches that might be more educationally effective.⁶³ Ideally, early practice experiences would start in the first professional year “. . . and be structured so that experiences build on one another, culminating with advanced pharmacy practice experiences.”⁶⁴ If this is the goal, then it would make sense that student pharmacists would need to participate in patient-centered care during the first professional year. While this may be challenging, there are ways to structure these practice experiences while concurrently teaching students in the classroom regarding the knowledge, skills, and attitudes needed to perform these practice activities. For example, the Auburn University Harrison School of Pharmacy developed a longitudinal patient care program where student pharmacists continuously engage in providing community-based patient-centered care throughout their first 3 years in pharmacy school.⁶⁵

Pharmacy practice experiences must be integrated with the rest of the curriculum in a manner that results in the achievement of defined competencies. Therefore, it is essential for competencies to be established that student pharmacists will develop through their practice experiences. However, most practice competencies are developed through a dynamic interplay between curricular components and practical application, and not solely developed in the experiential learning environment. This further supports the idea that practice experiences should occur continuously throughout the curriculum, not in discrete, isolated blocks.

Development of Professionalism in Student Pharmacists

How can schools develop professional character in student pharmacists? Some argue that these traits cannot be taught – they are inherent in varying degrees when students enter pharmacy programs. While this may be true to a certain extent, the process of professional socialization posits that students learn “the values, behaviors and traits” of their professions during their training.⁶⁶ Some longitudinal studies with medical and nursing students in the 1950s, 1960s, and 1970s demonstrated that the socialization process was primarily impacted by (1) role models, (2) the environments in which they learned, and (3) values and character traits that students had prior to beginning professional training.^{67,68} These findings should encourage colleges and schools of pharmacy to include professionalism outcomes as essential components of their programs.

The White Paper on Pharmacy Student Professionalism identified several areas in the academic environment through which professionalism can be developed: recruitment, admissions, the educational (didactic and extracurricular) program, and practice (experiential program).⁶⁹ Therefore, it makes sense that the pharmacy school admissions procedures should include assessment of professional traits in the evaluation of applicants, and that expected professionalism outcomes should be stated and evaluated in all student pharmacists. While a full description of potential strategies for developing and evaluating professionalism is beyond the scope of this paper, readers can refer to the White Paper as well as the *Pharmacy Professionalism Toolkit for Students and Pharmacists*, which was an outgrowth of the White Paper.^{69,70}

Most importantly, professional development in student pharmacists should include increased responsibility for providing patient care. Experiential education is clearly an important curricular component through which professionalism can be developed.⁶⁹ This occurs through student pharmacists both observing and participating in

activities with pharmacist role models as well as other health professionals. Thus, it is important for student pharmacists to have opportunities to observe pharmacists and then participate in patient-centered care as early as possible after entering pharmacy school. Experiences that involve active participation in patient-centered care have a much greater impact on the professionalization of student pharmacists than experiences that are primarily observational and passive in nature.

Leadership and Advocacy

Similar to the previous discussion of professional behavior, some may feel that leadership and advocacy cannot be taught. However, many books, professional training courses, and entire programs are devoted precisely to this end – training people to become leaders, advocates, and negotiators. Specific to pharmacy, the DELTA Rx Institute seeks to “. . .instill a spirit of change and innovation in the pharmacy profession. . . by offering tools, columns, profiles, articles and courses to pharmacy practitioners, students, and faculty.”⁷¹ There are many other examples in pharmacy education and continuing education that seek to develop entrepreneurial, leadership, and advocacy traits. Again, pharmacy schools might begin by examining student recruitment and admissions processes to assure that they are geared toward attracting and admitting students with these traits. Programmatic outcomes guiding curricula should include the development of these traits. Didactic and experiential curricula must provide opportunities for students to learn, practice, and receive feedback on the development of these skills. Student professional organizations should be geared towards leadership and professional advocacy rather than merely functioning as social networking opportunities.

Although creating change in practice has been discussed for decades, it is still not happening to the extent that it may need to in order to ensure a future profession of pharmacy. It is absolutely imperative that pharmacists take charge of their profession and demonstrate to the rest of the world their role in improving individuals’ and society’s health.

