Podium and Poster Abstracts

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ADMINISTRATIVE, INSTITUTIONAL AND PROGRAMMATIC ISSUES

Use of Personality Studies to Predict Interaction of Students at a Distance Learning Site in a Traditional Entry-Level Doctor of Pharmacy Degree Program. Holly H. Anderson, Patrick C. Hardigan, Victor Garcia-Barreras and Jose A. Rey, *Nova Southeastern University.* **Background:** Nova Southeastern University College of Pharmacy expanded its traditional entry-level doctor of pharmacy degree program to West Palm Beach, Florida in the fall of 2000. Classes are taught via compressed videoconference with the West Palm Beach campus most often being the distant site. First year pharmacy students at both sites receive the identical live lectures, handouts and tests. **Purpose:** To view personality characteristics of students to see if determinations can be made with regards to the incidence of verbal interactions during compressed video conferencing at a distance learning classroom compared to those of the non-distance learning classroom. Determine the impact of audiovisual conferencing technology on student interactions in an experiential education discussion course for students at a distant education site. **Process:** Results from the Myers-Briggs Type Indicator assessment will be analyzed. The number of student interactions through verbalization between the main campus and the distance learning site will be compared. The correlation of personality characteristics of student's verbal interactions (questions and comments) during a video conferenced educational activity of lecture and open discussion will be examined. The level of verbal interactions as a percentage of the class size of the distance classroom versus the broadcast classroom will be assessed. **Results:** To be presented at the meeting.

Using Communication Insights to Compare the Behavior Preferences of Pharmacy Applicants to that of Successful Students and Practitioners. Tina Penick Brock, Pamela U. Joyner, April A. Cooper, Fred M. Eckel and Dan Garrett, *University of North Carolina at Chapel Hill.* **Objectives:** The purpose of this project is to describe the process utilized and outcomes achieved when pharmacy applicants are surveyed and given feedback about their personal behavior preferences. The ultimate objective is to make more effective and efficient admissions decisions as well as to provide enrolled students with individual guidance regarding potential career choices. **Methods:** All applicants selected to interview for possible acceptance into the Class of 2005 at the UNC School of Pharmacy are asked to complete a Communications Insights Survey. This validated instrument is based on Marston's Behavioral Model describing Drive, Influence, Steadiness and Compliance. Results from these surveys will be compared to previous survey administrations to student leaders, pharmacy residents in North Carolina and leaders of the North Carolina Association of Pharmacists. **Results:** This project is a pilot program and a work-in-progress with data analysis scheduled for completion after the Class of 2005 is filled (May 2001). **Implications:** Behavioral research suggests that the most effective people are those who understand both their strengths and weaknesses. This knowledge allows an individual to best meet the demands of his environment. We conjecture that personal behavior preferences may be predictive of success in pharmacy school as well as future leadership in the profession.

Formative Assessment of Critical Thinking in the PharmD Curriculum. Shelley L. Chambers, Janet L. Schmittgen, Nicholas R. Blanchard, Lisa J. Woodard and Diane Kelly-Riley, *Washington State University.* **Objectives:** An important curricular outcome of our professional program is the development of critical thinking skills. We were interested in determining whether the abilities of our students to think critically progressed as they moved through the Doctor of Pharmacy program at WSU. **Methods:** We used the WSU critical thinking rubric to assess the abilities of our students in each of the four levels of the professional program. The rubric is an articulation of seven dimensions of critical thinking derived from the literature as well as local experience. Each dimension is clearly defined in order to shape student thinking in response to a written assignment and is rated on a six-point scale from scant to substantially developed. The writing assignments were rated by the Pharmaceutical Care Laboratory and Advanced Practice Experience faculty of the College of Pharmacy as well as expert readers from the WSU Writing program. Results of the students' critical thinking abilities at the four professional levels will be available in July. **Implications:** A number of problem solving and active learning strategies have been incorporated into the Doctor of Pharmacy curriculum with the intention of developing higher thinking abilities. Our critical thinking assessment project will evaluate the effectiveness of these strategies and guide the evolution of our approaches to develop these skills in pharmacy students at Washington State University.

Prior College Degree and Performance of Pharmacy Students. Marie A. Chisholm, *University of Georgia.* **Objective:** Determine if students who have a 4-year college degree before entering pharmacy school maintained better academic standing in pharmacy school (defined as not receiving any course grade of a D or F while in pharmacy school) than students without a prior 4-year degree. **Methods:** Students who entered the College from 1995-1999 were included in the study. Kaplan Meier analysis was used to determine whether there was a difference in the number of students remaining over the entire curriculum who did not receive a grade of 1.0 (D) or less in a pharmacy school course between those who obtained a prior 4-year college degree and those who did not. **Results:** 450 students (87%) did not have a prior 4-year college degree and 68 of the students (13%) did have a prior degree. There was a significant difference in the duration of students with a prior degree not receiving a grade of 1.0 or lower in a pharmacy course compared to students who did not have a prior degree ($P<0.05$). At the end of the fourth-year of pharmacy school, approximately 88% of the students with a prior degree did not receive a grade of 1.0 or less during the entire pharmacy curriculum compared to 79% of the students without a prior 4-year degree. **Implications:** Schools of pharmacy should consider the significance of achieving a college degree when evaluating candidates for admission.

Evaluation of Pharmacy College Admissions Test (PCAT) Scores and Grade Point Average (GPA) as Predictors of Academic Performance. Karen L. Daniel, Bridget J. Bernstein, Wallace Marsh, and Dean Arneson, *Nova Southeastern University.* **Objective:** The purpose of this study is to determine the value of PCAT scores versus pre-pharmacy GPA in predicting academic performance in the Doctor of Pharmacy curriculum. **Methods:** A retrospective review of all students who entered Nova Southeastern University College of Pharmacy between the years of 1993 and 1997 was conducted. Data collected included demographic information, individual and composite PCAT scores, pre-pharmacy GPAs, and overall pharmacy GPA after completion of didactic coursework. Approximately 400 pharmacy student records were reviewed. Regression analyses will be performed to determine the relationship between PCAT scores, pre-pharmacy GPA and subsequent didactic coursework. Finally, analyses will be performed to determine whether PCAT scores or GPAs are a more accurate predictor of academic performance in the pharmacy curriculum at Nova Southeastern University. **Results:** Data collection is currently ongoing and results and conclusions are pending. **Implications:** PCAT scores and GPA are among the most important factors examined when evaluating a candidate for acceptance into pharmacy school. The results of this study should allow for better prediction of success in the Doctor of Pharmacy program at Nova Southeastern University.

Relationships of Pre-College and Within-College Variables to Test Scores on a Pharmacy Licensure Examination. Thomas L. Kier, *Ohio Northern University.* **Objectives:** To explore the relationships of pre-college and within-college variables to scores on the national licensure examination. **Methods:** This retrospective study involved 409 graduates of a five-year baccalaureate program in pharmacy. Pre-college variables included high school GPA, ACT scores, and gender. Within-college variables included number of courses completed, number of courses failed/repeated, college GPA, and GPAs for five subsets of courses. **Results:** With the exception of the number of course completed, all pre-college and within-college continuous variables were significantly correlated with NABPLEX scores. Graduates who passed and graduates who did not pass the NABPLEX differed significantly according to their ACT composite, mathematics, English, science reasoning, and reading scores; number of courses failed/repeated; college GPA; and GPAs in all five subsets of courses. Although mean NABPLEX scores did not differ significantly by gender, a disproportionate number of women did not pass this examination. Statistical analyses controlling for pre-college variables showed the number of courses failed/repeated, college GPA, and GPAs in all five subsets of courses were significantly related to NABPLEX scores. **Implications:** Admissions criteria; policies for accepting credits for courses completed at

other institutions; academic advising and academic enhancement programs; and standards for academic probation, suspension, and dismissal. Recommendations for further research include explorations of demographic characteristics (*e.g.,* gender, race/ethnicity, age, transfer student status) as they may relate to success in pharmacy programs and performance on pharmacy licensure examinations.

Perceptions of Pharmacy Practice Preparedness at Graduation and One-Year Post-Graduation. Michael Miller, Vincent Giannetti, John Lech, Bruce Livengood and Stephen Morrison, *Duquesne University* (DUSOP). **Objectives:** To describe the relationship between perceived preparedness to provide the five professional practice-based functions defined by the American Association of Colleges of Pharmacy (AACP) at graduation and one-year post-graduation; and to describe graduates' perceptions of the influence of the DUSOP curriculum and experience on critical outcomes in the DUSOP mission statement. **Methods:** A questionnaire containing demographic items; 16 curriculum competencies characterizing the AACP professional practice-based functions; and seven outcomes stated in the DUSOP mission statement were drafted and reviewed by DUSOP faculty. Preparedness for each practice-based function was expressed using a five-point Likert-type scale anchored by "Not Prepared" and "Fully Prepared." The degree of influence that the DUSOP curriculum and extra-curricular experience had on Mission outcomes was expressed using a 5-point Likert-type scale anchored by "No Influence" and "Strong Influence." Questionnaires were mailed to graduates (n = 122) from the DUSOP Class of 2000 entry-level PharmD program followed by reminders at two weeks post-mailing. A one-year follow-up questionnaire will be mailed to the cohort followed by reminders to non-respondents. **Implications:** This evaluation screens for perceptions of degree of graduate preparedness to meet the AACP practice standards and the influence of curricular/extracurricular activities on key outcomes in the DUSOP mission for the initial graduating class in the entry-level PharmD program, serving as one consideration in the impetus to refine current curricular competencies.

Curricular Evaluation Using Self-Efficacy Measurements. Cecilia M. Plaza, Jennifer Retterer, JoLaine R. Draugalis and Richard N. Herder, *University of Arizona.* Self-efficacy measurements have been used in other health-related professions such as nursing and occupational therapy to assess proficiency in disciplinary areas but have not been used extensively in pharmacy education as a method of curricular evaluation. Self-efficacy is a measurement of an individual's confidence in his or her ability to perform a specific task to successful completion. **Objectives:** The purpose of this study was to use self-efficacy measurements as a methodological tool to evaluate curricular changes at the University of Arizona. **Methods:** Student self-efficacy regarding problem identification and clinical decision making was measured using an instrument based on a pair of clinical case scenarios. Instrument validation was conducted with the class of 1997, after which the class of 1998 was used as a baseline for pre-curricular changes. The class of 1999 reflected several curricular changes including more pharmacy practice material, particularly therapeutics and communications, earlier in the didactic component and incorporation of case discussions throughout the curriculum in order to promote integration and application of objectives and materials from basic science courses. **Results:** The class of 1999 was found to be more confident in dealing with clinical case scenarios when compared to the class of 1998. **Implications:** Self-efficacy measurement could provide a potentially valuable methodological framework for assessment and evaluation within pharmacy curricula, especially as more schools institute all-PharmD programs. Self-efficacy measurements could be used in a wide range of applications.

Merck Pharmacy Student Research Conference: A Study of Presenters' Interests, Opinions, and Careers. Sidney A. Rosenbluth, Iftekhar D. Kalsekar and Joseph K. Ma, *West Virginia University.* **Objectives:** To contact presenters from 22 annual Conferences (1979-2000) and measure their reactions to the Conference itself, inclinations toward postgraduate study, career choices, and research interests. **Methods:** A self-administered survey instrument targeted all 584 presenters, including 67 current students. **Results:** Addresses of 124 subjects were unavailable or incorrect. A total of 460 were presumably reached. Of these, 166 completed and returned questionnaires for an overall 36.1% response rate. Response rates for graduates were 25.3% (n=131) and for students 43.3% (n=29). Virtually all respondents were highly favorable about the conference and its continuation. A total of 85 (64.9%) graduates entered postgraduate education and/or training. They completed (or are pursuing) 34 (25.9%) PhD degrees, 34 (25.9%) post-BS PharmDs, 16 (12.2%) residencies, 14 (10.7%) masters, and 6 (4.6%) fellowships. A few attended medical (8), dental (1), and law (1) schools, or continued their education via certification programs (3). Nineteen (14.5%) held positions in the industry, 14 (10.7%) in academia, and 51 (38.9%) reported that their present positions frequently or always involved research. Of current pharmacy students, 24 (82.8%) agreed that the conference increased the likelihood of pursuing postgraduate education. Overall, 44 (33.6%) indicated that their presentations were published or submitted for publication. **Implications:**

Participation in research and presenting at the Conference seem to encourage advanced degrees, research careers, and research publications.

Perceptions of Campus Experiences by Pharmacy Students of Color. Clara Awe and Stephanie Crawford, *University of Illinois at Chicago.* **Objectives:** This study compared perceptions of campus life between pharmacy students of color at historically black colleges and universities (HBCU) and predominately white institutions (PWI). **Methods:** The Student Satisfaction Inventory [trademark] was administered to a sample of pharmacy students in attendance at a recent annual meeting of the Student National Pharmaceutical Association. The survey instrument measured student perceptions on the importance and satisfaction of their campus experiences, using the following scales: academic advising, campus climate, campus life, campus support services, instructional effectiveness, responsiveness to diverse populations, and student centeredness. **Initial Results:** Responses were received from 81 students, consisting of pharmacy students who attended all five HBCU-pharmacy schools (21% of sample) and 24 PWI-pharmacy schools (79%). Findings will be presented on student satisfaction levels (satisfaction scores), student expectations (importance scores), and the performance gap (unmet expectations) between the scores for these key areas in their overall educational experiences. **Implications:** This is the first study to examine perspectives of pharmacy students of color toward their educational institutions. Minority students are underrepresented in U.S. pharmacy schools, accounting for only 12% of the first professional degree enrollments. Our findings can be used by university administrators and faculty in developing awareness (of institutional strengths and areas in need of improvement) and institutional planning, which could result in increased recruitment and retention of highly qualified students of color at all U.S. colleges of pharmacy.

Mediators of Student and Preceptor Evaluations of Structured Practical Experiences. Andrea J. Cameron, Lesley A. Lavack and Hilja M. Toom, *University of Toronto.* **Objectives:** To determine the relationship between the (*i*) number of rotations taught by each preceptor and the student's evaluation of their preceptor's teaching skills and (*ii*) type of rotation and evaluation ratings received by students in the pharmaceutical care (PC) activity. The influence of rotation sequence on ratings will also be examined. **Methods:** Students were assigned to preceptors for two consecutive 8-week rotations, community and institutional, in random sequence, (*i*) A 53-item questionnaire solicited students' evaluation of preceptor teaching skills (TS) and practice site using a 5-point scale (strongly disagree to strongly agree). Ratings for the 42 TS items were summed and converted to percentages. The relationship between the TS percentage and number of previous student rotations will be determined, (*ii*) Preceptors evaluated student performance of 7 components of PC, every 2 weeks, using a 7-point scale (poor to excellent). The ratings were converted to a weighted sum expressed as a percentage (PC score). The PC scores will be analyzed for relationships between type and sequencing of rotation. **Implications:** The relationship between prior number of rotations and students' evaluations will add to the individual and summarized questionnaire results that preceptors receive annually. Combined with informal student feedback and self-reflection, this should contribute to continuous improvement in teaching abilities. If either rotation type or sequence influences mean PC score or variability this will assist final grade determination by faculty.

Postgraduate Forum: A Tiered Approach for Stimulating Students to Pursue Advanced Practice Skills. Clarence E. Curry, Tammy C. Dawkins and Valerie W. Hogue, *Howard University.* **Objectives:** Challenging minority students toward excellence in career development is an important programmatic goal. This project sought to: (*i*) provide a structured process for students to receive information on postgraduate programs (*ii*) increase the number of applications of Howard University students to postgraduate programs; and (*iii*) increase the number of Howard University students who receive residency certificates. **Methods:** A multi-tiered, comprehensive approach to educate and empower all students to pursue postgraduate programs was developed. The program consisted of an interactive lecture series for first professional year students, where exposure to a resident and an overview of the benefits of acquiring a residency was provided. Second and third professional year students participated in a half-day session employing a panel discussion and debate featuring local residents and preceptors. Senior students preregistered for a day-long session involving a keynote speaker, a power networking luncheon and afternoon workshops where hands-on experience was gained in resume writing and interviewing techniques. The total number of students applying to residencies, as well as those receiving residency certificates, is under review and will be presented. **Implications:** A deliberate effort to raise the interest and expectations of minority students towards residency and fellowship opportunities promises career benefits to the students and added diversity to professional leadership.

Differences in Dimensions of Organizational Commitment Between Faculty Groups. Arlene A. Flynn, *University of Illinois at Chicago,* JoLaine R. Draugalis, *University of Arizona,* Gina Gilomen, *Gilomen-Study*

Consulting. **Objective:** This study investigated differences in affective (desire to remain), continuance (need to remain) and normative (duty to remain) commitment across faculty groups. **Methods:** A three-component model of organizational commitment (Meyer and Allen, 1991) was used in this cross-sectional study. Measures for affective, continuance and normative commitment developed by Allen and Meyer (1990) were adapted for this study to reflect the academic workplace. A national sample of 563 faculty was surveyed by mail questionnaire. ANOVA and *t*-tests were used to detect differences in mean commitment scores between faculty subgroups of interest. Subgroups included tenure status, rank, discipline, gender, education, and institutional characteristics. **Results:** The response rate was 49.4% yielding 262 participants. There were no significant differences in normative or continuance commitment scores between tenured, probationary tenure track and non-tenure track faculty. Probationary tenure track faculty in this sample had significantly lower mean affective commitment scores than either tenured or nontenure track faculty. There was no significant difference in affective commitment between tenured faculty and non-tenure track faculty. There were no significant differences in faculty commitment related to discipline, gender, institutional governance or academic rank. Significant differences in effective commitment were found when comparing faculty by institutional type and education. **Implications:** Differences in faculty commitment across groups imply that differential strategies are needed to foster commitment in different groups.

Survey of Faculty Members' Perceptions on Student Body Professionalism and Civility. Catherine L. Meier and Karen L. Kier, *Ohio Northern University.* **Objectives:** (*i*) Determine faculty perceptions on the level of civility and professionalism in their own practice, (*ii*) Determine the faculty's opinion of the extent of professionalism and civility among thenpeers and students enrolled in the College of Pharmacy. **Methods:** Faculty members given survey ranked from 1 to 10 the importance of civility and professionalism in their practice. Participants were also asked to evaluate peers and the student body using the same criteria. Finally, faculty members were asked to rank several attributes of professionalism in order of importance. Descriptive statistics were used to evaluate frequency and variability of responses. **Results:** 19 of 23 (82.6%) faculty members responded. Faculty members ranked the value of professionalism and civility at 9.5 and 9.4, respectively. Their peers' level of professionalism and civility were 7 and 6.7. Among students, faculty ranked the level of professionalism and civility at 5.2 and 5.5. The most important attributes of professionalism were, (*i*) Honesty (mean 2.9, median 1); and (*ii*) Accountability (mean 2.7, median 2). **Implications:** These results demonstrate that faculty members place great importance on professionalism and civility and feel that the professional conduct of their peers is greater than average. However, they felt that the student body only places an average emphasis on these characteristics. Based on these results, a follow-up survey of the student body will be performed to evaluate student perceptions.

Articulating a College of Pharmacy Educational Technology Master Plan. Anthony E. Ranno, Thomas A. Birk, Melissa A. Diers and Gary C. Yee, *University of Nebraska Medical Center.* **Objectives:** To articulate a technology master plan for the College of Pharmacy as one step in creating a shared vision of how technology will address the college's strategic plan, and operationalize key elements of the newly developed college curriculum of study. **Methods:** The College of Pharmacy contracted with an internal consultant team within the University of Nebraska Medical Center, but outside the College of Pharmacy to facilitate a technology master planning process. Several methods will be used: focus groups with key stakeholders in the College of Pharmacy (faculty, administrative support personnel, students); interviews with senior college administrators; content analysis of written artifacts (including administrative and curriculum materials); three-step evaluation process of the final document. **Results:** This process began in the spring of 2000, and is due to be completed by summer of 2001. **Implications:** The College of Pharmacy technology master plan links technology planning with curriculum outcomes, facilitates integration of technology into teaching practice, and describes migration plans (management of upgrade and replacement cycles) for improving technology assets and infrastructure. In addition, the plan will include a faculty development rubric relative to technology. It will identify student technology-related abilities and competencies on which the curriculum is designed (including prerequisites for admission) and discuss existing and needed student computing resources.

Establishing a Distance Learning Site for a Traditional, Entry-Level, Doctor of Pharmacy Program. José A. Rey, Holly H. Anderson, Ceressa T. Ward, W. Cary Mobley, Carsten Evans and William D. Hardigan, *Nova Southeastern University.* **Background.** Since 1995, Nova Southeastern University (NSU) College of Pharmacy has utilized video conferencing technology in the delivery of its Non-Traditional Postgraduate Doctor of Pharmacy Program throughout Florida and Puerto Rico. The positive experience gained from this initiative prompted the College to pilot a distance education program as part of its traditional, entry-level, Doctor of Pharmacy Program. **Purpose:**

The current shortage of pharmacists has resulted in the need for colleges of pharmacy to consider increasing student enrollment. In August 2000, NSU in Ft. Lauderdale, Florida expanded its traditional entry-level Doctor of Pharmacy Degree Program north to a new site in West Palm Beach, Florida. Live lectures given to the students in Ft. Lauderdale are simultaneously broadcast using compressed video technology to the students in West Palm Beach, Florida. **Process:** In creating this pioneer program, a group of faculty was responsible for ensuring a professional presence and learning environment at this distance site. Policies and procedures were developed and implemented. These included daily operations, student services, contingency plans for technical difficulties, roles for distance site course facilitators, exam distribution and program integrity. **Implications:** NSU believes that the establishment of this distance learning site is a beginning step in addressing the workforce needs of the pharmacy profession by increasing access and educational opportunity for students.

Systematic Approach to the Design of an Experiential Management Database. Stanley Weber, *University of Washington.* **Objective:** The proper management of experiential courses requires gathering, storing, manipulating, evaluating, and disseminating considerable data. With a goal of managing information more efficiently, we developed a relational, web-ready database. **Methods:** We required a database that was cross platform; easy to design and maintain; had an email interface; was accessible over standard internet; allowed data to be displayed on a web browser; was easily scriptable to automate repetitive processes; was secure; and allowed legacy databases to be converted. **Results:** Our resulting database has automatic data collection and distribution, uses email to deliver information, and facilitates communication among school, site, and students allowing selecting, arranging, and tracking changes in rotation schedules, processing of form letters, management of faculty appointments, and tracking of grades, prerequisites, and assignments. Using a browser, students can login securely, search our clerkship site catalog, update their online resume, and see which prerequisites are on file. Students can also select rotations from our site catalog and edit and prioritize this selection list. Clerkship students can evaluate their site online, see where they are assigned, and generate email to their preceptor(s). Preceptors can view the site catalog, see which students have been assigned, view student resumes, and contact any scheduled student via email. Inquiries to our office to clarify issues have greatly decreased. **Implications:** This database achieved design objectives and helps us manage our experiential learning courses. The poster will illustrate our database.

BIOLOGICAL SCIENCES

Perceptions of Consensus on Teaching and Research by Pharmacologists/Toxicologists at Colleges and Schools of Pharmacy. Michelle M. Kalis and Shane P. Desselle, Massachusetts College of Pharmacy and Health Sciences and *Duquesne University.* **Objectives:** To measure both qualitative and quantitative perceptions of consensus on teaching, research, and administrative issues among pharmacology/toxicology faculty. To compare perceptions of progress toward achieving a scientific paradigm with members of the other academic disciplines within pharmacy. **Methods:** A survey was mailed to 142 pharmacology/toxicology faculty members. Respondents indicated the level of agreement they perceived within their respective departments on 16 issues addressing the consensus construct and ranked the five academic disciplines of pharmacy with respect to the development of a scientific paradigm. Respondents also provided qualitative data regarding priorities for teaching and research for pharmacologists/toxicologists. **Results:** The 36 respondents perceived at least modest agreement on every issue along the consensus construct and the pharmacologists/toxicologists favorably rated the discipline as having made progress toward achieving a scientific paradigm as compared to other disciplines. Qualitative data revealed a list of 25 areas important to research and 31 areas important to teach. Areas frequently cited for both teaching and research included pharmacogenomics, issues in complementary and alternative medicine, and neuropharmacology. **Implications:** Achieving consensus within an academic discipline has been purported to affect faculty member's socialization, commitment, and scholarly output. This study was an initial attempt at measuring consensus among pharmacologists/toxicologists at Colleges and Schools of Pharmacy in the U.S.

BRISTOL-MYERS SQUIBB STUDENT RESEARCH

Clinical Pharmacists Can Improve the Management of Hypertension in a Community Pharmacy. Thomas G. Wadsworth, *Idaho State University.* Despite tremendous progress in the last 25 years in awareness, treatment, and control of hypertension; the current NHANES studies show that these trends have not continued to improve. This is an opportunity for pharmacists in a retail setting to offer their expertise in drug therapies and harness their unique resources to identify risk or at-risk populations. The goal of this study was to show that retail pharmacists can identify and educate HTN or at-risk patients to improve knowledge and management of hypertension, and therefore,

improve disease management. Volunteers were selected based on the presence of hypertensive or lipid lowering drugs in the patient profiles found on the Super Save Drug prescription database in Pocatello, Idaho. Thirty-six respondents from 400 solicitations were randomized into one of the three treatment groups (A, B, C). Pre- and post-visits were scheduled for each subject four months apart. On each scheduled visit, Quality of Life (QoL) survey, knowledge assessment survey, a BP reading and total cholesterol measurements were collected. Following the first data collection, group A (full intervention) received a counseling session concerning their individual hypertension or dyslipidemia as well as standard brochures. Group B (partial intervention) only received the educational brochures, while the Group C (control) received no intervention. Pre- and post-QoL, disease knowledge, cholesterol, and blood pressure data comparisons were made between the groups using a one way ANOVA. There was no significant change within or between groups for total cholesterol, blood pressure, and knowledge. Although, the knowledge scores showed no differences between groups, the mean scores increased and increased the same amount for all three groups. By merely participating in the program, subjects' knowledge of hypertension and risk factors for heart disease increased.

CHEMISTRY

Two Teaching Strategies: Influencing Student Learning in the Chemical Sciences. Robin M. Zavod, *Chicago College of Pharmacy,* Louis Williams, *University of Houston,* Bruce L. Currie, *South Dakota State University.* **Objectives:** To evaluate whether teaching methodologies influence the ability of students to learn chemical concepts and apply them to a structure evaluation process. **Methods:** The students from one program learned to ask relevant questions to systematically "read" structures and evaluate their chemical properties in a course that utilized a tandem teaching strategy which modeled appropriate questioning and encouraged interactive student group discussions. Opportunity for the students to develop proficiency with these concepts occurred through workshop exercises, homework sets and examinations. The strategy in another program utilized peer teaching in student groups to develop the desired functional group analysis skills. In this scenario each student adopted a specific role within the team, including a facilitator for the group. The students were responsible for mastering a portion of the material, providing a team report, as well as participating in presentations. **Results:** Student proficiency was evaluated with the same assessments. Admissions data (GPA, PCAT, etc.) will need to be assessed to determine the degree to which the students were similarly academically prepared. The overall results from the two populations will be analyzed to determine if the teaching methodology had an influence on student performance. **Implications:** Teaching methodologies must be identified that promote student learning. In these courses a structure evaluation process is established, the need for memorization vanishes and the students become independent thinkers.

Perceived Consensus among Medicinal Chemistry Faculty. Marc Harrold and Shane Desselle, *Duquesne University.* **Objectives:** To (*i*) measure perceptions of consensus on teaching, scholarship, and administrative issues among medicinal chemistry faculty, (*ii*) compare perceptions of scholarly progress with those of other pharmacy disciplines, and (*iii*) determine which concepts and issues are perceived to be the most important to teach and research. **Methods:** Surveys were mailed to 162 medicinal chemistry faculty members. Respondents indicated the level of agreement they perceived within their respective departments on 16 issues addressing the consensus construct. Respondents also ranked medicinal chemistry and four other disciplines of pharmacy with respect to their development of a scientific paradigm. Finally, each respondent provided qualitative data regarding teaching and research priorities for medicinal chemists. **Results:** Respondents perceived at least modest agreement on every issue along the consensus construct. Medicinal chemistry was ranked favorably as having achieved significant progress toward its paradigm development (Wilcoxin signed ranks test). The qualitative answers focused upon 15 issues of research, most commonly that of specific therapeutic research targets. Less focused were the answers on issues to teach, which were categorized into 19 dimensions, with SAR and ADME concepts most frequently cited. **Implications:** Education literature infers significant benefits to disciplines achieving consensus, including greater success in publishing peer-reviewed articles and obtaining extramural funding, better likelihood of achieving promotion and tenure, and higher pay. This study measured perceptions of consensus and gathered qualitative data to identify the discipline's priorities, the first steps toward actually measuring and achieving consensus.

COMPUTER DEMONSTRATIONS

Development of a "Hybrid Media Educational Resource"(HMER): Overcoming Band-Width Limitations Using Quicklime Technology. Simon P. Albon and Felicia S. Lo, The *University of British Columbia.* **Objective:** To create an HMER that delivers high quality multimedia and video to pharmacy students working in the web environment, regardless of Internet connection speed. **Methods:** Using Media Cleaner Pro®, original uncompressed Quicktime videos on CD-ROM were compressed into alternate movies appropriate for 28.8 kbps, 56 kbps, ISDN, and T1 internet connections. Fast start Quicktime movies created for each alternate movie were combined into Quicktime reference movies. Reference movies and links to the uncompressed videos on CD-ROM, were combined into master reference movies. Reference movies were produced using Apple's MakeRefMovie tool and uploaded, along with the alternate movies, to a web server. Embedded poster movies utilizing links to the master reference movies were used to access video media through HTML pages. **Results:** An HMER was successfully created. Initiated through web page links, an embedded movie window shows either compressed media streamed from a web server or the original uncompressed media from CD-ROM. Although quality of the streamed media varies significantly with Internet connection speed, using the CD-ROM bypasses the streamed media providing seamless access to the original uncompressed versions. Selection is done automatically by the Quicktime Player Plugin allowing students using the CD-ROM to view high quality media regardless of Internet connection speed. **Implications:** The HMER provides a means to deliver quality multimedia and video to pharmacy students regardless of Internet connection speed.

Modern Biopharmaceutics Computer Based Training. Gordon L. Amidon and Judy C. Price, *University of Michigan.* **Introduction and Objectives.** New technologies have led to a great change in research and education methods. Computers, multimedia programs and the Internet are now widely used. The CD-ROM multimedia tool can include texts, data, pictures and audio and video. The goal of this software is to use these new tools to enhance the learning of Biopharmaceutics. **Software Characteristics.** This program is available in English: Modern Biopharmaceutics and Spanish, Biofarmacia Actual. It is divided into four modules: Fundamentals in Biopharmaceutics and Pharmacokinetics, Gastrointestinal Physiology, Controlled Release Dosage Forms and the Prediction of the Oral Fraction Absorbed. The CD includes an evaluation section with over 80 questions. Program advantages include: animations of time dependant processes *i.e.,* controlled release mechanisms, gastrointestinal motility, hundreds of figures and diagrams, visual presentation, ready access to definitions and easy navigation to any component. The program will be valuable for individual self-training and/or audiovisual support for a master class. The program includes an extensive reference file and cross-references with links to Web pages. This stimulates the students to utilize new information resources. There is a clear sequence established in each module and the CD contains more than 30 movies and animations. This tool can be use by professors, students and scientists working in biopharmaceutics to enhance their understanding of this important field. It is available in both individual and site license versions (http://www.tsrlinc.com/mbindex.htm)

Development of a Software Instructional Tool for the Biotechnology Drug Development Process. Kathleen Boje and Christine Sauciunac, *University at Buffalo.* **Objective:** We are developing a virtual, interactive laboratory that enhances student decision-making cognitive skills in the area of biotechnology drug development and research (R&D). The virtual laboratory will consist of seven modules illustrating principles of pharmaceutical biotechnology. The final product — an interactive, web-based computer application — will be of interest to a wide audience: pharmacy, pharmaceutical science, biomedical science, biology and chemistry students. This software could either be used as a "stand-alone" training course or could complement structured courses in pharmaceutical biotechnology. **Methods and Results:** The first six modules will present scientific, experimental biotechnology problems that commonly occur during R&D. The seventh module will consist of a reference library. Storyboards were created for the first four modules. Based on these storyboards, Macromedia's Authorware and Flash programming tools were used to create each module. Each screen within a module contains elements of text, graphics with animations and requires interactive student choices. Student usability testing has provided valuable feedback and modifications. Many of these software features will be demonstrated. **Implications:** The innovation and uniqueness of this project derives from its educational content and software design, as no other biotechnology drug R&D instructional software is currently available. The virtual lab software will be readily incorporated into web-based course management tools for distributed learning. (Funded in part by The Procter & Gamble Curriculum Development Grant.)

Development of a Companion Multimedia CD-ROM to Aid in Teaching Prescription Compounding. Lawrence Davidow and Robert Emerson, *University of Kansas.* **Objectives:** To develop a multi-media CD-ROM for students to use as a companion to a required textbook. The companion CD-ROM was developed to: *(i)* provide students with study guides to assigned readings; *(ii)* enhance student comprehension and *(iii)* provide visual examples of compounding procedures, and 4) illustrate completed example problems. **Methods:** Several software programs were used to insure compat-

ibility and integration of information on the CD-ROM. Study guides and sample prescriptions were developed in Microsoft Word and converted to portable document files using Adobe Acrobat. Practice quizzes over assigned readings and designed to give students instant feedback were converted to HTML. Sequential digital photographs made of compounding procedures were imported into Microsoft PowerPoint and narrations added for each step. Those files were then converted to an AVI movie file using Adobe Premiere. **Results:** Each student received a companion CD-ROM that contained information on compounding 10 different dosage forms. Scores on compounding exams, as well as student satisfaction, will be evaluated at the end of the semester and compared to results from previous years. **Implications:** It is expected that students will make better use of laboratory time by studying the companion CD-ROM prior to class. Students should be better prepared to complete lab exercises, feel more confident of their compounding technique, and participate in lab with better questions and discussion.

Developing an Interactive CD-ROM. Jeffrey C. Delafuente, K. Lynn McClure, Lucy Halunko and Seung Y. Lee, *Virginia Commonwealth University.* **Improve:** Identifying Medication Problems and Reaching Outcome Variables in the Elderly is an interactive CD-ROM designed for health professional students and practitioners. This program is divided into two sections: lessons and cases. Lessons are to be completed prior to working on the study cases. A multiple choice answer quiz appears at the end of each lesson and must be completed with correct answers before the learner can proceed to the next lesson. Explanations for correct and incorrect quiz answers are given after the learner submits their answer to a question. For study cases, learners are required to utilize small amounts of patient data by answering questions before additional patient information is supplied. After the learner selects the answers, explanations are given as to why each response is either correct or incorrect. Patient information is supplied in a logical sequence that simulates the order in which real patient data is usually generated. Case studies require the learner to identify drug-related problems and render plausible solutions to those problems using information learned in the lesson sections of the program.

Virtual Patient Database Integrated into a Pharmacy Curriculum Via the Internet. L. Clifton Fuhrman and Michael Dollar, *University of South Carolina.* **Objectives:** The purpose of this project was to develop students understanding of pharmaceutical and continuity of care concepts while enhancing their abilities to utilize information technology by designing an interactive web based Virtual Patient Database. **Methods:** First year pharmacy students are assigned a virtual family of four, which is accessed via an Internet server web page. The families consist of an adult male and female, a child and geriatric patient, which have been designed by clinical pharmacy practitioners. Problem scenarios, based on each patients specific disease state, integrate didactic concepts taught during each semester. Each patient has three scenarios a semester for 4 semesters over a two-year period. Students receive one problem each week at random. The problem must be answered via the web page within 24 hours. **Results:** A compact web based application has been designed from testing feedback resulted in pedagogical and student-user modifications of the final product. Students have been able to access and retrieve information via various computer sources to successfully answer patient problems. **Implications:** The Virtual Patient Database has been successfully implemented within the curriculum and been well received by the students during the past two years of implementation. The project has developed a positive learning experience for the students as they begin to answer patient questions concerning pharmacy care. The students also have become adept with utilizing Internet and computer software information sources.

Interactive Class Management: Use of the Web as an Effective Tool. Caroline A. Gaither and Stephanie D. Taylor, University of Michigan, and Renoir Gaither, *University of Michigany.* **Objectives:** This Web-based site allows the instructor to avail class materials to students via hyperlinked documents; to communicate with students via email; to host a set of interactive review questions for student practice. **Methods:** The Pharmacy Administration class is comprised of a series of lectures by guest lecturers with a variety of demonstration/presentation tools, including Powerpoint presentations, overheads, and handouts. A website was developed using Macromedia Dreamweaver and Attain Objects for Dreamweaver to present the following class elements: syllabus, calendar, assignments, online resources, reserve materials, feedback, and review session. **Outcomes:** Work is in progress to access the general utility, student satisfaction and pedagogical effectiveness. **Implications:** Instructors can easily and productively make class materials available via the Web, including interactive review sessions, that are customizable, timely and useful in a collaborative environment.

Development of a Six-week WebCT-based Pharmacoepidemiology Course for Third-Year PharmD Students. David A. Gettman, *Nova Southeastern University.* **Objectives:** There were five specific objectives. The first objective was to create a dynamic communications link between each of the 120 PharmD students and the professor. The second objective was to pro-

vide students with useful lecturettes and assignments on pharmacoepidemiologic concepts and methods. The third objective was to have each group of four students work together on-line to produce a quality poster presentation concerning pharmacoepidemiology and a prevalent health condition. The fourth objective was to test students using questions that followed Bloom's Taxonomy. The fifth objective was to provide the professor with useful feedback to improve the course. **Methods:** An on-line student tutorial was taken by each student to introduce her/him to the WebCT 3 environment. Then, each student was asked to complete an assignment list each week. Every Thursday evening the instructor provided two online office hours for student 'chat' regarding the syllabus, the six modules (course content), the group poster presentation project, and online timed quizzes. Transcripts of each weekly chat were posted to the web. **Results:** A typical bell curve distribution was seen in the combined scores for quizzes. Students reported that they enjoyed working online to produce the poster presentation that they uploaded for an online poster session the last week of class. **Implications:** WebCT 3 provides a more seamless, simple and accessible media for PharmD students to incorporate these newly developed skills into pharmacy practice.

e-Learning for Every Educator. Akima R. Howard, Barry A. Bleidt, Carmita A. Coleman, Michelle R. Easton, Carolyn Ford, Pheophilus H. Glover, Tara M. Jenkins, Arcelia M. Johnson-Fannin, Joanne K. Morse and Candice M. Nickens, *Hampton University.* **Objectives:** The purpose of this poster is to demonstrate the benefit of online courseware to enhance student learning. **Methods:** The opportunity for increased learning provided by Web-enhanced courses is well accepted. This session will describe specific online course tools used during class time in a technology-enabled classroom to enhance learning. The courseware that will be featured is Blackboard. Session presenters will show how certain features of this tool such as external links, discussion boards, online quizzes, and whiteboards can be used to enhance classroom activities. Applications from various disciplines within the curriculum will be exhibited. **Results:** The experience of Hampton University School of Pharmacy in using these tools and the lessons learned will be presented. Information on how to avoid common mistakes and tips for best use of online course tools will be shared. **Implications:** Attendees should be able to describe how to use online course tools to enhance classroom instruction, recognize and manage potential challenges, and discuss methods for assessing the effectiveness of Web-enhanced instruction.