Interprofessional Experiences

Both AACP and ACCP have recognized that in order to be competent in interprofessional care as practitioners, students need to be exposed to interprofessional skills as students.^{36,37} IPEs experiences are also essential if pharmacists are to achieve the IOM competencies.¹³ However, given the limited number of functioning interprofessional teams providing patient care, creating meaningful IPE patient care experiences has been a challenge for most health professions education programs. The 2006-2007 AACP

Professional Affairs Committee has provided recommendations to assist pharmacy schools in the implementation of IPE experiences.³⁷ Interprofessional education will need to occur through a variety of activities and throughout the curriculum, involve all relevant disciplines, and begin as early as possible in the curriculum. Such activities may include courses or seminars focused on interprofessionalism, as well as experiential opportunities or even research projects. However, the primary focus for interprofessional learning and practice should be patients.³⁷ Interaction with all relevant professions should be considered and explored, including medicine, nursing, and allied health.

Pharmacy schools must also understand and confront the barriers that exist to implementing IPE.^{34,35} ACCP's White Paper on "Interprofessional Education" has an extensive list of potential barriers but also outlines potential alternatives to help in overcoming the barriers.³⁴ Implementing IPE may be particularly challenging for pharmacy schools that are not part of academic health centers, but despite these challenges, meaningful IPE experiences must be included in pharmacy curricula.

Finally, schools must recognize that the success of IPE will be related to the support of the faculty as well as students. Unfortunately, faculty members may not respect or be aware of what roles other health professionals may play in patient care, especially if they have not trained or practiced with other health care providers.⁶⁰ Initial efforts at developing IPE may be championed by a few faculty leaders, not only within the college or school of pharmacy, but also within other health professional education programs with which pharmacy will partner.^{34,37} However, successful implementation of IPE will require it to become an integral component of the school's commitment with significant support from the faculty.

Addressing Cultural Competency

To successfully address cultural competence, pharmacy schools must first recognize that the key qualities pharmacists must possess to achieve cultural competence are communication (both verbal and nonverbal) and open-mindedness.^{38,39,43} Caring for the underserved must be incorporated throughout the curriculum, not just in experiential education or elective courses.⁷²⁻⁷⁴ Exposure to cross-cultural differences should occur throughout the curriculum in a variety of ways, ideally in interactive situations, which would challenge student pharmacists to engage in open-minded communication.⁴¹ Consulting successful published reports in the literature of cultural competence initiatives may provide topics as well as potential course activities to consider.^{41,75} It is important to remember that cultural com-

petence will not be achieved upon graduation, but that it is an ability that is continually developed.

ASSESSING ACHIEVEMENT OF COMPETENCIES

Assessments should be designed and implemented at a school-wide level and be part of the coordinated review of the curriculum. An assessment is the formal process of measuring a student's performance on an individual outcome. Assessments and evaluations provide feedback regarding the success of individual students as well as the instructors, courses, and curriculum, with regard to outcomes. Assessments and evaluations should be planned in the initial development of the curriculum and its courses. Those responsible should look to the literature for validated, reliable tools that reflect the modes of teaching in place. Evaluations of competency in some areas, such as professionalism, are extremely difficult to measure; however, these can be assessed during practice experiences.

RECOMMENDATIONS

In this paper we have projected the pharmacy practice of the future and identified those competencies that will be required. Keeping with the format provided in the most recent 2004 revision of the CAPE Guidelines, we have characterized these competencies into 3 specific domains: patient-centered care, population health, and pharmacy systems management. We have also identified 5 cross-cutting abilities that are necessary for successful practice: professionalism, self-directed learning, leadership and advocacy, interprofessional collaboration, and cultural competency. These cross-cutting abilities are as important as the practice-specific domains. Therefore, pharmacy schools must effectively address these abilities in their academic programs, including the articulation and measurement of expected outcomes.

Further specialization in pharmacy will result in pharmacy curricula being designed to prepare graduates for the next step in their professional development. It is our view that future pharmacy graduates will not be "fully developed" to move into roles as autonomous independent professionals and will likely require additional training or education beyond the first-professional degree.

To successfully address future practice competencies, curricula of the future must be developed in an evidence-based manner and cannot be solely governed by the values, interests, and expertise of an institution's faculty. In designing a curriculum, input from a variety of outside stakeholders is essential. This analysis supports the contention that future curricula need to be highly interactive, expand

experiential learning opportunities, and focus far less on information storage and retrieval.

Currently, the curricula of many schools remain primarily focused as information delivery systems. In his recent Rho Chi Lecture, William Campbell termed this “the iPod approach” where the focus is on the least expensive way to deliver the various curricular elements.⁷⁶ Moreover, the method by which many schools deal with the massive explosion of biomedical information is simply to add more content to the curriculum. This information explosion is better dealt with by using inquiry-based learning approaches that can promote thinking, problem-solving, self-directed learning, and professional responsibility, while focusing content on a representative sample of available material.

Providing quality experiential education is a significant challenge that all pharmacy schools must meet. Practice experiences should be expanded significantly beyond the current minimum ACPE standards, up to 2 years or 50% of the curriculum. Student pharmacists should be engaged in patient-centered care beginning with the first year. The current ACPE distinction between IPPEs and APPEs, and restriction with regard to allowable IPPE activities, limit pharmacy schools’ innovation and experimentation. Schools must have more freedom to develop new practice experiences that have greater potential to develop the competencies and abilities we have outlined.

Pharmacy schools seem to be differentiating themselves by moving in opposite directions, utilizing either 3-year accelerated programs or traditional 4-year programs (often with the prepharmacy requirements expanded to either 3 academic years or a baccalaureate degree). Thus, the time required to earn a PharmD degree ranges from 5 to 8 years of postsecondary education. Schools of pharmacy offering 3-year accelerated programs would seem to be particularly susceptible to the “iPod” approach of packing the various curricular elements into the smallest amount of time possible. While the same “content” is delivered in 3 years rather than 4 years, reducing the actual length of education by a year also reduces the amount of time for professional maturation, which also could reduce the extent of development of the cross-cutting abilities we have outlined. The evaluation of outcomes associated with traditional 4-year versus accelerated 3-year programs is but one of many questions that the academic pharmacy enterprise needs to study in a scholarly evidence-based manner.

If pharmacy education is to change so as to produce graduates with the requisite future practice competencies, then colleges and schools of pharmacy must change as well. They must become institutions that foster both educational and professional development of student

pharmacists, for example, by restructuring pharmacy education around communities of practice that optimize learning.⁷⁷ Pharmacy schools would become organizations with cultures focused on professional development. This concept is far ranging in the way it could impact education of student pharmacists. All members of the organization (faculty members, staff members, student pharmacists, graduate students, and residents) would be expected to work with each other in an environment that facilitates mutual learning and advances the organization’s mission, with professional behaviors expected of all members. Teaching and learning experiences would be focused on the needs of students, rather than the professional expertise or interests of particular faculty members. Student pharmacists would be engaged in meaningful patient care experiences that are continuous and begin immediately upon entry into pharmacy school. Promoting optimal patient care would become the force driving the curriculum. Patient care, population health, and system management activities of student pharmacists would be supported by pharmacy schools becoming patient care providers. While pharmacy schools typically have clinical faculty members practicing in a variety of affiliated venues, few schools have taken the step to establish practices that are their own. This is in stark contrast to other health professions such as medicine, dentistry, and veterinary medicine, which have for years had patient care practices that were used in the education and training of students. Under such a model, schools of pharmacy would pursue opportunities in practice and research that would advance practice and improve patient care. One example of such an opportunity would be the creation of interprofessional care models in conjunction with members of other health professions. Such entrepreneurial activities would not only create new learning opportunities, but have the potential to provide revenue streams to help offset reductions in available financial resources.