Web-based Application for Managing Pharmacy Student Rotations. Kim I. Leadon and Pamela U. Joyner, *University of North Carolina.* **Objectives:** Due to the large number and complexity of clerkship assignments throughout the state, a web-based program was needed to assist the UNC School of Pharmacy in managing student clinical clerkships while providing user-friendly access to different client groups. **Methods:** Faculty identified both deficiencies in the existing database and new functions required to more effectively manage rotations. A consultant was hired to design an application to specifically address identified needs. The Professional Experience Program (PEP) Database was developed to keep track of students, preceptors, and sites in one centralized location on the web. The password-protected website offers several utilities: preceptors upload information on student clerkship assignments and input data describing their practice site; students upload information on sites, preceptors, clerkship assignments and input personal profiles and clerkship/geographic preferences; system administrators oversee all functions and data reporting. **Results:** The PEP Database has reduced the administrative burden of managing over 1,300 rotation months/year. Student usage is high and their feedback positive. Preceptors need continued coaching to increase their use of the program. Future development plans include on-line evaluation of students, preceptors and clerkships and an automated function for assigning students to sites/preceptors. **Implications:** This program allows students to make better choices when given access to descriptive data about sites and rotations; enhances relationships between distant preceptors, their students, and the school; and allows a decentralized clinical faculty to effectively manage experiential education.

Developing Clinical Wireless Applications for Healthcare Professionals. Hisham Mahrous, *Midwestern University.* Mobile computing and Handheld PCs promise a revolution to benefit current practices in healthcare. With this technology, healthcare providers will have the ability to instantly update patient records to ensure that data properly reflects the most current information. Armed with this information at their fingertips, physicians, pharmacists and other healthcare providers stand to make more informed prescribing decisions and, thereby, reduce the chance of harmful drug interactions. In addition to the benefits to quality of patient care, mobile health care technology, through the elimination of redundant paperwork, allows for a more cost-effective practice. Mobile and wireless solutions are continuing to gain ground in the healthcare arena, as healthcare professionals are discovering the convenience of delivering timely information to and from the point-of-care. Two clinical applications will be demonstrated to show the benefits of using and implementing such technology in practices, especially for documentation, drug

information, and databases for patients.

VALITEQ Documentation Management Software as an Aid to Training and Validation Documentation. Marghi R. McKeon, *Lab Safety Corporation.* The objective of the VALITEQ DMS Software is to simplify the management and scheduling of initial and periodic training and validation of Students and Institutional IV admixtures personnel, and the generation of periodic training and quality assurance reports. The DMS uses a relational data base to produce training and validation summaries and schedules, individual training data records, active and archived personnel lists, practical assessment of aseptic technique forms, written tests and keys, and hood, compounder, refrigerator, and freezer Logs. The DMS software will facilitate ease of management and reporting of critical didactic and on-the-job training of all sterile-products compounding personnel, as a part of the VALITEQ aseptic technique validation system.

Grading Program. Joanne K. Morse, *Hampton University.* This program was created using Excel, in response to the need for a consistent method of grading that met my needs as coordinator. This program also addresses both weighting and team teaching issues. The other benefit of this program is the individual grade sheet it generates. All grades for a specific student can be viewed and printed just by typing the id number in the first box. All other information is pulled from pages, hidden to the student. This ensures privacy for other students as well as professor comments etc. The hidden pages can be used to generate specific grades for each test, labs, and other projects. The current program allows for up to 40 students, but can be modified to accommodate a greater number. Also team teaching is incorporated into the program so that multiple grades can be summated. Another feature is the statistical section. This will give basic information, such as, the average, median, mode, max and min for the class. Also a curve is plotted for each test and a cumulative graph can also be generated. Commercial programs are sometimes too modular and confining. This is a basic grading program that allows individual modifications as needed. Comments: I wrote this since we did not have a commercial product available. To work with this program one needs to know a bit about Excel. It is not a menu driven program at this time.

Development, Implementation and Evaluation of a Computer-Based Simulation for Problem Solving Instruction in Self-Care Pharmacy Practice. Gail D. Newton and John L. Stutz, *Purdue University.* **Objectives:** The purpose of this project is to develop, implement and evaluate computer-based simulations to facilitate student development of the problem solving abilities required to assist patients in the selection and use of nonprescription medicines. While highly cost-effective and efficient for some types of learning, passive instructional methods (*e.g.*, lectures) have been proven to be inadequate for the development of thinking skills. In contrast, active learning methods (*e.g.*, Guided Design) that are effective for problem solving instruction are time consuming and expensive to implement. **Methods:** The prototype simulation program was designed using directorate and falsity. A shell design was employed to permit rapid development of additional modules. The prototype module permits students to interact with a virtual patient to evaluate the suitability of self-care for a specific problem, recommend treatment and receive feedback relative to the appropriateness of the recommendation. **Results:** At present, the prototype module is being pilot tested with students in an advance clerkship devoted to fundamentals of teaching in higher education. A series of five modules will be developed and evaluated in an elective self-care course during the Fall 2001 semester. **Implications:** The proposed simulation may allow students to actively practice solving problems without the intensive instructor oversight and feedback associated with other active learning methods.

Development of an Instructional Virtual Medical Chart. Frank Romanelli, Jeffrey J. Cain and Kelly M. Smith, *University of Kentucky.* **Objective:** An interactive CD-ROM formatted virtual medical chart was developed to enhance the information extracting and synthesizing abilities of third year professional pharmacy students. **Methods:** Using a standardized patient and narrator, a clinical scenario was authored and digitally videotaped. The digital playback was then synchronized with a still frame medical chart which corresponded to the patient and clinical scenario presented during the narration. The presentation and a post-exercise quiz are stored on a CD-ROM disk for use by students and faculty. **Results:** The virtual medical chart was designed following observations from the clinical faculty and resident staff that pharmacy students on experiential rotations had a significant degree of difficulty in understanding and extracting information from medical charts. The virtual medical chart allows students to easily conceptualize a patient scenario and visually identify the location of patient specific information within a medical chart. The CD-ROM format allows students to proceed through the exercise at their own pace and also allows instructors to assess understanding via a post-exercise quiz. **Implications:** Enhanced understanding and information extracting abilities from medical charts. Improved performance during experiential rotations. Innovative approach to facilitate the understanding of clinical practice within a simulated environment.

Building a Web-Based Adaptive Examination. Phillip J. Vuchetich, *Creighton University.* **Intent:** To demonstrate building a web-based adaptive examination using Questionmark Perception software. **Process:** Demonstration or hands-on participation will be used to develop and deliver a sample computer adaptive exam. **Outcome:** Participants will recognize the capabilities of computer adaptive testing software. Free CD-ROMs that include a fully functional, time-limited evaluation version of Questionmark Perception software, printable documentation and training manuals will be available for conference attendees.

An Experiential Management Database. Stanley S. Weber, *University of Washington.* **Objective:** The proper management of experiential courses requires a relational database to tie information together. Our goal was to design and implement a database to manage information more efficiently; for both in-house use and for placement on the web. **Methods:** Among our design parameters was ease of implementation, flexibility, security, and ability to supply data to the web. We choose FileMaker Pro. **Results:** Our resulting database incorporates automatic data collection and distribution; often using email. It facilitates communication among school, site, and students allowing selecting, arranging, and tracking changes in rotation schedules. It also helps processing of form letters, organization of appointments and promotions clinical faculty, and the tracking of grades, prerequisites, immunization status, and submission of rotation assignments. Using a web browser students and preceptors can login securely, search our clerkship site catalog, update their online resumes, and determine what information we have on file. Rotations can be requested from our site catalog. Students can evaluate their sites online, review which sites they are scheduled for, and generate an email notice to their sites. Preceptors can view their site information and the site catalog, determine which students have been assigned, view the online resumes, and contact any scheduled student via email. **Implications:** Inquiries to our office to clarify issues have greatly decreased. The database achieved design objectives and helps us manage our experiential learning courses. The web accessible portion facilitates communication.

CONTINUING PROFESSIONAL EDUCATION

Career Changes of Recent Graduates from a Nontraditional Doctor of Pharmacy Program. Margaret M. Charpentier, Marilyn M. Barbour and Anne L. Hume, *University of Rhode Island.* **Objectives:** The Nontraditional Doctor of Pharmacy (NTPD) program at the University of Rhode Island was developed to provide local and regional pharmacists the opportunity to improve their clinical skills as well as to obtain the advanced degree. Of the 65 students who finished the didactic coursework, 47 will have completed the experiential requirements for the PharmD degree by May 2001. This report will describe the changes in practice responsibilities and positions of these graduates. **Methods:** An interview form was administered on admission to the program. Demographic characteristics, employment and year of graduation (undergraduate pharmacy degree) were included in this survey. A follow-up survey instrument with questions regarding current position, changes in professional responsibilities, as well as actual changes in employment will be mailed in April 2001 to the graduates of the program. **Results:** The initial survey at the time of admission indicated that the pharmacists obtained their undergraduate degree a mean of 11.4 years ago (range 0 to 38 years). The pharmacists were from diverse backgrounds with 25.5% from community practice, 57.5% from institutional practice, 17.0% from other practice areas. **Implications:** Through assessment of changes in career paths and responsibilities, we will evaluate the impact the NTPD program has had on practicing pharmacists who chose to pursue further education.

"Outreach Education" Administrative Structure to Foster Resource Sharing. Kristin K. Janke and Henry J. Mann, *University of Minnesota.* **Objective:** This initiative sought to develop an administrative structure that would: *(i)* maximize resource sharing between a non-traditional PharmD program and a continuing education program; *(ii)* serve degree seeking and non-degree seeking pharmacists requiring educational programs; and *(iii)* encourage prudent program decision making with the goal of becoming and remaining self sustaining. **Methods:** In 1998, the Office of Outreach Education was developed. Over the next 2-1/2 years, the Office launched a non-traditional PharmD program, grew its continuing education offerings and initiated certificate programs. Gradually, energy was shifted from nontraditional program course development to the development of online CE and certificate programs. Needs assessment, market analysis and outcomes assessment projects were initiated to assist in deciding which programs would sustain the office into the future, after the non-traditional program had served its market. **Results:** To date, 20 online courses have been developed for the non-traditional PharmD program. From these initial courses, 4 certificate programs in natural medicinals, clinical nutrition support, patient assessment and web information have been generated. Nondegree seeking pharmacists now represent approximately 50% of the enrollment in online courses. Repeat offerings have ensured that tuition levels are relatively predictable and sufficient to sustain the staffing

required. Partnership agreements are being negotiated with medicine, nutrition, dentistry, pharmacy employers and a national organization to facilitate further enrollment. **Implications:** This model can assist other institutions interested in restructuring CE offices to maximize resource sharing.

Staffing and Roles Required to Optimally Support Online Course Development. Kristin K. Janke, Erica A. Wattson, *University of Minnesota.* **Objectives:** To define the roles and staffing complement required to design, develop and implement online courses for pharmacists. To minimize the workload of contributing University faculty. To investigate unique options for cost-effective staffing. **Methods:** When designed, the Office of Outreach Education's primary purpose was to minimize faculty workload in developing online coursework, by providing the staffing necessary to assist with design, development and administrative implementation of courses. Since 1998, the Office of Outreach Education has experimented with various staffing models and gradually outlined distinct roles that are necessary for successful online courses. **Results:** As the portfolio of courses has developed from one to nineteen, the staffing has changed from one generalist staff member to ten (10) individuals with highly specialized job responsibilities. Using shared positions with CE, the office holds 6.0 total FTE with 4.25 FTE specifically allocated to online learning. Ten distinct roles in developing online courses have been defined. Using this model, faculty function as content experts, but are not required to fulfill other roles such as instructional designer, course administrator, or resource developer. Unique staff positions include an Instructional Design Resident, Technology Enhanced Learning Interns, and a Marketing Intern. PharmD students also provide course support while completing clerkship rotations and thesis projects with office staff. **Implications:** This model can assist other institutions interested in designing effective online course development teams and maximizing human resources.

Situated Learning in an Internet Continuing Education Course - Pilot to Practice. Dale E. Wright, Terri Schindel amd Andrew Uminski, *University of Alberta.* **Objectives:** To determine which situated learning components of an Internet continuing education course pharmacists believed to be important to their learning. **Methods:** A situated learning framework guided the design of a self-study Internet continuing education course, "Using the Internet as a Drug Information Resource". In the pilot project, a written survey and semi-structured interviews were used to identify which situated learning components of the program experienced and novice Internet users perceived to be important to their learning. Based on the pilot results, the course was redesigned into a modular format that retained all of the original situated learning components except the bulletin board. Feedback on the value of the situated learning components to pharmacist learning in the revised course is being gathered using an on-line survey. **Results:** In the pilot, pharmacists valued course elements representing nine of the 10 key situated learning components. The Internet context of the course was particularly valuable to learners. Collaborative learning through a bulletin board was not. Results from surveys gathered during 5 months (January through May 2001) of implementation of the new course will be compared to the pilot results. **Implications:** The pilot project suggested that a situated learning framework is relevant to the design of distance-delivered, independent-study continuing pharmacy education programs. Pharmacist feedback on the implemented version of the course will allow these findings to be tested in a practice situation.

Innovative Teaching Method: Distance Learning Drug Information Preceptorship. Carol M. Balmer, Vicki S. Fisher and Sondra K. May, *University of Colorado Health Sciences Center.* In September 2000, the University of Colorado School of Pharmacy began offering a Drug Information Preceptorship as part of the experiential component of the Distance Learning Doctor of Pharmacy Program. Students develop drug information skills through projects typical of an on-campus drug information preceptorship. Students complete medical writing projects, participate in online journal clubs, and answer drug information inquiries. Guidance and feedback are provided by Drug Information Specialists via online discussions, netmeetings, email and phone. Extensive resources are available to students via remote access to the campus medical library. **Objectives:** *(i)* Measure student satisfaction with an Internet-based drug information preceptorship; *(ii)* compare Internet-based student satisfaction with on-campus student satisfaction with drug information preceptorships; and *(iii)* evaluate student progress with drug information skill development. **Methods:** Students complete a midpoint and final evaluation of the preceptors and overall preceptorship experience to determine student satisfaction. Student satisfaction evaluations will be compared between students in the Internet-based and on-campus preceptorships. Baseline and final assessments are completed by each student to assess achievement of rotation goals, perception of personal strengths and weaknesses associated with core drug information skills, and comfort level with using drug information resources. Implications: A drug information experiential program can successfully be provided via distance learning technology. Continued evaluation of student perceptions of the Internet-based preceptorship is an important tool for development of an effective educational program.

Creating a Postgraduate Program Focusing on Continuing Professional Development (CPD). Guylaine Bertrand, Claude Mailhot, *Université de Montréal.* **Objective:** Continuing education programs are usually offered once with a specific topic presented. The Faculty of Pharmacy recently developed a postgraduate CPD program allowing pharmacists to play a more active part in patients' health care. The program focuses on educational needs of pharmacists with courses being offered in a concentrated format and repeated on a regular basis. **Methods:** Most of the thirty-nine courses created are one-credit courses. Each includes self learning and exercise components to be completed prior to, during and following a one-day meeting. Workshops during meetings allow for case studies and discussion with an expert. As a follow-up exercise, pharmacists must apply the concepts acquired during meetings in their daily practice. A written report then confirms achievement of desired outcomes. Following each course, participants complete a satisfaction assessment questionnaire and evaluate the feasibility of applying the acquired knowledge and abilities in their practice. **Results:** Currently, over 1000 pharmacists have participated in one of the nine courses offered during the first year of the program. Course assessments indicated that over 90% of participants were satisfied with the courses and 85% said they would apply their new knowledge and abilities in their practice. **Implications:** The course structure (homework, group discussion, time spend with the expert) appears to be an effective way of meeting educational needs and impacting on practitioners daily activities. Program outcomes will continue to be assessed in terms of practice improvement.

Educational Program to Expand Access to Emergency Contraception. Colleen M. Brady, David W. Fielding, Judith A. Soon, and Brenda Osmond, *The University of British Columbia.* **Background:** On December 1 2000, British Columbia became the first Canadian province to permit community pharmacists with special training to provide emergency contraceptive pills (ECPs) to women without a prescription from their physicians. **Objectives:** An educational program was designed and implemented to assist BC pharmacists expand their scope of practice in order to address the need of accessible emergency contraception for the women of BC. **Methods:** The educational program was jointly designed by the College of Pharmacists and the BC Pharmacy Association based on the training manual developed for the Washington State pilot program. Eighty pharmacists throughout the province were trained to provide three hours of standardized instruction, and all 2400 BC pharmacists were invited to participate. Upon completion of the training session, pharmacists can register with the College of Pharmacists and their pharmacy can signup on the 1-800-NOT-2-LATE registry. **Results:** Ten weeks after the launch of the program, there are 1300 trained pharmacists and 360 pharmacies in BC with at least one trained pharmacist. Approximately 100 ECP prescriptions per week have been prescribed by pharmacists in some 200 pharmacies distributed in all 20 Regional Health Districts in the province. **Implications:** Continuing professional education programs can, in a timely fashion, be utilized to address real, educational needs arising from changing practice requirements and emerging health issues.

EDUCATIONAL RESEARCH

Virtual Patient Technology Utilized for Teaching Nontraditional PharmD Students. Paige Akers, Helen Klarich and Peggy Piascik, *University of Kentucky.* **Objectives:** To demonstrate use of and evaluate effectiveness of innovative and interactive technology to assist in teaching pharmaceutical care to PharmD candidates in a distance learning program. **Methods:** The Virtual Patient simulates a pharmacist-patient interaction situation using Top Class Course Management software. Students interact with virtual patients to take medication histories and gather information required for completing a therapeutic care plan and answering assigned questions. Students work individually and submit their finished assignment electronically to the instructor by the designated deadline. The virtual patient was created with Macromedia Authorware and is designed to respond when prompted by the user. The student asks questions with key words or phrases, which provides the respective response from the patient. Students who have completed one or more Virtual Patient activities will be surveyed to assess the effectiveness of this technological teaching tool. We will assess whether students feel this activity enhanced learning of the subject content, whether the technological process was simple to manage, and students' satisfaction with this activity as part of their course work. **Results:** Work In Progress. **Implications:** The Virtual Patient simulation is created to provide off-site students an opportunity to practice their patient care skills, including taking medication histories and gathering information required to complete a therapeutic care plan. Results of the survey will help guide further development of innovative teaching tools for use in our distance learning program.

The Pharmacy Script Concordance Test: A Tool to Assess Clinical Pharmacy Competence. Kathleen Besinque, Panrasri Khonputsa, William Gong, May Mak and Dixie Fisher, *University of Southern California.* Competence is a person's capacity to perform job functions. Researchers find

differences between experts and novices lay primarily in experts' recall of meaningful relationships and patterns, or the structures of the knowledge rather than in a problem-solving strategy applied to the problem. Structure or organization of knowledge is called "Script". The Script Concordance (SC) Test is an assessment tool designed to probe whether knowledge of examinees is efficiently organized for clinical action. Studies in medicine revealed SC tests accurately distinguish this "script" between students, residents and faculty groups with the students' scores being lowest. There has been no published SC test to evaluate organization of knowledge in clinical pharmacy. **Objectives:** To develop and pilot a Pharmacy Script Concordance Test (PSC). To determine whether this test can be used to measure pharmacy students' ability to efficiently organize knowledge for clinical competence in diabetes mellitus. **Methods:** A SC test was constructed using faculty experts for content. Validation of the test using a group of practice experts for standardization of content and scoring was done. The test will be administered in March to four groups: pre-clerkship students, new graduates, ambulatory care residents and pharmacy faculty. Data will be analyzed by using descriptive analysis and the factorial analysis of variance to verify whether the differences between the groups are significant.

Impact of an Internet-Based Smoking Cessation Educational Module on Pharmacists' Knowledge. Michael C. Brown and Kristin K. Janke, *University of Minnesota.* **Objectives:** Internet-based education is an increasingly common medium for professional education, but little literature exists describing its impact on the participant pharmacist's knowledge or practice. The primary objective of this study was to describe the change in pharmacist's knowledge following an internet-based educational intervention. Secondary objectives were change in participants' reported knowledge and familiarity with smoking cessation and change in participants' anticipated involvement with smoking cessation patients. **Methods:** Pharmacists enrolled in a respiratory pharmacotherapy course in the non-traditional Doctor of Pharmacy program at the University of Minnesota were eligible to participate. Participants completed one of two possible 40-question tests (A or B) as a pretest. Each participant then completed the educational module, consisting of three lectures and two cases. After the module, participants completed the other 40-question test (B or A) as a posttest and an exit questionnaire. **Results:** Thirty-eight pharmacists participated in the study. The average pretest score was 37% (range 25-57.5%). The average posttest score was 86.25% (range 70-100%). All participants' test scores improved (range 30-65%, *P<0.001*). All exit questionnaire respondents reported that their knowledge and familiarity with smoking cessation improved. After completing the module, 92% of practicing pharmacists anticipated their involvement with smoking cessation patients would increase. **Implications:** This study fills a void in the literature by describing internet-based education's effect. Future studies are needed to determine the long-term knowledge retention and pharmacists' actual patient care involvement.

Does Consensus Exist Within Pharmacy's Academic Disciplines? Shane Desselle, Charles Collins and Marc Harrold, *Duquesne University,* Michelle Kalis, *Massachusetts College of Pharmacy and Health Sciences,* Elaena Quattrocchi, *A&M Schwartz College of Pharmacy and Health Sciences.* **Purpose:** Education literature insinuates the momentous ramifications of intradisciplinary consensus. This project was conceived to measure the accord within each of five pharmacy disciplines concerning teaching and research issues and the perceptions of those disciplines' development of a scientific paradigm. **Methods:** A survey was mailed to a random sample of pharmacy educators stratified by AACP-designated disciplines. The survey was designed to measure the consensus construct in addition to allowing for comparisons in perceptions of agreement on teaching and scholarship issues across academic departments. Subjects also ranked the five disciplines in development of a scientific paradigm. **Results:** From the 189 valid responses, it was observed that all five disciplines demonstrated at least modest consensus, with pharmacy practice exhibiting somewhat less accord in certain areas (one-way ANOVA). The greatest accord was achieved on course sequencing and content, while less accord was achieved on departmental decision-making and methods of reward. Respondents reporting less intradepartmental consensus were female and employed at "teaching" institutions. Respondents perceived medicinal chemistry and pharmacology/toxicology as having best developed their scientific paradigms (Wilcoxin signed ranks test). **Implications:** It would benefit each discipline to reach an even greater accord on certain issues. Despite similar results on an objective measure of consensus, a perception exists that pharmacy practice and social/administrative scientists have yet to fully develop their scientific paradigms.

Counseling Patients with Low Health Literacy. Donna Dolinsky, Conrad Dhing, John Lonie, David Mihm and Brinda Thakkar, *Long Island University.* **Objectives:** To design, implement, and evaluate an instructional module to teach students to develop sensitivity to needs of low health literacy patients, assess degree of health literacy and counsel patients and caregivers on medication management using materials and methods appropriate for low

health literacy patients. **Methods:** Based upon an updated National Library of Medicine literature search on Health Literacy, the evidence-based module will be presented to students in a required lecture/recitation course on Communications in Pharmacy Practice. Recitations consist of interactive activities, *e.g.,* interviewing simulated patients while being videotaped, analyzing performance using explicit criteria, and practicing generating questions, listening and responding empathically. This module will be primarily experiential and interactive, using scripted simulated patients. We are creating printed and electronic text and graphics as well as electronic animation and film clips. There will be two types of outcome assessment: a written exam measuring understanding of health literacy associated problems and solutions, and video taped counseling with low health literacy simulated patients. We will evaluate performance using explicit criteria measuring quality of sensitivity, assessment and interventions. After testing and revising the program, course materials will be packaged into a curriculum guide. **Implications:** Pharmacists can enhance health outcomes through identifying low health literacy patients and meeting their special medication counseling needs.

Assessing Students' Motivation to Learn in Large Classes. Eric H Hobson, *Union University.* **Purpose:** Identify factors that motivate pharmacy students to learn in large classes and to compare these factors to those identified by non-pharmacy students. **Methods:** 412 students (328 pharmacy; 84 non-pharmacy) from three colleges (Albany College of Pharmacy, n=231; St. Louis College of Pharmacy, n=97; Southeast Missouri State University, n=84) completed an in-class, open-ended, two question response activity focusing on what does/does not motivate students to learn in class. All responses (814; 412 X 2 questions) were transcribed and coded by "idea units" (1924 total units). Data were categorized using eight descriptors selected from the motivation literature (teacher attitudes/behaviors, course structure, intrinsic factors, course content, performance measures, vocational/financial concerns, learning environment, parents/others). **Findings:** Students reported that "teacher attitudes/behaviors" and "course structure" were important positive and negative motivation to learn in class sources. Other important positive motivation sources included: "intrinsic factors," and "course content." Important negative motivation sources included: "learning environment," "intrinsic factors" and "course content." Data from the two pharmacy student populations were identical. Little difference emerged when non-pharmacy student responses were added to the response pool.

Assessment of Student Performance Prior to Clerkships. Rhonda M. Jones and Michael S. Monaghan, *Creighton University.* **Objectives:** Our school recently developed twelve ability-based educational outcomes for graduates. The purpose of this project is to determine the effectiveness of the didactic curriculum in preparing students for clerkships based on their performance of these ability-based outcomes. **Methods:** Prior to beginning clerkships, forty-eight fourth-year pharmacy students were randomly selected to complete a twelve-station pharmacy objective structured clinical examination (P-OSCE) using standardized patients (SPs). Each station focused on an ability-based outcome and consisted of a case, student directions, SP directions, case performance criteria, and references deemed necessary to complete the case. Pharmacy practitioners developed each case based on real-life encounters from their experience. The case content, performance criteria, and directions were validated by a separate three-faculty practitioner panel review. The students were videotaped and scored by a faculty-grading panel according to the performance criteria. **Results:** Student performance data will be presented as an overall and a per-case percent score. These values will reflect the students' ability to perform the educational outcomes as well as the effectiveness of the didactic curriculum and current learning environment. **Implications:** The data presented will be used to evaluate how well the didactic curriculum prepares students for the performance of the ability-based outcomes. The data will reflect the effectiveness of the learning environment in terms of active learning. How such performance data can be used in curricular reform will also be illustrated.

Comparison of Traditional and Web-Based Course Evaluation Processes in a Required, Team-Taught Pharmacotherapy Course. Jennifer B. Kasiar, Sara L. Schroeder and Sheldon G. Holstad. *St. Louis College of Pharmacy.* To improve the utility and efficiency of course evaluations, we compared a web-based evaluation process with traditional methods. In a team-taught course (enrollment = 170), students were randomly assigned to complete evaluations online (n = 50) or by traditional, paper-based methods (n = 120). Evaluations were conducted 4 times during the semester. Each evaluation rated 4-5 different instructors on 14 performance items. Web-based (WEB) and traditional (TRAD) evaluations were compared for *(i)* Likert score on each item; *(ii)* quantity and quality of student comments; *(iii)* student satisfaction; and *(iv)* consumption of student time. WEB and TRAD Likert scores rating instructor performance were similar on 13/14 items. WEB ratings were significantly higher (*P<0.05*) for 15/18 instructors for the item, "Instructor was knowledgeable in subject area." The WEB group submitted more comments (range 38.6-60%) than the TRAD group (range 2.7-16.5%) and the quality of

comments was higher in WEB group. Upon questioning, students, faculty and staff all rated the web-based process as more convenient and less time-consuming than the traditional method. A web-based evaluation system, using subsets of students to complete each evaluation, can be employed to obtain representative course and instructor-specific feedback. The web-based process yields quantitatively and qualitatively superior student comments, enhanced student satisfaction, and more efficient use of student, faculty and staff time.

Nontraditional PharmD Graduate Survey: Assessing the Impact on Individual Careers. Helen I. Klarich, Ann B. Amerson and Peggy Piascik, *University of Kentucky.* **Objectives:** determine the impact of earning the PharmD degree on graduates' career development; and compare the perceived quality of career vs. the time and expense invested in pursuing the degree. **Methods:** The Nontraditional PharmD Option at the University of Kentucky has granted 150 PharmD degrees since 1990. Practicing pharmacists earn the Doctor of Pharmacy degree on a part-time/off-campus basis. A graduate survey has been developed to assess the perceived value of the program as a professional and career development tool. The survey will be made available to them by traditional mail and via World Wide Web. The survey includes questions in the following areas: why graduates chose to enroll in a nontraditional PharmD program, the time commitment required for program completion, applicability of course work to pharmacy practice, and the impact of obtaining the PharmD credential on their professional practice. The perceived value of the PharmD degree relative to time since graduation from the B.S. and PharmD programs will be evaluated for trends and differences. **Results:** No results available at this time, work in progress. **Implications:** Results will guide farther program modification in terms of course content, format and delivery method.

Pharmacy Student Self-reported Levels of Empathy and Assertiveness as a Function of Instruction Using Simulated Patients in a Communication Skills Laboratory. John M. Lonie, *Arnold & Marie Schwartz College of Pharmacy.* **Objectives:** The purpose of this study was to assess whether instruction using standardized patients in a communications skills laboratory would significantly effect scores on an instrument measuring self-reported empathy and assertiveness. **Methods:** Students completed pre and post measures of a validated self-report instrument measuring empathy and assertiveness. Students attended weekly communication recitations in which they put into practice empathic and assertive responding techniques with standardized simulated patients. The recitation sessions also included student videotaping of counseling scenarios with the standardized patients. The participants, peers, and instructor later reviewed the videotapes offering suggestions for improvement. **Results:** Seventy-eight students completed both the pre and post instruments. Using the paired t-test, posttest assertiveness scores (mean = 24.41, SD = 6.59) improved significantly (t = 5.68, P <0.001) over the pretest scores (mean = 20.40, SD = 6.04). Likewise, the posttest scores on empathy (mean = 27.76, SD 4.55) significantly improved (mean = 25.05, SD = 4.85) over pretest scores (t = 3.41, P = <0.001). **Implications:** As a part of a professional education, it is our responsibility as educators to expose pharmacy students to the strengths and weaknesses in their communication skills. If we treat empathy and assertiveness as skills that can be developed and nurtured, we can help students improve these abilities through self-awareness, practice and peer assessment.

Assessment of Student Retention in a Therapeutics Course with Weekly Noncumulative Assessments. Kimberly A. Linowiecki-Zientara, *Midwestern University.* **Objectives:** Balancing the quantity of material and the level of retention is a challenge in a content intensive course. The purpose of this project was to evaluate the extent to which students enrolled in a 5 quarter-hour required therapeutics course retained knowledge without being held accountable via a cumulative exam. **Methods:** An optional, cumulative exam was offered to 120 students enrolled in a 5 quarter-hour course in pharmacotherapeutics. The score from this exam was used to replace the students' lowest exam score in the course. The exam included material from the first 5 of 8 exams and administered at midterm. Mean scores for exams 1-5 was compared to scores on the cumulative exam. Students anonymously completed a survey indicating the number of hours spent studying for this exam compared to others in the course. **Results:** 71(59.2%) students took the cumulative exam and of these, 65 (91.5%) responded to the survey. 24(36.9%) students reported that they did not study for the cumulative exam. Of those who studied, 30(73.2%), 10(24.4%) and 1(2.4%) reported that they prepared less, the same and more compared to others in the course, respectively. There was a statistically significant difference between mean scores for exams 1-5 (82.5%) and the and the cumulative exam (72.7%) (P<0.001, paired student t). **Implications:** Without cumulative exams, retention was lower but within the C range. Cumulative assessments should be required.

Do Canada's Hospital Pharmacy Managers Have The Skills They Need? The Results from a National Survey. Neil J. MacKinnon and Sheri D. Axworthy, *Dalhousie University.* **Objectives/Intent:** Hospital pharmacy managers in Canada are facing many pressures in today's healthcare environment,

and yet their training occurs primarily on-the-job. The objectives of this study were to identify: *(i)* pharmacy management skills deemed to be of high importance by Canadian hospital pharmacy managers; *(ii)* pharmacy management skills lacking in managers, as determined by self-assessment; and *(iii)* demographic characteristics associated with pharmacy managers lacking these essential skills. **Methods/Process:** A survey was developed and pilot tested in November 1999. The revised survey was mailed to all 514 Canadian hospital pharmacy managers during July 2000. Two follow-up reminders were sent to non-respondents. **Results/Outcomes:** The response rate was 52.7 percent. Out of the 61 specific managerial competencies considered, the respondents identified "demonstrating ethical conduct" as both the most important skill and their greatest strength. "Understand the operating principles of managed care" was the least important skill needed, while "participating in the implementation of a marketing program" was their greatest weakness. Respondents with a MBA degree, 16 or more years' experience, and who worked in an institution with 500 or more beds, had a statistically significant higher mean self-assessed skill level. **Implications:** This survey has identified the degree of importance and the self-assessed skill level of 61 management skills in hospital pharmacy managers in Canada. The findings have implications for Canada's Colleges of Pharmacy, training programs, and continuing education.

Experiment in Critical Thinking: Do Pharmacy Students Think Like Experts? Donald R. Miller, *North Dakota State University.* **Objectives:** To determine whether students completing a drug literature evaluation course could rank the quality of three studies similar to a panel of experienced researchers and to determine if the California Critical Thinking Test (CCTST) predicts which students think more like experts. **Methods:** In a previously published article, a panel of researchers was asked how much their belief in a subject changed after reading three extended study abstracts - a case-control study (CC), a well done experimental study (EXP), or a shoddy experimental study (PLACEBO). The experts' change in belief was affected most by the EXP study, next by the CC study and least by the PLACEBO study. In a drug literature final exam, pharmacy students were asked for their change in belief, expressed by a likelihood ratio, in a manner that duplicated the published study. Students who ranked the studies correctly vs. incorrectly were compared on CCTST scores. **Results:** The students' change in belief after reading the studies was modest and not statistically different between study types. The likelihood ratios for students were: EXP 0.67 (vs. 0.33 for experts), CC study 0.78 (0.45), and PLACEBO 0.77 (0.75). There was no difference in CCTST scores between students who did or did not place studies in correct order. **Implications:** After a drug literature evaluation class pharmacy students did not think like experts and the CCTST did not predict which students thought more like experts.

Critical Incidents in Pharmacy Education and Professionalization. Kimberly S. Plake and Lon Larson, *Drake University.* **Objective:** To identify and analyze "critical incidents" in the education and professional socialization of pharmacy students. Critical incidents are events judged to be particularly meaningful by the participants in the events; the events may be positive or negative. **Methods:** As an assignment in a course focusing on psychosocial issues, students were asked to write short narratives of critical incidents that had occurred during their time in the pharmacy program (the assignment was done during their last semester of didactic work). This was a replication of an earlier study done with medical students. Students were encouraged to consider a wide variety of incidents such as course assignments, issues at work, interactions with students, pharmacists, and professors. The analysis of these incidents will include sorting them into relevant categories. Initial categories will be those used in the study of medical students: *(i)* expression of empathy; *(ii)* difficulty in acculturating; *(iii)* struggle between empathy and acculturation; and *(iv)* blending empathy with acculturation. **Implications:** These incidents will provide insight into the important professionalization issues faced by pharmacy students, and thereby, may provide useful information in developing curricula and academic policies. They may also illuminate the perceived gap between the academic world and the "real" practice of pharmacy.

Students' Attitudes towards the Milemarker Assessment: A Cumulative Examination. Sujit S. Sansgiry, Thomas Lemke, Julianna Szilagyi and Andrea Smesny, *University of Houston.* **Objectives:** The milemarker assessments are cumulative examinations used to assess students' knowledge and retention of information from didactic courses. There are three milemarker exams, each after completion of a professional year. The objective of this study was to evaluate students' attitude towards the first milemarker exam. **Methods:** One hundred students who had completed their first year of the pharmacy curriculum were required to take the milemarker exam. A 30-item questionnaire, developed to evaluate examination-related cognitions, time management, study strategies, and attitude towards milemarker exam, was administered two days after taking the exam. Each statement had only four anchors, without a neutral point, ranging from strongly disagree to strongly agree. **Results:** Students indicated that courses were interesting (3.12 ± 0.43) and they enjoyed (3.09 ± 0.55) the courses taught during the first year.

Students found it difficult to prepare for the milemarker exam (2.04 ± 0.75) and their confidence in their preparation was low (1.83 ± 0.84). Furthermore, they did not study very hard (3.50 ± 0.69) or regularly (3.12 ± 0.89) for the exam. However, they indicated that the exam helped them integrate information from different subjects (2.73 ± 0.71), and it clarified some of the concepts they had learned in the class (2.48 ± 0.86). **Implications:** These results will provide a guide for future improvements in the milemarker assessment process and indicate ways to motivate student preparedness.

Portfolio's Role in Changing Graduate Students' Perceived Self Efficacy. Kenneth W. Schafermeyer, Donald R. Rickert and Peter D. Hurd, *St. Louis College of Pharmacy*. **Objectives:** This study is designed to gain insights into the perceptions that graduate students have toward the role of portfolios in the development of self efficacy. Self efficacy results from feelings of competence and self worth. While competence is usually developed in the classroom, self worth is often neglected. It is hypothesized that portfolios give students the opportunity to enhance self worth by: *(i)* participating in self assessment; *(ii)* chronicling success; *(iii)* benchmarking model behaviors; and *(iv)* persuading (*i.e.,* helping students develop self mastery through positive feedback). **Methods:** A qualitative research design is used for this study. The sample includes twelve individuals who have completed a portfolio requirement for the Master of Science program at the St. Louis College of Pharmacy. Data are obtained through telephone interviews using an established set of questions aimed at exploring the perceived value of the portfolio as a means of helping students achieve self worth. **Expected Outcomes/Implications:** Portfolios are gaining acceptance as an educational tool but are not yet used widely in pharmacy graduate programs. This study has the potential to gain insights into the role that portfolios play in helping students achieve self worth. In addition, the study will give insight into the value of portfolios as a means of achieving course and abilities outcomes and will help evaluate the value of portfolios as a learning tool.

Positive Economic Impact of Pharmacy Clerkship Students in an Intensive Care Unit. Michael A. Shara, Robert I. Garis and Frances C. Moore, *Creighton University*. **Objectives:** This study investigated the cost savings impact of pharmacy student interventions in a hospital intensive care unit (ICU) during four-week Adult Inpatient Pharmaceutical Care clerkships. **Methods:** In addition to providing pharmaceutical care, students had responsibility for documenting interventions such as; *(i)* changing dosages based on renal function; *(ii)* preventing and managing drug-drug interactions; *(iii)* recommending intravenous to oral dose switches; and *(iv)* recommending better therapeutic alternatives. In order for an intervention to be counted as a student contribution, it had to be initially identified by the student, then reviewed and approved by the preceptor, and implemented by the prescriber prior to input from any other health care professional. **Results:** There were 788 average annual interventions by students in this 26-bed ICU. The interventions amounted to an average of 21.9 ± 4.21 per student, based on the 3-year study. The cost savings impact is conservatively estimated at $50,000-128,000 annually. A more detailed analysis of these interventions is underway and is likely to yield an even greater pharmacoeconomic impact, based on the literature and the acuity of the ICU setting. **Implications:** This study indicates that pharmacy clerkship students are capable of making a valuable impact while acquiring the skills of pharmaceutical care provision. These findings may be useful to pharmacy schools seeking to establish teaching sites external to their university hospital.