As pharmacy and pharmacy education look to the future, there will be challenges in implementing the vision for pharmacy education that we have articulated in this paper. Much of the challenge focuses on both pharmacy and pharmacy education being able to effectively change the paradigms they are operating under. Meaningful health care reform is likely to occur in the United States in the near future. Pharmacists may have the opportunity for expanded patient care roles and payment for services not related to dispensing. Successful change will be dependent on the profession of pharmacy aggressively pursuing these opportunities such that they become standards of practice. Advanced patient care services, provided only by a small minority of pharmacists, will have minimal impact on the health of the United States.

Likewise, pharmacy schools face challenges as well. Colleges and universities are entities where change is often difficult to achieve; however, for the profession of pharmacy to move ahead, significant change will be required from the institutions that prepare its workforce. The current economic crisis creates a situation where most, if not all, pharmacy schools will need to operate with fewer resources. Careful decisions will need to be made so that resources will be utilized both efficiently and effectively. In the future there will likely be calls for even greater accountability that will impact pharmacy schools, from both the public and accrediting agencies. In addressing the curricular competencies we have identified, we have attempted not to be too prescriptive in our recommendations as to how they should be addressed by individual institutions. Each school of pharmacy will need to wrestle with these issues as they strategically make decisions for the future, taking into consideration their strengths, institutional missions, and obligations to stakeholders.