Multiple Choice Progress Examination: Comparison of Lecture-Based and PBL-Based Curricula: Interim Results. Anne M Whelan, Patrick S Farmer and Susan A Mansour, *Dalhousie University*. **Objective:** In 1997/98 the College of Pharmacy at Dalhousie University implemented a unique, integrated problem-based learning (PBL) curriculum for a 4-year undergraduate pharmacy program. Several methods are being used to compare the PBL-based curriculum to the previous lecture-based curriculum. This 5-year project was designed to determine if the knowledge learned by students in the two curricula is equivalent. **Methods:** A bank of multiple choice questions was developed including items from the biomedical and pharmaceutical sciences and all other pharmacy disciplines. This bank is enhanced each year. A single 100-item exam is administered simultaneously each spring to all students in the undergraduate program. Data collected from the classes of 1998-2002 will include students from the lecture-based and PBL-based curricula. The results from each graduating class will be compared using ANOVA. Performance on questions in each subject area will be assessed. The project received ethical approval in 1998. **Implications:** In addition to determining if knowledge acquisition is similar with the two curricula, data from the project will be useful to determine if students are acquiring the knowledge needed to achieve curricular outcomes and meet national accreditation standards. Students are able to track their progressive acquisition of knowledge as they proceed through the curriculum. Finally, subject areas of the curriculum that require changes may be identified.

Student Performance in a Stacked vs. Nonstacked Curriculum.
Kelly J. Anderson, Rhonda M. Jones, Michael S. Monaghan and Paul D. Turner, *Creighton University*. **Objectives:** A "stacked" curriculum is one in which a course(s) is condensed into half a semester followed by another condensed course(s) for the second half of the semester. Our program stacked the curriculum as a means of lessening student workloads and improving performance during the first professional year. The purpose of this study was to determine if stacking improved student performance as measured by grades. **Methods:** Final numerical course grades for seven first-year courses were obtained for four consecutive years, two years of stacked grades and two years of non-stacked grades. A one-way ANOVA was conducted comparing the four consecutive years. Significant findings were followed up with post hoc comparisons of the stacked and non-stacked courses using the Independent t Test or its nonparametric counterpart, the Mann Whitney U, if heterogeneity was present. **Results:** Significant findings were observed in the communications and health care systems courses (F = 40.64, $P < 0.001$ and F = 12.48, $P < 0.001$). In both courses, significantly higher grades were observed in non-stacked classes (Z = 4.71, $P < 0.001$ and Z = 3.39, $P = 0.001$) than stacked classes. No significant differences existed for the other five pharmacy courses. **Implications:** Stacking the curriculum is not a clear advantage that always improves student performance. Other means of lessening student workloads should be explored.

Pharmaceutical Biotechnology Virtual Laboratory: Student Software Usability Testing. Kathleen Boje and Christine Sauciunac, *University at Buffalo*. **Background:** We are developing a virtual, interactive laboratory that illustrates principles of the pharmaceutical biotechnology drug R&D process. Two of the 7 modules (1 and 4) are completed; another 2 modules (2 and 3) will be completed by March 2001. **Objective:** To conduct student software usability testing on modules 1-4 to assess student acceptance of educational software. Software design is a vital prelude to pedagogical effectiveness: well-designed software promotes rapid user acceptance and a positive learning experience; the converse applies to poorly-designed software. **Methods:** Student volunteers (n=30) will be recruited (and compensated) from Sp'01 Pharmaceutical Biotechnology. Students will complete modules 1-4 in two private sessions. After each session, students will complete an anonymous usability survey on student characteristics and standard usability categories: usefulness (user satisfaction in attaining his/her goals), effectiveness (user ease of software use), learnability (user's ability to use the software from session-to-session) and attitude (user likeability/opinions of the software). **Results:** Preliminary student feedback (n=8) on the prototype module revealed insightful comments. Formal usability testing survey results will be presented. **Implications:** This usability survey (to be conducted in April 2001) is vital for continuous evaluation and improved design. These studies will focus on software usability design, which is an important component for student acceptance/learning from educational computer software. Future studies assessing the software's pedagogical effectiveness are needed. (Funded by The Procter & Gamble Curriculum Development Grant.)

Inventory of Student Approaches to Learning and Studying During an Entry-Level Doctor of Pharmacy Program. Lisa E. Davis, Eric G. Boyce and Phyllis Blumberg, *Philadelphia College of Pharmacy*. **Objectives:** To determine the types of approaches to learning and studying in pharmacy students and whether these change during the program. **Methods:** Students in the first and third professional years of an entry-level Doctor of Pharmacy program were asked to complete the Approaches and Study Skills Inventory for Students (ASSIST) in the beginning of the 2000-2001 academic year. Results from each survey were scored individually and data were analyzed using descriptive and comparative statistics. **Results:** A total of 279 first-year and 209 third-year pharmacy students completed the survey. For all students, learning style scores were highest for Strategic Approach (mean 73), followed by Deep Approach (mean 58) and lastly, Surface Apathetic Approach (mean 49), ($P<0.001$). Third-year students scored higher in Strategic Approach ($P=0.0007$) and lower in Surface Apathetic Approach ($P=0.0003$) to learning. Overall, students preferred teaching methods of transmitting information ($P<0.0001$), but third-year students had higher scores for preferring teaching methods that support understanding ($P=0.02$). **Implications:** The ASSIST instrument is helpful in identifying students' approaches and preferences in learning, but the meaning of the differences seen is unclear. Our pharmacy students have a strategic approach to learning and prefer passive teaching methods. Colleges of Pharmacy that wish to enhance deep approaches to learning and methods that support understanding may need to examine student learning characteristics and the design and delivery of course work.

Evaluating the Communication Skills of Entry-Level PharmD Students. Conrad W. Dhing amd Sameer Kotak, *Long Island University*. **Objectives:** Assess the communication skills of Entry-Level PharmD students using APhA-ASP counseling guidelines. **Method:** As a part of the Communication Skills course, 4th-year entry-level PharmD students were distributed into five laboratory sections which meet one-hour each week throughout the semester. A pretest was conducted in the first week of the semester

wherein the students were presented with scenarios involving prescription filling and counseling using graduate assistants as role-players. These students were not provided with any instructions on how to deal with the scenarios. A standard evaluation form using criteria from the APhA-ASP counseling guidelines was used to assess the students' counseling skills. Over the course of the semester, students would receive instructions and reading materials on developing counseling and communication skills. Every week students would get a chance to practice the counseling process and implement interpersonal communication skills like empathy and assertiveness. A posttest will be conducted in the final week of the semester using the same format and evaluation form to assess the level of counseling and communication skills in the students. **Results:** Pretest data have been collected. Posttest data will be collected at the end of the semester. **Implication:** The Communication Skills course is a valuable tool for teaching pharmacy students to develop competent counseling skills.

Web-Based Learning as Supplemental Instruction and Research Tools. Judy Garrett, Charles Born and Jamie Messenger, *University of Arkansas Medical Center.* **Objectives:** To develop a web-based supplemental instruction program to maintain the quality of peer tutoring as the availability of tutors fluctuates and provide a research tool for: *(i)* comparing students' abilities to answer objective- and subjectively-scored questions; and *(ii)* identifying variables related to student use of web-based instruction. **Methods:** Parallel sets of objective and subjectively scored practice questions were developed over 15 topics in a P1 physiology course and made available on the web. Use was not mandatory. Paired *t*-tests were used to compare percent scores on each set. To assess effectiveness, two categories of use were defined: <10 and 10 or more sets, with the dependent variable being the average score after Exam 2. These groups were compared with respect to achievement and two variables hypothesized to be related to the use of web-based instruction: prior Internet use and pre-professional physiology coursework. **Results:** In many areas (*e.g.,,* cardiac and smooth muscle) critical to success in advanced courses, subjective test scores were significantly lower than objective scores. The web-based materials were used by students across all achievement ranges, with the average score of students who used 10 or more sets—80.4, being significantly higher than those who completed fewer practice question sets—76.4 ($P<0.05$). Neither prior physiology coursework nor Internet use was significantly related to use of the web-based questions. **Implications:** Web-based materials are both effective instructional and research tools.

Design and Validation of an Authentic Performance Assessment in a Doctor of Pharmacy Curriculum. Terrence R. Jackson, JoLaine R. Draugalis Marion K. Slack and Woodie M. Zachry III, *The University of Arizona.* **Objectives:** The study is an evaluation design in which the authentic assessment determines the level of student performance compared to an established set of expected learning outcomes. Performance assessment is deemed "authentic" when students face tasks that simulate real practice challenges based on practice standards (Wiggins 1989). **Methods:** An authentic assessment has been developed and will be administered using as a template material specific to outcome domains relating to professionalism, information management and critical thinking, in an entry-level PharmD program. The authentic assessment was created using recommended developmental guidelines and Bloom's hierarchical taxonomy for creating items with variable difficulty. Evaluation and application of the authentic assessment requires development of standards differentiating levels of mastery and a scoring rubric for determining the level of skill performance. Evidence for content, construct, and criterion-referenced validity will be assessed using classical test theory and the item response theory one-parameter logistical (Rasch) model. A student self-evaluation of their perceived competency of the abilities measured by the authentic assessment will also be included. **Implications:** To make full use of outcomes-based educational processes, students must have the "opportunity to learn" and demonstrate achievement. Furthermore, accurate and valid authentic assessment of student performance must be accomplished to demonstrate achievement. Development of authentic assessments for pharmacy students will assist pharmacy education in maintaining high educational standards.

Evaluating the Impact of a Pharmacy Quality Improvement Training Program. Jennifer K. Johnson, David P. Nau, Virginia G. Scott and Stephen Small, *West Virginia University.* **Objective:** West Virginia is one of several states that adopted regulations requiring Quality Assurance or Quality Improvement (QI) programs in all pharmacy settings. An increasing number of states are planning to add similar requirements for QI in the near future. Although many hospital pharmacy departments may participate in QI initiatives due to JCAHO requirements, very few community pharmacists know how to create a successful QI program. The West Virginia University School of Pharmacy created a day-long continuing education program that was provided to nearly 250 pharmacists in 8 different locations. The goal of this study is to evaluate the impact of the training program on the implementation of QI in various pharmacy settings. **Methods:** A written questionnaire was developed and pilot-tested on a small number of pharmacists. The questionnaire and cover letter were sent to all pharmacies that sent their staff to the training program. Information is being collected from each site to determine if the training program was effective in helping them implement a new QI program or modify an existing program. **Implications:** As an increasing number of states require the creation of QI programs in pharmacies, it is important to develop effective and efficient training methods on QI. This study will help to determine the effectiveness of a live continuing education program in helping pharmacies establish successful QI programs.

Student and Preceptor Perceptions of a Clerkship Assessment Instrument. Rhonda M. Jones and Michael S. Monaghan, *Creighton University.* **Objectives:** The American Council of Pharmaceutical Education (ACPE) specifically recommends that programs establish formative assessment processes. We recently developed and piloted a formative clerkship assessment instrument based on our ability-based educational outcomes. The instrument's purpose is to establish a consistent assessment system, format, and process for providing students useful feedback regarding their development. The purpose of this project is to evaluate the assessment instrument and process from the student's and preceptor's perspective. **Methods:** The instrument was piloted during the 2000/01 year with twenty randomly selected fourth year pharmacy students and their preceptors. At the end of clerkships, both groups completed a questionnaire designed to measure the extent to which they believed this instrument and process were useful in facilitating skill development, overall student progression, and communication between the preceptor and student. The survey included both Likert scale and open-ended questions. **Results:** Student and preceptor responses will be compared statistically. The ability of the instrument to evaluate and improve students' performance of the educational outcomes will also be assessed. **Implications:** Data from this project will: *(i)* evaluate the utility of a paper-pencil method to track and improve students' ability to perform the program's educational outcomes; *(ii)* assist in the review and revision of the assessment instrument and process; and *(iii)* assist other schools/colleges of pharmacy in developing a formative clerkship assessment instrument and process.

Informed Shared Decision Making (ISDM): An Interdisciplinary Model for Enhancing Pharmaceutical Care and Student Learning in Pharmacy Curricula. Rosemin Kassam and Simon P. Albon, *University of British Columbia.* **Objective:** To develop an interdisciplinary ISDM teaching module for pharmacy. **Methods:** Literature reviews gathered current evidence of ISDM in pharmacy, medicine, occupational and physical therapy. Following ethics approval, ISDM competencies developed for physicians, were provided to "good practitioners" from each discipline followed by structured interviews. Practitioner interviews were recorded and analyzed to determine the importance of ISDM in each discipline, to clarify the wording of the competencies and to identify potential barriers to implementing ISDM and typical situations in which ISDM might be practiced. Student researchers (SRs) from each discipline were recruited and trained to recognize ISDM competencies through a formalized workshop utilizing standardized patients and cases relevant to each discipline. Using a common field notebook, SRs observed preceptors and recorded evidence of ISDM while on clerkships. ISDM competencies practiced, the ease with which the competencies were carried out, potential barriers to ISDM and situations in which ISDM could be practiced were recorded. Data collection and analysis is ongoing. **Results:** Literature review revealed minimal evidence of ISDM in pharmacy. Pharmacy practitioners felt ISDM was important and the competencies, with some re-wording, were relevant. Data analysis of field notes will be used to refine the competencies and develop a teaching module for ISDM in pharmacy. **Implications:** ISDM has the potential to offer pharmacy students a strategy for effectively involving patients in pharmaceutical care.

Assessing the Financial Planning Knowledge of Doctor of Pharmacy Graduates at a Private University. David A. Latif, *Shenandoah University.* **Objectives:** To examine the financial planning knowledge of a graduating class of Doctor of Pharmacy students, and to determine if significant gender differences exist with regard to basic financial planning knowledge. Research indicates that a basic knowledge of financial planning concepts may result in more productive employees who will be less likely to participate in counterproductive behaviors such as excessive absenteeism and tardiness. In addition, increased life expectancies and the shift in the workplace from defined benefit to defined contribution retirement plans makes it imperative that pharmacy graduates have a basic understanding of financial planning. **Methods:** A basic financial planning quiz was developed after a review of the financial planning literature and was designed to assess the graduates' knowledge of basic financial planning concepts. The quiz was administered electronically to each graduating Doctor of Pharmacy student in the class of 2000. **Results:** Of the 64 students in the class of 2000, 35 filled out and sent back usable questionnaires (54%). Results revealed that responding graduates obtained a mean score of 57% on the quiz. A student t-test revealed no significant differences on finan-

cial planning knowledge based on gender. **Implications:** pharmacy graduates may not have basic financial planning knowledge which may contribute to counterproductive behavior in the work place; and pharmacy schools could further assess the need for student financial education and, if needed, offer educational interventions to remedy this.

The Basic Math Skills of First Year Doctor of Pharmacy Students. David A. Latif, *Shenandoah University.* **Objectives:** To assess the basic math skills of two classes of Doctor of Pharmacy students at a private Southeastern School of Pharmacy. A second objective is to propose an educational intervention program that has the goal of improving the basic math skills of those students, if any, who are shown to be deficient on basic math skills. Methods: The Basic Math Skills Test (BMST) was used to assess 121 first year Doctor of Pharmacy students from the classes of 2003 and 2004 respectively. All entering students present during orientation week were tested using the Basic Math Skills Test (BMST) (10). The BMST consists of a 50 question, timed math test that measures basic math skills in nine different areas. The areas and level of difficulty were taken from an eighth grade mathematics text book. In accordance with the recommendation of the developer, students were allotted 20 minutes to complete the exam. **Results:** Results revealed that the cumulative mean score on the BMST of this sample was 68.90%. **Implications:** poor basic math skills impede successful completion of the pharmacy curriculum; poor basic math skills may increase the probabilities of mathematical mistakes when filling prescriptions in pharmacy practice; two different options are advanced for remediating those students who are identified as being deficient in basic mathematics (those who achieve a percentage score of less than 70).

Relationship between an Annual Examination to Assess Student Outcomes and Final Grade Point Average at Shenandoah University School of Pharmacy. David A. Latif and Richard Stull, *Shenandoah University.* **Objectives:** Shenandoah University's school of pharmacy utilizes an annual examination as one component of assessing students to ensure that students are, not only developing a knowledge base, but retaining one as well. The major objective of this project was to assess the convergent validity of an annual multifaceted examination designed to assess student outcomes. This was accomplished by correlating the obtained results on the annual examination with Doctor of Pharmacy students' final grade point average. **Methods:** The class of 2000 was given an annual written examination during the fourth professional year. The exam is a multifaceted, dynamic examination designed to assess proficiency and performance related to each required course taken at Shenandoah during the prior three years. This study only examined the written portion of the examination, and not the skills portion. **Results:** A Pearson r correlation revealed a moderate correlation (r=0.349), which was significant at the 0.01 alpha level. **Implications:** The results suggest that the annual examination is significantly related to students grade point average. These results can be used to identify student strengths and weaknesses in the curriculum, and, if necessary to design educational interventions to address weaknesses in specific academic areas. In addition, the annual examination provides information for the appropriate national accrediting agencies pertaining to student assessment and outcomes.

Student Performance and Feedback in a Pharmacotherapy Course: Comparison of Full-Time Versus Adjunct Faculty. Charles Y. McCall and William E. Wade, *University of Georgia.* **Background:** All 3rd-year Doctor of Pharmacy candidates take Pharmacotherapy I (P-I, fall semester) and Pharmacotherapy II (P-II, spring semester). Each is a case-based, 60 contact hour/4 credit-hour semester course. Both full-time faculty (FT) and adjunct faculty teach in these courses. The percentage of each course taught by adjunct faculty is 27% and 23% for P-I and P-II. To date no assessment of student performance and satisfaction of FT versus adjunct faculty has been made. **Objectives:** To collect data on student performance on written exams and end-of-course comments for both FT and adjunct faculty and determine if differences exit. **Methods:** For each course class performance per individual instructor will be assessed. For each instructor questions submitted for written exams 1-4 will be evaluated with respect to: *(i)* question type (multiple choice, matching, true/false, short answer, or discussion/essay); and *(ii)* question taxonomy (per Bloom; *i.e.* knowledge, comprehension, application, analysis, synthesis, or evaluation). Class performance will be evaluated for: *(i)* overall performance on exam questions of FT vs adjunct faculty; and *(ii)* performance on questions of equivalent taxonomy for FT versus adjunct faculty. Student feedback for FT versus adjunct faculty will be assessed. **Implications:** Increasingly our graduates are interested in participating in didactic courses. To ensure a quality experience in the classroom evaluation of all instructors in a course should be continually assessed.

Retention of Pharmacotherapy Knowledge after Two Different Models for Teaching. Donald R. Miller, *North Dakota State University.* **Objectives:** To determine how well students retain classroom knowledge a year later, and to determine whether a new inquiry-oriented learning model is more or less effective than a traditional lecture and examination teaching method. **Methods:** Cohort 1 was taught a 3rd-year rheumatology pharma-

cotherapy module during 1997 using a traditional model with lectures and tests. Cohort 2 was taught in 1998 through weekly take-home, case and literature-based assignments. Their grade came solely from the weekly assignment scores with no quizzes or tests given. A convenience sample of each cohort was requested to take a 34-question exam on rheumatology pharmacotherapy approximately one year later, while they were 4th professional year students. The follow-up exam was drawn from the tests that cohort 1 took. **Results:** 24 students from cohort 1 took the follow-up exam and scored an average of 53.3%. The same students had scored an average of 80% on their original tests and so retained 67% of their original knowledge. There was a weak correlation between original test score and the follow-up score (r = 0.39, P = 0.06). The 23 students from cohort 2 scored an average of 58.2% on the follow-up exam. The difference between cohorts was not quite statistically significant *(P* = 0.06). **Implications:** Long term retention of pharmacotherapy material was modest under either model but students in the nontraditional, active-learning model retained knowledge at least as well as traditionally taught students.

Survey of Students' Perceptions of Preparedness for Pharmacy Practice Tasks for Curricular Continuous Quality Improvement. L. Douglas Ried, Carole Kimberlin, Michael Meldrum and Michael McKenzie, *University of Florida* and Gayle Brazeau, *University at Buffalo.* **Objective:** Continuous quality improvement (CQI) of a new entry-level PharmD curriculum was conducted using a survey evaluating students' perceptions of their preparedness (POP) to complete pharmacy practice tasks. **Methods:** Since 1997, as part of a curricular CQI program, all students in a new entry-level PharmD program were surveyed annually for their perceptions on their preparation to perform pharmacy practice tasks. Survey questions were developed based on the CAPE outcomes. Each student was asked "how well did the curriculum prepare you to perform" 41 activities on a 7-point Likert scale. These results were compared with our previous PharmD alumni using the same instrument **Results:** The students' POP increased over the four-year program. The POP was similar for each 1st and 2nd professional year since 1997. Responses for students entering into their experiential year were similar to responses of alumni from the previous PharmD program. It is anticipated that following the experiential year these values should be higher previous graduates of our previous program. **Implications:** This CQI process provides the College with useful benchmarks to assess the new entry-level PharmD compared to previous curriculum and to assess areas of curricular strength and weakness.

Improved Scoring Consistency with Multiple Evaluators after Rubric Implementation. Karen A. Sauer and JoLaine R. Draugalis, *The University of Arizona.* **Objectives:** A rubric was developed to improve the consistency of PharmD project proposal scoring by faculty members. In the past, the two scores for the same proposal had varied by as much as 42 points out of a possible 90. **Methods:** Pharmacy faculty members who volunteered to review project proposals were provided with a scoring rubric. Two faculty members reviewed and scored each proposal with the two scores averaged and calculated as part of the PharmD project grade. **Results:** Fifty-six proposals were each graded by two faculty members. For 34 proposals, both graders used the rubric (group A). For the remaining 22 proposals, either one reviewer used the rubric or neither reviewer used the rubric (group B). The difference between the two scores for each proposal was obtained and a mean difference value was then calculated for both groups. Upon comparison, a significant difference was observed indicating an improvement in scoring consistency for group A. When these mean difference values were compared to the three previous years, group B was not significantly different. However, group A again exhibited a statistically significant improvement in scoring consistency. **Implications:** In situations where numerous evaluators are used, steps to improve consistency and fairness need to be in place. Rubrics can be used as a tool to make grading easier and more objective while providing students with performance expectations for the activity.

Partnering with a CHC to Provide Clinical Pharmacy Services. David M. Scott, Sam C. Augustine, Randy Rouse, Jennifer Lightbody and Bruno Himmler, *University of Nebraska Medical Center* **Objectives:** To establish a partnership between University of Nebraska Medical Center (UNMC) College of Pharmacy and Siouxland Community Health Center (SCHS) to integrate clinical pharmacy services and provide training for pharmacy students. Also, to compare the efficacy and safety of a treatment group (receives disease state management program conducted by a pharmacist) with a control group (standard approach to care), for Type II diabetes patients. **Methods:** A cooperative relationship between SCHC and UNMC for the purpose of delivering clinical pharmacy services directly to CHC clients is being developed. Practice activities between the physicians and the clinical pharmacist for disease state management of diabetes will be established, and than will be evaluated, to determine the impact of clinical pharmacist's activities on the management of these patients. Other parameters to be studied are medication compliance, adverse effects, patient satisfaction, and quality of life. **Results:** We envision that the provision of disease management services by the phar-

macist will reduce the Hg-A-lC levels of diabetic patients in the treatment group, one and two years after baseline measurements, as compared to the control group. **Implications:** Pharmaceutical care in the ambulatory population of CHCs may improve outcomes in the management of several disease states. The expansion of this cooperative relationship to a network of five CHCs for the purpose of disease state management and the training of students will result.

Is There a Correlation between Traditional Testing Methods and Standardized Patient Examinations as a Tool for Assessment in Therapeutics? Cindy D. Stowe and Stephanie F. Gardner, *University of Arkansas for Medical Sciences.* **Objectives:** Standardized patient examinations are objective structured clinical examinations that provide a tool of assessment that requires a student demonstrate problem solving and patient communication skills. Traditional testing methods (*e.g.,* essay, short-answer, multiple-choice) have been the standard of assessment in most Therapeutics courses in Colleges of Pharmacy. The purpose of this study is to demonstrate if there is internal consistency between structured short-answer and objective multiple choice examinations with that of standardized patient examinations. **Methods:** Therapeutics I course consists of four modules: Fluid and Electrolyte Disorders, Nephrology, Cardiology, and Gastrointestinal Disorders. Grades for the course are based on the following: *(i)* four modular structured short-answer examinations (150 points/examination); *(ii)* recitation case presentation and SOAP notes (150 points); *(iii)* a comprehensive final examination (250 points) consisting of two parts: an objective multiple-choice portion (150 points) and a standardized patient examination (100 points). There will be a 'practice' standardized patient examination. The practice case will come from the Fluid and Electrolyte Disorders module and the final standardized patient examination will consist of three cases from the remaining three modules. Correlation will be assessed between each modular examination and the corresponding standardized patient case on the final examination. Correlation will also be assessed between the two portions of the comprehensive examination.

Survey of Immunizations and Travel Medicine in the Pharmacy Curricula. Caroline Zeind, Brenda Waning and Pauline Cawley, *Massachusetts College of Pharmacy and Health Sciences-Boston.* **Objectives:** To measure the extent of pharmacy education, training, and practice in the field of immunizations (IM) and travel medicine (TM). **Methods:** Electronic questionnaires were distributed to 81 colleges in U.S. in 2 parts: demographic and curricular. Demographic surveys were sent to chairs/deans. Fifteen question surveys pertaining to IM and TM education, training, and practice were sent to appropriate faculty. **Results:** As of February 2001, response rates for demographic and curricular surveys were 89% (72/81) and 86% (70/81), respectively. Topics pertaining to IM and TM were covered in required curriculum in 98.5% (66/67) and 55.7% (39/70), respectively; the extent of coverage of these topics varied greatly among colleges. More extensive coverage of IM and TM was reported in traditional PharmD programs compared to nontraditional PharmD programs. Elective courses in IM were offered by 10% (7/70) of colleges, while 1.4% (1/67) offered TM electives. Experiential IM clerkships were offered by 8.6% (6/69), while 6% (4/67) offered TM clerkships. Students learn the technique of vaccine administration at 58% (40/69) of colleges and 37.7% (26/69) offer immunization certification programs. Pharmacists were reported to administer vaccines in 67.5%(27/40) of states. **Implications:** While most colleges report coverage of topics pertaining to IM and TM in the curriculum, many do not offer training experiences. Curricula should be modified, as necessary, to prepare students for the pharmacist's evolving role in IM and TM.

EDUCATIONAL STRATEGIES

Development of a Capstone Module Prior to PharmD Rotations. Karen L. Kier, *Ohio Northern University.* Objectives: *(i)* Design 9 credit 10 week capstone module to access student knowledge base from previous modules, *(ii)* Design a course that would require the student to organize, synthesize, and present relevant information for optimizing drug therapy. *(iii)* Design a course to facilitate the change from didactic work to rotations. **Methods:** A capstone module group of faculty was formed. Goals and objectives were identified. Literature was reviewed. Course syllabus was designed to incorporate critical thinking skills and assessment of prior accumulated pharmacy education. A web site was designed to provide students with access to examples, journal articles, and other class projects. Weekly student focus groups were designed. **Results:** Course content included journal clubs, case presentations, SOAP format, medication history/counseling skills OSCE, WebCT assessment exam, therapeutic debates, development of definitive clinical trial database, designing a research project, poster sessions, innovations in pharmacy project, advances in therapeutic issues, pediatrics, geriatrics, and communication skills. Advisory Board members were invited to judge the poster session and to lead focus group discussions on assessing the curriculum. Weekly course focus groups provided good insight. **Implications:**

Development of a highly successful module that improved the transition from courses to rotations. Development of a rotation web site that provided opportunities for students to access capstone information. Development of assessment tool for determining curricular needs and successes. Development of student confidence in clinical skills prior to starting rotations.

First Year Pharmacy Practice Seminar Sections Taught by Volunteer Faculty, Residents and P-4 Students. Kenneth Lem, Lisa Kroon and Cathi Dennehy, *University of California, San Francisco.* **Objectives:** The primary objectives were to minimize the reliance on volunteer faculty who conduct first year Pharmacy Practice seminar sections and to initiate a self-directed learning and leadership program for residents and P-4 students by having them serve as preceptors in required courses. **Methods:** One to two pharmacy residents and nine P-4s and were paired and assigned to P-l conference sections as preceptors in the CP112-113 Pharmacy Practice series. The residents and P-4 students come from community pharmacy and non-acute care rotations, respectively. Their conference sections are run concurrently with those of volunteer faculty' traditionally the only preceptors who facilitated these sections. Preceptor responsibilities include preparing lesson plans, leading discussions, assigning grades and make-up work, grading midterm examinations, and attending weekly planning meetings. **Results:** Initiation of this program fit into the school-wide effort to employ self-directed learning strategies and offer leadership opportunities to residents and P-4 students. The utilization of senior students has eased the burden of having to enlist volunteer faculty to conduct seminar sections for two out of three quarters. The influx of new seminar preceptors requires constant teacher development, and more administrative time is spent on preparing materials and facilitating pre-seminar planning sessions than before. **Implications:** The level of satisfaction among P-1 and P-4 students plus volunteer faculty has been high and provides an impetus to continue this method of teaching.

Integrated Case Writing: The Dalhousie College of Pharmacy Approach. Susan A Mansour, Anne M Whelan and Patrick S. Farmer, *Dalhousie University.* **Objective:** To develop case writing guidelines for an integrated hybrid problem-based learning (PBL) curriculum for a four year undergraduate pharmacy program. **Methods:** A number of resources regarding case writing were identified and reviewed. Case writing workshops were held wherein teams of clinical, science and administrative faculty drafted integrated cases. Teams experimented with different approaches to integrating content. During the first year of pharmacy case development faculty from various disciplines met regularly to discuss content and approach, while developing and completing the integrated cases used in the curriculum. Members of the curriculum committee then developed guidelines based on the most successful experiences of the case writers. **Results:** "Case development principles and procedures" were developed for use at the Dalhousie College of Pharmacy. Integrated cases have been completed for the curriculum. **Implications:** A four year integrated PBL curriculum in an undergraduate pharmacy program is novel. Case writing for an integrated curriculum such as this requires input from many diverse faculty. Clear guidelines are essential to facilitate uniformity in case format and integration for a pharmacy curriculum.

Exploring Students' Metered Dose Inhaler Skill Acquisition. Gary Milavetz and Christine Catney, *The University of Iowa.* **Objectives:** To study students' metered dose inhaler (MDI) procedural knowledge retention and to compare students' MDI technique with and without a laboratory experience. **Methods:** The instructor described and demonstrated MDI inhaler technique. Before and after the presentation, 92 students identified and ordered MDI procedural steps on a printed survey. Then students were randomized to Group 1 (control, n=46)) or to Group 2 (n=46) and practiced MDI technique 3 times with peer feedback in the laboratory. All students demonstrated their technique on videotape. Group 1 was videotaped prior to practicing; Group 2 was videotaped after practicing. The survey was administered again immediately after lab and at the following unannounced intervals: 5 days, 1 month, and 3 months. The survey administered at 3 months was an alternate form. Two evaluators used a previously developed checklist to score videotapes. **Results:** Correct-response survey results were pre and post lecture (n=92): 31.5% and 87%, respectively; immediate post lab (n=73): 93.2%; 5 days post lab (n=89): 88.8%; one month (n=78) and 3 months (n=79) post lab: each 96%. MDI technique was performed correctly by 13 students in Group 1 and 12 students in Group 2. **Implications:** Students retained the correct order of MDI procedural steps at 3 months; however, most were unable to demonstrate the procedure after practicing with peer feedback 3 times. These results stimulate further work to develop laboratory learning experiences that positively affect students' MDI skill acquisition.

Development of Experiential Case Studies Utilizing Actual Patients and Clerkship Students. Miriam A. Mobley Smith and Jill Dischler, *University of Illinois at Chicago.* **Objectives:** To improve clerkship students': (*i*) ability to apply drug therapy problem solving skills to develop case studies based on actual patients; and (*ii*) communication, presentation and teaching skills. **Methods:** PHAR 354 Experiential IV is the culminating course within

the experiential sequence. Utilization and application of drug therapy-related problem solving skills to complete recitation-based case studies is integral to the student's academic success. Advanced ambulatory care/academic clerkship students interview, counsel, develop pharmaceutical care plans and document SOAP notes on selected patients they see in the Pharmaceutical Care Center medication management clinic. Subsequently, they develop case studies based on their patients. Each student has 2 encounters with their patient during their rotation to develop, implement, critique or change their care plans before case studies completion. These plans incorporate therapeutic goals and rationale, regimen, monitoring parameters and endpoints. The students then function as recitation facilitators/peer instructors for case studies to improve their communication, presentation and teaching skills. **Results:** Clerkship students developed relevant case studies that reflected an actual patient's therapeutic needs and concerns. The case studies accurately demonstrated the pharmacist's role in promoting positive drug therapy-related patient outcomes. The students exhibited enhanced communication, presentation and teaching skills. Additional case studies for future recitations were developed. **Implications:** *(i).* Learning enhancement and reinforcement by application of actual drug therapy problem solving experiences, *(ii)* Mutually beneficial for faculty, students and patients. *(iii)* Will be continued in subsequent courses.

Evolution of a Doctor of Pharmacy Seminar Course: Christine L Papoushek, Jana Bajcar and Cleo Boyd, *University of Toronto.* **Objective:** Demonstrate the impact of collaborative critical reflection strategies on the evolution of a Doctor of Pharmacy Seminar Course. **Methodology:** The establishment of educational outcomes for our program necessitated the alignment of curricular and performance expectations in the Seminar Course. To accomplish this, various strategies have been employed over several years. Initial reflection based on increased emphasis for advanced competence in communication and focus on developing skills required to educate lifelong learners confirmed the need to adopt the use of rhetorical communication frameworks. Using these frameworks as our fundamental pedagogical paradigm we: *(i)* revised the tasks to better reflect the practical needs of the profession; *(ii)* developed criterion-based global assessment instruments to measure performance; and *(iii)* trained faculty and students to use these instruments in the assessment. Further reflection strategies to facilitate the curricular change required to meet the outcomes included: *(i)* student and faculty de-briefing, *(ii)* facilitated focus groups, and *(iii)* observational methods. **Results:** Using these various strategies have resulted in developing a more structured course that is outcomes and assessment driven. **Implications:** Collaborative critical reflection driven modifications of course structure have been invaluable in ensuring that our program continually meets the needs of the student, faculty and profession. We intend to continue the process of collaborative critical reflection to maintain and confirm our commitment to meeting the educational outcomes set by the Canadian Council for Accreditation of Pharmacy Programs.

Continuous Quality Improvement in a Nontraditional PharmD Program Curriculum: Incorporating Student-Practitioner Needs. Lynn R. Patton and Nancy F. Fjortoft, *Midwestern University.* Pharmacists enrolled in nontraditional PharmD (NTPD) programs bring diverse and rich professional experience to academic programs in contrast to students enrolled in entry-level programs. The past and current professional experience of NTPD students provides them with a viable framework for evaluating the relevance of NTPD curriculums. To take advantage of this experience, two surveys have been conducted by one College of Pharmacy NTPD Curriculum Committee. The first survey was a review of the entire curriculum and was administered via the mail to all enrolled NTPD students (n=45). The response rate was 42%. The second survey focused on the content and format of the 12-credit therapeutics sequence and was administered via the mail to all NTPD students enrolled in the course (n=30). The response rate was 53%. The comments were evaluated by the NTPD Curriculum Committee and therapeutics course coordinator as part of the curriculum evaluation process. Many of the student suggestions were incorporated in the curriculum and course sequence. These changes included shifting the sequencing of some courses, changing the credits assigned to some courses, and making some changes within courses in required textbooks, topics, assignments, content, and workshop format. The revised NTPD curriculum is in its second year of implementation, and formative evaluations indicate that the changes made based on student input have enhanced the curriculum.

Evaluation of a Scholarship of Teaching and Learning Certificate Program for Pharmacy Residents. Frank Romanelli, *University of Kentucky.* **Objective:** To evaluate the impact of an elective scholarship of teaching and learning certificate program for pharmacy residents. Methods: Following implementation of an elective certificate program for pharmacy residents, a survey instrument was authored and distributed to all participants. **Outcomes:** Ten of ten surveys were completed for a 100% response rate. Participants were asked to rank their level of knowledge of contemporary pharmacy education issues on a scale of one to ten. One being no knowledge and ten being vast knowledge. Prior to completing the certificate program, the mean score for this item was 4.2. Following completion of the program the mean score increased to seven. Using the same scale participants ranked their own abilities as teachers. Mean scores before and after the program were 4.9 and 6.5, respectively. 99% of respondents agreed with the statement that the certificate program should be offered yearly and 1% strongly agreed. **Implications:** The elective Scholarship of Teaching and Learning Certificate Program which was offered to our residents had a positive impact on teaching skills, and all residents reported that the program was beneficial and should be continued. Implications: Program directors should investigate the potential of implementing similar programs as a means of cultivating resident teaching skills.

Effectiveness of Just-in-Time Workshops for Assisting Undergraduate Students with Research. Marion K. Slack, *The University of Arizona.* **Setting:** A professional pharmacy program offering a PharmD degree in which students are required to complete a research project during their fourth year in the program. **Objectives:** To determine if just-in-time workshops are an effective method of supporting undergraduate pharmacy students while they while they work on their research projects. **Methods:** Just-in-time workshops were defined as educational sessions designed to address issues in conducting research that are timed to coincide with students' progress through their research projects. Three workshops were offered: one creating a code book and entering data, a second on basic data analysis using a spreadsheet, and, third, writing a research report. Each session included basic concepts, discussion of an example, and time for students to ask specific questions related to their projects. The sessions were evaluated using a retrospective pretest-posttest form in which students rated their knowledge before the workshop and after the workshop on a five-point scale (0 = no knowledge; 5 = a great deal of knowledge). **Results:** Attendance ranged from eight to 14 at the three workshops. Attendees rated their initial knowledge from 0.7 to 1.8 and their knowledge at the end of the workshops from 3.6 to 3.9 ($P < 0.02$ for all pretest-posttest comparisons). **Conclusions:** The workshops appear effective in supporting undergraduate pharmacy students while they complete their research projects. By student request, an additional workshop has been created on writing a research proposal.

Using Technology to Remediate Pharmacy Students in an Integrated Curriculum. Richard E. Stull, *Shenandoah University,* Harvey Jacobs, *Wilkes University.* **Objectives:** One difficulty in offering an integrated curriculum is that there are few applicable courses offered during summer sessions that would allow students to make-up failed coursework. One alternative is the use of Internet-delivered materials. Approximately 15 students over a 3-year period have used Internet-provided coursework to remediate deficiencies within the Schools of Pharmacy at Shenandoah and Wilkes Universities in a collaborative effort. The objective was to share resources, a positive benefit to both institutions, while allowing students to utilize diverse pedagogy in mastering selected outcomes. **Methods:** Selected students at Wilkes were permitted to enroll in a Shenandoah distance-learning course in order to remediate the failed sequence. The conditions of the remediation were specifically outlined to students prior to the enrollment. Students enrolled in the course through Wilkes and arrangements/payments for courses on a per credit basis were made between Wilkes and Shenandoah. Course grades were then entered directly into the Wilkes University transcript; no transfer of grades was necessary. **Results:** To date 13 students enrolled in the remediation course through Shenandoah. Data indicate that students were able to achieve competency through the on-line offerings. **Conclusions/Implications:** Although problems occurred during the collaborative effort it seems clear that sharing resources, particularly Internet-delivered course offerings benefit involved institutions and at the same time decreases the time students with academic difficulties may have to spend to complete a professional program.

I Doubt It! - "Active Learning" to "Teach" a Questioning Attitude. Brenda L. Thompson, Laura D. Roller, Brian J. Seiz and Sheldon G. Holstad, *St. Louis College of Pharmacy.* **Intent:** Teaching students to question the validity of scientific research can be challenging. Too often, students merely accept the written word as fact and do not doubt the methodology and conclusions made by researchers. We attempted to help students develop a questioning attitude to enhance their ability to critically evaluate biomedical literature. **Process:** An active learning strategy was devised that placed students in the role of "investigators." In a discussion group setting, students were asked to brainstorm ideas for scientific research. With instructor guidance, a research topic was claimed (HIV transmission prophylaxis) and pertinent hypotheses were formed. Students conducted a pre-prepared latex glove integrity experiment, and then tabulated and analyzed their results. Finally, students were asked to draw statistical and clinical conclusions, and to critique their own methodology and conclusions. **Results:** Students vehemently vocalized shortcomings of the design, data collection, analysis, and extrapolated conclusions. They realized the difficulty in conducting and controlling even simple research experiments. This exercise helped them gain insight of constant threats to the validity of clinical research. **Implications:** This active learning

strategy gives students the opportunity to understand common pitfalls of scientific research. With this understanding, students possess more confidence in their critical evaluation skills and learn to question scientific validity. The instructors sense that this hands-on approach more effectively fosters a questioning attitude than more conventional didactic methods.

Implementation of Web-Based Computer Adaptive Testing Software. Phillip J. Vuchetich, *Creighton University.* **Intent:** To implement web-based adaptive testing software that enables mastery evaluation of ability based outcomes. Adaptive testing, in which a test changes based on a student's performance or interactions with the examination, has become common in high stakes examinations, but is still uncommon within the academic setting. **Process:** Only web-based testing software was considered because the resource must to be accessible to distant students as well as on-campus students. Several options, both stand-alone assessment software and software included as part of course environments, were evaluated. **Outcome:** We selected and implemented commercially available stand-alone web-based assessment software for the core platform. The software has been used as a platform to develop examinations that are not reasonable to deliver on paper, including adaptive pathways based on logic defined in the server, and inclusion of multimedia resources. Enhancements to the core platform have enabled us to implement dynamically generated questions. It has been successfully used by both on-campus and distant students for examinations, quizzes, and surveys. **Implications:** Computer adaptive testing software greatly expands the options for student assessment. Faculty are already using this software for surveys, quizzes, and examinations, and the platform has been a springboard for developing novel assessment instruments, including a mastery examination. The web-based interface allows incorporation of the latest web technologies to enhance assessment options and minimize the support time that would be associated with client software installed on each student's computer.

Self-Directed Learning of Pharmaceutical Calculations: A Challenge for First Year Pharmacy Students to Comprehend that Calculation Errors are not Acceptable. Joanne Whitney and Michael Winter, *University of California, San Francisco.* **Objectives:** To ensure that first year pharmacy students are competent in performing pharmaceutical calculations and that they embrace the philosophy that calculation errors are unacceptable in the profession of pharmacy. **Methods:** Students are assigned sequential chapters in Zatz, Pharmaceutical Calculations and must pass each of five 10 question quizzes with a grade of >90%. Conversion factors and abbreviations are provided. A sixth quiz covers reconstitution and balancing electrolyte composition of intravenous solutions. Any student scoring < 90%, is offered a make-up quiz. If the student fails the make-up, an incomplete grade in pharmacy practice is assigned and a re-take of the failed quiz is mandatory in the following year. Student scores are monitored and compared. **Preliminary Results:** In the first year of the program, 83 students took at least one make-up, all passed. In the second year, 60 students took a make-up, 3 failed receiving a grade of incomplete, 2 removed their incompletes in the following year and one left school. This year, 42 students have failed at least one of four quizzes; one also failed a make-up. **Implications:** Although not difficult, correct calculations are critical in order to preserve the health and safety of patients. A high performance standard impresses upon students the importance of accuracy and provides them with sufficient training to function at a professional level.

Development of Health Information Pamphlets to the Local Vietnamese Community. Marguerite Yee and Lap Nguyen, *University of British Columbia.* **Objective:** To design a template for directed studies projects to address the need for health and drug information in ethnic communities in a metropolitan area. **Methods:** A survey was developed for Vietnamese patients, physicians and pharmacists to determine the need for written health and drug information in Vietnamese. Surveys were distributed to patients in physicians' offices, Vietnamese community groups and pharmacies with Vietnamese clients. Public health agencies, pharmacies and physicians were consulted to determine the availability of printed health information in Vietnamese. Topics determined to be a priority were delivery devices for administration of asthma medications and general information about rheumatoid and osteoarthritis and the most commonly used prescription therapies. **Outcomes:** Five written pamphlets for various drug delivery devices for asthma medications were written in English, proofread by English-speaking health professionals, translated into Vietnamese, proofread by Vietnamese health professionals, distributed to selected Vietnamese patients for testing, revised and tested until all patients could follow the written instructions. Final versions in Vietnamese were designed to include illustrations. A similar process was followed for four additional pamphlets; one providing information about rheumatoid arthritis, another describing common prescription and nonprescription therapies, and similarly for osteoarthritis. **Implications:** Senior pharmacy students can develop patient-friendly health information for ethnic communities. The distribution and assessment of the usefulness of the pamphlets is ongoing. The template can be used for other ethnic-speaking groups in the metropolitan area.

Development of a "Hybrid Media Educational Resource" for the Faculty of Pharmaceutical Sciences. Simon P. Albon and Felicia L. Lo, *University of British Columbia.* **Objective:** To create a prototype of a "Hybrid Media Educational Resource" (HMER) that delivers high quality multimedia and video to all pharmacy students working in the web environment, regardless of internet access speed. **Methods:** Development of the HMER involved strategic planning, creative development and production phases. Strategic planning consisted of information gathering, consultations and concept mapping to define the procedure for integrating existing CD-ROM and web-course resources. Creative development involved re-designing the original CD-ROM interface for presentation and delivery on the web. Production focused on developing HTML pages, completing an HTML version of the original CD-ROM, creating compressed Quicktime movies and incorporating Quicktime Plugin technology to build the HMER. **Results:** A prototype of an HMER was successfully created. Initiated through web page links, an embedded movie window shows either compressed versions of the original media streamed from a web server or the original uncompressed media from CD-ROM. Although the quality of the streamed media varies significantly with internet access speed, using the CD-ROM bypasses the streamed media providing seamless access to the original uncompressed version. Media selection is done automatically by the Quicktime Plugin allowing students using the CD-ROM to view high quality media regardless of internet access speed. The prototype will be implemented and evaluated beginning September 2001. **Implications:** The HMER has the potential to provide quality technology-based educational resources for all pharmacy students.

Integration of the Pharmaceutical Sciences Curriculum Using the Web-Based Learning Centre (WBLC). Simon P. Albon, Howard Sham, Nelson P. Kuhlen, Philip Hui and Kishor M. Wasan, *University of British Columbia.* **Objective:** To upgrade the WBLC prototype created in year one of this project. **Methods:** Enhancing the initial WBLC prototype involved strategic planning, creative development and production phases. Strategic planning consisted of information gathering, consultations and concept mapping to re-design the prototype. The creative development process involved transcribing the entire resource into storyboards and site maps. The production phase created the navigation system, homepages, course materials, examinations, graphic elements, animations and other interactive elements using a number of software packages. Existing evaluation profiles were added for on-line delivery. **Results:** An upgraded WBLC integrating seven core pharmacy courses and Continuing Pharmacy Education (CPE) into a seamless resource was successfully created. Components of the resource include the WBLC homepage, seven WebCT courses and the CPE website. The WBLC homepage provides instructions, tutorials and recommendations for using the resource. WebCT courses utilize a common design including a homepage and Course Materials, Evaluation Tools, Communications Tools and Resource Centre elements. Integration of course materials is provided through strategic links within each course, between courses and to the internet. The user-centric navigation bar links all resource components. The WBLC was used throughout the four-year pharmacy program beginning September 2000. **Implications:** The upgraded WBLC, utilizing improved site design and navigation, has the potential to improve integration of the pharmacy program and enhance teaching and learning in the pharmaceutical sciences.

Framework for Defining Levels of Desired Student Competence. Jana M. Bajcar and Cleo L. Boyd, *University of Toronto.* **Objectives:** Pharmacy education is developmental and requires that the learner progresses through increasingly complex levels of competence. A need exists for a developmental framework which defines levels of competence for education outcomes, especially in a competency/ability-based curriculum. **Methods:** The specific purpose of the framework was defined and the literature reviewed for information that could inform the development. Based on the literature and the authors' experience, a conceptual framework was developed and feedback was obtained from faculty and graduates to test its applicability. **Results:** For a pre-set education outcome unit the framework provides a means of defining a desired level of competence. Level of competence is defined by "Level of Difficulty" of the task, and the student's "Proficiency" in performing the task. There are three " Levels of Difficulty" defined by the complexity of knowledge and the complexity inherent to the specific situation in which the application of the knowledge occurs. Four levels of "Proficiency" are defined in the framework (Initial, Developing, Intermediate and Advanced) that must be achieved at each "Level of Difficulty" before progressing to the next "Level of Difficulty". Thus 12 stages of increasing level of competence can be defined. **Implications:** This model was used by the Association of Faculties of Pharmacy of Canada to set the PharmD Education Outcomes and by the University of Toronto PharmD Program to align the PharmD curriculum.

Curricular Alignment and Renewal of a Student-Centered, Problem-Based Advanced Therapeutics Course in the First Year of a PharmD Program. Aleksandra Bjelajac and Cleo Boyd, *University of Toronto.* **Objective:** To continue to improve a team taught, student-centered, problem-

based (PBL) advanced therapeutics course to assure successful achievement of new educational outcomes. **Methods:** The faculty continued to utilize the model of curricular development known as Assess, Align and Engage. Through assessment, we aligned these components of the course with the outcomes levels: *(i)* content covered; *(ii)* learning objectives and cases; *(iii)* format and method of student assessment; and *(iv)* tutorial format. Sessions led by the education specialist for the faculty included: *(i)* application of the theory of leveling to modification and development of learning objectives and cases; *(ii)* standardization of test item writing and evaluation; and *(iii)* an exercise in the various tutoring modes appropriate to a student-centered, PBL pedagogy selected to engage students more effectively in the learning process. **Results:** This process led to: *(i)* modification of existing learning objectives and cases, and development of new objectives and cases aligned with the outcomes levels; *(ii)* modification of course content; *(iii)* reformatting of the protocol for oral exams; *(iv)* alignment of test items with outcomes levels; *(v)* standardization of test item writing among course instructors, and 6) modification of PBL tutorial format to incorporate other pedagogical methodologies to engage students more effectively. **Implications:** We are observing continued improvement of the quality and the delivery of the advanced therapeutics course.

Evaluating Grading Consistency Among Faculty in Recitation Sections. Eric Boyce and Amy Morgan, *Philadelphia College of Pharmacy.* **Objectives:** The purpose of this report is to describe the methods used and data collected on grading consistency across a group of recitation-case studies sections. **Methods:** Faculty teaching in a one-credit, 2-hour case studies course attended a pre-course session to discuss the grading rubric and potential teaching methods to be used. The rubric contained grading criteria for case write-up and for in-class participation. Faculty discussed and came to some agreement on interpretation and use of the rubric. At the end of the semester, faculty grade sheets for each section were compared to determine the presence of outliers. Faculty then met to discuss to potential reasons for any differences and methods to enhance consistency when appropriate. **Results:** A total of 12 faculty were involved in teaching 12 sections to a total of 212 students. The course grades were 88.4 ±2.6% (mean +SD) (range 84.4-93.2%) for the write-up portion, 83.8 ±3.4% (range 79.4-90.2%) for the in-class participation portion, and 86.0 ±2.2% (range 83.8-90.3%) for the total grade. There were no differences among sections ($P>0.05$, ANOVA). One of the sections with the highest participation grades utilized a number of useful strategies to increase participation. **Implications:** The comparison of course grades across a number of sections of small group teaching can be useful to assist in improving grading consistency among sections, but also to explore methods to enhance the course.

Medical Spanish: Providing Pharmaceutical Care to a Growing Cultural Minority. Pedro I. Chavez and Mary Chavez, *Midwestern University.* The Hispanic origin population is the second largest minority group in the U.S. and is increasing rapidly. This segment of the U.S. population will account for 44% of the growth by 2025. So as to provide pharmaceutical care to this emerging population, elements of cultural diversity and language must be taught to pharmacists and pharmacy students. An elective course in Medical Spanish has been developed which attempts to address some of these needs. The underlying philosophy of this course is that students know more about language skills than they are aware. By tapping into this hidden knowledge, we facilitate the process of introducing and making students more proficient in a new language. First, the student selects a health care scenario of individual interest and prepares a written dialog in English. The future health care provider then generates the appropriate Spanish translation and learns the proper pronunciation. By role playing the health care situation out loud in class with their "role" partner, corrections in vocabulary and pronunciation can be made. With time the student becomes more proficient in Spanish. In addition, the students have the opportunity to generate multimedia presentations (audio's, videos) of Spanish dialogs. This course has been offered for three-quarters and is directed primarily at students not fluent in Spanish but also addresses the individualized needs of more skilled Spanish speakers. This course has been well received by students and faculty alike.

Technology-Supported PBL in a Pharmacy Dispensing Lecture Course. Clarence E. Curry, Valerie W. Hogue, *Howard University.* **Intent:** This project incorporated elements of problem-based learning (PBL) in a traditionally-taught pharmacy dispensing lecture course using technology to facilitate interactive communication among students and faculty. The project was designed to: *(i)* apply course enhancements using a modified PBL methodology, *(ii)* develop and use a comprehensive web site having discussion board facility for small group interaction, and *(iii)* assess the impact on learning satisfaction among students. **Process:** A course web site provided a forum for small group discussion and served as a resource for problem research. Pharmaceutical care links were provided to students for access to selected online prescription pharmacy sites, drug information sites, and adult and pediatric medicine sites. Five cases were developed based on selected course objectives. Students were divided into eleven tutorless groups comprised of six to

seven members. Every fourth lecture period, a case was distributed. Each group was expected to chronicle learning issues during an in-class session. In addition, groups met once in an out-of-class session. Learning issues generated during class were addressed between sessions. Using small group discussion boards, students communicated about these and related issues that contributed to case resolution. Small groups were required to post case solutions onto their password-protected discussion boards within two weeks of receiving the case. Evaluation of student learning satisfaction is underway. **Implications:** Technology can support the use of active-learning processes in courses where faculty resources are limited.

Student Usage of Course Materials on The Internet. Richard Dalby, Karen Plaisance and Robert Michocki, *University of Maryland.* **Objective:** To evaluate student use of administrative and content-related course materials placed on the internet. **Methods:** Hits on specific sites were used as a surrogate for how frequently students accessed six categories of administrative" information and content during a third year Integrated Science and Therapeutics required course taught in Fall 2000 to approximately 90 students. **Results** are tabulated below.

Type of Information	Files	Hits	Hits Files^{-1} Students^{-1}
Answer keys	7	483	0.8
Competency criteria (Skills based assessment)	13	1200	1.0
Course description and objectives	3	298	1.1
Instructor contact information	2	257	1.4
Handout files (99) accessed through 16 weekly schedule files	16	3691	2.6
Grades	7	4085	6.9

Implications: While such data must be interpreted cautiously, it appears that, on average, students accessed administrative files at least once per semester but displayed a disproportionate interest in grades. Students viewed competency criteria, on average, at least once yet appeared less interested in answer keys. It is likely that less than half our students reviewed courses content from the web, perhaps because hard copies of handouts were also available. We conclude that students currently utilized the web for grade information rather than as a learning tool. We question the basis for administrative pressure to place course material on web pages in the face of anecdotal feedback suggesting that our PharmD students prefer hard copy.

Interactive Conference for Students Completing Ambulatory Care Rotations. Lisanne DiTusa, Linda Eugenio Clark, Kenneth R. Eugenio, S. Mimi Mukherjee, Mary G. Amato, William P. Brennan, Jr., Michelle Byrne and Jennifer Goldman-Levine, *Massachusetts College of Pharmacy and Health Sciences- Boston.* **Objectives:** We developed an interactive educational conference designed to promote student/faculty discussions regarding the practice of clinical pharmacy and to increase student awareness of opportunities and challenges facing pharmacists in the ambulatory care setting. **Methods:** Ambulatory care practice faculty serving as preceptors for Bachelor of Science and Doctor of Pharmacy students are invited to participate. Conferences are held once a week for two hours. Students are assigned to groups according to clinical site and preceptor. Each week, two groups of students are required to facilitate an interactive discussion regarding activities at their clinical site. In addition, each conference includes a faculty lead discussion to address topics such as evidence -based medicine, reimbursement strategies, literature evaluation and career planning. At the end of the eight-week session, each student completes a questionnaire to assess the following: interest in topics discussed, topic relevance, appropriateness and overall organization of the conference. **Results:** The results of the questionnaire will allow measurement of conference utility, success and help direct changes for improvement. **Implications:** Recognizing that ambulatory care experiences are often variable depending on clinic site, it is essential for students to gain an appreciation for the numerous opportunities available. Our efforts will serve as a template for other educational programs.

Introductory Pharmaceutical Calculations Offered as a 1-hour Pre-Pharmacy Course: Are There Any Benefits? Pheophilus H. Glover, PharmD and Corinne C. Ramaley, *Hampton University.* **Objective:** The purpose of this study was to determine if students who take a 1-hour introductory course in pharmacy calculations offered during the Pre-Pharmacy curriculum performed better (will have higher test scores) on mathematical calculations in a Pharmaceutics Lab course as compared with students who did not take such a course. **Methods:** Tests were given in Pharmaceutics Lab, which evaluated proficiency in reducing and enlarging formulas, calculating quantities needed for a prescription, dosage calculations, conversions, milliequivalent calculations and other common pharmaceutical computations. Data were collected from students in the Class of 2002, 2003 and 2004. The mean test scores from the experimental group were compared to the mean test scores from the control group using a *t*-test for groups of unequal size. **Results:** Preliminary results for the Class of 2002 and 2003 indicate there is no significant difference

in the mean test scores between the two groups of students at a 0.05 probability level. Data collection from the Class of 2004 is in progress. **Implications:** A sound mathematical background in pharmaceutical calculations is essential in preparation for the pharmacy board exam, as well as in practice as a pharmacist. Students need mastery of such skills early in the pharmacy curriculum. If the hypothesis is true, early introduction of pharmaceutical calculations may prove to be a better strategy for enhancing math skills.

Improving Time Management Skills of Students with Academic Performance Problems. Jeffrey L. Hall and Michael T. Rupp, *Midwestern University - Glendale*. **Objective:** To create a methodology to assist students with academic performance problems and their faculty advisors to objectively assess how students allocate their time. **Methods:** The management technique of Multidimensional Work Sampling (MWS) was used to characterize students' daily activities in three dimensions: Activity (what was done); Contact (with whom the activity was done), and; Function (the purpose or objective of the activity). A standard data collection form was created through a series of focus groups with students. Students were provided random signal generators set at four signals per hour. When signaled, students were instructed to record what they were doing at that instant on the data collection form. Data were collected from 87 second-year pharmacy students over successive twelve-hour periods (8 am to 8 pm). **Results:** Analysis is in progress. A total of 4,115 observations were recorded by students during the data collection period. Among the analyses that are planned is to use the function code in each observation to determine the amount of time students spend in academic versus non-academic activities. **Implications:** Most students with academic performance problems have difficulty managing time effectively. The instrument and methods created for this project will allow for the accurate collection of data related to students' use of time, thereby providing a basis for faculty advisors to better assist students to improve their time management skills.

Ensuring Classroom Participation During Journal Article Presentations Using On-line Discussion Forums. Akima R. Howard and Tara M. Jenkins, *Hampton University*. **Objective:** The last month of the Biostatistics/Literature Evaluation course is dedicated to journal article critique presentations. Students are required to read the article being presented by their classmates beforehand. In our experience, some students do not read and classroom discussion is limited. This project describes one method of ensuring student participation in journal article critique presentations using online discussion forums. **Methods:** All students receive a literature evaluation checklist of questions to consider when evaluating a research article. This list is divided into sections that correspond to the number of students in the class. For every article presentation, each student is given a specific item on the checklist to evaluate. For example, a student may have to comment on the adequacy of the introduction and study objective for one group' presentation and then comment on the selection of statistical tests for the next. Students post their comments BEFORE their classmates actually present. The result is a threaded on-line discussion on each element of the article. Not only do the presenters receive a grade for their article critique and presentation, every student receives points for posting the designated comment on that article. Points for each posting accumulate and result in one grade for class participation. **Implications:** We anticipate increased class participation as compared to previous semesters.

Advanced Diabetes Care Course Within a Diabetes Concentration: Pedagogy and Assessments. June Felice Johnson, Renae Chesnut and Brad Tice, *Drake University*. **Objectives:** A course entitled Advanced Diabetes Care was developed for pharmacy students as a didactic component of a new diabetes concentration. The course objective was to enhance depth of knowledge and skills to assure graduates of successful roles in diabetes management. **Methods:** The course emphasized enhancement of knowledge in diabetes management and its complications, skills training in the use of devices, and marketing strategies for diabetes management services. Student portfolios, course announcements, and grade books were maintained using Web-Course-in-a-Box. Active learning was accomplished through class visits by expert guest speakers, guided in-class discussions, a foot assessment training video, student experiences in role-playing "Living the Life" of a diabetic patient, podiatry clinic visits, patient interviews, and student presentations. **Results:** A pre- and post-course survey of students indicated acquisition of knowledge and skills and changing attitudes during the course. Weekly grading of guided questions related to reading assignments provided students with regular feedback on their understanding of key material. Student presentations enabled faculty to assess each student's ability to demonstrate the proper use of glucometers, articulate the pharmacist's and podiatrist's role in preventive foot care, and construct components of a successful diabetes management marketing plan. **Implications:** Students gained a greater depth of understanding of diabetes management through active-learning strategies designed to enable them to take responsibility for self-learning.

Integration of Pharmaceutical Sciences into a Therapeutics Driven Problem-Based Learning (PBL) Curriculum. Tannis M. Jurgens, Robert K. Drobitch and Patrick S Farmer, *Dalhousie University*. **Objectives:** To develop a process for the integration of pharmaceutical science concepts into therapeutics driven cases used in a problem-based learning curriculum. **Methods:** Content of pharmaceutical science courses in our previous curriculum was outlined and topics essential for inclusion in the new curriculum were identified. A tabular overview of the new therapeutics driven curriculum was prepared. Cases were drafted by therapeutic content experts. Pharmaceutical science topics identified from the old curriculum were inserted into the cases where they fit best with therapeutic content. Several methods were used including: insertion into text of case, addition of guiding questions or prompting questions to be used by non-expert tutors. Coverage of essential material was tracked by completing a curriculum content table, matching cases with topics covered. **Results:** Pharmaceutical science concepts have been integrated into the new curriculum. Since completion of the first year of integration in 1999, the process has been refined, based on feedback from students and tutors. Use of curriculum content tables ensures coverage of essential material, allows adjustment as needed and facilitates interdisciplinary teaching. While some breadth of coverage is lost, students achieve the desired depth of knowledge. **Implications:** A problem-based pharmacy curriculum that fully integrates therapeutic and pharmaceutical science concepts is unique. Feedback from students, tutors and faculty indicates that this format emphasizes the relevance of pharmaceutical sciences to solving therapeutic problems.

Developing an International Elective Rotation In Traditional Medicine. Mujahid Arastu, Robert L. Chapman and Beverly A. Talluto, *Midwestern University*. **Objectives:** Development of a rotation in traditional medicine for a student enrolled in the fourth year of a PharmD program that introduced therapeutic modalities, merged conventional and complementary practices, and the provision of pharmaceutical care in a unique environment. **Methods:** A site, a local preceptor and a co-preceptor from the College were identified to accommodate the student's experience. A contract was prepared between the College and the Superintendent of the Government Nizamiya General Hospital, Hyderabad, India. The preceptor's resume and description of the site were obtained. A journal recording daily activities and interactions was compiled by the student, who also filed performance evaluations of the site, the preceptor and a project, in addition to the preceptor's evaluation of the student. Student outcomes: Two case studies in progress were introduced in the context of historical background, description of the Unani system of traditional medicine. The student observed methods of product preparation and formulation, in addition to delivering three presentations on the experiences gained in working with a Unani physician. **Implications:** This practical model in designing a rotation in distant areas served by practitioners of traditional medicine, provides a format to provide pharmaceutical care interventions in the context of a different culture and system of medical practice. Elements of the Unani system of medicine could be understood and applied toward treating members of a culturally diverse population in the U.S.

Design of an Education Strategy for Development of Pharmaceutical Care Documentation Skills. Jana M. Bajcar, Natalie R. Kennie and Cleo L. Boyd, *University of Toronto*. **Objective:** To design a strategy for perfecting pharmaceutical care documentation skills. **Methods:** In supervising PharmD students in a Family Practice rotation, gaps in students' documentation skills were observed. Using Biggs and Collis's Structure of Observed Learning Outcomes model (SOLO taxonomy) and the teaching of documentation skills in the program curriculum, several contributing factors were identified. Four theoretical education models (Kolb's Experiential Learning, Adult Learning Principles, Transfer of Learning, and SOLO taxonomy) were selected and used to inform the development of the educational strategy. **Results:** A strategy for perfecting documentation skills was designed using a four step developmental approach that consists of a specific documentation format, criterion-based collaborative assessment, and a consistent approach to feedback and coaching. Step 1 - review of fundamental documentation skills with application to paper cases. Step 2 - application of documentation skills to more complex paper cases. Step 3 - bridging to real patient practice through the use of a simulated patient scenario. Step 4 - observation of documentation skills in actual practice. This approach will be presented with a description of instruction and plans for assessment. **Implications:** The expected level of documentation skills in a competency/ability-based curriculum can be met or perfected through a stepwise developmental approach incorporating criterion-based collaborative assessment.

Student Preferences for Large Lecture Presentations: PowerPoint or Web-Based Formats. Kathleen Boje, *University at Buffalo*. **Objective:** Informal feedback from pharmacy students indicated some dissatisfaction with the use of PowerPoint for large lecture classes (>100 students). The objective was to survey student opinions on alternative presentation and handout formats. **Methods:** Lecture content was established from previous years. Lectures were presented using (1) a typical PowerPoint format with class handouts consisting of a slide print out (3 per page); and (2) a web - based browser format, utilizing navigational scrolling and hypertext links and hand-

outs consisting of printed web pages. After presentation of the formats, students voluntarily completed an anonymous survey on perceptions and preferences. A rating scale of 1-5 (1=poor; 5=excellent) for each format was used for each categories: instructor use effectiveness; clarity of key concept presentation; visual appeal; handout quality and interest level. **Results:** A total of 55 completed surveys were collected. In four out of five categories, students rated the PowerPoint format as marginally (non-significantly) better, with an average "4" rating in each category. These findings were consistent with the overall preference for a particular presentation format: 51% of the responding students preferred PowerPoint, versus 47% who preferred a web-based format. Only 2% (one student) preferred acetate transparency overheads. **Implications:** Students are apparently satisfied with either PowerPoint or web-based format. There is no clear student mandate for instructor use of one format over another. These results were surprising in light of the previous informal feedback.

Progressive Model for Integrating Learning Concepts Across Pharmacy Practice Courses to Avoid the "Learn and Dump" Phenomenon. Edwina S. Chan, Mary R. Monk-Tutor and Pamela J. Sims, *Samford University.* **Objectives.** Enhance student learning and application of critical concepts in patient care through development and implementation of a logical topic alignment and reinforcement delivery model. **Methods.** As a result of ACPE's and AACP's recommendations for integration of professional abilities across the curriculum, a committee was charged with designing a model for integrating nine Practice courses: Fiscal Management, Therapeutics, Drug Literature Evaluation, Ethics, Physical Assessment, Nonprescription Drugs, Human Resources Management, Pharmacy Practice, and Pediatrics Elective. The model was implemented in three phases. Phase I focused on garnering faculty support based on improved understanding of course delivery structures and needs. Phase II involved realignment of content to allow for concurrent delivery of key topics across courses. The extent of integration ranged from logical incorporation and reinforcement of learning objectives from other courses to team development of PBL problems that encompassed multiple ability outcomes from different courses. In Phase III, effectiveness of the delivery model was assessed. Results will determine the focus of future integration efforts. **Implications.** An integrated delivery model helps prevent the "Learn and Dump" phenomenon by reinforcing the holistic care of the patient rather than the discrete management of disease states. Advantages of this model include limited resource requirements, adaptability to both PBL and non-PBL courses, and curricular flexibility to fit the pace and needs of any program.

Transatlantic Mobility of Pharmacy Students' Pharmobility. Christopher Cullander, *UCSF,* Peter Redfern and Stephen Moss, Bath, UK. **Objectives:** The underlying objective of the project is to increase student awareness of pharmacy education, pharmacy practice and pharmaceutical science in overseas countries. **Methods:** In the next two years 90 pharmacy students will have the opportunity to undertake a semester in a host university overseas as part of a project jointly funded by FIPSE in the USA and the EC Directorate of Culture and Education in Europe. In addition to funding the mobility of the students and organizational costs, the project will support the creation of a teaching module. The project involves four colleges of pharmacy in the USA, (UCSF, California, Ann Arbor, Michigan; Gainesville, Florida; Austin, Texas) and six schools of pharmacy in Europe (Bath, UK, Brussels, Belgium; Pari-Sud, France; Barcelona, Spain; Lisbon, Portugal; Hamburg, Germany). The students will spend a minimum of 12 weeks in the host university and undertake taught units, project work, clinical experience or a combination of these activities. The teaching unit will take the form of an internet based computer aided learning package describing pharmacy education and practice in the countries and states involved in the project. **Results:** This is essentially work in progress but on an informal, unfunded basis, students from Bath will be undertaking placements in the four US universities in the summer semester of 2001; evaluation of this preliminary placement will inform the direction of the project.

Assessment of General and Professional Abilities in the Third Professional Year via Compounding Skills. Richard Dalby and James Polli, *University of Maryland.* **Objective:** To evaluate each student's ability to compound basic dosage forms throughout the third professional year using an assessment tool that explicitly measured general and professional abilities. **Methods:** General and professional abilities were publicly announced, and each student was individually assessed each week on two or three products, with the aid of a competency criteria sheet that facilitated rapid and explicit feedback. **Results:** The syllabi, competency criteria sheets, and examinations will be presented in detail, and the manifestation of general and professional abilities will be highlighted. **Implications:** Compounding can be efficiently taught to all students within an eight credit required Integrated Science and Therapeutics course, and offered as a two credit Compounding elective to interested students. Features of this curricular design are: *(i)* The compounded dosage forms are relevant to therapeutic issues covered by the required

course; *(ii)* All students have a chance to demonstrate on multiple occasions their ability to prepare and dispense the most basic dosage forms *(i.e.* a solution, capsule, ointment, and sterile product), while only the elective teaches more complex dosage forms; and *(iii)* Compounding students serve as peer mentors since they have greater compounding experience. The Compounding syllabus emphasizes four professional abilities as well as three general abilities (thinking, self-learning, and social interaction and citizenship), and the exams challenge each student's general and professional abilities.

Technology-Based System for Improving Feedback and Evaluation of Students' Prescription Counseling. Michael Deninger, *The University of Iowa.* **Objectives:** Videotape is a useful tool for documenting and evaluating counseling interactions; however, equipment can be cumbersome and difficult to use. A semi-automated system was developed to streamline and increase use of videotaping. The system developed provides: *(i)* easy distribution, *(ii)* rapid turnaround of video, and *(iii)* a centralized record of each interaction. **Methods:** Video is recorded using digital (MiniDV) camcorders. The video is transferred to computer using iMovie (Apple). Videos are batch processed with Cleaner 5 (Terran) to optimize computer playback and then stored on a central file server (Novell) in a student's personal directory. Counseling interactions are evaluated by teaching assistants using a 10-point Primary Trait Analysis. A web-based evaluation tool (developed in WebObjects) was used to store, retrieve, and analyze the PTA information for individual students. **Results:** Typically, 60 students would videotape in a given day (total videotape footage between 3 and 5 hours). The recordings can be processed and distributed for all students in one day requiring 1.5 hours of operator time. Evaluations of the videotapes are recorded in the database. Students can view their recorded video within 24 hours and critique themselves. Within 48 hours students receive specific instructor supplied feedback. **Implications:** This system allows for convenient, rapid turn-around distribution of video and database documented feedback for videotaped counseling interactions. The system could also be easily adapted to other disciplines.

Using NetPodium as a Tool to Deliver Content in an Online Antithrombosis Certificate Program. Janet P. Engle, Nancy L. Shapiro, Edith Nutescu and Margaret Maloney, *University of Illinois at Chicago.* **Objectives:** This project assessed the effectiveness of using NetPodium, a product designed to produce live and archived web broadcasts, to deliver content in a 9 week online certificate program that taught pharmacists how to design and implement an antithrombosis clinic. This project assessed whether using web-broadcasting technology as a tool for online pedagogy could enhance learning. **Methods:** The College has offered a 9-week online antithrombosis clinic certificate program for several years. Class material is presented using streaming audio and video as well as graphics, slides, web-based notes, hyperlinks and asynchronous conferencing. In this year's offering, archived broadcasts will be added to the online materials for several sections of the course. Learning assessments are conducted throughout the program including a proctored assessment at the conclusion of the program. **Potential Outcomes:** Forty-three pharmacists from all over the country and Canada have participated in this program. Twenty-five pharmacists will participate in the next offering this spring which will include the new learning tool. Assessments will be conducted to measure the value of archived broadcasts as a learning tool. **Implications:** Many pharmacists cannot leave their practice sites to attend live certificate programs. Online programs that include pedagogy that mimics live interactions afford the pharmacist with another option to update their knowledge and skills.

Development and Implementation of an Academic Pharmacy Practice Experience Rotation. L. Clifton Fuhrman, Margaret Arant, Karen S. Brown and Wayne E. Buff, *University of South Carolina.* **Objectives:** To design, develop, implement, and assess a teaching rotation for senior students interested in pursuing academic careers. **Methods:** College of Pharmacy faculty (Administration, Pharmacy Practice, Basic Science) and senior students developed objectives for the rotation. Objectives included teaching philosophies, research, service, course and test design, and classroom instruction. The underclass students (P1) assessed the senior student at the end of the rotation using a 5-point Likert questionnaire (5=strongly agree, 1=strongly disagree) developed by faculty and senior students taking part in the rotation. An exit interview, concerning the four-week rotation, of the senior student was also conducted. **Outcomes:** Underclass students (n=75) considered having a senior student in the lab beneficial (mean=4.76) and would like to see this rotation continued in the future (mean=4.76). The rotation students performance in class was evaluated favorably by the P1 students (mean 4.8). A question focusing on the willingness of underclass students taking part in a similar rotation during their senior year was rated at 3.58. **Implications:** The rotation students were provided with the opportunity to develop lectures, teaching material, and had an exposure to the rigors of the academic arena. Underclass students benefited from this rotation by interacting with a senior student and recognizing the students' ability to impart knowledge and instruction from the education that they had received during the first three years in their professional program.

Student Attitudes Toward Web-Based Case Studies on a Cardiology Clinical Clerkship. Patricia A. Howard, *University of Kansas.* The purpose was to assess pharmacy student attitudes toward case studies using a web-based format as compared to a traditional text-based version. Twenty-four case studies were developed focusing on cardiovascular therapeutics. Each case included patient information and self-assessment questions. When completing the text-base cases, students were given hardcopies and later met with the instructor to review answers. With the web-based version, students completed cases on-line, submitted answers by e-mail and received immediate standardized instructor responses. An on-line discussion feature enabled further student-instructor interaction. Clerkship students used each format in random order for half of the cases and then completed a 40-question evaluation. Data were collected from 34 PharmD students for analyses. The majority of students indicated they were comfortable with computer technology. Thirty-three of the students rated the web-based format an effective learning method and 24 preferred this format over the text version. The most frequently cited advantage was the immediate instructor feedback. The most frequently cited disadvantage was the need to flip between screens to obtain patient information. Among the 10 students preferring the paper method, the most commonly identified advantage was convenience. Ongoing analysis will examine relationships between format preferences and student-specific variables. Web-based case studies are well accepted by most pharmacy students and provide an effective teaching method for clinical clerkship students. This method offers a number of advantages for both students and instructors.

Development and Implementation of an Interdisciplinary Case Conference for Health Professional Students. Pamela U. Joyner, Carol P. Tresolini and Donna H. Harward, *University of North Carolina-Chapel Hill.* Collaborative education across the health professions can promote comprehensive, cost-effective patient care and emphasize health promotion and disease prevention, while also increasing professional and patient satisfaction. Health professional education, however, remains largely segregated by profession with little opportunity for students to interact across disciplines. **Objectives:** The objectives of this project were to: *(i)* collaborate across health professional schools to develop and implement a shared clinical learning experience emphasizing an interdisciplinary approach to patient care; and *(ii)* evaluate the impact of such an experience on student and faculty knowledge and attitude. **Methods:** A two-part simulated interdisciplinary case conference was planned by an interdisciplinary team of faculty and administrators and implemented for UNC-Chapel Hill health professional students. Evaluation data were collected via student pre-and post-conference surveys and post-conference surveys of facilitators and standardized patients. **Results:** Working in interdisciplinary small groups, 438 (92% of the targeted total) University of North Carolina students from seven health care professions interviewed standardized patients and developed patient-centered management plans. Post conference survey data indicate that: *(i)* students gained knowledge about training and skills of other disciplines; *(ii)* the use of standardized patients enhanced the learning experience; and *(iii)* all groups included standardized patients as partners in treatment planning. **Implications:** Interdisciplinary experiences can assist students in developing appreciation for the expertise that each health profession offers.

Designing A Web-Based Learning Center (WBLC) to Facilitate Communication and Learning for Students on their Pharmaceutical Care Clerkships. Rosemin Kassam and Stephanie Lee, *University of British Columbia.* **Objectives.** To utilize the WBLC to facilitate communication and interaction between Faculty and students during clerkships. **Methods.** A fishbone diagram, a program logic model, an activity timeline and site maps were developed as part of the planning phase. An information gathering step involved consultation with the Faculty WBLC development team and the University WEB CT support group to identify relevant tools and software. The production step consisted of designing course web pages, drop menus, templates, course materials, graphics and a resource centre. The evaluation phase is on-going. **Results.** The planning tools helped with the efficient implementation of the project. Three pharmacy practice courses were designed. Each course consisted of a homepage, course materials, evaluation tools, communication tools, and a resource centre. Course materials and pharmaceutical care resources were integrated through linking within each course (intralinks), between courses (interlinks), and to other Internet sites (URLinks). Evaluation tools including quizzes, self-assessment surveys, and clerkship evaluation forms were incorporated. WEB CT communication tools - Private E-mail, Bulletin Board and Real-time Chat were built in. The evaluation will help strategize the future direction of the WBLC. **Implications.** The WBLC has the potential to enhance learning and communication for Faculty and students on their clerkships.