REFERENCES

1. Denzin NK, Mettlin CJ. Incomplete professionalization: the case of pharmacy. *Social Forces*. 1968;46(3):375-82.
2. Mrtek RG. Pharmaceutical education in these United States – an interpretive historical essay of the twentieth century. *Am J Pharm Educ*. 1976;40(4):339-65.
3. Hepler CD. The third wave in pharmaceutical education: the clinical movement. *Am J Pharm Educ*. 1987;51(4):369-85.
4. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm*. 1990;47(3):533-43.
5. Medication Therapy Management Services Definition and Program Criteria. Available at: <http://www.pharmacist.com/AM/Template.cfm?Section=MTM&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=4577>. Accessed September 22, 2009.
6. Joint Commission of Pharmacy Practitioners. *Future Vision of Pharmacy Practice*. November 10, 2004.
7. Commission to Implement Change in Pharmaceutical Education. Background paper II: entry-level, curricular outcomes, curricular content and educational process. *Am J Pharm Educ*. 1993;57(4):377-85.
8. Center for the Advancement of Pharmaceutical Education. *Educational Outcomes 2004*. Alexandria, VA: American Association of Colleges of Pharmacy; 2004.
9. American College of Clinical Pharmacy. The definition of clinical pharmacy. *Pharmacotherapy*. 2008;28(6):816-7.
10. American Society of Health-System Pharmacists. ASHP Health-System Pharmacy 2015 Initiative. Revised March 2008. Available from the American Society of Health-System Pharmacists. Available at http://www.ashp.org/s_ashp/docs/files/2015_Goals_Objectives_0508.pdf. Accessed September 22, 2009.
11. American Society of Health-System Pharmacists. ASHP long-range vision for the pharmacy work force in hospitals and health systems. *Am J Health-Syst Pharm*. 2007;64(12):1320-30.
12. National Association of Chain Drug Stores, National Community Pharmacists Association, American Pharmacists Association. Project Destiny Executive Summary. August 2008. Available at <http://www.pharmacist.com/AM/Template.cfm?Section=Home2&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=15490>. Accessed November 19, 2009.
13. Institute of Medicine. *Health Professions Education: A Bridge to Quality*. Washington, DC: National Academies Press, 2003.
14. Nurses Remain Atop Honesty and Ethics List. Available at <http://www.gallup.com/poll/20254/Nurses-Remain-Atop-Honesty-Ethics-List.aspx>. Accessed September 22, 2009.
15. American Board of Internal Medicine Committee on Evaluation of Clinical Competence and Clinical Competence and Communication Programs. Project Professionalism. Philadelphia, PA: American Board of Internal Medicine; 2001:5-6. Available at <http://www.abim.org/pdf/publications/professionalism.pdf> Accessed September 22, 2009.
16. Hammer DP, Berger BA, Beardsley RS, Easton MR. Student professionalism. *Am J Pharm Educ*. 2003;67(3):Article 96.
17. Chalmers RK. Contemporary issues: professionalism in pharmacy. *Tomorrow's Pharmacist*. March 10-12, 1997.
18. Burke JM, Miller WA, Spencer AP et al. Clinical pharmacist competencies. *Pharmacotherapy*. 2008;28(6):806-15.
19. Brown D, Ferrill M, Hinton A, Shek A. Self-directed professional development: the pursuit of affective learning. *Am J Pharm Educ*. 2001;65(3):240-7.
20. Huynh D. Personal Communication with Stuart Haines, May 2009. **PERSONAL COMMUNICATION**
21. Plaza CM, Draugalis JR, Slack MK, Skrepneck GH, Sauer KA. Use of reflective portfolios in health science education. *Am J Pharm Educ*. 2007;71(2):Article 34.
22. Center for the Advancement of Pharmaceutical Education. *Libraries and Educational Resources Supplemental Educational Outcomes Based on CAPE 2004*. Alexandria, VA: American Association of Colleges of Pharmacy; March 2007.
23. Zellmer WA. Unresolved issues in pharmacy. *Am J Health-Syst Pharm*. 2005;62(3):259-65.
24. Tice BP. Advancing pharmacy through entrepreneurial leadership. *J Am Pharm Assoc*. 2005;45(5):546-53.
25. Shuck AA, Phillips CR. Assessing pharmacy students' learning styles and personality types: a ten-year analysis. *Am J Pharm Educ*. 1999;63(1):27-33.
26. Joyner PU, Harbour DC, Pittman AW. Assessment of preferred learning styles, work style profiles, and personality types of external students [abstract]. 98th AACP Annual Meeting: July 12-15, 1997, Indianapolis, IN. *Am J Pharm Educ*. 1997;61(4):77S.
27. Hardigan PC, Cohen SR. Comparison of osteopathic, pharmacy, physical therapy, physician assistant, and occupational therapy students' personality styles: implications for education and practice. *J Pharm Teach*. 1999;7(2):67-79.
28. Rezler AG, Manasse HR, Buckley JM. Comparative study of the personality types attracted to pharmacy and medical school. *Am J Pharm Educ*. 1977;41(1):7-10.
29. Holland RW, Nimmo CM. Transitions, part 1: beyond pharmaceutical care. *Am J Health-Syst Pharm*. 1999;56(17):1758-64.
30. Nimmo CM, Holland RW. Transitions in pharmacy practice, part 2: who does what and why? *Am J Health-Syst Pharm*. 1999;56(19):1981-7.
31. Holland RW, Nimmo CM. Transitions in pharmacy practice, part 3: effecting change—the three-ring circus. *Am J Health-Syst Pharm*. 1999;56(21):2235-41.