Student Development of Disease State Management Plans for Community Practice: Reinforcement of Curricular Outcomes. W. Greg Leader, William M. Kolling, Gina C. Biglane and William H. Ross, *University of Louisiana at Monroe.* **Objectives:** Develop a course that will provide stu-dents with the opportunity to apply cognition gained from didactic courses to simulated real-life situations and serve as a method of reinforcing the skills imparted by previous course work. **Methods:** At the initiation of the course, students evaluated their abilities with respect to pre-identified programmatic outcomes using a 5-point Likert scale. Students were assigned to work groups and completed weekly assignments culminating in an implementation plan for a disease state management (DSM) service in the community setting. The implementation plan consisted of a collaborative practice agreement, plans for documentation, patient management protocols, resource utilization, facility and equipment needs, personnel needs, and reimbursement. At the conclusion of the course, students presented and defended their plan in front of peers and faculty. The course concluded with students reevaluating their abilities with respect to the previously defined outcomes. **Results:** Initial survey responses (n=63) indicated an adequate level of confidence in student ability to perform the outcomes (3.47/5). Post-course responses (n=57) demonstrated an increase in confidence levels (4.42/5). **Implications:** Initial results indicate that hands-on experiences in a simulated environment increase student perception of their ability to perform, even when pre-experience perceptions are at a comfortable level.

CommuniRes: Providing Comprehensive Training and Support Services for Community Pharmacy Residency Programs. George E. MacKinnon III and Michael T. Rupp, *Midwestern University-Glendale.* Community pharmacy residency programs (CPRPs) provide structured educational training for the development of advanced knowledge and skills in the delivery of pharmacist-directed care in community settings. CommuniRes, was created to assist pharmacists and pharmacy school faculty liaisons to successfully implement CPRPs in community practices by using various educational strategies and initiatives. A one-day training seminar prepares attendees with the knowledge and resources they will need to initially implement a CPRP. Intended to provide a comprehensive "turn key" approach for developing and implementing a CPRP, attendees are then eligible to participate in a suite of individualized support services developed to assist in the day-to-day management of CPRPs. Ongoing support services include a searchable Internet site containing a national residency directory, frequently asked questions on CPPRs, and a registry of potential resident applicants; promotional materials to assist in recruitment of resident applicants; periodic conference calls to share ideas, suggestions, and concerns; responses to questions and requests for information via fax and e-mail; and special sessions at professional meetings in which residency directors, preceptors, and residents can network. An advisory panel of nationally recognized experts in CPRPs and education provide direction to CommuniRes. As colleges of pharmacy look to expand experiential sites, CPRPs will provide excellent models in which to educate pharmacy students. Importantly, these sites also provide the foundation for a practice-based research network in the community setting.

Faculty Development for Curricular Outcome Assessment: A Diffusion Process. Jill E. Martin, Raymond Jang, Andrea Wall and Giovanni M. Pauletti, *University of Cincinnati.* **Objective:** In 1998, the University of Cincinnati College of Pharmacy began to develop a systematic and comprehensive curricular outcomes assessment (COA) process. The purpose was to document the achievement of competencies and to identify areas of the curriculum needing improvement. **Methods:** Driven by strategic planning within the college and heightened ACPE accreditation expectations, faculty adopted the CAPE outcomes. Extensive faculty development, pedagogical culture change and shifts in organizational structure occurred. Fifteen faculty attended AACP Xerox Institutes over a 3-year period. The College also conducted 4 mandatory workshops for faculty focusing on assessment skills. COA volunteer committee members guided and facilitated the development. A critical element for success was addressing culture change by grass-roots involvement. Also, an educational specialist was hired as a consultant to assist faculty in writing outcome objectives, development of longitudinal assessment, and preparation of standardized course syllabi. These syllabi documented course objective linkage with CAPE outcomes and enabled the College to map courses to professional competencies. **Results:** A multifaceted assessment plan is being implemented that includes course-by-course evaluation, a comprehensive written exam, and student portfolios. A topic for future discussion is OSCEs. **Implications:** We successfully created a cooperative climate for complex and challenging efforts. The enhanced skills of the faculty coupled with the new assessment program will provide quantified evidence for curriculum strengths and weaknesses so that formative and summative quality improvement will result.

Competency/Ability-Based Curriculum Review: A Systematic Approach. Allan Mills and Jana M. Bajcar, *University of Toronto.* **Objective:** To develop a systematic approach to evaluating the integration and alignment of a competency/ability-based PharmD curriculum. **Methods:** In 1999 the Canadian Council for Accreditation of Pharmacy Programs defined PharmD Education Outcomes. In preparation for accreditation, the curriculum committee developed and utilized a systematic approach to assess to what degree

the education outcomes were adequately taught and assessed in the curriculum. Each course was evaluated to determine to what extent it contributed to the development of competencies required for each outcome. Course instructors specified the level of competence expected at the beginning of the course and at the end of the course. A Competency Development Path was created, using the previously collected data, to identify gaps. Then areas of alignment and misalignment were identified and recommendations made for any modifications in course content, performance expectations, and/or assessment methods. **Results/Implications:** The systematic approach developed by the PharmD Curriculum Committee incorporated the use of initial and terminal outcome measures to evaluate the degree to which the curriculum, instructional methods and assessment tools performed to expectations. The process has identified areas of strength and weakness and created a means for shared dialogue among the faculty about the curriculum. This resulted in opportunities to enhance the quality of the students' learning experience.

Development of an Immunization Certificate Program for PharmD Students: A Multidisciplinary Approach. Michael H. Nelson, Nina R. Morris, ElGenia H. French and William B. French, *Southwestern Oklahoma State University.* **Objective:** Immunization administration has become a significant part of pharmacy practice and there is a need in pharmacy education for the training of pharmacy students to develop and implement immunization practices. The objective of this project was to design an immunization certificate program for PharmD students utilizing the expertise of several disciplines in pharmacy education. **Methods:** The certificate program has two main components: didactic and practical training. Didactic training consists of 4 lecture hours in a Medicinal Chemistry course regarding the science of immunizations and 3 lecture hours in a Pharmaceutics course regarding immunization administration and practice development. Practical training consists of a 3 hour Pharmaceutical Care Laboratory session during which students administer 6 saline injections using 3 injections techniques. Students gain further experience by administering immunizations under physician protocol to incoming pharmacy students and faculty. Upon proof of current CPR training, students receive a certificate documenting program completion and a record of immunizations administered. **Results:** In the first year of implementation. 83 students completed the certificate program. Once trained, students administered the following immunizations: hepatitis A (7), meningococcal (2), hepatitis B (10), varicella (14), MMR (1), and Td (4). Additionally, students administered 5 TB skin tests. **Implications:** This multidisciplinary approach to immunization training developed at Southwestern Oklahoma State University expands the practice capabilities of our PharmD graduates.

Evaluating Online Delivery of a Pharmaceutical Calculations Course. Larraina S. Parker, *University of Houston,* William R. Letendre, *Professional Compounding Centers of America (PCCA),* Sujit S. Sansgiry, *University of Houston.* Universities are utilizing online education delivery systems to alleviate increasing costs, class sizes and staffing difficulties. The quality of education provided by online delivery systems need to be evaluated. **Objectives:** The objective of this study is to evaluate the effectiveness of online teaching delivery methods for a Pharmaceutical Calculations Course. **Methods:** The P*ceutics Institute @ PCCA conducted pharmaceutical calculations courses at two major universities. At one university, students had an option to take the course either online or on-campus. At a second university, all students were given the course online. Online students received all lecture materials and assignments by logging onto a website. All students had access to on-campus tutorials and all students took proctored exams on-campus. Course effectiveness was evaluated based on student final grades. Student perceptions of the course and delivery methods used were obtained through a standardized questionnaire. Data will be coded and analyzed using the SAS statistical package at a set apriori significance level of 0.05. **Implications:** It is hypothesized that by evaluating and comparing teaching delivery methods instructors and students can feel confident in the quality of education provided through online programs. Student responses including satisfaction ratings and suggestions for improvement will be used to enhance the course.

Implementation and Baseline Assessment of a Pre-Residency Track Experiential Pharmacy Education Program. Jo E. Rodgers, John A. Pieper and James C. McAllister III, *University of North Carolina at Chapel Hill.* **Objectives:** The educational outcomes of a coordinated and challenging clinical education experiential program, the UNC Pre-Residency Track (PRT) Program, will be evaluated in fourth year pharmacy students. The program consists of closely-precepted clinical rotations, focused mentoring, weekly seminars and educational sessions with faculty and administrative leaders. **Methods:** The ten selected students were compared to a matched group of students assigned to other sites in the areas of knowledge, attitudes and skills. At the completion of the experience, follow-up assessments will be conducted. **Results:** The student groups were well matched by age, gender, ethnicity, marital status and grade point average (3.67±0.19 vs 3.48+0.26). There was no difference in the overall disappointing performance of PRT students and matched students on the baseline assessment tool (36.4+8.9 vs 33.9±15.6

points, 100 potential points) or in specific content areas of pharmacokinetics (4.7±1.3 vs 3.7±3.8, 18 potential points), adverse reactions (7.0±.1.6 vs 5.3±.1.6, 9 potential points) or consultation notes (20.0±6.2 vs 21.4±10.8, 60 potential points). **Conclusions:** The UNC School of Pharmacy and Hospitals have developed a competitive pre-residency clinical education program for highly-motivated pharmacy students. At conclusion of the first year of the program, an evaluative tool will be re-administered and an assessment of matching with nationally-competitive residency programs conducted between PRT students and the matched cohort.

Needs Assessment of Community Pharmacy Residency Programs using the Nominal Group Technique. Michael T. Rupp, *Midwestern University - Glendale.* **Objective:** To identify and prioritize the needs of community pharmacy residency programs (CPRPs) that must be met to ensure successful implementation and long-term sustainability. **Methods:** The nominal group technique (NGT) is a structured decision-making process and aid to program planning. NGT has been described as "a creative process that presumes either a lack of agreement at the outset or an incomplete state of knowledge concerning the nature of the problem or the components that must be included in generating a successful solution." To provide guidance to CommuniRes, a university-based program recently created to support CPRPs, an advisory board of nationally recognized experts in CPRP training participated in a NGT session to elicit and prioritize CPRP needs. **Results:** Silent generation of ideas elicited thirty-six initial needs. Subsequent group discussion and consolidation resulted in a final total of twenty distinct CPRP needs. Each group member was then asked to select the seven most urgent needs and rank-order them according to their importance. Prioritization was determined by the number of persons who listed a particular need, and the average ranking they assigned to it. **Implications:** Based on results, the needs of CPRPs were assigned to one of four cells for the purpose of prioritizing programmatic offerings within CommuniRes: Group Primary Priorities, Group Secondary Priorities, Individual Primary Priorities, or Individual Secondary Priorities.

Collaboration of Ambulatory Care Faculty in Experiential Education to Enhance Student Learning. Nicole Sparano, John Conry, Melissa Somma and Eric Wright, *Wilkes University.* **Objectives:** To develop a unique approach to experiential teaching of doctor of pharmacy students during their ambulatory care (AC) rotation. This process was developed to. enhance student learning while stimulating collaboration among faculty. **Process:** Four AC faculty, two at family medicine centers and two at VA clinics, each precept two students during a six-week AC rotation. Prior to each rotation, faculty meet to schedule eight clinical topic presentations, four disease state discussions, and a shadowing experience at another faculty AC site. The topic discussions are facilitated by a faculty member and students are pre-assigned readings. Each set of students are required to lead one disease state discussion and encouraged to incorporate active learning and creativity in their presentation. Following the student presentations, peer evaluations of the presenters and a co-presenter evaluation are completed. At the rotation conclusion, each set of students visit one of the other AC sites in order to observe and participate in clinical activities. Additionally, students meet for group reflection and discuss how the experience may apply to their future career. Subsequently, students complete a survey to assess the overall group education process. **Implications:** The preliminary impact has been enhancement of student participation in group discussions and a broadened range of AC experience. Additionally, faculty collaboration and time management have been optimized. Further research will determine student satisfaction and perceived learning.

Evaluation of a New Curriculum Requirement - Attendance at Clinical Case Conferences. Robert K. Sylvester and Scott A. Chapman, *North Dakota State University.* **Objectives:** To determine student perceptions of a new curriculum learning activity requiring attendance at a clinical case conference. **Methods:** Clinical case conferences offered as an optional learning activity were rated highly by students but poorly attended. Consequently, faculty implemented the requirement that P1, P2, and P3 students attend one case conference each semester. P4 students presented cases during the semester to satisfy clerkship requirements. At the end of the semester students were asked to evaluate the educational value of the case presentations and to define pharmaceutical care. **Results:** 90% of students completed the evaluation. Students defined pharmaceutical care as patient-focused rather than product-focused. P1 students most often noted patient counseling. In addition to patient counseling, P2 and P3 students more frequently included the evaluation of a patients; drug regimen and disease management in their definitions. The percent of students who felt the case conference increased understanding of pharmaceutical care was: 91.5% P1s, 74.5% P2s, 40% P3s. The percent of students who felt the case conference increased their drug knowledge was: 89% P1s, 78% P2s, 59% P3s. The percent of students who felt it was appropriate to make attendance a course requirement was: 87% P1s, 73% P2s, 69% P3s. **Implications:** The decrease in perceived value among upperclassmen was expected as their knowledge increased. Nevertheless students viewed this as a

positive learning activity; 75% supported the new requirement.

Levels-Based Competency Evaluation Tool For Students In A First Year Experiential Course. Christopher J. Turner, Ralph Altiere, and L. Clark, *University of Colorado.* **Objective:** to design and implement a competency-based tool to evaluate pharmacy students in a first year experiential course. **Methods:** a rubric for experiential course PHRD 3300 *(AJPE* **64**, 312-319 (2000)), was created to provide examples of "above," "meets" and "below expectations" for each of the CAPE competencies required to practice pharmacy. Students in this community pharmacy-based course used the rubric to self-assess their ability level for each CAPE competency, and provided written statements to justify their self-assessments. Teaching assistants, guided by the rubric and the students' competency statements, agreed or disagreed with the self-assessments and provided feedback. The minimum criteria to pass the course was an "above" or "at expectations" grade for each competency. **Results:** the evaluation tool permitted ability-based evaluation of the CAPE competencies required to practice pharmacy at an appropriate level by comparing students' written descriptions of their activities against preset criteria for "above," "meets" and "below expectations." By modifying the criteria and their degree of difficulty, the tool can be used for any experiential course. The primary disadvantage of the tool was that students and teaching assistants were unfamiliar with this form of assessment. **Implications:** a level-of-competency tool has been created which successfully allows objective evaluation in an experiential course of the CAPE competencies required to practice pharmacy. It can be modified for use in any experiential course.

Longitudinal Patient Evaluation: Applying Basic and Administrative Science to Practice. Andrea Wall, Barbara Harmon, William K. Fant and Jill E. Martin, *University of Cincinnati.* To encourage our students to integrate basic and administrative science concepts into pharmacy practice, we developed an activity that required students to apply the knowledge and skills developed in 7 of the first professional year courses (P1) to the treatment of a patient. Each student selected a volunteer patient with a chronic disease that matched the content of P1. An initial patient interview provided baseline demographic and clinical information. Patient cases were included in the following student projects: *(i)* describe the normal physiological and/or anatomical system and determine the abnormality caused by the disease; *(ii)* describe the biochemical reactions associated with the disease; *(iii)* describe the pharmacodynamic aspects of dosing, potential adverse effects or drug interactions; *(iv)* determine the patient's insurance coverage and their familiarity and satisfaction with its provisions; *(v)* conduct a medication interview using skills and tools from class: *(vi)* describe the physical and chemical properties of a medication prescribed for the patient; *(vii)* identify a social service or medical agency that relates to the patients disease state. Assignments were assessed by the faculty member assigned to the individual course. At the end of the year students resented a poster describing his/her project. Student's were receptive and positive regarding the integration and were able to appreciate the need for the basic science and administrative coursework in their early curricular experience.

Development and Introduction of a New, Web-based Course in Central Nervous System Pharmacotherapy for Postgraduate Students. Michael Z. Wincor, *University of Southern California.* **Objectives:** The purpose of this project vas to develop and introduce a new, case-based, interactive, 4-semester unit course in central nervous system therapeutics, delivered primarily over the world wide web (WWW) using Blackboard Courselnfo. **Methods:** Following two evening sessions intended to develop personal relationships and prepare everyone to successfully access the course, further sessions were web-based. Students received a course outline listing weekly topics and required readings. Each week, cases were posted to the site; each was designed to develop the students' abilities to identify problems, formulate desired outcomes and treatment plans, identify monitoring parameters, and discuss patient counseling points. Following completion of each week's cases, the students could visit a virtual chat room to discuss specific questions and problems with the course instructor. In addition, the instructor was available by e-mail and phone. Supplementary reading materials, when appropriate, were provided in PDF format, and three timed exams were delivered over the WWW. **Results:** A total of 15 postgraduate students completed the course. The scores on exams were comparable to those seen in the course prior to conversion to a web-based format. Use of the virtual chat room varied among students. Overall, the students, both experienced computer users and novices, found the approach a positive experience. **Implications:** With sufficient planning, aside from occasional technological difficulties, an interactive, case-based course can be provided on the WWW.

Cooperative Education: A Method for Completing Early Experiential Education. Mark L. Yorra, Robert J. Blaser and Debra A. Copeland, *Northeastern University.* **Background:** Northeastern utilizes Cooperative (Co-op) Education to deliver the early experiential (EE) component in a 0-6 pharmacy curriculum. Co-op is a full time paid work experience, which provides an intense and focused approach to delivering experiential edu-

cation. **Purpose:** To utilize Co-op experiences as the mechanism for completing early experiential education by establishing specific learning objectives for institutional and community pharmacy practice. Competency assessment occurs when students return to campus and share their experiences with faculty and peers. **Methods:** The preparation phase of the Co-op model includes second year students taking 2 didactic courses that introduce basic pharmacy practice skills. In addition, students review an EE Learning Plan, receive academic exercises to complete while on Co-op. The activity phase occurs during the student's time on Co-op. Finally during the reflection phase, students return to campus and participate in a course where the learning objectives are reviewed to ensure all competencies have been successfully completed and to remediate students as needed. **Results:** Descriptive statistics will summarize student's completion of competencies as well as site evaluations. Ongoing assessments provide feedback precipitating modifications in the learning objectives as needed. Implications: Utilizing the Co-op experience to execute early experiential competencies is a unique and effective method of delivery. Assessments are critical in providing optimal early experiential education.

Assigning Medical Conditions to First Year Pharmacy Student Teams: Projects and Outcomes. Arm Zweber, *Oregon State University.* Objectives: The team projects allow students to: develop effective collaborative learning skills; develop educational materials for a specific population; participate in a session similar to a professional poster setting; and construct knowledge about a specific medical condition. **Methods:** First year Pharmacy students were assigned to a "disease state team" consisting of 5 to 6 students. Team member assignments were based roughly on incoming GPA, gender, and ethnic background, with an effort made to diversify the group as much as possible. Disease states or medical conditions were assigned at random to each team. Two projects based on the assigned disease were to be completed by the end of the academic year: *(i)* Create a Student Health Center Pharmacy display window to educate viewers about the disease/condition; and *(ii)* Present information about the assigned disease state in a Poster Session format with fellow pharmacy students and faculty. **Results:** Window displays were evaluated by SHS Pharmacy staff. Criteria included clarity, accuracy, relevance to audience, creativity and appeal. Posters and team participation were evaluated by OSU COP faculty and staff. Students completed an end of the year evaluation of learning objectives. **Implications:** Team project work facilitates the development of working relationships. Developing educational materials about a particular disease state enhances skills required to explore and understand a particular topic. Student evaluation of the objectives will be available.

INNOVATIONS IN TEACHING COMPETITION WINNERS

Development and Evaluation of a Web Based Virtual Oncology Patient. Jill Kolesar, Michael Pitterle, Beth Martin, and Sandy Hoel, *University of Wisconsin.* **Objectives:** This project was designed to enhance the virtual oncology patient previously implemented in the pharmacotherapy teaching laboratory. Enhancements included accessibility from the Web and randomization of students to four clinical scenarios in the patient presentation. **Methods:** The breast cancer virtual patient includes extensive and interactive patient history, anatomy, pathology, diagnostics, simulated physical exams, and clinical scenarios. Each week students interacted, assessed and managed one of four clinical scenarios culminating in a SOAP note. In pharmacotherapy laboratory students presented their patient to small group "Pharmacy Rounds", exposing each student to the various clinical scenarios. The program, developed using Authorware and linked to a database, provides patient clinical information and the ability to evaluate student SOAP notes and on-line quizzes. Student performance and satisfaction will be assessed in an on-line cumulative quiz. **Results:** The Web-based interactive virtual patient was developed, providing students with the opportunity to interactively manage a patient from diagnosis to death and to share their management strategies within their small group. The virtual patient is currently used during pharmacotherapy lab. Student satisfaction and performance will be assessed at the conclusion of the module and results presented. **Implications:** The virtual patient provides a unique learning opportunity, a method to independently implement and collectively discuss patient management prior to clerkship experience. Virtual patients may also expand clinical teaching by reaching individuals outside the traditional university setting.

Innovative Enabling Strategies Which Bridge the Gap Between Learning and Active Practice. Debra Sibbald, *University of Toronto.* Objectives: To bridge the gap between learning and practice in PBL self-medication courses through two projects which enable active learning, peer teaching, inter-year mentorship, and written and oral patient communication. **Methods:** Project one developed a valid, reliable consumer website with information prepared by student teams. Database programs were used to create 30 reviews in question/answer format with referenced links. Project two used first year students as standardized patients in reinforcing practices to prepare seniors for an OSCE exam, and during the exam as patients and raters.

Results: Project one utilized the web as an interactive tool conveying content and skills learned as students directly to the public Utilization data from students and consumers was very positive. Project two showed learning benefits to first year students who were also able to rate performance as well as standardized actors. Third year candidates performed better after interactions with first year students vs. standardized actors. Double the number of tests were possible with cost efficiency. **Implications:** Project one maximized interactive learning: assists patients in making informed choices, provides students and pharmacists with an accurate counseling reference, enables student self-directed asynchronous problem-based learning. Project two gives seniors increased knowledge, clinical and communication skills improving confidence in provision of pharmaceutical care. Juniors acquire mentors, peer teaching skills, training for future exams, a balanced health care perspective, improve communication skills and tolerance, and realize progressive curriculum goals.

Use of a Real-Life Pharmaceutical Marketing Case to Establish Collaborative Relationships and Develop Team Building Skills. JoAnn Stubbings, *University of Illinois-Chicago*. **Objectives:** To engage students in a creative critical thinking process and develop team building and interpersonal skills while analyzing and solving a real world pharmaceutical marketing case. **Methods:** Approximately seventy, third year PharmD students taking an elective course in Pharmaceutical Marketing are assigned a real-life pharmaceutical marketing case from practitioners in pharmacy-based businesses. Students work in small groups to analyze the marketing situation and develop a strategic marketing plan. After one month, the teams present their plans to their peers, the marketing practitioners, and faculty. The practitioners judge the first and second place teams and give awards to the students for the best marketing plan. **Results:** Students consistently report that they spent more time than expected on the case because its unique real-life challenge captures their interest. The pharmaceutical marketing practitioners report their enthusiasm for the quality of the students' work. Over the past nine years, the pharmaceutical marketing elective has grown in size from thirty students to a maximum of seventy students with many students turned away each year because of restrictions in classroom space. **Implications:** Real-life case based learning and the development of collaborative relationships with representatives from pharmacy-based organizations may have application to other courses in colleges of pharmacy to enhance students' real-life learning experience.

INNOVATIONS IN TEACHING COMPETITION HONORABLE MENTIONS

Subcellular Pharmacokinetics and Web-Based Simulations. Stefan Balaz, *North Dakota State University*. **Objectives:** To improve student understanding of elementary pharmacokinetics in terms of physiology, body composition, and drug properties without increasing the level of used mathematics. **Methods:** Teaching undergraduate pharmacokinetics at the subcellular level wherever feasible including: derivation of the one-compartment model from first principles, relating the pharmacokinetic parameters to body composition (volumes of body fluids, lipid and protein contents, metabolic and excretory activity) and drug properties (lipophilicity, amphiphilicity, reactivity, acidi-1)Vbasicity). Teaching the more complicated pharmacokinetic cases by comparing their behavior with the one-compartment situation. Usage of web-based simulation tools to provide an anybody-anytime-anywhere access and to substitute the use of more sophisticated mathematics. **Results:** Java applets for simulation of membrane transport and pharmacokinetics were built. The approach was implements and used in Fall 2000. Student understanding of pharmacokinetics slightly increased, as evidenced by the grades of comparable tests in years 1997-2000. Student ratings of the course and the instructor increased significantly by 0.5-0.9 points on the 5-point scale. Students liked the use of web-based tools and appreciated their role in advancing their learning as evidenced by surveys. **Implications:** The approach improves student understanding of pharmacokinetics, works well for non-mathematically inclined students, and increases intuitive comprehension of dosing regimes and of the effects of patient's conditions. The applets will be available to students after graduation, will help them to solve pharmacokinetic problems in practice, and can contribute to maintaining their bonds to alma mater.

Evidence Based Medicine: Innovative Curriculum and Coursework. Patrick Bryant, Angela Varner Bedenbaugh, Antoine Richardson and Patricia Marken, *University of Missouri - Kansas City*. Today's expectations for clinical pharmacists matriculating from the nation's pharmacy schools include the ability to solve pharmaceutical-care problems utilizing critical thinking skills and maintaining a current understanding of therapeutic options through independent learning. To meet these expectations, an interdisciplinary team from the UMKC School of Pharmacy has developed a 2-semester course entitled Evidence Based Medicine (EBM), integrating literature evaluation, biostatistics, pharmacoeconomics, "traditional" drug information concepts, and information technology. The course achieves this by directly incorporating abovementioned elements into discussion and application of evidence based medicine decision-making processes. EBM I and EBM II incorporate the tools and techniques of these individual components and consolidate them into a structure that allows students to make solid, defensible patient-care decisions and develop rational institutional policies and practices. In addition to newly developed coursework, instructors have strived to utilize interactive team-teaching models along with use of technology and specialist guest-lecturers to facilitate the rapid transfer of knowledge and skills to students. The intent and rationale for implementing this course series is to equip the student with necessary tools and to foster the ability to solve pharmaceutical-care problems utilizing critical thinking. Additionally, EBM provides students with skills to remain current with therapeutic options through independent learning and using evidence based medicine principles. The philosophy supporting this evolution, as well as detailed descriptions of the process, coursework, and assessment techniques utilized are presented.

Standardized Patient Assessment - Innovations in Pharmaceutical Education. Denise Glasser, Anne Caffee, Renee Ahrens and Mark Johnson, *Shenandoah University*. **Objectives:** Standardized Patient Assessment (SPA) laboratory is a workshop approach to teaching basic patient assessment skills in a disease state management model. **Methods:** The workshop includes the application and refinement of interpersonal communication skills and an opportunity to coalesce content from several previously required courses to develop a strategy that provides quality pharmaceutical care. The class is taught in the third professional year. Within the SPA laboratory there are three innovations. First, it requires the student to demonstrate their ability to integrate information from the integrated science and therapeutics course, as well as the dispensing, communications, law and pharmacy management courses. Second, the student integrates essential elements of disease state review, management capabilities, patient assessment, documentation, and reimbursement into a disease state management practice model. Third, videotaped simulated disease state management encounters monitor students' progress in assessing, evaluating, communicating, and resolving multivariate patient care situations. **Results:** Combining these three innovations allows the students to enhance their clinical function level. **Implications:** An assessment of the influence of the course innovations will be completed in may 2001 as students complete the first rotation of their fourth year clinical experience.

Innovative Clerkship in Pharmacy Education. Dana Purkerson Hammer and Susan M. Paulsen, *University of Colorado Health Sciences Center*. **Objectives:** Offer a comprehensive, elective, six-week clerkship experience in pharmacy education for PharmD students to develop their skills and stimulate their interest in the teaching and service aspects of academic life. **Methods:** Students participating in this rotation meet the following outcomes through a wide variety of activities: *(i)* create and deliver an instructional module; *(ii)* assess the learning value of that module or other instructional activity; *(iii)* participate in school committees and describe the committees' impact on the educational process; *(iv)* analyze a variety of instructional methodologies and assessments used by faculty members; *(v)* discuss changes in pharmaceutical education over the last three decades; *(vi)* identify, evaluate and discuss references and resources for pharmacy faculty to aid in their teaching; *(vii)* evaluate and discuss specific education journal articles of interest to the student; (viii) analyze the role of specific national associations that impact pharmacy education; *(ix)* complete and present an education-related project; *(x)* create a portfolio to demonstrate achievement of rotation outcomes. **Results:** Participant feedback and evaluations of the rotation are very positive. Student portfolios reflect their understanding of pharmacy education and the challenges and rewards of faculty life. Undergraduate students value the instructional activities of and interaction with these clerkship students. **Implications:** With continued success this model, the rotation may become required for all students, as well as stimulate more of them to pursue academic careers.

Service Learning Nutrition Program. Catherine Jarvis, Joel Giles and Christopher Turner, *University of Colorado Health Sciences Center*. **Objectives:** This paper describes a service-learning course where first year pharmacy students are working with children at 2 inner city elementary schools. The ethnic distribution in the elementary schools is 75% Hispanic (10% Spanish speaking only and 10% English as a second language) and 25% African American. The populations in both schools are socioeconomically deprived. **Methods:** The students participate in 7 weekly 1 hour modules where each pharmacy student is matched with a group of 3 to 4 elementary students to teach modules about healthy nutrition and physical activity. Each module has a didactic portion, a physical activity and tasting activity. **Results:** The elementary school students learn about healthy nutrition from positive role models. They learn that there are different kinds of milk and decide which they like best and which is best for them. They do experiments to determine which foods have more fat - oranges, potato chips, celery, or french fries. The pharmacy students learn basic principles of nutrition, an important foundation to their future roles as health care professionals, however, they also learn much more. They learn to convey health related information, they practice patient counseling, teaching and problem-solving skills and they interact in a socioeconomic and ethnically diverse environment. They are faced with situations

where an elementary student doesn't speak English, doesn't have a home or cannot afford fruits and vegetables. **Implications:** The pharmacy students enthusiastically embrace their role as mentors to the elementary students and they thoughtfully participate in assignments where they reflect about how the experience will apply to their future careers as health care professionals.

A Multifaceted Active Learning Approach to Teaching Pharmacy Health Care and Behavior. Folakemi Odedina, Carla Clemmons and Nikita Dukes, *Florida A&M University.* After three years of teaching "Pharmacy and Health Care Behavior", it became obvious that the learning objectives for the course was not being achieved using the traditional classroom teaching style. The goal of the multifaceted teaching innovation was to actively involve students in their learning, facilitating attitudinal changes as well as behavioral changes in the provision of pharmaceutical care services that meet the need of patients. Students learnt by assuming diverse roles during the semester. As instructors, students were responsible for teaching one subject matter in class. As health educators, students went into the community to teach and encourage health promotion and disease prevention. As presenters, the students had the opportunity to discuss their community projects with faculty and other students using poster presentations. As researchers, the students explored chronically ill or long-term care patients' expectations that were not being met by pharmacists and how pharmacists can meet these expectations. As potential role models, students assessed their unhealthy behaviors and chose to stop one unhealthy behavior by the end of the semester. As authors, the students worked on several papers, including a report of their research investigation. Students and peer evaluative data verify that the learning objectives for the class were achieved with the multifaceted learning approach.

Documenting Gains in Student Professional Abilities through an Active Learning-Based Pharmacotherapeutics Course Sequence. Nancy Waite and Eric Hobson. **Objectives:** Although active learning approaches are no longer novel in pharmacy curricula, little assessment of the impact that new teaching strategies have on pharmacy students' professional practice abilities has occurred. The pharmacy education literature primarily assesses learning outcomes stemming from teaching innovation using course-embedded assessments without control populations. **Methods:** This study compared an active learning, case-based, student-centered teaching approach (class of 1997) to a lecture-based approach (class of 1998) for a therapeutic course sequence. An assigned case write-up on clerkship provided a course-removed ability assessment. A primary-trait scoring rubric was developed and used by clinicians and non-clinicians to score 120 random samples, blinded cases. **Results:** A significant improvement in overall score, organization and persuasiveness traits were found for cases written by students in the intervention group. Trends to improvement were seen among this group in readability, tone and clinical accuracy. 88.5% of all paired scores were similar ($\leq$ one point difference). **Implications:** Student performance on a professional practice-based task improved following implementation of an active learning, case-based, student-centered teaching approach in therapeutics course sequence.

LIBRARIES/EDUCATIONAL RESOURCES

Digital Curriculum: Pharmacy and Library Collaboration to Support the PharmD Curriculum. Veronica Shuford, Barbara Wright, Lilian Hill, Pascal Calarco, *Virginia Commonwealth University.* **Objectives:** An ongoing collaboration between the VCU School of Pharmacy and VCU Tompkins-McCaw Library (TML) enhances teaching and learning in the PharmD curriculum by adopting new technologies and integrating library resources into electronic course information. **Methods:** In response to the observation that pharmacy students need to develop greater proficiency in information management and to the needs of clerkship students, preceptors, and non-traditional students both on and off campus, Pharmacy and TML have integrated evolving education technology, information technology, and communications technologies. The adoption of BlackBoard Course Info, a comprehensive and flexible e-learning system has enhanced access to course material, electronic resources, and communication between faculty, library staff, and students. Training for students, faculty, and preceptors in the use of these technologies has become an integral part of the program. Necessary elements to the success of this effort included the development of system resources and infrastructure, technology knowledge, collaborative relationships, and administrative support for the initiative. **Results:** Include a reduction of the barriers caused by distance for off-campus clerkship students, preceptors, and non-traditional students, improved access to current health information independent of location, a reduction of professional isolation for non-traditional students and preceptors, and strengthening of information management and technology skills of future practitioners. **Implications:** The partnership formed between the library and pharmacy has furthered the ability to provide current information and education for faculty and students.

MERCK RESEARCH SCHOLARS PROGRAM

Identification of the Receptor Site(s) Mediating Gender-Differential Responses to MK-801. Gabriel Bartoo, *Idaho State University.* **Rationale:** Several investigators have found gender differences in response to the NMDA receptor antagonist, MK-801. Our lab found that ethanol withdrawn female rats were more sensitive to the anticonvulsant effects of MK-801 than ethanol-withdrawn male rats. As some evidence suggests that MK-801 may elicit some behavioral responses via interactions at sigma receptors, it was hypothesized that gender-differential responses to MK-801 could be moderated, at least in part, via sigma receptors. Identification of such pharmacodynamic gender differences could have important implications in future drug development. **Methods:** Four lines of investigation were followed to test this hypothesis: (*i*) characterization of gender-differential responses to MK-801 in an open-field behavioral model; (*ii*) comparisons of sigma receptor binding densities and affinities in different regions of male and female rat brains; (*iii*) evaluation of the extent to which MK-801 interacts with sigma receptors by competition binding; and (*iv*) evaluation of the ability of a sigma receptor ligand to attenuate MK-801-induced behaviors. **Results:** Gender differential behavioral responses were confirmed among several parameters, including locomotion and stereotypical behavior. However, the ability of a sigma receptor ligand to inhibit these behaviors remains to be seen. Saturation binding analysis with a sigma-1 receptor ligand found that female rats have a higher density and affinity of these sites across several brain regions than do male rats. Initial competition binding results suggest that the interaction of MK-801 at these sites is minimal. **Conclusions:** Female rats are more sensitive to the behavioral-activating effects of MK-801 than male rats. Higher female sigma receptor densities may be a partial explanation for this observation. However, the ability of MK-801 to directly interact with sigma receptors at physiologically relevant concentrations is questionable. Also, a pharmacokinetic mechanism for gender differences in behavioral responses is an alternate possibility.

Tocomin-50% Suppression of Preneoplastic (CL-S1) and Neoplastic (+SA) Mammary Epithelial Cell Proliferation is Associated with a Reduction in Protein Kinase C (PKC) Activation. Jennifer T. Cain, *University of Louisiana at Monroe.* **Introduction:** Tocotrienols are a subclass of vitamin E compounds that display potent anticancer activity. Determining the anticancer mechanism of action of tocotrienols would provide essential information necessary for understanding the potential health benefits of these compounds in reducing the risk of breast cancer in women. **Rationale:** Vitamin E compounds have been shown to inhibit mitogen-induced PKC activation. Epidermal growth factor (EGF) is a potent mitogen for normal and neoplastic mammary epithelial cells and an initial event in EGF-receptor (EGF-R) mitogenic-signaling is PKC activation. Studies were conducted to determine if the antiproliferative effects of tocotrienols are associated with a reduction in EGF-induced PKC activation. **Methods:** CL-S1 and +SA mouse mammary epithelial cells were grown in culture and maintained on serum-free media containing l0ng/ml EGF, 0-80μM Tocomin-50%, and 0-10μM phorbol myristate 13-acetate (PMA), a potent activator of PKC. Tocomin-50% is a commercially available nutritional supplement that is 50% tocotrienol. Western blot analysis was used to assay EGF-R, tyrosine kinase activity, and PKC levels. **Results:** Tocomin-50% inhibited EGF-dependent CL-S1 and +SA cell growth in a dose-responsive manner, but was not found to alter EGF-R levels or tyrosine kinase activity. Combined treatment with PMA reversed the growth inhibitory affects of Tocomin-50%. Tocomin-50% was also found to inhibit EGF-induced PKC activation, but had no affect on overall cellular levels of PKC. **Conclusions:** In summary, these findings indicate that Tocomin-50% suppression of EGF-dependent preneoplastic and neoplastic mammary epithelial cell proliferation occurs down-stream from the EGF-R and appears to result from an inhibition of PKC activation.

Effects of Nicotinamide on Cell Death as Induced by the Toxin t-BuOOH in HCN-1A Cells. Meredith R. Evers, *South Dakota State University at Brookings.* **Rationale:** Generation of highly reactive, oxygen radicals causes the death of neurons and contributes to the development of neurodegenerative diseases. In previous studies in mice, tertiary-butylhydroperoxide (t-BuOOH) induced DNA fragmentation and cell death in all brain regions within minutes of administration. Murine studies also indicated that nicotinamide, a poly (ADP-ribose) polymerase inhibitor and precursor for NAD+, was able to prevent the nuclear damage and apoptosis induced by t-BuOOH. The purpose of this project is to replicate these results using human cortical neurons and to establish the exact molecular mechanism(s) of nicotinamide. **Methods:** HCN1-A cells were maintained at 37∞ C in a 5% CO_2 environment using Dulbecco's modified Eagle's medium, which was changed daily. Cell viability was determined by treating cells with 10mM or 1mM nicotinamide prior to the addition of 100uM, 1mM, or 100mM concentrations of t-BuOOH. Following incubation periods of 24, 48, or 72 hours, lactase dehydrogenase assays (Sigma) were utilized to quantify cell death. 'Sandwich' ELISA assays (Oncogene) were performed to determine the levels of p53, p21, and bcl-2 in order to gain insight into nicotinmide's cellular mechanisms. **Results:** Following the administration of t-BuOOH, the HCN1-A cells had statistically

significant rates of cell death at all time point analyzed. Co-administration of nicotinamide was shown to increase cell survival rates. T-BuOOH up-regulated the pro-apoptotic proteins p53 and p21 and down-regulated the anti-apoptotic protein bc1-2. These effects, however, were reversed in the presence of nicotinamide. **Conclusion:** Nicotinamide is able to increase survival in HCN1-A cells when administered with t-BuOOH. Its neuroprotective effects can at least in part be attributed to nicotinamide's ability to prevent the depletion of bc1-2 and its inhibition of increases in p53 and p21.

To Characterize the Temporal Expression of Cystatin C in Relation to Expression of Cathepsin B, Following Transcient Ischemia. Swetal Gandhi, *Florida A&M University.* **Rationale:** Cystatin C, a cysteine protease inhibitor produced by the choroid plexus and found in CSF at high concentrations, may have an important role in brain injury. A temporal profile of cystatin C immuno-like reactivity (CC-IR) has been identified in morphologically degenerating neurons after 6 minutes of transient forebrain ischemia (TFI). However the expression of Cystatin C in degenerating neurons following TFI has not been quantified. Thus, western blot analysis was performed to examine Cystatin C protein concentrations in normal and experimental rat hippocampus following TFI. **Methods:** We used the two-vessel occlusion model with hypotension to induce TFI in rats for 6 minutes and then examined concentration of Cystatin C after 1, 3, and 7 days of recovery. The hippocampus was extracted and processed for western-blot analysis to quantify expression of Cystatin C. **Results:** Western blot analysis of the hippocampus showed that there were elevated levels of Cystatin C expression following TFI injury. A temporal profile of Cystatin C expression was detected and maximum expression of Cystatin C was observed at 7 days following TFI. **Conclusion:** A temporal profile of Cystatin C has been quantified at 1, 3, and 7 days following TFI. Maximum expression of Cystatin C is observed at 7 days following TFI. These results lend further support that a delicate balance between proteases and protease inhibitors specifically following TFI modulates pathophysiologic processes in the brain. In addition, Cystatin C may contribute to the neurodegenerative process following injury.

ICV Administered Antisense Regulation of Multi-Drug Resistant (rndr1a) P-Glycoproteins and Multi-Drug Resistance Associated Proteins (mrp) in the Rat Brain: Implications for Microdialysis Pharmacokinetic Characterization of CNS Active Compounds. Crystal R. Hall, *Ohio Northern University.* The ability to concentrate drugs within the central nervous system (CNS) is highly dependent upon the existence and activity of transport proteins within the blood brain barrier (BBB), primarily P-glycoproteins (P-Gp) and multi-drug resistance associated proteins (MRP). Intracerebroventricular (ICV) cannula insertion did not alter cortical gene expression of mdrla or mrpl, which encode for P-Gp and MRP respectively. Subsequently, antisense oligonucleotides against mdr1a and mrp1 were screened. We hypothesized antisense knockdown of these genes would enhance CNS concentrations of drugs assessed via *in vivo* microdialysis. ICV administered antisense (5' AAG GTC TTC TTC GAG CTC CAT 3', 100 picomoles twice daily x 3.5 days) against mdrla resulted in a diminished DNA statement when compared to controls at one hour post final treatment, with DNA bands returning at 12 and 24 hours post final treatment. Animals receiving antisense targeted at mrp1 (5' CTC CCC TTC TGC AGA CTC AT 3', 100 picomoles twice daily x 3.5 days) revealed visible DNA bands at all time points post administration. Thus, we were able to identify a potential antisense sequence capable of decreasing mdr1a gene statement. Finally, ICV infusions of the mrp1 substrate, ondansetron (0.1μg/ml), or the mdr1a substrate, colchicine (0.1μg/ml) following treatment with antisense did not yield significant changes in CNS drug concentrations when compared to controls. Results of this study confirmed the presence of cortical gene products necessary for the statement of drug resistant proteins, specifically mdr1a and mrp1. In addition, these results suggest that antisense administration could result in a diminished protein expression. However, *in vivo* microdialysis analysis of CNS drug concentrations suggests that the antisense against mdr1a did not alter P-Gp function. Thus, further research is required to adequately delineate the pharmacokinetic effects of an antisense against mdr1a.

Heterologous Sensitization of Adenylate Cyclase in CAD/D$_{2L}$ Cells is PKA-Dependent. Christopher A. Johnston, *Purdue University.* **Rationale:** Persistent activation of dopamine receptors may be involved in certain psychiatric disorders including schizophrenia and drug abuse. Although acute activation of dopamine D$_2$ receptors inhibits cyclic AMP accumulation, chronic activation of dopamine D$_2$ receptors enhances subsequent drug-stimulated cyclic AMP accumulation. This heterologous sensitization occurs in cells expressing dopamine D$_2$ receptors through an unknown mechanism. The current project has focused on heterologous sensitization in Cath.a differentiated (CAD) cells. **Methods:** CAD cells were stably transfected with the dopamine D$_2$ receptor (CAD/D$_{2L}$) using pcDNA3 using Lipofectamine transfection protocol. Confluent cells plated in 48-well cluster plates were treated with drugs for 18 h. After washing, cells were incubated in presence or absence of 10 μM forskolin for 15 minutes at 37°C followed by lysis with 100 μL of 3% TCA on

ice. Cyclic AMP was quantified using a competitive binding assay. **Results:** Chronic treatment (18 h) of CAD/D$_{2L}$ cells with quinpirole induced a two-fold enhancement of subsequent forskolin-stimulated cyclic AMP accumulation, which was blocked by the D$_2$ antagonist, spiperone, and pertussis toxin pretreatment. Chronic treatment with the cyclic AMP dependent protein kinase (PKA) inhibitor, H89, enhanced adenylate cyclase activity similar to that of quinpirole. Chronic activation (18 h) of PKA by forskolin, IBMX, or dibutyryl cyclic AMP attenuated both quinpirole- and H89-induced heterologous sensitization, and each PKA activator caused a significant reduction in subsequent forskolin-stimulated cyclic AMP accumulation. **Conclusions:** These data define a role for PKA in heterologous sensitization in CAD/D$_{2L}$ cells. Specifically, heterologous sensitization is induced by inhibition of PKA, whereas activation of PKA results in a desensitized response and blockade of sensitization.

Analysis of p53-Mediated Repression of RNA Polymerase III Promoters. Nihar Niranjan Mandavia, *University of Southern California.* **Rationale:** The tumor suppressor gene p53 regulates cellular growth, thereby helping to maintain the integrity of the genome. It has been well established that p53 both activates and represses RNA polymerase (pol) II transcription. Recent studies have determined that p53 represses RNA pol I and RNA pol III transcription as well. The pol III specific transcription factor TFIIIB, which contains the TATA-binding protein (TBP), has been shown to be a direct target of p53. **Methods:** In this study, we began an analysis of the mechanism by which p53 mediates repression of pol III transcription. We hypothesize that as p53 binds to and sequesters TBP, this binding will decrease TFIIIB formation. In order to test this hypothesis, we performed cotransfections using p53 null mouse embryo fibroblast (MEF) cells. A reporter construct encoding a modified tRNA gene was cotransfected with p53 and TBP expression constructs. The amount of modified tRNA transcribed from the reporter construct was quantified using the ribonuclease protection assay (RPA). **Results:** We showed that p53 does downregulate pol III transcription and we also showed that this repression can be alleviated by the overexpression of TBP. Furthermore, p53 did not modulate transcription from the TBP promoter or regulate cellular TBP concentrations. In contrast, our studies with p53-mediated repression of an RNA pol II promoter (B-3 Integrin) showed that this repression was not alleviated by overexpression of TBP. **Conclusions:** These results support our hypothesis that p53 mediates transcriptional repression of pol III genes by binding directly to TBP and preventing the formation of functional TFIIIB complexes at the promoter. While the p53-TBP interaction has been well studied, the effect of this interaction on transcription is not known. Our study is the first to suggest that the binding of p53 to TBP may mediate the repression of pol III genes.

Effects of Prenatal Stress on Glucose Metabolism. Pamela J. Mayfield, *University of the Sciences in Philadelphia.* Recent epidemiological studies have correlated low birth weight with increased susceptibility to diabetes in adults. Intrauterine exposure to maternal glucocorticoids has been suggested to produce low birth weight and increased susceptibility to diabetes during adulthood. Stress produces large physiological increases in glucocorticoid levels. However, the role of maternal stress in the etiology of diabetes has not been examined. The objective of our investigation was to determine if chronic maternal stress and the subsequent glucocorticoid release will decrease birth weight and lead to impaired glucose metabolism in the offspring. Chronic stress was administered to pregnant rats via daily forty-five minute immobilization sessions during the 21-day gestation period. Pregnant control rats were left undisturbed. Offspring from both groups were weighed immediately after birth. Glucose metabolism in the 21 and 84-day old offspring were evaluated by measurement of hepatic glucokinase (GK) activity. GK activity was quantitated by coupling the conversion of glucose to glucose-6-phosphate with the reduction of NAD$^+$. Glucose metabolism in 84-day old offspring was also evaluated with a glucose tolerance test (GTT). During pregnancy, maternal weight gain in the stress group was markedly lower than the control group ($P < 0.05$) confirming the effectiveness of the stress procedure. The birth weight for pups in the stress group was 6.31 +/- 0.13 grams (mean +/- SEM) and was not significantly different from controls. GK activity in 21-day old prenatally stressed male and female offspring were 5.84 +/- 0.60 and 7.20 +/- 0.74 nmoles NADH/min/mg protein respectively, and were similar to GK activity in control offspring. GK activity data from the 84-day old offspring and results of the GTT studies are currently being evaluated. Based on the limited data obtained, it appears that prenatal stress has no effect on birth weight or glucose metabolism in 21-day old offspring.

Polymeric Oral Drug Delivery Systems for Peptide/Protein Drugs. Oluchi U. Njoku, *Howard University.* Recombinant DNA technology has facilitated the production of peptide and protein drugs. However, oral delivery of peptide and protein drugs is fraught with difficulties which center around low bioavailability. The purpose of this project is to investigate the suitability of an organic redox-initiated polymerization method for the fabrication of two types of pH-responsive copolymers capable of protecting peptide and protein

drugs *en route* to the colon, which is a less hostile environment suitable as an absorption site for the drugs. Butylacrylate-based hydrogels and N,N-dimethylacrylamide-based hydrogels were synthesized at 25° C using benzoyl peroxide and an amino alcohol as an organic redox-initiator system. Studies were carried out on the influence of the ratio of the co-initiators and the incorporation of a pH-sensitive hydrolyzable cross-linker on the swelling and structural properties of the hydrogels. The swelling isotherms were modeled by the second-order equation of Hans Scott; while the hydrogel network was analyzed using Peppas model for charged polymeric networks (modified Flory-Rehner model). The ratio in which benzoyl peroxide and the amino alcohol combined affected the molecular weight between cross-links, rate of swelling and equilibrium degree of swelling of the hydrogels. The incorporation of a hydrolyzable cross-linker in the hydrogel network provided controlled kinetics of swelling, which is important for proper protection of the peptides and proteins in the acidic conditions of the stomach and proteolytic enzymes in the small intestine. The organic redox-initiated polymerization method is suitable for the fabrication of oral drug delivery systems containing thermolabile drugs like peptides and proteins.

Synthesis of Selective *P. carinii* Dihydrofolate Reductase Inhibitors. Michelle R. Pagley, *Duquesne University*. Infections with *Pneumocystis carinii* are a major cause of morbidity and mortality in patients with acquired immunodeficiency syndrome (AIDS). Dihydrofolate reductase (DHFR) inhibitors such as trimetrexate are used to treat *P. carinii* infections, but these compounds often cause severe toxicities in human cells necessitating leucovorin rescue. The goal of this research was to find a DHFR inhibitor that is selective for *P. carinii* such that human cell toxicity and leucovorin rescue can be avoided. A previously reported series of 2,4-diamino-6-substituted-pyrido[2,3-*d*]pyrimidines found that the selectivity of the pyridopyrimidine for *P. carinii* DHFR is potentially due to a N9 methyl group. It was determined that the selectivity arises from an interaction of the N9 methyl group with Ile 123 in the active site of the *P. carinii* DHFR. However, it was also determined that in culture, the potency was significantly reduced due to problems with lipid solubility. This was the reasoning for creating a series of 2,4-diamino-6-substituted-quinazoline compounds with a C8 instead of the N8. The goal of the research was to synthesize a series of eight N-substituted quinazoline compounds that will decrease the distance between the Ile 123 and the N9 substitution to enhance selectivity. The target compounds were synthesized from commercially available 2,4-diamino-6-nitro-quinazoline which is reduced with Raney nickel and hydrogen at 30 psi to yield the intermediate 2,4,6-triamino-quinazoline. The appropriate benzaldehyde or naphthaldehyde is then reductively aminated with the intermediate under hydrogen at 30 psi, to afford the parent compound. Reductive methylation with the appropriate aldehyde and sodium cyanborohydride at a pH of 2-3 yields the target N9-substituted analogues. The compounds have been confirmed using NMR and elemental analysis. They are currently being evaluated as inhibitors of human and *Pneumocystis carinii* DHFR. Once results have been obtained, conclusions may be drawn as to whether the length of the N9 substitution effects selectivity as has been hypothesized.

Empirical Test of the Policy Basis for a Health Care Provider-Patient Evidentiary Privilege. Stuart R. Warren, *University of New Mexico*. **Objectives:** *(i)* To test whether the physician-patient evidentiary privilege encourages patients to seek treatment by protecting confidences from admission as evidence in court (the original policy rationale for the evidentiary privilege); *(ii)* to test whether the same policy rationale applies to the pharmacist-patient relationship; *(iii)* To determine whether patients differ in their willingness to disclose symptoms to physicians vs. pharmacists. **Methods:** Two groups were surveyed as to whether they would seek treatment from a physician or consult with a pharmacist about a variety of hypothetical illnesses. One group was instructed to assume that communications are inadmissible as evidence in court proceedings. The other group was instructed to assume that these communications are admissible. The *t*-test was used to determine the significance of differences between the mean responses. **Results:** There was a significant difference (*P*<0.05) between the mean responses of the two groups to; *(i)* 14/28 physician-related questions; *(ii)* 3/28 pharmacist-related questions; and *(iii)* participants were significantly less likely to seek pharmacist counseling than to seek treatment by a physician for most conditions. **Implications:** The results support this policy rationale for the physician-patient evidentiary privilege because many subjects were significantly less likely to seek treatment for certain conditions if they believed that information disclosed could be used against them in court. The results provide little support for the proposition that patient disclosure would be enhanced by extension of the privilege to pharmacists. Patients may feel that accurate diagnosis by a physician is dependent on honest disclosure, but that effective counseling by pharmacists is not. This may have implications for patient education if pharmacists are to provide effective pharmaceutical care. A surprising number of subjects indicated that they would be reluctant to seek treatment from a physician or to disclose embarassing symptoms even when an evidentiary privilege

exists. These issues may merit further study.

Examination of the Role of Porin in Macromolecular Cellular Transport. Yin Zhang, *Virginia Commonwealth University*. **Purpose:** The phenomenon of macromolecular transport, such as nucleic acids into mammalian cells has been observed for decades, yet neither the exact mechanism nor the identity of such transport system is known. According to the fluid-mosaic model of the plasma membrane, these large (> 4 kDa), hydrophilic molecules should theoretically be hindered from this hydrophobic lipid bilay-er. Prokaryotic and mitochondrial membranes are known to contain transport systems for macromolecules, and one family of those transport proteins — porin (a.k.a. VDAC) - has been identified in eukaryotic plasma membranes. Therefore, our goal was to test the hypothesis that porin is involved in macromolecular transport in mammalian cells. **Methods:** The 1st phase of the study involved establishment of mutant NIH 3T3 cells carrying porin over- and under-expression. Porin cDNA was cloned into pIRES vector and transfected into cells for stable expression. Western blotting was used to quantitate porin expression. The 2nd phase involved uptake study of oligonucleotides (ONs) across cell and mitochondrial membranes in the mutants. Additionally, the effects of porin enhancers (*e.g.*,: Ca^{+2}) and inhibitors (*e.g.*,: CSA) were examined. All uptake results were analyzed using ANOVA for statistical differences among control, over-, and under-expressing groups. **Results:** The project is currently in the process of creating porin construct. Porin cDNA were ligated with pIRES vector and are being screened for positive clones for subsequent cell transfection. Preliminary study with porin 31HL cDNA transfected cells demonstrated 40% and 480% increase in porin expression in total cells and mitochondria, respectively. On cellular uptake was increased by about 50% in the over-expressing cells. **Conclusions:** If porin mediates nucleic acid transport, then porin over-expressors should demonstrate an increase in the rate and possibly extent of ON transport. Conversely, a corresponding decrease in the rate of nucleic acid uptake in porin dominant negative cell lines is expected. Preliminary data suggests that porin may participate in ON cellular transport. Future studies would include screening for other porin isoforms and membrane proteins with high affinity to nucleic acid molecules.

NEW INVESTIGATORS PROGRAM

Trend Analysis of Organ Transplantation Among Racial or Ethnic Groups. Hong Xiao and Ellen S. Campbell, *Florida A&M University,* Kai-Sheng Song, *Florida State University*. **Purpose:** This research provides public policy implications regarding organ resource allocation and increases public awareness of the current status of transplant use in various racial and ethnic populations. **Procedures:** HCUP National Inpatient Sample data were used to obtain a yearly estimate of the number of organ transplants by organ, by race for 1988 through 1997. ICD-9-CM codes identified lung, heart, liver and kidney organ transplantation procedures. Each record in the sample was weighted by its respective discharge weight to extrapolate a national estimate. To assess whether there are significant differences among races in organ transplantation rates over time, regression models were estimated for heart, liver, and kidney transplants. Transplantation rates were modeled as a function of time, race, and interaction variables. **Findings:** Examination of time trend graphs and regression analyses clearly indicates that transplantation rates for Caucasians were significantly higher than their non-Caucasian counterparts. Moreover, the divergence between rates for Caucasians versus other groups grew more each year for the organs studied. **Conclusions:** Caucasian patients received significantly more organ transplants than other racial and ethnic groups. Further research is needed to explain why this divergence continues to grow.

Relationship Between Objective Disease Severity and Health State Preference Measures in Asthmatics. Karen Blumenschein and Alan Zillich, *University of Kentucky,* Magnus Johannesson, *Stockholm School of Economics,* Patricia Freeman, *American Pharmacy Services Corp.* **Objective:** The objective was to evaluate the relationship between willingness to pay (WTP), quality of life (QOL), health values and disease severity measures in asthma patients. The hypothesis studied was that asthma patients with more severe disease, measured via forced expiratory volume percent predicted (FEV 1%), are willing to pay more for a hypothetical cure from asthma, have a lower QOL and have lower health values than those with less severe disease. **Methods:** One hundred asthmatic patients were recruited from community pharmacies in Kentucky for face-to-face interviews. Spirometry was used to assess objective disease severity. The Short Form 36 (SF - 36) and Asthma Technology of Patient Experience (Asthma TyPE) measured QOL. WTP was obtained via a dichotomous choice contingent valuation question. Health values were obtained via the rating scale, time trade-off and standard gamble methods. **Results:** In logistic regression analysis WTP was significantly related to disease severity (*P*=0.02). *A* majority of the QOL measures were correlated with FEV1% values. In linear and logistic regression analyses, FEV1% was positively associated with health values for all three techniques; however, the relationship was statistically significant only for the time trade-off method.

Conclusions: The results suggest that lung function, as measured by FEV1% predicted, is a predictor of health state preference measures in asthma. Further research is needed to accurately quantify these relationships.

PHARMACY PRACTICE

Development of a Post-PharmD HIV Specialty Residency Program. Jana M. Bajcar, Alice Tseng, Michelle Foisy, Laura Park-Wyllie, Emily Musing, Janice Wells, Mary Grondin and Irvin Salit, *University of Toronto.* **Objectives:** To describe the development of the first Canadian postgraduate HIV pharmacy specialty residency. The goal is to train skilled, highly knowledgeable pharmacists who can pursue challenging careers in clinical, academic, or industry HIV settings. **Methods:** Pharmacists at two urban hospital HIV clinics collaborated with staff and the university to develop the residency. The program was based on a general residency model, with emphasis on HIV. Program policies were tailored to existing accreditation standards; objectives and responsibilities were modified to reflect the expectations of an advanced degree resident. Innovative and distinguished rotation sites were recruited with pharmacist and non-pharmacist preceptors **Results:** In 1998, an HIV specialty residency was developed by two of Canada's largest HIV clinics, the university and other HIV institutions. The 12-month program includes ambulatory, inpatient, community, and family practice rotations, with optional specialties such as pediatrics and palliative care, and research and teaching responsibilities. The success of this program has stimulated the development of other institutional specialty residencies. **Implications:** An innovative HIV specialty residency was developed to meet the growing need for pharmacists with HIV expertise. The impact of this program has exceeded its original goals, and has played an important part in expanding the profession and the role of pharmacists in patient care.

Improving the Use of Integrated Instructional Methods in Pharmacotherapeutics Courses. Eric Boyce, Elena Umland, Laura Mandos, Eric Wittbrodt, Cathy Poon, William Kirchain, Sarah Spinier, Amy Morgan and Lisa Davis, *Philadelphia College of Pharmacy.* **Objectives:** This report describes the use of assessment data to improve teaching methods in pharmacotherapeutics courses. **Methods:** Pharmacy students and faculty have assessed a 24-credit, third-year, pharmacotherapeutics-disease course series every semester for 5 years. Data from surveys, focus groups and discussions have been used to continually improve the use and integration of instructional methods and topics in the lecture, laboratory, and case studies components of the course series. **Results:** Students have responded well to the integration of the instructional methods and topics in these courses. Lecture is effective in delivering large amounts of information, but in-class case discussions led by faculty and pharmacy rounds (in-depth topic reviews for extra credit) led by students are now fully integrated into the lecture components as a result of assessment data. The schedule of topics has been rearranged to increase introductory, fundamental and less complex topics early in the course series. The integration of numerous instructional methods and coordination with lecture is perceived to enhance knowledge and skill development (problem solving, critical thinking, communication, information retrieval, etc.) in the laboratory and the case studies components. Faculty workshops and one-on-one sessions have been utilized to enhance course delivery, grading consistency, and examination writing skills. **Implications:** Student and faculty have provided very useful insights into the design and delivery of these courses.

Establishment of an Ambulatory Care Practice Group (ACPG): A Model to Support and Foster Innovative Pharmacy Practice Faculty and Site Development. Michelle L. Byrne, Jennifer D. Goldman-Levine, William P. Brennan Jr., Mary Amato, Linda Eugenio Clark, Lisanne DiTusa, Kenneth R. Eugenio and Mimi Mukherjee, *Massachusetts College of Pharmacy and Health Sciences-Boston.* Recognizing the unique and individual endeavors of faculty members at their respective practice sites, the ACPG was formed in June 2000 to encourage collaborative activities supporting professional development for ambulatory care pharmacy practice faculty. The ACPG acts to identify and implement activities that benefit the advancement of pharmacy care at the levels of practice site, college, state, and national initiatives. Four areas have been identified to facilitate the groups' goals: *(i).* Practice: to share and develop techniques to improve and/or expand the faculty member's "preceptor" and "clinician" roles in addition to developing a core curriculum for all of the college's ambulatory sites, *(ii).* Scholarship: to hold monthly meetings that support and foster collaborative research ideas and projects that benefit the advancement of pharmacy practice and education. *(iii).* Teaching: to organize and facilitate weekly student-focused learning forums to address key ambulatory care issue, enforce evidence-based disease management, foster innovative thinking among future pharmacist, and to introduce an Ambulatory Care Practice elective within the curriculum; and *(iv).* Regulatory: to monitor, disseminate and participate in key legislative and regulatory issues regarding the delivery and reimbursement of pharmacy care. Preliminary feedback from both faculty and students participating is positive.

Design and Implementation of a Didactic Community Pharmacy

Elective Course. Kristin A. Casper and Marialice S. Bennett, *The Ohio State University.* **Objectives:** To design, implement, and evaluate an elective course that will focus on the development and management of a clinical community pharmacy practice site. The course will introduce students to issues surrounding the provision of pharmaceutical care and disease state management in a community pharmacy setting. **Methods:** The three credit hour course will consist of didactic lectures and discussions that will introduce topics pertinent to the development of a clinical community pharmacy practice site. Topics of discussion will include pharmacy operations, maintenance of a pharmacy staff, management of workflow, documentation of outcomes, marketing, billing and reimbursement, and implementation of innovative services. In addition, innovative community pharmacy practitioners will be invited to lecture about the practical aspects of developing clinical services and implementing these services in their community practice sites. **Results:** The course will be offered for the first time in Spring 2001. Outcomes data will be collected to evaluate the students' perceived ability to apply the knowledge gained and their reported likelihood of implementing innovative services in a community pharmacy setting. **Implications:** Students who are provided with the necessary knowledge and tools to understand and implement innovative community pharmacy services can apply this knowledge to future community experiential rotations and professional pharmacy practice sites. In doing so, the students will ultimately advance the practice of community pharmacy.

Implementation of a "Capstone" Pharmacotherapeutics Course. Judy W.M. Cheng and Brooke D. Fidler, *Long Island University.* **Objective:** To implement a "capstone" pharmacotherapeutics course to: *(i).* Develop students' ability in utilizing knowledge from different courses in providing pharmaceutical care for complicated patients; *(ii).* Develop an appreciation of other aspects of clinical pharmacy practice. **Methods:** This course consists of 3-hour lecture, 1-hour recitation and 1-hour group project time per week. Topics covered include: Nutritional therapy and alternative medicine, organ transplant and complications, patient management issues in ambulatory care, community care, critical care, long term care, and hospice care, and providing pharmacy consultation to pharmaceutical industries (medical writing, marketing/advertising/educational consulting). Students are divided into groups and are assigned projects to complete and present towards the end of the semester. Nature of projects includes developing drug formulary kits, medication utilization criteria, education symposium, providing medical-legal consultation and marketing consultation for pharmaceutical industries. These projects are to expose students to other responsibilities of clinical pharmacists. Students will also fill out feedback survey evaluating whether this course helps them to put information together and prepare for clerkships. **Implications:** In standard pharmacotherapeutic courses, disease management is taught in segregation. This leaves students with difficulties assembling information together in managing real-life, complicated patients. Different strategies, including problem-based learning and join-recitation among courses, are used to bridge this gap. This course presents another innovative way in trying to help students accommodate with learning and applying the growing body of pharmaceutical knowledge.

Direct-Patient Care Activities of First-Year Pharmacy Students in an Early Experiential Program. Dale E. Wright, Cheryl E. Cox, Betsy S. Koshy, Nancy Rae, University of Alberta. **Objectives:** The feasibility of combining an experiential program for first-year pharmacy students with internship training for licensure as a pharmacist was explored in a pilot project. **Methods:** Nine students spent 4 weeks in a community pharmacy after their first year of study. Student activities were patient-focused to socialize students early to the pharmacist's patient-care role. The activities were a logical extension of the curriculum in the areas of client-focused care, drug information, communication skills, health promotion, and professional practice. **Results:** The activities identified as most valuable by both students and preceptors involved direct student-patient interaction - patient history interviews, and patient counseling on dosage form administration conducted during a pharmacist-led counseling session. Students also identified as valuable other activities that extended their understanding of the patient-care role of the pharmacist, such as discussing ethical scenarios with the preceptor, participating in clinic days/health promotion events, researching drug information questions, and reviewing prescriptions. Program activities that were least successful were those that resembled didactic classroom assignments. **Implications:** The pilot project demonstrated that first-year pharmacy students can successfully interact with patients in a structured review of their medication history and in dosage form counseling under the supervision of a pharmacist. These patient interaction activities are essential for students to acquire confidence in building rapport with patients, and to develop the caring dimension of the pharmaceutical care model of practice.

Effects of Self-Directed Videotaped Role-play on Scores of a Standardized Patient Counseling Lab Exam in a Communication Course. Jan K. Hastings, Donna S. West and Daniel L. Halberg, *University of Arkansas for Medical Sciences.* **Objectives:** The purpose of this study was to evaluate

whether or not student-directed videotaped role-plays are as effective as instructor-directed laboratory role-plays for improving communication effectiveness. **Methods:** Approximately 75 students enrolled in a communication course were randomized to either a traditional laboratory group or an intervention group. Students in the traditional labs practiced their patient counseling skills using student partners to role-play scenarios. The intervention group did not attend lab sessions. The student partners in this section were instructed to role-play the same scenarios, then videotape their best efforts to turn in at the end of the course. Lab grades in both settings came from assessment by the partners on a standardized assessment form. At the end of the course, all students were graded by a standardized patient (SP) on a final patient-counseling scenario. **Results:** The two groups were demographically similar. Scores on lab assignments were similar. The scores on the SP exam were significantly different between the groups (P=0.035). **Implications:** Self-directed role-playing and videotaped patient counseling increased students' scores on a SP counseling final exam when compared to scores of students participating in a traditional laboratory session. Also, the use of a self-directed lab required less time commitment on behalf of the faculty.

Developing a Database for Pharmaceutical Calculation Answers Using Actual Student Generated Errors. Susan M. Jay, Peggy Piascik and Jeff Cain, *University of Kentucky.* **Objectives:** To develop a database, containing both correct mathematical approaches and common errors, for use online in reviewing pharmaceutical calculation problems. **Methods:** A minimum score of 80% in pharmaceutical calculations is a competency requirement in our curriculum. Students who score below competency on an exam or quiz are required to submit both an incorrect and correct solution to problems calculated incorrectly on an exam or quiz. The incorrect solution is to be made up of the actual method initially used by the student, identifying the type of error at the point it occurred. The correct solution is to be worked in combination with the incorrect problem so that the student can identify the type of mistake made (decimal place error, number transposing, etc.). The ongoing collection of these problems can then be used as a database for an online generated math review program. **Implications:** By using actual student responses, the most common mistakes are incorporated into the database by cataloging the errors. This procedure also allows the instructor to identify a particular math concept for review that is consistently misunderstood by several students based on commonly reported errors. Students and practitioners, who have online capability, can use the database for review and use can be tracked for analysis as well as course remediation purposes. The online database can be easily updated as needed.

Women's Health Pharmacotherapy: Course Delivery via Classroom and Distance Education Strategies. Connie K. Kraus and Denise L. Walbrandt Pigarelli, *University of Wisconsin.* **Objective:** To demonstrate the evolution of a course utilizing active learning modes in the classroom and via computer conferencing in an elective therapeutics course. **Methods:** In the first course offering, case studies prepared by groups of students were presented to the class as a whole; class met once weekly. In the second course offering, material was again conveyed through case presentations but was delivered via WebCT computer technology. Cases were posted to WebCT, and discussion was conducted via internet bulletin boards. In the third course offering, students were assigned cases, information questions, and therapeutic controversies to independently prepare and post to WebCT. Student performance was measured by evaluations of the cases, questions, and controversies utilizing standard School of Pharmacy tools. In addition, three quizzes were administered during each semester to examine comprehensive student learning. At the end of each semester, students completed course evaluations to provide feedback on course content and delivery. **Results:** Student course evaluations will be reported and compared. **Implications:** Technology offers flexibility in course delivery but does not lend itself to group-based active learning as well as it did in the traditional classroom setting. Independent active learning via technology is currently being evaluated.

Implementing an Immunization Certificate Program in the PharmD Curriculum. Rose M. Madejski, *University at Buffalo.* **Objectives:** To provide students with increased pharmaceutical care and disease-prevention services prior to clerkship and registration as a pharmacist. **Methods:** With the continued evolution of the entry-level PharmD Program, the curriculum changed to expand the pharmaceutical-care activities of pharmacists. An Immunization-Certificate Program was approved for the second professional year as part of the pharmaceutical care sequence. Seven ambulatory care faculty completed the APHA/CDC course and acted as facilitators for the didactic component of the program. A nurse was hired to teach injection techniques. Adult CPR was taught by a faculty member. The schedule was developed and implemented in the spring of 2001. Students began the Immunization Program by practicing with oranges intramuscular, intradermal and subcutaneous injection techniques. After practicing with oranges, students demonstrated competency by administering injections to a fellow student. Students were graded using the APHA Injection Technique Assessment Guidelines. The

Epidemiology section was completed with 8 hours of lecture and six-case studies discussed in a small group setting. Demonstrating CPR proficiency completed the requirements for the program. **Results:** All 91 students successfully completed the program. The certification exam was administered in March 2001. Students who successfully pass the exam will receive CDC/Immunization Certificates from APHA. Results are pending at present. **Implications:** Students completing this program upon registration as pharmacists can apply to their respective State Boards for certification as immunizers and enhance their practice site's pharmaceutical care activities.

Assessment of Student Perception of Clerkship Assignment Process. Betsy McCollum, Michael Richardson and Ann Amerson, *University of Kentucky.* **Objective:** Clerkship students were surveyed to assess: *(i).* Use and value of several information resources provided prior to the clerkship assignment process; *(ii).* Student satisfaction with the clerkship assignment process; and *(iii).* Preparedness to begin clerkship rotations. **Methods:** Each year third-year pharmacy students are given information designed to help them make decisions about clerkship site choices and transition to the experiential education environment. A survey was given to students midway through the clerkship year to determine their use and value of the information resources. The students were asked to rate on a scale of 1 (strongly disagree) to 6 (strongly agree) the value of six separate information resources pertaining to clerkship site selection, their satisfaction with the assignment process (*e.g.* fairness, ease of use), and the usefulness of orientation information given to prepare them for the transition from classroom to rotation site. Additionally, they were asked to provide written comments about needed changes. **Results:** The most highly valued information resource was reported to be discussions with fourth-year students currently on rotation. Students generally reported that the on-line assignment process was fair and easy to use. Students felt they were well oriented, but would have liked more information about grading, expectations of preceptors and the professional competency assessment process. **Implications:** Program faculty will continue to provide information in the same manner, with increased emphasis on noted areas of deficiency.

Implementation of an Oral Examination Process in a Pharmacotherapy Course Series. Robert L. Page, Joseph J. Saseen, Sheryl L. Follin and Dana Hammer, *University of Colorado.* **Objective:** Literature has shown students are often unable to practice patient presentation skills utilizing a SOAP format until experiential training and lack confidence with this form of communication. A didactic oral examination process was established to improve third-professional year students' ability to present patient cases in a SOAP format and apply their knowledge to solving case-based pharmacotherapy problems. **Methods/Process:** Five oral examinations that increased in complexity were conducted over three semesters during the 1999-2000 academic year. For each exam, students were given 30 minutes to prepare a patient case and 10 minutes to present in the SOAP format and answer impromptu questions. Students were graded on presentation style and the quality/accuracy of their SOAP. Six-core faculty were assigned approximately eight students to assess presentation style for all five exams, utilizing an eleven-item assessment tool. Faculty experts in specific content areas were used to grade the quality/accuracy of the SOAP presentations. **Results/Outcomes:** Preliminary analyses of student performances indicate an improvement in presentation style throughout the course series. Students' perception of the benefit of this process on their clerkship experiences will be evaluated. Full results will be presented. **Implications:** A progressive oral examination process should enhance students' ability to successfully prepare and present patient cases, as well as improve their problem-solving skills. This approach could serve as a model for other institutions.

Developing New Pharmacy Practice Faculty. Cynthia L. Raehl and Arthur A. Nelson, Jr., *Texas Tech University.* **Objective:** A formal faculty development program targeting 31 assistant professors in their first through fifth years is described. **Methods:** The multiyear program includes *(i)* school-wide faculty orientation week; *(ii)* first-year Chair/Regional Dean faculty member biweekly meetings resulting in an annual prospective faculty development plan and performance evaluation; *(iii)* formal department and school-wide faculty retreats; *(iv)* visiting professor program; *(v)* third-year mid-probationary internal peer review. **Results:** Program refinement continues after five years. Tenure and non-tenure track practice faculty share development needs in teaching and practice. Teaching acclimation first concentrates on course mechanics, team responsibilities and instructional technology; and in later years individual teaching style and assessment techniques. Practice development concentrates on a hierarchical clerkship teaching model incorporating faculty, resident, and P3/P4 students. Documenting clinical and fiscal outcomes for both individual and group practitioners remains a yearly challenge. Chair identified research development needs begin with explicit discussion of tenure requirements, establishing a writing regimen, and preparing written research program statements. Tenure track faculty highest ranked research needs are: funding (1.71 ± 0.49 on a 1-5 scale), research assistants (1.86 ± 0.69) and limited clerkship duties (1.86 ± 0.90). A grantsmanship

workshop and internal seed and equipment grant applications generally precede external grant applications. **Implications:** New faculty struggle to balance multiple responsibilities and grasp institutional expectations for performance and eventual promotion and/or tenure. A formal faculty development program is critical for newly appointed assistant professors.

Development of an Assessment Tool for Measuring Competencies in Community Pharmacy Clerkships Using the Pharmacy **Practice Activity Classification System.** Anthony E. Ranno, Sam C. Augustine, David M. Scott, Gary L. Cochran and Jon C. Wagner, *University of Nebraska Medical Center.* Objectives: To develop and evaluate an assessment tool for measuring core competencies in community pharmacy clerkships using the Pharmacy Practice Activity Classification (PPAC) and UNMC College of Pharmacy's Programmatic Abilities and Outcomes Guide. Methods: The PPAC is a classification of activities of licensed practicing pharmacists across the continuum of healthcare delivery systems. This taxonomy was selected because it reflects the current categorization of the practice and it is a dynamic document that will be updated periodically. The activities and the tasks from the PPAC were cross-referenced with the College's Professional Program Curriculum Programmatic Abilities and Outcomes Guide for Faculty and Students and used to create an assessment document. Community pharmacy preceptors will evaluate the usability of this tool by completing a questionnaire. **Results:** The assessment tool along with the evaluation questionnaire, the PPAC and the Abilities and Outcomes Guide will be sent to the community pharmacy preceptors. Questionnaires will be returned and analyzed. **Implications:** The PPAC describes specific behaviors that can be directly observed at the practice site. This instrument was developed as a method to evaluate a student's performance in the community pharmacy setting, and to provide a mechanism for continuous quality improvement in that the PPAC will be revised to reflect current practice activities.

Assessment of Baseline Club Drug Knowledge Among Third Professional Year Pharmacy Students. Frank Romanelli, Joy Gerk and Kelly M. Smith, *University of Kentucky.* **Objective:** To determine baseline knowledge of specific club drugs and to ascertain the extent of previous and current club drug usage among respondents. **Methods:** Faculty members and one student volunteer authored an anonymous survey instrument which was distributed to 78 third year professional students. Respondents were asked to identify common clinical effects and overdose management strategies for club drugs. Respondents were also asked to identify both their past and current history of club drug usage. **Results:** 72 of 78 surveys were returned for a 92% response rate. 50% of respondents could identify the most common age group and socioeconomic status of typical club drug users. 4% of respondents reported having ever tried a club drug, and 0% reported currently using one. Less then 50% of respondents could identify the clinical effects or management strategies for ingestion of "ecstasy," ketamine, or Rohypnol. **Implications:** Current pharmacy curricula may be lacking in instruction of club drug pharmacology and pharmacotherapeutics, with increasing use of these drugs. Colleges might consider increasing instruction in this area.