32. Nimmo CM, Holland RW. Transitions in pharmacy practice, part 4: can a leopard change its spots? *Am J Health-Syst Pharm.* 1999;56(23):2458-62.
33. Nimmo CM, Holland RW. Transitions in pharmacy practice, part 5: walking the tightrope of change. *Am J Health-Syst Pharm.* 2000;57(1):64-72.
34. American College of Clinical Pharmacy. ACCP white paper. Interprofessional education: principles and application. A framework for clinical pharmacy. Available at <http://www.accp.com/docs/positions/whitePapers/InterProfEducFinal12-08.pdf>. Accessed September 22, 2009.
35. Remington TL, Foulk MA, Williams BC. Evaluation of evidence for interprofessional education. *Am J Pharm Educ.* 2006;70(3):Article 66.
36. American College of Clinical Pharmacy. AACP position statement: interprofessional education and practice. 2008. Available at <http://www.accp.com/docs/positions/positionStatements/IntprofEducPracPosStmntFinal.pdf>. Accessed September 22, 2009.
37. Kroboth P, Crismon LM, Daniels C et al. AACP Reports. getting to solutions in interprofessional education: report of the 2006-2007 Professional Affairs Committee. *Am J Pharm Educ.* 2007;71(6):Article S19.
38. Rudd KM, Stack NM. Cultural competence for new practitioners. *Am J Health-System Pharm.* 2006;63(10):912-3.
39. Mullins CD, Blatt L, Gbarayor CM, Yang HK, Baquet C. Health disparities: a barrier to high quality care. *Am J Health-Syst Pharm.* 2005;62(18):1873-82.
40. O'Connell MB, Korner EJ, Rickles NM, Sias JJ. ACCP white paper. cultural competence in health care and its implications for pharmacy: part 1. overview of key concepts in multicultural health care. *Pharmacotherapy.* 2007;27(7):1062-79.
41. Assemi M, Cullander C, Hudmon KS. Implementation and evaluation of cultural competency training for pharmacy students. *Ann Pharmacother.* 2004;38(5):781-6.
42. O'Connell MB, Rickles NM, Sias JJ, Korner EJ. ACCP white paper. cultural competence in health care and its implications for pharmacy: part 2. emphasis on pharmacy systems and practice. *Pharmacotherapy.* 2009;29(2):14e-34e.
43. Shah MB, King S, Patel AS. Intercultural disposition and communication competence of future pharmacists. *Am J Pharm Educ.* 2004;68(5):Article 111.
44. Murphy JE, Nappi J, Bosso J et al. American College of Clinical Pharmacy's vision of the future: postgraduate pharmacy residency training as a prerequisite for direct patient care practice. *Pharmacotherapy* 2006;26(5):722-33.
45. Leiker LL, Mehta BH, Rodis JL et al. Assessment of pharmacy faculty members' opinions regarding required postgraduate pharmacy residencies. *Am J Health-Syst Pharm.* 2009;66(4):378-88.
46. Barr RB, Tagg J. From teaching to learning: a new paradigm for undergraduate education. *Change.* 1995;November/December: 13-25.
47. Bruner JS. The art of discovery. *Harvard Educ Rev.* 1961;31(1):21-32.
48. Kirschner PA, Sweller J, Clark RE. Why minimal guidance during instruction does not work: an analysis of the failure of the constructivist, discovery, problem-based, experiential and inquiry-based teaching. *Educ Psychologist.* 2006;41(2):75-86.
49. Barrows HS, Tamblyn RM. *Problem-Based Learning: An Approach to Medical Education.* New York: Springer; 1980.
50. Schmidt PL, Trevejo RT, Tkalcic S. Veterinary public health in a problem-based learning curriculum at the Western University of Health Sciences. *J Vet Med Educ.* 2008;35(2):212-8.
51. Ross LA, Crabtree BL, Theilman GD, Ross BS, Cleary JD, Byrd HJ. Implementation and refinement of a problem-based learning model: a ten-year experience. *Am J Pharm Educ.* 2007;72(1):Article 17.
52. Helms KL, Stamm PL. Does facilitator knowledge and experience impact student performance [abstract]? 109th AACP Annual Meeting: July 20-23, 2008, Chicago IL. *Am J Pharm Educ.* 2008;72(3):72S.
53. Stamm PL, Helms KL. Problem-based pharmacotherapy: a first year case map [abstract]. 109th AACP Annual Meeting: July 20-23, 2008, Chicago IL. *Am J Pharm Educ.* 2008;72(3):Article 72S.
54. Woods DR, Hall FL, Eyles CH, Hrymak AN, Duncan-Hewitt WC. Tutored versus tutorless groups in problem-based learning. *Am J Pharm Educ.* 1996;60(3):231-8.
55. Haworth IS, Eriksen SP, Chamait SH et al. A problem based learning, case study approach to pharmaceuticals: faculty and student perspectives. *Am J Pharm Educ.* 1998;62(4):398-405.
56. Duncan-Hewitt WC. A focus on process improves problem-based learning outcomes in large classes. *Am J Pharm Educ.* 1996;60(4):408-16.
57. Raisch DW, Holdsworth MT, Mann PL, Kabat H. Incorporating problem-based, student-centered learning into pharmacy externship rotations. *Am J Pharm Educ.* 1995;59(3):265-72.
58. Beck DE, Boh LE, O'Sullivan PS. Evaluating student performance in the experiential setting with confidence. *Am J Pharm Educ.* 1995;59(3):236-47.
59. Weathermon RA, Erbele S, Mattson M. Use of standardized patients as an assessment tool at the end of an ambulatory care rotation. *Am J Pharm Educ.* 2000;64(2):109-13.
60. Hasse KL, Smythe MA, Orlando PL et al. ACCP white paper. Quality experiential education. *Pharmacotherapy.* 2008;28(10): 219e-27e.
61. *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree.* Chicago, IL: Accreditation Council for Pharmacy Education, adopted January 15, 2006.
62. American Association of Colleges of Pharmacy Academic Practice Partnership Initiative. Summit to Advance Experiential Education in Pharmacy. Final Report and Proceedings. Edition 1, 2005. Available at <http://www.aacp.org/resources/education/APPI/Documents/SummitFinalReport.pdf>. Accessed September 22, 2009.
63. Koda-Kimble MA, Speedie MK. Accreditation: we want standards, not standardization. *Pharmacotherapy.* 2009;29(5):491-4.
64. Haase KK, Smythe MA, Orlando PL et al. ACCP position statement: ensuring quality experiential education. *Pharmacotherapy.* 2008;28(12):1548-51.
65. Krueger JL, Beck DE, Jungnickel PW. *The Auburn University – Longitudinal Educational Experience for Pharmacy Students.* Presented at Primary Care Education for the 21st Century: Lessons from National Initiatives, Baltimore, Maryland, September 1998.
66. Merton RK, Reader GG, Kendall PL. *The Student-Physician: Introductory Studies in the Sociology of Medical Education.* 1st ed. Cambridge, MA: Harvard University Press; 1957.
67. Becker HS. *Boys in White: Student Culture in Medical School* Chicago, IL: University of Chicago Press; 1961.
68. Simpson IH, Back KW, Ingles T, Kerchhoff AC, McKinney JC. *From Student to Nurse: A Longitudinal Study of Socialization.* Cambridge, MA: Cambridge University Press; 1979.