Longitudinal Program to Develop Students' Patient Consultation Skills. Susan M. Paulsen, Dana Purkerson Hammer and David Thompson, University of Colorado Health Sciences Center. **Objectives:** Establish a system to progressively develop and assess students' skills in patient consultation. **Methods:** Twice each semester, students learn, practice and are assessed on various aspects of patient consultation in a Professional Skills Development course sequence. Students are videotaped while consulting a standardized patient. Initial consultations involve an uncomplicated patient receiving an uncomplicated prescription. Thereafter, consultation scenarios are made progressively more challenging as students move through the course sequence. For each scenario, students practice with, are assessed by, and receive detailed feedback from standardized patients. The videotaped consultation is then assessed by the student and by a faculty member using prospective criteria. Initially, process, style, and outcome are assessed, while accuracy of content assumes a larger role in latter consultations. **Results:** This approach to developing students' patient consultation skills permits students to gain confidence in their abilities by focusing on specific new skills to be mastered and providing multiple sources of assessment. Students find the process beneficial to their learning and directly applicable to practice. Patient consultation skills appear to improve regardless of students' academic (GPA) standing. **Implications:** A progressive multiple-semester sequence of patient consultation activities may be more beneficial than a one-semester stand-alone course. This methodology could serve as a model for other schools.

Standardized Patient Interviews as an Outcome Assessment Tool of Pharmaceutical Care. Beverly A. Sullivan and Joseph F. Steiner, *University of Wyoming.* **Objectives:** Develop and utilize a uniform method of assessing graduating students pharmaceutical care skills. Evaluate the method for its utility as a programmatic outcome assessment tool. **Methods:** During the last week of the fourth year, all graduating students encountered a standardized patient [an actor]. The student received a brief history and had twenty minutes to interview the patient, do a history, check for physical findings and make recommendations. A debriefing followed where the "patient" and the student evaluated the encounter. The student then wrote an encounter note using the SOAP format. The "patient" completed a 28-item checklist of pre-determined clinical competencies that the student should have addressed during the encounter. All encounters were monitored through a one-way mirror by pharmacy practice faculty and videotaped. **Results:** All students provided at least adequate pharmaceutical care to the patient and most exceeded the basic level as determined by the check-list, the SOAP note and faculty evaluations. The weakest area was under physical findings where most students did not look into the patient's mouth (the patient complained of a black tongue) or touched the patient's rash. The students overwhelmingly evaluated the exercise as a positive learning experience. **Implications:** The use of standardized patients as an outcome assessment tool of pharmaceutical care skills appears to be a valuable addition to programmatic outcome assessment.

Longitudinal Ambulatory Care Rotation. Beverly A. Talluto, Lynn Patton, Lisa Knoblauch, Allison Fox, Jill Berkowitcz and Amy Schwartz, *Midwestern University.* **Objectives:** Develop a Longitudinal Ambulatory Care rotation for students enrolled in the first year of a nontraditional PharmD program that will reinforce therapeutic topics, encourage practical application, and develop therapeutic competencies and skills. **Methods:** Sites and preceptors were identified to accommodate the NTPD students in Illinois, Arizona, Nevada and sites local to the NTPD student. The student would visit designated sites either 4 hours per week or 8 hours every other week for a total of 196 rotation hours in a one-year period. A workbook was developed to direct learning activities which included literature readings, SOAP noting, physical assessments, case presentations, drug information and journal article presentations. Student evaluations occur at a 3, 6, 9 and 12 month period. Preceptors receive the therapeutics schedule as well as a timetable when the students would be able to complete a drug information question and a case and journal article presentation. Student Outcomes: Students were very eager to participate in this new rotation experience that began March 2001. Evaluation tools include PharmD Competencies Student Evaluation, General Skills Worksheet, Purdue Professionalism Behavior Questionnaire, Workbook and Program Evaluation and Site and Preceptor Evaluation. **Implications:** 1. NTPD students reinforce didactic learning and enhance clinical skills. 2. Satisfy a rotation requirement using longitudinal experience. 3. Rotation will serve as a model and pilot for future innovative experiential rotations.

Results of a Professionalism Behavior Scale in Experiential Rotations. Beverly A. Talluto, David Loiacono and Amy Lullo, *Midwestern University,* Dana Parkinson, *University of Colorado Health Sciences Center.* **Objectives:** Introduce the students and preceptors to the dimensions of professionalism using the Purdue Professionalism Behavior Scale. Determine if there is a difference in ratings between the first and third professional year. Determine which dimensions of professionalism need to be addressed by administration. **Methods:** Preceptors evaluate students and students self evaluate themselves on a professionalism behavior scale (twenty-five different dimension of professionalism) in all experiential rotations (PS 1 Introductory I,II, PS2 IPE III, and PS 3 Clinical, Hospital and Community). Data was collated and graphs were produced to compare the student's self-evaluation of the professionalism dimensions to the preceptor's evaluations in the first and third year in similar rotations (Community, Hospital and Clinical). A chart was developed to show dimensions with any change greater than plus or minus 0.2 points. Student Outcomes: Students in the third year rated themselves lower in community and hospital and higher in clinical rotations as compared to first year evaluations. Preceptors rated third year students higher in hospital and community and lower in clinical rotations as compared to the first year. **Implications:** 1. Heightened awareness of the dimensions of professionalism; 2. Opportunity to observe these dimensions in the preceptors administering experiential rotations; 3. Learning tool to discover what areas of professionalism must be addressed; 4. Use the information to understand the student's perceptions of professionalism.

Experiential and Didactic Combine in a PS3 Long Term Care Elective. Beverly A. Talluto, Linda Esposito, Irene Juska, Heidi Tripam, Craig Beske, Carol Slas and R. Schutzenhofer, *Midwestern University.* **Objectives:** Offer an elective course to PS 3 students to introduce them to Long Term Care practice and consulting pharmacy using didactic and experiential learning. The student will leave the course with an understanding of the practice of pharmacy in a Long-Term Care facility. **Methods:** Didactic lectures provide the student with a perspective of the development and practice of Long Term Care pharmacy. Lecture topics include chart reviews, geriatric physiology, operations, distribution systems, intravenous infusion; impact of managed care, social issues of aging, OBRA, antipsychotic drugs, Joint Commission Survey, laws that govern Long Term Care practice, and nutrition. Student visits in Long Term Care facilities were coordinated to occur throughout the ten-week elective. **Student Outcomes:** The experiential component provides the student an opportunity to observe and dialogue with a consultant pharmacist at a facility,

observe patient chart reviews and clinical decision making. The student completed a worksheet assignment at the site. Evaluation tools include mid and final examination of didactic lecture material, a site worksheet exercise, a site and preceptor evaluation and speaker evaluations. **Implications:** 1. Provide students with an interaction of didactic and experiential learning. 2. Provide an opportunity to explore a career option. 3. Bring the practice of pharmacy into the classroom to reinforce learning. 4. Serve as a model for future innovative experiential/didactic electives.

Development and Validation of an Instrument to Assess the Self-Confidence of Students Enrolled in the Advanced Pharmacy Practice Experience Component of the Doctor of Pharmacy Curriculum. Supakit Wongwiwatthananukit, Gail D. Newton and Nicholas G. Popovich, *Purdue University.* A desired outcome of pharmaceutical education is to develop pharmacy students confidence in their ability to use their expertise to render pharmaceutical care. Pharmacists who aren't confident in their abilities will be reluctant to become extensively involved in patient care. Conversely, pharmacists who are overly confident in their ability may actually cause patients harm. **Objectives:** To develop a reliable and valid measure of pharmacy students self-confidence. **Methods/Results:** The instrument was developed with an underpinning in the self-efficacy theory. Generated instrument items were based on literature review and informal interviews with preceptors/faculty members. Following content validation by internal and external content review panels, the instrument was pilot tested with a sample of 260 students from six colleges of pharmacy and revised based on the results of exploratory factor analysis. Subsequently, a revised instrument was administered to 837 students from 13 colleges of pharmacy and revised based on confirmatory factor analysis. The results indicated that this instrument had content validity, high internal consistency reliability, factor structure, convergent and discriminant validity. **Implications:** Further testing of the instrument would provide more comprehensive evidence for its construct validity when assessing students level of self-confidence. Ultimately, the instrument may allow pharmacy educators to assess student confidence and when necessary, develop methods to balance student confidence prior to enter practice.

Innovations in Teaching Involving OTC Product Selection. Cathi E. Dennehy, Lisa A. Kroon, Mitra Assemi and Ken Lem, *University of California, San Francisco.* **Purpose:** This case-based exercise facilitated first year student development of problem-solving skills and experience with over-the-counter (OTC) product selection. It included an individual assignment, collaborative learning coupled with a field exercise, oral presentations, and peer- and self-evaluations. **Methods:** Students were divided into 15 groups of 8 and assigned a patient case involving either a dermatological (8 cases) or gastrointestinal complaint (7 cases). Individually, each student visited a pharmacy and selected 3 OTC products for their case. They then prepared a written paper evaluating the 3 products and selecting 1 based on advantages and disadvantages, patient variables, mechanism of action, onset of action, side effects, drug-drug interactions, and cost. Students with the same case were then divided into two groups of 4. Each group of 4 discussed the products each person had evaluated, and selected 1 as their final recommendation. One student from each group of 4 was selected by the instructor to deliver an oral presentation discussing their rationale for the selected product. Students peer-evaluated the presenter and the presenter completed a self-evaluation. **Results:** This exercise involved real-world experience in OTC product selection. It required independent evaluation and group collaboration. Discussion was generated based on differences in product selection between groups with the same case. **Implications:** Students were provided with a learning experience that is not replicable in a classroom setting and encourages self-directed learning.

Problem Based Learning in the Compounding Laboratory. Sam C. Augustine and Dennis H. Robinson, *University of Nebraska Medical Center.* **Objective:** The purpose of this study was to develop, implement, and assess problem-based learning in the compounding environment. **Methods:** The class was randomly divided into groups of 5-6 students. Every two weeks, each group was assigned a compounding problem and each member within a group given one of five responsibilities, namely, manager, QA/QC, formulation, compounding, and dispensing (counseling). There were six modules; each building on the knowledge and skills acquired during the previous weeks activities. Individual student responsibilities were rotated for different modules. Each group was required to establish hypotheses, identify learning objectives, manage and coordinate activities to solve problems and compound each pharmaceutical. Portfolios were maintained by each group to document activities. Each student also maintained their own portfolio that documented activities, assessments and reflections. Assessment methods included: student's ability to collaborate, their written and oral communication, problem solving skills, performance on quizzes, and compounding proficiency. In addition, group and individual portfolios were graded and surveys used to assess attainment of course objectives. **Results:** Student feedback, assessment surveys and student performance indicated that this approach was an effective learning strategy in the compounding laboratory. Students were creative and maintained comprehensive portfolios that were an essential component of this experience. **Implications:** In addition to individual responsibilities, this approach required teamwork to apply, integrate, and communicate their skills and knowledge to formulate, compound, assure quality, and dispense a variety of dosage forms.

Academic Credit for Prior Experience. Marilyn Barbour, Cynthia Wedekind, Norma Owens and Margaret Charpentier, *University of Rhode Island.* **Objectives:** Sixty-five pharmacists have completed the didactic coursework of the Nontraditional Doctor of Pharmacy (NTPD) program at the University of Rhode Island. All students are required to complete five 5-credit Advanced Clinical Clerkships (ACC). Clerkship credit for prior experience emerged as a concern and challenge for students and faculty in finding the appropriate balance to ensure the skill development of clerkship had been achieved through portfolio documentation. This report describes our process for portfolio evaluation and outcomes from our first group of students. **Methods:** Students were required to provide portfolio-based evidence of core skills including collection and interpretation of patient data, as well as design, implementation and monitoring of pharmacotherapy regimens. A committee of faculty met to evaluate individual portfolios. An assessment tool was developed that evaluated the quality and quantity of documentation that showed ACC goals had been achieved. The Curriculum Committee and College faculty voted on all recommendations. **Results:** In the class, 44 individuals submitted portfolio documentation for experiences they believed met ACC goals. Credit for the one block rotation was awarded to 17. Two individuals requested all clerkship requirements be waived, 15 credits were actually awarded. The committee is currently evaluating the portfolio documentation of the second class. **Implications:** A systematic procedure to match the achievement of course goals with work experience is essential in the process of portfolio review.

Individualized Faculty Weighting of Clinical Knowledge/Skill Domains for Advanced Pharmacy Practice Experience (APPE) Grading. Rex 0. Brown, Matthew R. Helms, Stephanie J Phelps and Richard A. Helms, *University of Tennessee.* Changing to a paperless evaluation method for fourth-year student rotations allowed faculty preceptors to weight 10 selected domains of APPE evaluation. Previously, all domains were fixed at 10%. Objective: To characterize the weightings of 10 knowledge/skill domains by full- (n=13) and part-time (n=16) faculty who precepted 82 inpatient, one-month APPEs. **Methods:** The APPEs characterized were required (n=39) and selective/elective (n=43) experiences. The percent weighting for each domain was at the discretion of the preceptor and the total score comprised 80-90% of the total grade. **Results:** Pharmacotherapeutic management (PM; 16.6 ± 4.3%) and disease and therapeutic knowledge (DTK; 16.5 ± 3.7%) were weighted highest, while practice management (1.3 ± 2.7%) and drug distribution (0.5 ± 1.7%) were weighted lowest. General medicine preceptors weighted PM and DTK highest, while fewer selective/elective preceptors ranked PM (57%) and DTK (71%) highest. Educational initiative was weighted in the top three categories in 71% of the selective/elective APPEs. Full-time faculty placed more emphasis on PM (17.5 ± 3.4% vs. 14.8 ± 5.6%, *P*<0.005) while part-time faculty placed more emphasis on professional attitude (11.2 ± 2.6% vs. 9.4 ± 2.2%, *P*<0.01). **Implications:** Most preceptors emphasized PM and DTK in their APPEs. There was greater emphasis on educational initiative in selective/elective evaluations. When given the opportunity to weight different domains of clinical knowledge/skill, faculty individualized evaluation.

Implementation and Assessment of a Novel Strategy to Teach Inter-Professional Communication Skills. Anne Caffee, Denise Glasser, Renee Ahrens and Mark Johnson, *Shenandoah University.* Objectives: *(i)* using the practice based Standardized Patient Assessment course to develop and practice communication skills needed to work in health care teams; *(ii)* assisting the student during the critical transition from the didactic model in which an answer is either right or wrong, into the collaborative care model of practice in health care teams. **Methods:** The simulated encounter assessment format of the course was modified to replace the simulated patient with a simulated prescriber (SP). Communication barriers incorporated into the case included authority mismatch, incomplete information, and time constraints. The student in the pharmacist role was provided an office and reference books. The SP entered the pharmacy to ask a question about patient issue from a list previously provided to the student. **Results:** The assessment of the videotaped encounter included the communication techniques used to overcome the barriers to communication. This assessment provided information for discussion and further development within the course. The SP assessed the student performance on a global scale. Further data collection will include a preceptor survey of communication skills during the first experiential rotation of the fourth professional year. **Implications:** Students exposed to a variety of communication demands within the context of disease state management exercise may be more prepared to actively participate as full members of the health care team.

Comparison of Traditional Lecturing (TL) with Problem-Based

Learning (PBL) in PharmD Students' Examination and Recitation Performance. Judy W.M. Cheng, Antonia Alafris, Harold L. Kirschenbaum and Martin E. Brown, *Long Island University,* Michelle M. Kalis, *Massachusetts College of Pharmacy and Health Sciences.* **Objectives:** PBL has been implemented in selected courses of the entry-level PharmD curriculum. This study is designed to compare students' performance in a pharmacotherapeutics course (PH210) following PBL or TL. **Methods:** Fourth year students enrolled in PH210 in Fall 1999 (Group A, n=200) and Fall 2000 (Group B, n=200) were included. PH210 consists of 4 hours of lecture (TL or PBL) per week and two hours of recitation [Developing pharmaceutical care plans (PCP)] every other week. Hyperlipidemia and thromboembolic diseases were chosen for evaluation. Hyperlipidemia was taught to group A using PBL and thromboembolic diseases through TL and vice versa for group B. Demographic data, PCP scores and examination scores for questions pertaining to the two topics, will be compared between the groups, and the effects of PBL vs. TL will be discussed. **Implications:** The development of students' problem solving skills is becoming increasingly important in pharmaceutical education due to the expanding volume of practice-related knowledge. Implementation of PBL requires tremendous commitment from faculty. It is important to examine short and long-term effects in educational outcomes to ensure that efforts are well spent. This study will examine short-term education outcome. If short-term outcomes are favorable, long-term outcomes will be examined.

Assessing Student Perception of Large- and Small-Group Instruction. Henry H. Cobb, Patricia C. Thomas, Linda C. Schramm and Marie Chisholm, *The University of Georgia.* **Objective:** This study was undertaken to measure student perception of instruction in a large group classroom setting with that of a small 8-student skills lab group. **Method:** A 22-item course instruction survey and a 24-item Skills Laboratory instruction survey were administered to an entire class of 96 professional students meeting as a group. All 96 students were enrolled in both a didactic Disease Management course and the accompanying Skills Laboratory. Both instruments were given to assess instructors, general learning success, educational progress and professional development. For evaluation, a five-point Likert-type scale was employed, ranging from strongly disagree (1) to strongly agree (5). The data were analyzed using parametric descriptive statistics. The mean and standard deviation for each survey item were listed in tabular form. Seven matched questions from the two survey instruments were compared to determine the strengths of each teaching setting. **Results:** Higher means for matched questions were noted in the Skills Laboratory (small-class size) involving learned factual knowledge, rational thinking skills, and responsibility for the patient. The Disease Management course (large-class size) had higher mean scores in amount learned, positive attitude toward pharmacy practice, and difficulty. **Implications:** The results indicate that both courses were successful and accomplished the designed objectives. The comparison questions will be expanded to improve the assessment of strengths each course provides to the curriculum.

Longitudinal Assessment of First-Year Pharmacy Student Attitudes about Pharmaceutical Care. Jennifer M. Danielson and Richard P. D'Elia, *Campbell University.* **Objectives:** *(i)* Assess current student attitudes about pharmaceutical care at beginning and end of their first year; and *(ii)* Compare attitudes over time with students from another institution. **Methods:** In September 2000, 94 Campbell students were surveyed using a previously validated instrument. The survey will be re-administered to Campbell students and results analyzed in May 2001. **Results:** On a five-point scale (1 = Strongly Disagree to 5 = Strongly Agree), preliminary data show students strongly agreed that pharmaceutical care is valuable (mean 4.61); improves patient health (mean 4.69); and benefits their professional career (mean 4.51). Gender (23 male/71 female), age (mean 22.65 yrs), and prior pharmacy experience did not affect these responses. Students > 25 years old (17%) disagreed more strongly (mean 1.25) with the statement that "providing pharmaceutical care takes too much time and effort" than students < 25 years (mean 1.71). Students with prior pharmacy exposure disagreed more strongly (mean 1.48) that "providing pharmaceutical care is not worth the additional workload it places on pharmacists" versus those who had not worked or volunteered in pharmacy settings (mean 2.22). **Implications:** Increased age and pharmacy experience prior to school indicates an increasing tendency to support the pharmaceutical care concept. Complete analysis will contrast current attitudes with those of students five years ago to obtain trends over time and explore the impact of pharmacy school enrollment on attitudes about pharmaceutical care.

Expectations of Ability and Perceived Value of PharmD Students in Advanced Experiential Rotations. Nancy A. Huff, *Massachusetts College of Pharmacy and Health Sciences — Boston,* S. James Matthews, *Northeastern University,* Andrea F. Luisi, *University of Rhode Island,* Dennis J. Chapron, *University of Connecticut.* **Objectives:** The purpose of this project was to collect data via survey to determine a site director/manager's expectations of a PharmD student's ability at two different points during the advanced experien-tial education rotations. In addition, we sought to identify benefits and barriers associated with having students placed at a practice site and as well as issues influencing the decision to participate in an advanced experiential education program. **Methods:** Faculty representing each school of pharmacy with students in advanced experiential education rotations created a brief three-part survey tool. The first part to identified the site's expectations for students in their first advanced rotation and upon completion of their last advanced rotation. Twenty-seven specific activities were identified for expectation assessment. The second part addressed issues associated with having PharmD students on advanced rotations at the practice site; specific student contributions to patient care and/or preceptor development. The third part addressed factors influencing the decision to participate in an experiential education program. Surveys were mailed to all Institutional Pharmacy Directors and Community Pharmacy Regional Managers who currently work with one or more of the Schools of Pharmacy in the New England region. **Implications:** The information obtained with this survey will assist the schools with curriculum development, site recruitment, and preceptor development.

Involvement of a Pharmacy College in a Community Diabetes Improvement Project. June Felice Johnson, *Drake University.* **Objectives:** A 1998 Wellmark Report found the highest incidence of diabetes in Iowa among an urban population in the 50317 zip code area east of Drake University in Des Moines. Pharmacy practice faculty at Drake University College of Pharmacy & Health Sciences participated in a multidisciplinary task force which received a grant from the Wellmark Foundation, a non-profit foundation of Blue Cross Blue Shield of Iowa and South Dakota. The objective of the grant was to improve community diabetes health through a screening, referral, and education project in this area. **Methods:** Visiting Nurse Services (VNS) coordinated and organized the screenings. Pharmacy students attended screenings as part of a service assignment for their Introductory Pharmacy Practice Experience (IPPE). Pharmacy faculty developed the data collection tool and analyzed the data which was entered by a pharmacy student. **Results:** The VNS completed 100 screenings of 5,000 people from August 1999 to August 2000. One hundred twenty two pharmacy students participated in the screenings. A total of 382 people with no history of diabetes had abnormal blood glucose results and were referred to their physician. Of these, 200 completed physician follow-up and 58 were subsequently diagnosed and treated for Type 2 diabetes. **Implication:** A pharmacy college successfully collaborated in a community improvement project aimed at increasing the recognition of diabetes in a high-risk urban population.

Do Pharmacy Students Utilize Evidence-Based Medicine When Making Interventions? Andrea F. Luisi and Jayne E. Pawasauskas, *University of Rhode Island.* **Objectives:** The purpose of this study is to examine interventions of pharmacy students assigned to an adult internal medicine service. **Methods:** During year one of this study, all intervention documentation forms of students assigned to two clinical faculty were collected and analyzed. Interventions were categorized as either drug information or therapeutic intervention. An intervention was considered a therapeutic intervention if it prompted consideration of a change in the patient's therapy. Other data collected included reference(s) used, acceptance of recommendation, and type of provider who solicited the recommendation. Totals for each category were compiled. A total of 895 interventions were reviewed. Based on this data, the documentation form was modified to facilitate its use. The new form has two sections, a short area to be completed for a drug information request, and the entire form to be completed for a therapeutic intervention. During the current academic year, all intervention documentation forms are again being collected. These forms will be analyzed as above. In addition, two clinical faculty will review the interventions for correctness, appropriateness, and cost. Also, the percentage of interventions that are considered to be evidence-based will be calculated (*i.e.,* those which list a primary literature reference). The goal is to generate information to share with the site regarding pharmacy students' activities during an adult internal medicine clerkship.

Integration of Basic Drug Information Skills into a Professional Practice Development course series. Laurie S. Mauro, Linda McCall, Gayle L. Kamm, Angie P. Gilis, Curtis D. Black, *University of Toledo.* **Objective:** This project will evaluate the effectiveness of integrating basic drug information (DI) skills into a Professional Practice Development (PPD) course series. **Methods:** This DI component of the curriculum is delivered in the second of four professional years. It includes lectures, laboratory exercises, and a series of individual student assessments. This core instruction is intended to achieve a set of four global DI skills: obtaining background information, systematic searching, tertiary literature evaluation, and formulating appropriate responses to patient specific problems. Eleven additional, specific skills, such as primary literature evaluation and adverse event reporting, are also included. Global skills are assessed via six patient case scenarios including a series of traditional practice prescriptions where specific DI competencies are evaluated. Overall assessment of global skills is determined at the end of the year via a practical examination (passing score of 75%). Practical examination scores of

the 95 students currently enrolled in the course series will be assessed. Student performance on the patient case scenarios and other specific skill assessments (*e.g.,* professional writing assignments and didactic exams) conducted throughout the series will be presented. Implications: DI skills are essential to pharmacy practice. DI education is typically accomplished through free-standing DI courses. Integration of DI into the PPD course series permits direct application of DI skills to the routine practice of pharmacy.

Improving Access to Prescription Drugs for The Indigent or Uninsured Populations of Franklin County, Ohio. James D. Nash, Milap C. Nahata and Ruth E. Emptage, *Ohio State University.* **Objective:** In July 2000, the Columbus Medical Association Foundation awarded a grant to the Prescription for Care (PFC) Alliance, consisting of thirty-four collaborating partners. The objective of the grant is to improve access to prescription medications for the uninsured and indigent populations of Franklin County, Ohio. **Methods:** Three faculty are participating in the project to conduct research, provide education, and improve therapy outcomes. Data from Franklin County and around the country are being collected to determine how medical practices, pharmacies, and community outreach programs are currently providing prescription access to the uninsured and indigent. After data analysis, the project will be implemented in three phases. Phase I will provide medication services to PFC alliance agencies. Chronic medications will be obtained through Manufacturer Assistance Programs and PFC staff will be responsible for completing forms and tracking renewals. Acute medications will be provided by contracted pharmacies through the use of a pharmacy benefits manager. Phase II will expand services to entire Franklin County and medication formularies will be reevaluated. Phase III will add a centralized PFC pharmacy that will accept medication donations, purchase, and dispense medications necessary to serve the needs of individual patients. **Implications:** The PFC project should improve access to and outcomes with medications for low-income and uninsured residents of our county.

Students' Perceptions of Women's Health Content in Pharmacy Curriculum. Melody Ryan, Ann Amerson, Barbara Brandt and Deborah S. Kwolek, *University of Kentucky.* **Objectives:** To determine the student perception of curriculum adequacy in women's health. **Methods:** A 5-point Likert scale (0=not covered, 4=excellent coverage) questionnaire was administered to first and third year pharmacy students addressing adequacy of curricular content areas related to women's health. Multiple regression analysis using the general linear model was used. Items measuring the adequacy of the curriculum were dependent variables; educational level and gender were independent variables. **Results:** Response rate was 97.5% (n=153). The overall means score was "adequate" (2.08). Students rated the coverage of osteoporosis and fertility control highest (94% ranked >/= "adequate"). Items ranked as inadequate by >/= 45% of students were physical abuse and differences in oral health. Compared to first year students, third year students indicated greater coverage in the curriculum (P=0.0336). For most questions, there were no rating differences between the male and female students. However, more women than men found physiology (37% vs. 20%, P=0.02) and physical abuse (59% vs. 45%, P=0.09) coverage inadequate. **Implications:** Student perception of women's health coverage in the curriculum is adequate, but particular areas need attention. Increased awareness is needed in the areas of gender physiology and domestic violence among all students, particularly males. The findings of this study have led to the placement of a new module on women's health in the 3rd year program.

Early Clinical Experiences in Pharmacy (ECEP) in Senior Health Care Program. Cynthia L. Raehl, C.A. Bond, Wen Luan, Tresa Woods, Carlos Fernandez, Rebecca Sleeper and Roland Patry, *Texas Tech University-HSC.* **Objective:** Initiate a controlled prospective cohort interventional study evaluating the effects of a 2-year longitudinal geriatrics care experience for first and second year pharmacy students. **Methods:** First-year pharmacy students volunteered for the ECEP program (n=37) or the control conventional curriculum (n=22) group. A subgroup of 15 ECEP students volunteered to serve as Geriatrics Student Teaching Assistants (GSTAs) to promote peer mentoring and student accountability. GSTAs received additional preclinical training in communication skills, aging, frailty, continuum of care, end of life, reimbursement, and functional assessment. Four scheduled visits provided structured patient contact with senior citizens; each visit was preceded by a training session. Validated assessment tools evaluated: attitudes toward geriatrics care, pharmaceutical care, health professions, and career perspectives. Educational outcomes were assessed by didactic and clerkship grades and annual assessment scores. **Results:** Control and ECEP students did not differ significantly (Mann-Whitney U) in their baseline attitudes toward senior health care and the pharmacy professions as assessed by the Auburn Instrument, Pharmaceutical Care Attitudes Survey, Interprofessional Perception Scale and Health Responsibilities score. One-year results will be available in May 2001. **Implications:** Early clinical experiences for health professions and pharmacy students are advocated by ACPE despite lack of documented benefit. ECEP and control students will be compared using attitudinal and professions scales as well as GPA and Annual Assessment day scores.

Web Site and Secure On-Line Database for Operational Management of a Clerkship Program. Michael Richardson, Betsy McCollum and Ann Amerson, *University of Kentucky.* **Objectives:** A system was needed to increase efficiency in communication with preceptors and clerkship students; improve speed and accuracy in the clerkship request and assignment process; and facilitate day-to-day operational management of the clerkship program. **Methods:** An open viewing web site was linked to a secure database. Preceptors and students were provided an ID and password for access to the secure database. The database provides access to the clerkship schedule, clerkship syllabi, evaluation forms for on-line submission, and contact information for students, preceptors and program faculty and staff. Prior to the beginning of the clerkship year, an on-line process matched and assigned 77 students to 770 clerkship sites (out of a total of 2,695 choices), using student preferences and a computer-generated random selection process. **Results:** The on-line request and selection process resulted in an 87% time savings over the previous year. A survey of the students showed a high level of satisfaction with the procedures and fairness of the process. A survey of preceptors showed a high level of satisfaction with on-line communication methods. Use of the web site and database resulted in a 55% savings in the time needed for the day-to-day operational management of the program. Modifications and improvements for the second year of operations were identified and implemented. **Implications:** The web-site and integrated database significantly increased the overall efficiency of the clerkship program operation.

Relationship of Teaching Approaches to Student Preference for Active Learning. Mary T. Roth, Jo E. Rodgers, Julie A. Gouveia-Pisano and J. Herbert Patterson, *University of North Carolina.* **Objective:** To determine whether teaching approaches have any relationship to student preference for active learning. **Methods:** Sixty-nine students enrolled in one of three elective courses were given a 46-item pre-and post-questionnaire to determine student preferences for two different teaching approaches. Teaching approaches in a cardiology, acute care, and ambulatory care elective employed traditional lecture, active learning, and active learning, respectively. Student responses in the different courses were compared using a Kruskal-Wallis test, and significant findings were further analyzed using a Wilcoxon rank-sum with a Bonferroni correction [$P < 0.017$], **Results:** Eighty-six percent of the total student cohort completed both the pre- and post-questionnaire. Preliminary analyses revealed three questions suggesting student preference for active learning. Students in acute care felt they best retained information if they were involved in teaching others compared to students in cardiology ($P = 0.017$). Students in ambulatory care preferred active learning approaches over traditional approaches, a finding that was statistically significant compared to student responses in cardiology ($P = 0.012$). Finally, students in ambulatory care felt more responsible for their own learning and development when their responses were compared to students in cardiology ($P = 0.013$). Additional analyses will be conducted and final results presented. **Implications:** Student preference for active learning is evident in courses that utilize such an approach. Continued assessment of this approach and its potential impact on student attainment of course outcomes will be an important component of curricular assessment.

Implementation of a Longitudinal Drug Information (DI) Portfolio in Lieu of a DI Clerkship. Joseph J Saseen, Sondra May and Dana Hammer, *University of Colorado.* **Objectives:** To enhance PharmD graduates' DI skills in pharmacy practice, it would be optimal to require each student to participate in a DI clerkship rotation. Unfortunately, most pharmacy schools do not have enough sites to accomplish this. The goal of this project was to provide clerkship students with a valuable DI experience in lieu of required participation in a DI clerkship. **Methods/Process:** Students complete a DI portfolio over the course of the final clerkship year, utilizing information gathered from a minimum of two of seven six-week rotations. Completed portfolios contain: 30 documented DI question responses; one drug monograph; one DI bulletin, newsletter, or handout; six reports of adverse drug reactions/product problems; a summary of information discussed on one drug therapy-related topic at a pharmacy committee/subcommittee meeting; and a section for other DI-related activities. Each portfolio component is evaluated by the on-site preceptor and one of seven core faculty members. **Results/Outcomes:** Data from students, graduates, and preceptors on the perceived value of the portfolio process for current and future practitioners' use in practice will be presented. **Implications:** DI concepts and skills are actively reinforced throughout clerkship training as opposed to one focused clerkship. This approach should enhance the DI skills of future practitioners who have not had the opportunity to participate in a DI clerkship. This program could also serve as a model for other institutions.

Process-Oriented Course For Teaching a Systematic Approach to Prevention, Identification and Resolution of Drug-Related Problems (DRPs). James E. Tisdale, Maureen A. Smythe, J.V. Anandan and Paul J.

Munzenberger, *Wayne State University*. **Objectives:** To create a course that teaches a systematic process for prevention, identification, and resolution of DRPs. **Methods:** A 5-credit course called Advanced Therapeutic Problem Solving I was created and is offered in the 3rd professional year of the entry-level PharmD program. This course employs a student-directed, problem-based, small group approach to teach a process for DRP prevention, identification, and resolution. The process includes: Collection/evaluation of patient data; using data to support the medical problem list; reviewing the recommended pharmacotherapy of the medical problems; identification of therapeutic goals and literature-based treatment guidelines; identification (with literature support) and prioritization of DRPs; creation of a literature-based plan for DRP resolution; identification of desired outcomes; plan implementation and documentation; monitoring; plan revision. This course provides a unique skill set enabling students to identify, prevent and resolve DRPs, irrespective of disease state or nature of drug therapy. **Results:** Student evaluations of individual class sessions and the course have been favorable. Data comparing the preparedness for experiential training of our entry-level PharmD students who have completed this course with that of our B.S. and previous post-BS PharmD students are being analyzed. **Implications:** The process taught in this course will better enable our students, and ultimately our pharmacists, to take responsibility for and positively influence drug therapy outcomes.

Utilization of Adjunct Faculty during Fourth Professional Year Rotations to Provide Curricular Feedback and Assess Student Preparedness during the Didactic Courses. Howard 0. Wachsmann, Jr., Evan T. Robinson, *Shenandoah University*. **Objectives:** Develop and implement an annual survey to utilize preceptors during the final year of the program to assess the student's preparation for practice and the appropriateness of the experiential program structure. Results are reported each year to the preceptors and the School's Academic Affairs Committee for further curricular evaluation and refinement. **Methods:** An evaluative instrument was developed and distributed to preceptors assigned students during the academic year. To encourage non-biased responses, the survey was not coded to preserve respondent anonymity. Respondents self reported their rotation category allowing for data stratification. Results are tabulated and shared with the Academic Affairs Committee and the preceptors at the conclusion of each academic year. **Results:** This study is ongoing and results for the second year will be compared with data from the initial year. **Implications:** Valuable data can be collected by using preceptors as a measure of quality control, thus providing information that can be utilized by a curriculum committee to better prepare students for practice experiences. In addition, sharing the results with the preceptors provides them with feedback as to their assessment of the program and a sense of involvement in the program.

Utilizing Technology to Improve PharmD Experiential Programs. Robert G. Wahler, *University at Buffalo*. **Objectives:** To evaluate the use of Personal Digital Assistant devices and Patient Palm Chart & Assessment Manager software (tools) to assist students in providing and documenting clinical activities in order to optimize time through minimizing required paperwork. **Methods:** Doctor of Pharmacy candidates in Geriatrics Experiential rotations during the Spring 2001 semester were provided the tools and asked to use them to monitor patients and collect key information needed to develop pharmaceutical care plans, SOAP notes, case presentations, recommendations and associated outcomes. The data were downloaded into a desktop computer to provide printed consultations. At the end of each rotation, the students were surveyed to determine the usefulness of this system in providing patient care. The criteria used to evaluate this approach include ease of use, days to mastery, estimated time saved, usability of data captured and improvement in student performance. In addition, the nature of the candidates' recommendations, interventions and outcomes of patient care will be collected using the tools. **Results:** The results will test whether this approach was evaluated by students as being an effective method for patient data collection and monitoring. Data will be presented to summarize the students' evaluation of the tools. The number and nature of recommendations, their disposition and patient outcomes will be tabulated. **Implications:** Student use of these technological tools may improve experiential rotations by minimizing paperwork and optimizing patient care activities.

Interdisciplinary Approach to Teaching Medication Adherence to Pharmacy and Medical Students. Wisam S. Younis, Dana L. Singla, Terri Jackson, Karen J. MacKinnon, George E. MacKinnon III and Ben Field. *Midwestern University, and Arizona College of Osteopathic Medicine, Glendale, Arizona*. The purpose of this study was to teach the concept of medication adherence to pharmacy and medical students through an interdisciplinary project. Each pharmacy student was paired with a medical student. The pharmacy student assumed the role of a pharmacist, and the medical student that of a patient taking a four-week placebo HIV prophylaxis regimen. A total of 93 pairs were randomized to participate in one of three levels of pharmacist counseling. The remaining unpaired 23 medical students were assigned to the control group and did not receive counseling. After completion of therapy, all groups met to identify and discuss compliance barriers, and to obtain a final tablet count to measure medication adherence. From the post-attitudinal survey, medical students responded to have more empathy for their patients ($P<0.05$). The majority of all students agreed or strongly agreed that participation in this project will help them work within the health care team (86% and 81%, respectively), and that they should have more participation in interdisciplinary projects (75% and 80%, respectively). No statistical difference between interventions in compliance were identified between groups. This study demonstrates that student attitudes were overall positive in working with their professional colleague, suggesting integration of more interdisciplinary healthcare education initiatives.

Developing an Immunizations and Travel Medicine Course that Incorporates Interdisciplinary Teaching and Service Learning. Caroline Zeind, Mary Amato and Lorianne Wright, *Massachusetts College of Pharmacy and Health Sciences-Boston*. **Objectives:** To develop, implement, and evaluate an immunizations and travel medicine (IM/TM) course incorporating interdisciplinary teaching and service learning (SL). **Methods:** Course objectives were designed to enhance student learning in the IM/TM field using classroom and community settings. An interdisciplinary approach was utilized to incorporate drug literature evaluation, immunology, therapeutics, public health, and socio-political aspects of IM/TM. Faculty lectures were presented in an integrated format and seminars focused on student centered active learning. Community-based programs aimed at improving vaccine awareness were identified for student participation in SL. Students were evaluated by examinations, presentations, and community project work. Course evaluation included close-ended and open-ended items. A survey assessing students' perceived knowledge in IM/TM was administered prior to and upon course completion. **Results:** The course was first offered as an elective to eight pharmacy students in fall semester 2000. SL activities included participation in vaccine-awareness programs. Overall evaluation of the course was positive (mean score of close-ended items: 4.88/5, SD= 0.33). Open-ended comments included favorable responses towards SL and indicated the course would be a valuable component of the required curriculum. Students perceived the greatest enhancement of their knowledge in immunizations (routine and special), malaria, and high altitude illness topics. **Implications:** Results indicate student satisfaction with classroom and community experiences. Further expansion and integration within the required curriculum will be considered.