69. APhA-ASP/AACP-COD Task Force on Professionalism. White paper on pharmacy student professionalism. *J Am Pharm Assoc.* 2000;40(1):96-102.
70. APhA-ASP/AACP Pharmacy Professionalism Toolkit for Students and Faculty. Available at http://www.pharmacist.com/AM/Template.cfm?Section=Professionalism_Toolkit_for_Students_and_Faculty&Template=/CM/HTMLDisplay.cfm&ContentID=5415 Accessed September 22, 2009.
71. Drake Entrepreneurial Leadership Tools for Advancement. Available at <http://www.deltarx.drake.edu/> Accessed September 22, 2009.
72. Zweber A, Roche VF, Assemi M, Conry JM, Shane-McWhorter L, Sorensen TD. Curriculum recommendations of the AACP-PSSC Task Force on Caring for the Underserved. *Am J Pharm Educ.* 2008;72(3):Article 53.
73. Wells BG, Beck BE, Draugalis JR, et al. Report of the 2007-2008 Argus Commission: what future awaits beyond pharmaceutical care? *Am J Pharm Educ.* 2008;72(Supp):Article S8.
74. Onyoni EM, Ives TJ. Assessing implementation of cultural competency content in the curricula of colleges of pharmacy in the United States and Canada. *Am J Pharm Educ.* 2007;71(2):Article 24.
75. Evans E. An elective course in cultural competence for healthcare professionals. *Am J Pharm Educ.* 2006;70(3):Article 55.
76. Campbell WH. 2008 Rho Chi Lecture: one easy piece. *Am J Pharm Educ.* 2008;72(5):Article 118.
77. Duncan-Hewitt W, Austin Z. Pharmacy schools as expert communities of practice? A proposal to radically restructure pharmacy education to optimize learning. *Am J Pharm Educ.* 2005;68(3):Article 54.

Appendix 1. Pharmacy Practice Competencies Across Three Core Domains

Domain 1: Provide Patient-Centered Care

Participate in the development of patient-specific therapeutic plans

- Compile and evaluate patient-specific information
- Collaborate with physicians, other prescribers, patients, and caregivers to:
 - establish therapeutic objectives
 - select an appropriate drug regimen to achieve the therapeutic objective(s)
 - determine the dose and dosage schedule
 - assess an existing drug regimen and recommend modifications

Maximize appropriate drug use behaviors

- Determine the extent to which patients adhere with their therapeutic plan(s) including recommended drug regimens
- Determine whether patients engage in and use appropriate techniques to perform self-monitoring activities as part of their therapeutic plan(s)
- Identify the root cause(s) that prevent(s) patients from engaging in optimal drug use behaviors
- Influence patients to improve adherence to recommended lifestyle behaviors, drug regimens, and self-monitoring

Select the appropriate dosage form, formulation, route of drug administration, and/or drug delivery system

- Collaborate with physicians, other prescribers, patients, and caregivers to select the most appropriate dosage form to achieve the therapeutic objective(s)
- Select the route and method of drug administration

Use technology effectively to carry out professional functions

- Use technologies to store and retrieve information
- Use technologies to perform patient monitoring activities

Educate patients regarding patient-specific therapeutic plans

- Ensure patients and caregivers understand the importance, nature, and scope of the therapeutic plan(s) being recommended
- Ensure patients and caregivers understand the potential benefits and risks of the therapeutic plan(s) being recommended
- Ensure patients and caregivers can adhere to the drug regimen (including administration techniques) included in their therapeutic plan(s)

Participate in the process of monitoring patient outcomes

- Collaborate with physicians, other providers, patients, and caregivers to:
 - develop monitoring plans to determine if the therapeutic objective(s) is/are being achieved
 - develop monitoring plans to detect adverse drug effects
 - evaluate the actual or potential impact of drug-drug, drug-disease, and drug-food interactions on patient outcomes
- Collaborate in the patient monitoring process by:
 - interviewing patients to determine if the therapeutic objectives are being achieved or if the patient is experiencing an adverse effect from a drug
 - performing targeted physical examinations (e.g. vital signs, visual inspection) to determine if the therapeutic objectives are being achieved or if the patient is experiencing an adverse effect from a drug
 - recording patient-specific monitoring data in an organized manner using appropriate medical terminology

Answer patient-specific questions

- Identify appropriate sources of information and evaluate primary literature to synthesize answers to patient-specific questions

- Communicate information to physicians, other providers, patients, and caregivers in a timely and effective manner

Administer drug products to patients

- Employ professional practice standards to administer drug products to patients.

Perform basic life support measures and triage patients

- Achieve and maintain certification in first aid and cardiopulmonary resuscitation (CPR)
- Recognize situations which are beyond one's own scope of practice or professional competence
- Refer patients to other health care professionals or institutions for advanced levels of care

Domain 2: Promote Population Health

Participate in quality assurance processes related to drug use

- Participate in and perform drug use evaluations
- Identify the root cause(s) of patient safety problems related to drug use

Participate in health education

- Prepare and deliver educational programs to lay audiences regarding health promotion and appropriate drug use
- Prepare and deliver educational programs to health professionals regarding drug therapy

Participate in health policy decision-making processes related to drug use

- Identify appropriate sources of information, analyze data, and evaluate primary literature to assist policy makers and prescribers with making well-informed decisions about drug therapy

Domain 3: Manage Pharmacy Systems

Manage systems that provide drug products to patients

- Oversee a drug delivery system that provides drug products to patients in a timely, safe, and efficient manner
- Ensure the security, integrity, and proper storage of drug products

Assist in the preparation of medications for patient use

- Ensure that drug products are labeled appropriately
 - Employ professional practice standards to compound the most commonly prescribed drug products in acute (e.g. IV admixtures, total parenteral nutrition) and chronic care (e.g. oral suspensions, topical preparations) settings
-