SOCIAL AND ADMINISTRATIVE SCIENCES

Adoption of Pharmaceutical Care: Application of the Diffusion of Innovation Model. Donelle Airmet and Barbara Adamcik, *Idaho State University*. **Objectives:** Little theory-based research has been done, despite the decade-old pharmaceutical care (P'care) paradigm shift, to assess pharmacists reasons for adoption/rejection. Using Rogers Diffusion of Innovation model, pharmacist innovation-decision stage and perceptions of P'care were assessed. P'care cannot be provided without physician support, therefore physician attitudes and experience with pharmacists' expanded roles were obtained. Comparing pharmacist and physician perceptions allows identification of perceived barriers and attitude differences toward pharmacist roles. **Methods:** A questionnaire, mailed to 1,200 randomly selected pharmacists and physicians in two states, contained questions evaluating aspects of the model. **Results:** Response rate was 29.2% (n=350), including 153 pharmacists and 146 physicians. Thirty-five percent of pharmacists reported adoption (36% undecided, 29% rejected). Lack of personnel resources (65%) and lack of reimbursement (61 %) were the two most often cited reasons for rejection. Pharmacists mean assessments of the benefits of P'care on the five scales of the model ranged from 3.07-3.80 (range 1-5, 5=strongly agree). Physicians were consistently more negative ($P=0.001$) toward pharmacists providing clinical pharmacy, P'care, and collaborative practice agreements then were pharmacists. Attitudes toward 33 pharmacy services (traditional, expanded and P'care) yielded significant differences ($P=0.0l$) between the two professions for 30 items. **Implications:** This study demonstrates usefulness of the model in understanding factors associated with adoption of P'care. Additionally, findings suggest the significant perceptual differences between pharmacists and physicians regarding the value of P'care.

Description of Affiliations Between Pharmacy Programs and Student Health Service Pharmacies. Jean T. Carter and Donna G. Beall, *The University of Montana*. **Objectives:** As schools of pharmacy seek additional ambulatory care sites to train their students, they may be overlooking a potential site on their own campuses. The purpose of this study was to determine to what extent schools of pharmacy and pharmacies located within campus-based student health services (SHS) are affiliated. **Methods:** An IRB-approved 11-item questionnaire and introductory letter was e-mailed to the chairs of pharmacy practice departments in 82 U.S. schools of pharmacy as listed in the AACP Roster. This was followed by two reminders. Responses were treated as confidential and all identifiers were removed from the database. **Results:** The survey achieved an 82% (67/82) response rate. Ninety-one percent

(61/67) of schools had an on-campus student health service. Of these, 61% (37/61) had an on-site pharmacy. SHS pharmacies were most frequently owned by the university (16/37). Seventy percent (26/37) of the SHS pharmacies had an affiliation with the pharmacy program; early and advanced practice experiences were the most common types of affiliations at 69% (18/26) and 58% (15/26), respectively. Fifty percent of the schools without an affiliation with their SHS pharmacy cited the lack of qualified clinical instructors as a barrier. Other barriers and types of activities in advanced practice experiences were described. **Implications:** Schools of pharmacy that do not currently use their SHS pharmacies for student training should investigate the feasibility of doing so.

Social and Administrative Sciences: Have We Progressed Toward Developing Our Own Scientific Paradigm? Shane P. Desselle, *Duquesne University.* **Objectives:** *(i)* Assess our section members' perceptions of the level of consensus that exists within their departments; *(ii)* Determine what they believe to be the most important concepts to teach and research; and *(iii)* Compare rankings of our scientific paradigm development by members of other pharmacy disciplines. **Methods:** Surveys were mailed to 148 faculty members in the social and administrative sciences. Subjects responded to a 16-item scale, indicating the level of agreement existing among fellow department members on various issues of teaching and scholarship. Their beliefs of the most important concepts to teach and most important issues to research were gathered using open-ended questions. Finally, subjects ranked five disciplines of pharmacy with respect to their development of a scientific paradigm. **Results:** Section members perceived at least partial agreement on every dimension ascertained by the questionnaire. Perceptions of agreement were lower (one-way ANOVA) among respondents from "teaching" institutions. The social and administrative sciences were viewed as having less structure than medicinal chemistry, pharmacology, and pharmaceutics but as much structure as pharmacy practice (Wilcoxin signed ranks test). Kruskal-Wallis ANOVA revealed no differences among other disciplines' perceptions of our paradigm structure. **Implications:** Even though our discipline has already come a long way in developing a scientific paradigm there is a perception, including amongst ourselves, that we have a considerable ways to go. The greatest strides can be made by focusing upon which issues to research.

Development and Evaluation of an Independent Research Course Designed to Provide PharmD Students Research Opportunities. Tara M. Jenkins, Hampton University. Recent discussions in academia have focused on encouraging pharmacy students to pursue advanced degree programs and/or academic teaching positions. In an effort to expose students to research opportunities available in healthcare administration and academia, an independent research course was designed for entry-level doctor of pharmacy students. **Objective:** The purpose of this project is to describe the development and evaluation of a healthcare administration independent research course offered to third year professional pharmacy students interested in attending graduate programs, fellowships and/or residencies. **Methods:** The two-credit hour elective courses were offered for thirteen two-hour class sessions in the fall and spring semesters. Students were required to propose, develop and implement an independent research project related to an administrative principle, concept or trend impacting the profession of pharmacy. The analytical aspect of the course required students to participate in administrative briefings to discuss traditional and controversial pharmacy administrative issues. **Results:** All students enrolled in the course formulated, developed, and implemented research projects during the fall semester. Six students submitted and presented their research projects at the Annual American Society of Health-Systems Pharmacists Midyear Clinical Meeting in December 2000. Students who successfully completed the fall semester were permitted to enroll in course during spring semester. **Implications:** enhanced student research methodology and statistical application skills; fostered an appreciation for independent learning; stimulated problem based learning techniques

Lay People and Health Professionals Awareness of and Value for Pharmaceutical Care. Gloria J. Nichols-English, *The University of Georgia.* **Objectives:** Focus group discussions were conducted at the community level for the purpose of determining attitudes, perceptions, and awareness of the pharmaceutical care concept and the role that pharmacists play in the provision of primary patient care. Lay community residents and health professionals were asked to express their opinions about the pharmacy services they used and the value they placed on these services. **Methods:** Qualitative methods, using focus group discussions of patients and health professionals, were used to systematically assess awareness and attitudes towards the delivery of pharmaceutical care services in the community setting. Participants were 12 health professionals and 11 adult patients between the ages of 27-74 who had been diagnosed with one or more chronic illnesses within 6 months of the study. Analysis: Consisted of repeated readings of transcripts of the group discussions to highlight words, sentences, or phrases, and concepts. A coding system was applied to the transcripts, creating categories for discussion themes. **Results:** Health professionals and the lay participants overall were satisfied with existing pharmacy services in the community. None of the participants were aware of the concept of pharmaceutical care services. Most expressed the intent to use these services if made available. Territorial issues might present barriers to other health professional's acceptance of pharmaceutical care services. **Implications:** The need for better marketing the concept of pharmaceutical care to patients and providers.

Community Outreach Assessment of Patients' Health Needs, Expectations, and Preferences. Gloria Nichols-English, *The University of Georgia.* **Purpose:** Focus group interviews of patients and health professionals were used to systematically assess a community's health and related service needs. These needs included: their world view of health, lifestyle practices, and the attitudes and beliefs which influence their decision making about their medication use behaviors or choice of alternative services and therapies. These and other factors such as environmental influences and barriers to access to care affect the health status and health needs of the community. **Methods:** Qualitative methods were used to conduct two focus groups consisting of 12 health professionals and 11 adult patients between the ages of 27-74, who had been diagnosed with one or more chronic illnesses within 6 months of the study. **Analysis:** Consisted of repeated readings of transcripts of the group discussions to highlight words, sentences, or phrases, and concepts. A coding system was applied to the transcripts, creating categories for discussion themes. Results: Findings illuminated the need for inter-agency cooperative efforts to assess patient care needs. There should be emphasis placed on creating partnerships between providers and patients in medical decision-making. Patients want more information from providers than they are given, and providers want patients to assume more responsibility for their health, and to be better at practicing self-advocacy. **Implications:** The need for better exploration of methods to optimize patient outcomes through tailoring community outreach programs to meet specific health needs.

Can Pharmacy Students Objectively Rate their Professional Behavior? Folakemi Odedina, Carla Clemmons and Nikita Dukes, *Florida A&M University.* **Objectives:** The profession of pharmacy demands that practitioners adhere to the highest standards of professionalism. In this study, pharmacy students' objectivity in assessing their professional behavior was investigated. **Methods:** Data were collected from fourth year students, their peers and lab instructors in the fall of 2000. Professional behavior was assessed using Hammer's "Professional Behavior Assessment Form (PBAF)". The total scale score of the PBAF was 125. As part of a class requirement, the students were divided into health behavior groups comprising 4 - 5 members. The group members were peer evaluators for each student. Students' self-assessment (SA), their peer evaluations (PE) and instructor evaluation (IE) were collected during the semester. Overall mean on the SA, PE, and IE were compared using t-test statistic. **Results:** Fifty-eight complete responses were obtained (response rate of 46%). SA mean was 116, 113 for PE and 111 for IE. T-test statistic confirmed that students' SA group mean is significantly different from PE group mean (P=0.027); and SA group mean is significantly different from IE group mean (P=0.010). **Implications:** Study results show that the students consistently rate their professional behavior higher than the corresponding ratings of their peers and instructor. This raises the question of whether students can objectively rate their professional behavior (as seen and understood by their peers, instructor, and more importantly by their future patients) to continuously improve their professionalism.

Relationship Between Critical Thinking and Pharmacy Students' Academic Performance. Folakemi Odedina, Nikita Dukes and Carla Clemmons, *Florida A&M University.* **Objectives:** One of the educational goals specified by the AACP CAPE Advisory panel for the pharmacy curriculum is the ability to think critically, solve complex problems, and make informed, rational, responsible decisions within scientific, social, cultural, legal, clinical, and ethical contexts. This study explores the relationship between pharmacy students' critical thinking (CT) skills and their academic performance in a pharmacy administration course. **Methods:** Data were collected from fourth year students in the Sections 1 and 2 of the Pharmacy Health Care and Behavior (PHCB) classes. CT was assessed using the California Critical Skills Test (CCTST) 2000 form and academic performance by the performance of the students on their final exam in the PHCB course. To evaluate the relationship between CT and academic performance, Pearson correlation between students' rating on the CCTST forms and their performance on their final exam was calculated. **Results:** For all PHCB students, academic performance was found to be positively correlated with CT skills (Pearson correlation was +0.30). The Pearson correlation for PHCB students in Section 1 class was +0.25 and +0.49 for PHCB students in the Section 2 class. **Implications:** Study results show a positive relationship between CT and students' academic performance. The results indicate that CT skills are essential competency for pharmacy students to succeed in pharmacy school. More importantly, CT skills should be encouraged to develop competent practitioners.

Examining The Predictors of Prescription, Nonprescription and "Alternative" Drug Product Use Among The Elderly. Peri J. Ballantyne,

Joan A. Marshman, P.J. Clarke and J.C. Victor, *University of Toronto.* **Objectives:** Prescription drug use by the elderly is of growing concern as indicated by a large research literature focused on costs, inappropriate prescribing and patient compliance. However, prescription drugs account for only a portion of drug use by the elderly, who have increasing access to non-prescription drugs and complementary and alternative medicines. We will use the Canadian National Population Health Survey to illustrate the level of use of prescription, non-prescription and alternative medicines in 4 cohorts of the elderly (65-69; 70-74; 75-79; 80+). We will develop multivariate models to examine the influence of health, demographic, geographic, and socioeconomic variables on the likelihood of any drug use, of high use of drugs (all types); and of concurrent use of prescription, non-prescription and "alternative" medicines. **Methods:** Secondary analysis of cross-sectional survey data; descriptive data will illustrate the level of use of drugs and drug types among 4 age cohorts; logistic regression analysis will be undertaken to examine likelihood of any drug use, of high drug use and of concurrent use of the 3 drug types. **Implications:** Our findings will have several important implications: level of overall drug use among the elderly; level of self-care and/or care outside the medical system; elderly Canadians' use of non-insured drugs; characteristics of those at risk for high use of drugs; suggest whether non-prescribed medicines replace or complement prescription drugs.

Learning Styles in Different Learning Situations. Jean T. Carter, Amanda K. Thuesen and Donna G. Beall, *The University of Montana.* **Objectives:** The Learning Style Inventory (LSI), based on David Kolb's Experiential Learning Model, has been used to identify learning style preferences. However, the LSI does not require respondents to consider a specific learning experience when they are completing the inventory. The purpose of this project was to determine whether student responses would vary if specific learning situations were varied. **Methods:** Using an IRB-approved approach, 60 students in their first week of the professional pharmacy program were asked to donate LSI results to the study after they were discussed in class. The students completed the LSI twice: first, they thought about how they would prefer to learn to become a pharmacist: second, they thought about learning a hobby or sport. **Results:** All students agreed to participate. Fifty-eight of 60 LSIs contained complete information. When learning how to become a pharmacist, students preferred assimilating 41% (24/58), followed by converging 22% (13/58), diverging 21% (12/58), and accommodating 16% (9/58). When learning a new hobby or sport, 50% (29/58) students preferred accommodating. Assimilating, converging, and diverging were each selected by 16% (9/58) of the students. When the learning activity changed from pharmacy to a hobby or sport, 74% (43/58) of the students' learning style preferences changed. This shift in learning style preferences was significant (chi-square=18.471, df=3, $P<0.001$). **Implications:** When using the LSI, the type of learning activity should be clearly stated.

Job Satisfaction of Full-time Faculty at Colleges of Pharmacy in the United States. David L. Helgeland, *South Dakota State University.* **Objectives:** This study attempted to determine the primary sources of job satisfaction and dissatisfaction, intrinsic and extrinsic sources of satisfaction and dissatisfaction, and differences in sources of satisfaction and dissatisfaction based on demographic characteristics for full-time faculty at colleges of pharmacy in the United States. **Methods:** Proportionate random sampling was used to select full-time faculty from each college of pharmacy in the United States to participate in the study. Administrative, adjunct, and emeriti faculty, and those in support areas, were excluded. A pre-validated job satisfaction survey instrument was mailed to the selected sample. Data were analyzed using descriptive and multivariate statistics. **Results:** A 38% response rate was reached, with 259 usable surveys being returned. Overall, respondents were mildly satisfied with their jobs. The primary sources of satisfaction were intrinsic (related to the job itself) in nature and mostly involved aspects of teaching. The sources of dissatisfaction were extrinsic (not related to the job itself) in nature and dealt with salary issues. The faculty member's age, tenure status, salary, and percentage of time spent teaching appeared to influence the level of satisfaction. **Implications:** With changes in health care and in higher education, administrators at colleges of pharmacy could use the study results to potentially provide a work environment which improves both intrinsic and extrinsic factors to increase satisfaction levels of faculty.

Effects of Research Training in Pharmacy School on Career Success Among PharmD Alumni. Abir A. Kahaleh, Caroline A. Gaither, Frank J. Ascione and Duane M. Kirking. *University of Michigan.* **Objectives:** The overall goal of the research was to assess the attitudes of PharmD alumni towards the research training experience at the University of Michigan. The specific objective was to examine the relationship between the research experience and intrinsic and extrinsic career success among PharmD alumni. **Methods:** Participants were PharmD graduates from the College of Pharmacy between the years 1987 and 1999. Four hundred and eight alumni out of 560 completed the self-administered questionnaire for a response rate of 73%. **Results:** The majority of the respondents (82%) stated that the required research project should be continued and 63% stated that the research experi-

ence had a positive impact on their career. Skills gained from a pharmacy research methods course were significantly related to an increased level of flexibility/adaptability in the job market (r=0.34). The skills gained from the research experience were significantly related to job satisfaction (r=0.33) which was significantly related to the overall rate of career achievement (r=0.55). Since graduation, 17% of the respondents held an office, 22% have published, 26% have received an award, 40% presented papers or posters, and 70% are currently earning at least $70,000 yearly. **Implications:** This study emphasizes the need for research training at pharmacy schools to enhance the professional vitality of pharmacists and increases the likelihood of pharmacists' success in a changing market.

Facilitating Student Understanding of Health Care Economics by Playing Monopoly® Marianne McCollum and Dana P. Hammer, *University of Colorado Health Sciences Center.* **Objective:** Facilitate first professional year PharmD students' understanding of health care economics by playing the board game Monopoly®. **Process:** In the first semester of the entry-level PharmD program, students were enrolled in a required Health Care Economics course. In a three-hour session during the first week of the course, students were given an introductory lecture on market structure, and then divided into small groups to play Monopoly®. During the game session, students had the opportunity to observe the financial effects incurred when players gained monopolies in actual game markets. The session closed with discussions about the degree of monopoly power in various health care markets and the potential impact on access and costs. Snacks were included to create a relaxed atmosphere, as well as prizes for the top performers in each of three class sessions and a grand-prize winner. **Results:** End-of-semester evaluations indicated the majority of participants (86%) felt that playing Monopoly® was helpful in understanding health care economics; 94% recommended repeating the exercise the following year. Anecdotally, students indicated the exercise enabled them to get to know fellow students better. **Implications:** This exercise proved to be a novel way to illustrate concepts in health care economics, and provided examples and analogies that were used during the remainder of the health care economics module. This instructional methodology could serve as a model for similar courses.

Innovative Curriculum in the Social and Administrative Sciences. Lon Larson, Darrel Bjornson, Charles Phillips, Kimberly Plake and Jane DeWitt, *Drake University.* **Objective:** We wanted students to be able to use – rather than merely be familiar with – the concepts and methods of the social and administrative sciences (SAS). Secondarily, and more selfishly, we wanted to make teaching more fulfilling for faculty. **Methods:** The means to accomplish these goals included: *(i)* enhancing active learning and pursuing innovative teaching methods in the classroom; *(ii)* allowing students to participate in projects and problem-solving experiences, in which they apply their knowledge; *(iii)* giving students options in their coursework. These aims required smaller classes than the annual enrollment of about one hundred students; yet, common competencies and skills among all students were desired. The core SAS sequence includes six courses (encompassing the traditional social and administrative sciences, excluding communications): four basic courses (Professions and Ethics, Patients and Systems, Research Methods, Law) and two applied (Applied Concepts, Applied Methods). Some basic courses are divided into sections; these sections have different instructors, but share a common syllabus, readings, and assignments. In contrast, sections of the applied courses cover different material (Management, Managed Care, Psychosocial Aspects of Chronic Disease, Pharmacoepidemiology, and Pharmacoeconomics, among others); all sections emphasize using or applying concepts or methods. **Results:** The first cohort of students is currently finishing the sequence. This presentation describes the successes and problems encountered in implementing the curriculum, and presents available data regarding its outcomes.

Utilization of Legal Cases to Teach Pharmacy Law: Is it Beneficial to Prepare? Alan R. Spies and Noel E. Wilkin, *University of Mississippi.* **Objectives:** To determine whether students who prepare assigned cases display a greater understanding of the material than students who are not expected to prepare. **Methods:** Students in the course were randomly assigned to one of four firms. Each class period one firm's members were responsible for reading a case before class and being prepared to present its information. Only the firm members were given the case before the class period in which it was to be covered. During class, students in the firm were called upon to present the facts of the case and applicable principles of law as applied to the pharmacist. Essay questions on the exams were used to determine if those who were expected to prepare outperformed those who were not expected to prepare. The grader was blinded to the students' names and group assignments. **Results:** It is expected that the students will display a greater understanding on the essays that test the issues that correspond with their assigned case. **Implications:** This study will help to determine whether students who prepare cases before class possess a greater understanding of the material prepared. If benefits are found, it will suggest that instructors, when using case-based education, should make sure that all students have access to cases before class,

read the material before class, and are prepared to respond to questions about the material.

SCHOOL POSTERS

Use of CQI Tools to Develop a Model of Seamless Programmatic Assessment in Compliance with ACPE Accreditation Standards 2000 Mary R. Monk-Tutor, Edwina S. Chan, Pamela J. Sims, Timothy R. Covington, Condit F. Steil and Andrew A. Webster, *Samford University.* **Objectives.** The continuous quality improvement technique of Hoshin Planning, including Affinity and Spider Diagrams, was used to identify existing and needed assessment efforts in order to develop a school-wide seamless assessment initiative. **Methods.** As a result of faculty experiences at the AACP Teaching Institute 2000, an Assessment Committee was created and charged with the responsibility of improving programmatic assessment. After holding an educational session for faculty on strategies for achieving seamless assessment, Assessment Committee members led faculty work groups in using Hoshin Planning, including Affinity and Spider Diagrams, to identify all assessments currently being conducted in the school. The data obtained were summarized, evaluated for effectiveness and results were compared with AACP Accreditation Standards 2000 to identify unnecessary or missing areas in current programmatic assessment efforts. By completing this baseline inventory of the types of assessments currently being used, the Assessment Committee will be able to develop a comprehensive, integrated model for evaluating all aspects of the program in an ongoing fashion that meets the requirements of Accreditation Standards 2000. **Implications.** Hoshin Planning is an extremely helpful tool for conducting a baseline evaluation of assessment techniques currently in use and for assisting in the development of a comprehensive plan to achieve seamless programmatic assessment.

Trials and Tribulations of a College Evaluation Committee. JoLaine R. Draugalis, Marion K. Slack, Karen A. Sauer, Stacy L. Haber and Richard R. Vaillancourt, *University of Arizona.* The Evaluation and Special Study Committee (ESSC) is responsible for advising the dean and college on steps to take to evaluate the educational and instructional effectiveness of its programs. The committee, in an advisory capacity, assists the dean's office, respective department heads, and standing committees of the college in review of college wide curricular performance. The committee consists of one administrator, four faculty members, and two students. The Committee's activities for the past three years will be detailed with particular attention given to the sources reviewed, approaches taken, and materials developed in creating an "Outcomes Expected of Graduates of the Doctor of Pharmacy Program at the University of Arizona" competency document. Outcomes were divided into five domains: ensuring appropriate therapy and outcomes, dispensing medications and devices, health promotion and disease prevention, professionalism, and health systems management. General ability-based outcomes are embedded throughout the professional practice-based outcomes. One year was spent locating and reviewing numerous sources for ability-based outcome statements. The following academic year, committee members worked on specific objectives and competencies for each domain. Current activities involving the "Outcomes Expected" document include pilot testing in several student groups, preparing a companion user's manual, and exploring methods to determine how students and faculty can best use the competency document throughout the curriculum to ensure attainment of abilities.

Curriculum to Prepare Graduates for Diverse Futures. Barbara Sauer, Stephen Kahl, Michael Winter, Christopher Cullander and Mary Anne Koda-Kimble, *University of California at San Francisco.* **Purpose:** A dynamic curriculum designed to prepare graduates for an evolving health care system is described. **Process:** In 1995, faculty determined that the changing scientific and health care environment (rapid penetration of managed care in California, reduced availability and increased competition for experiential sites and faculty, and employer needs in the practice, regulatory and industry sectors) was creating demand for pharmacists with diverse skills. They also agreed that slight modifications to the existing curriculum would not adequately prepare graduates for emerging opportunities. A new core curriculum was designed around 12 "clusters" of related courses (*e.g.,* kinetics and metabolism, pharmaceutical chemistry and pharmacology, therapeutics). Cluster committees (each with basic science and clinical instructors) determined course content, sequencing and optimal instructional methods. They also sought to enhance integration of basic and clinical sciences, reduce or minimize redundancy, and facilitate independent learning. **Results:** The redesigned curriculum was implemented in fall 1998. All graduates are eligible for licensure and expected to meet uniform performance expectations (Educational Outcomes), which integrate general and professional abilities. Second year students select an emphasis area ('Pathway') in Pharmaceutical Care, Health Policy and Management, or Pharmaceutical Sciences. Other innovations include early clinic experiences, peer teaching/collaborative learning, and more APPEs in the final year. Implications: The curriculum structure (2/3 core;1/3 pathway/elective) provides sufficient flexibility to assure that it remains dynamic and contemporary.

Innovative Clerkship Design: Impact on Student Development. Sian M. Carr-Lopez, Mary J. Ferrill, Susan J. Blalock and Elizabeth A. Elledge, *University of the Pacific.* An alternative to traditional, six-week, single-subject rotations was evaluated over one academic year. A pilot program combined the responsibilities of two, six-week rotations with similar skill sets (hospital and internal medicine, community and ambulatory care, and two electives), to provide a 12-week, longitudinal experience. A 64-question survey was sent to all preceptors who had participated in both the traditional and pilot program. The survey compared the effectiveness of each clerkship design at developing professional skills and enhancing student performance. Twenty-seven preceptors completed the survey. The 12-week rotation was rated more favorably by preceptors than the 6-week rotation on an average of 21.3 items (SD=19.4); whereas, the 6-week rotation was rated more favorably on an average of 9.0 items (SD=10.6) ($P<0.03$, Wilcoxon Signed Rank test). The majority of preceptors indicated that the 12-week rotation better enabled students to: be self paced and self directed; apply methods, protocols or theories in new situations; develop or fine-tune important skills; complete meaningful projects or assignments; interact with pharmacist role-models; and integrate into the healthcare system. Finally, although the 12-week rotation was viewed as more beneficial to the preceptor/student relationship, it also created more scheduling difficulties. These findings support the value of 12-week clerkship programs as a potential alternative to traditional, single-subject rotations.

Integrating General and Professional Abilities: An Interdisciplinary Approach. Daniel C. Robinson and Kathleen Hill-Besinque, *University of Southern California.* The USC School of Pharmacy has incorporated innovative strategies for teaching and assessment of student abilities within the curriculum. The curriculum includes interdisciplinary team-based teaching, a broad use of technology and opportunity for students to be involved in patient care from the first year. Core competencies of the curriculum include communication skills, drug therapy management and problem solving abilities. Several courses have adopted assessment strategies to include projects and assignments that utilize curricular abilities across subjects or disciplines. Examples include: clinically based case study debates and action memos in the Ethics course, patient education projects in the Pharmaceutical Care course and case conferences in the Therapeutics sequence. In the Pharmaceutical Care course a group patient education assignment has been designed to assess communication skills, technological competence, drug therapy knowledge and research skills. In completing the project, students are required to produce a factual, researched, and aesthetic patient education product, in print or WEB format, ready for use in University or other health care settings. A state-of-the-art technology center located within the School provides resources for the assignment. The quality of the product is assessed by faculty, lay public, and peers. Students must incorporate a broad range of skills and apply information from multiple courses to successfully complete the product. The response to the assignment has been very positive. Innovation in teaching and assessment are essential components of the curriculum.

Block Scheduling and the Integration of General and Professional Abilities in Instruction and Assessment. Nancy E. Kawahara, Craig Hitchman, Ed Soltis, Wally Murray and Max Ray, *Western University of Health Sciences.* Western University of Health Sciences admitted its first doctor of pharmacy class in August of 1996. The faculty and administration in place at the start of the College took a novel approach to didactic curriculum delivery when they designed the program using a block scheduling approach. Each block is 15-18 days in length and there are 10 blocks in an academic year. While the block scheduling approach has been successful, experience has shown us that consistent development of abilities is difficult in a curricular design that compartmentalizes instruction into such short periods of time. Each block attempts to incorporate teaching and learning strategies that require application rather than simple attainment of knowledge. However, with 25 faculty involved in the coordination of blocks each academic year, maintaining continuity of abilities development is difficult. The Faculty is currently exploring alternative ways of structuring the curriculum delivery to maximize our ability to have students demonstrate competency in ways other than written testing. This poster will present and discuss several possible modifications under consideration.

Putting the "ACT" In Didactic. David C. Thompson, Dana Hammer, Susan Paulsen and Neal Schmidt, *University of Colorado.* The University of Colorado School of Pharmacy implemented its entry-level PharmD program in the fall of 1999. The curriculum was completely redesigned from a series of separate, stand-alone courses to vertically integrated "tracks" that run sequentially through six semesters of the program. The backbone of this curriculum is a Professional Skills Development course sequence wherein concepts and information presented in other, primarily didactic, courses are revisited, reemphasized and considered in practical application. The course also includes general pharmacy practice instruction and development of general and professional pharmacy skills which become progressively more complex and rigor-

ous as the sequence proceeds. Curricular content and ability-based outcomes are revisited each semester with continuous integration with previous and concurrent courses. Students are better able to learn and develop abilities in a consistent and progressive manner. Content and abilities are assessed by written and performance-based examinations. In the latter, students may be asked to consult with a standardized patient, compound a formulation, or perform another pharmacy-related task. Most of these activities are assessed by the students, faculty and patients for accuracy, process and style. The Professional Skills Development course is viewed positively by faculty and students alike, with horizontal and vertical integration with concurrent courses being considered its most positive attribute. The new curriculum, built around the Professional Skills Development course, promotes the translation of knowledge into practice and development of general and professional abilities.

"Reinforcing Concepts by Studying Experts: An Integrated Approach to the Teaching of Pharmaceutics." Emmanuel O. Akala, Tracey L. Rogers and Gerunda B. Hughes, *Howard University*. The intent of the project was to enhance the teaching of pharmaceutics by combining didactic teaching with studying the work of experts. A typical research article in the field of pharmaceutics investigates many factors that affect the presentation of drugs to the final consumer: the patient. Thus a single paper may cover such subject areas as pharmaceutical mathematics, physical pharmacy, pharmaceutical technology, biopharmaceutics and pharmacokinetics. The concept was that giving students the opportunity to study such research articles would enable them to see the single thread that runs through pharmaceutics. By doing so, it would increase their understanding of the subject. Students in the PharmD Class of 2002, who were enrolled in pharmaceutical technology and biopharmaceutics and who had taken pharmaceutical mathematics and physical pharmacy, were used to test the intervention. Following an explanation about the intervention and some initial lectures, the students were divided randomly into groups and assigned research articles and questions for developing lines of thoughts and analyzing the articles. Each group then made a presentation to the class. The students' reactions to the intervention were positive, though it placed a greater demand on their time.

Service-Learning Activities Encourage Civic Responsibility. Robert A. Robeson, *Nova Southeastern University*. On-site experience in a service-learning environment intended to foster a sense of community involvement is required of all first-year pharmacy students at Nova Southeastern University College of Pharmacy. Awareness of community needs and social problems helps develop a deeper understanding of classroom instruction and the humanistic care of patients. Students are encouraged to address community needs, participate with leaders, and develop mentoring skills. The service learning experience involves a commitment of fifty-six (56) volunteer hours per semester for each student. The College of Pharmacy contributes approximately nine thousand (9,000) hours of community service in a variety of settings serving senior citizens needing assistance, elementary school children improving English, adults seeking a high school diploma, or the homeless requiring daily meals. Upon completion of this rotation, student learning outcomes include: the promotion of positive health and prevention of disease, articulation of personal values and attitudes, leadership development through meeting unmet community needs, and examination of social factors contributing to problems experienced within the local population.

Introduction of PBL in the First Semester of Pharmacy School. William N. Kelly and David A. Hawkins, *Mercer University*. **Introduction:** Three major educational goals of our school are to increase active, self-directed learning, help cultivate skills in critical thinking and problem solving, and engender a desire for lifelong learning. **Methods:** To set the stage for accomplishing these goals, we integrated problem-based learning (PBL) into a required "Introduction to Pharmacy" course. The course is taught in the first semester of the first professional year and exposes students to a variety of pharmacy topics including the history of pharmacy, pharmaceutical care, professionalism, and career development. A two-day workshop was conducted to train pharmacy faculty on how to facilitate a PBL group. Students were briefed on the purpose, rationale, and mechanics of the PBL process. Seven 2-hour PBL sessions were held during the course. Each PBL group was comprised of 6-8 students and a faculty facilitator. Case vignettes were used as the mechanism for PBL. **Results:** A random sample of students assessed the course. The students surveyed thought the PBL process was an excellent way to develop their skills in critical thinking, problem solving, working together as a group, learning to use the library, and accessing drug information. **Implications:** By training students on how to be active learners at the beginning of pharmacy school, subsequent parts of the curriculum can be used to further develop the critical thinking and problem-solving skills of our students and to enhance their ability to learn.

Appraising General and Professional Ability Based Outcomes: A Curricular Mapping Project. Robin M. Zavod and David P. Zgarrick, *Midwestern University — Chicago*. Our college community values an educational mission that includes preparation of students to meet ten general and professional ability based outcomes established by the college faculty. A Curricular Mapping Project was started in 1999 to assess how, and the degree to which we are meeting these outcomes. A set of general criteria that represent a more detailed, but not a prescriptive itemization of these outcomes was developed to guide the mapping process. These general criteria are assessable and are meaningful within the context of either the required didactic or experiential education component of the curriculum. The course coordinators for all required courses and the Director of Experiential Education mapped their respective teaching strategies/methods, and learning activities to these criteria. Subsequent evaluation of these items afforded the college the insight to improve our sequential and coordinated curriculum, to address curricular deficiencies, to develop new capstone courses to aid in assessment of several of these outcomes, and to identify areas were additional curricular assessment would be beneficial. Improvement in curricular design include: *(i)* inclusion of pathophysiology within the therapeutics course sequence; *(ii)* development of a capstone course that links patient evaluation, communication and patient education; *(iii)* content coordination between the Applied Pharmaceutical Care and the Therapeutics course sequence; and *(iv)* coordination of the basic sciences to provide practical coverage of infectious organisms and the agents to treat them.

Innovative, Capstone Course to Prepare Students for Advanced Pharmacy Practice Rotations. Patricia A. Chase and W. Kent Van Tyle, *Butler University*. This poster will describe an innovative, capstone course that assists students in achieving the following: integrating courses in the curriculum through the development of Discovery Maps, identifying the knowledge, skills and attitudes (K/S/A) required to become a competent practitioner, solving patient case management problems on key disease states and observing clinical practitioners resolve patient problems using actual patients and patient situations. Teams of students study a total of 12 disease states over the semester. For each disease state students identify and resolve therapeutic problems presented in patient-care cases, develop Discovery Maps, and provide oral presentations on the disease state(s) and patient-specific care plans. For each case a disease state management expert leads a discussion that provides students with a deeper understanding of specific patient care management issues. This course integrates collaborative learning activities, use of computer technologies, and expansion of students' understanding of the knowledge, skills and attitudes needed to manage key disease states and patient specific problems. It provides students with a deeper appreciation of real problems that patients must cope with and gives students an opportunity to observe experts who model professional behaviors in resolving therapeutic problems. Multiple assessment instruments include the development of group and individual learning issues, group process skills, group presentations, student assessment of the curriculum, and development and presentation of Discovery Maps.

Integration of General and Professional Abilities Into Experiential Training. Steven R. Abel, Bruce C. Carlstedt, Brian A. Shepler and Steven A. Scott, *Purdue University*. General and professional outcome abilities were developed and adopted by faculty in 1993 and 1997, respectively. Faculty have been requested to identify and incorporate corresponding outcome abilities into their didactic course objectives. In 2001, this process was expanded to include experiential training. Both general and professional outcome abilities were identified and incorporated into the School's required core skill-based competencies, as well as core competencies for inpatient and ambulatory medicine. Currently utilized and suggested methods of assessment were listed, which could be shared with preceptors to facilitate assessment of student performance for each objective. Sign-off forms corresponding with core objectives and associated outcome abilities were modified such that the instructor may indicate the student's progress in meeting the objectives (proficient, developing, deficient) at various points during experiential training. Students will be expected to demonstrate proficiency relative to the stated competencies upon completion of experiential training. It is our belief that inclusion of general and professional outcome abilities with course objectives throughout the continuum of the curriculum will improve the individual student's ability to identify longitudinal personal and professional growth.

Integrated Laboratory: Combining General and Professional Abilities with Professional and Civic Responsibility. Lawrence Davidow and Robert Emerson, *University of Kansas*. With the conversion to an all PharmD curriculum, the KU School of Pharmacy adopted a 5-semester sequential laboratory course called Integrated Laboratory. The goals of this course are to reinforce concepts taught in core course work and to encourage development of professional and civic responsibility in students. As an example of how general and professional abilities are combined, students in pharmaceutics lecture are taught how to calculate required alcoholic concentrations for drug dissolution. In lab, they apply these calculations to actual prescriptions through compounding, generating prescription labels, and verbally counseling instructors. To teach professional responsibility, students are sent to observe (shadow) and interact with pharmacists in actual practice settings. First year students shadow at a community pharmacy where they learn the pre-

scription filling process and patient counseling methods. Second year students shadow at a poison control center while concomitantly enrolled in a toxicology course. Third year students learn about externships by shadowing senior students who are completing rotations at a variety of practice sites. Civic responsibility is fostered by requiring service-learning each semester. To reinforce course work on drug and alcohol abuse students must attend an Alcoholics Anonymous meeting and participate in a community-based after-school program targeted at high-risk grade school children. Students are required to develop personal learning objectives, journal their activities and reflect on and discuss their experiences in class.

Evolution of a Five Semester Pharmacy Care Laboratory Sequence with a Focus on Active Learning. Gina C. Biglane, William M. Kolling, W. Greg Leader and William H. Ross, *The University of Louisiana at Monroe.* A five-semester pharmacy care laboratory sequence was initially developed in 1997 to serve as a problem-based, active-learning experience for students beginning their first professional year. Faculty and student feedback resulted in an evolutionary process whereby successful educational strategies were further enhanced while weaker educational modules were redesigned. Each semester's laboratory is developed around a theme germane to current pharmacy practice. Thematic activities are based on appropriate CAPE-derived curricular outcomes presented at a developmentally suitable level. Most semesters include an early experiential component based at different practice sites throughout the state. Motifs independent from concurrent didactic classes were chosen to enhance the previous and current semester's work and serve as a suitable introduction to future course work. The major themes are: Semester 1, drug information retrieval via primary, secondary, and tertiary sources, including computer based resources; Semester 2, a problem-based learning series of clinical cases designed with guided readings intended to introduce and develop critical thinking skills; Semester 3, management and marketing issues for practitioners; Semester 4, compounding and parenteral manipulation skills using current practice examples; Semester 5, design of collaborative and clinical practices in the community. Each semester's summative data is used to enhance material for the next cycle. The course and student assessments are incorporated into continuous programmatic evaluation.

Criteria-Based Assessment of General and Professional Abilities. Richard Dalby, Karen Plaisance and Robert Michocki, *University of Maryland.* **Objective:** To develop and evaluate tools to reduce the time, stress and inconsistency associated with assessment of professional abilities (such as compounding technique or writing pharmaceutical care plans), while preserving or improving the quality of feedback to students. **Methods:** During an *Integrated Science and Therapeutics* course (92 students) faculty *(i)* broke each of thirteen skills into individual elements; *(ii)* wrote criteria for outstanding, competent and unacceptable performance of each element; *(iii)* weighted the value of each element; and *(iv)* publicized the evaluation criteria prior to assessment (for example, see (https://rxsecure.umarvland.edu/courses/PHAR554-PHAR555). Faculty and residents rated student performance by checking boxes on a criteria table amenable to rapid spreadsheet entry. **Results:** Grades and feedback were generally posted on the Internet within seven days. A follow-up questionnaire to experienced instructors revealed that grading was judged quicker, less subjective, more consistent among graders and generated better quality feedback to students than previously used methods. Agreeing to definitions for performance levels of each element was time-consuming and we did not reach consensus on how to score a skill if students obtained one or more unacceptable scores for individual elements. This method of evaluation was judged no more stressful on faculty and students than other approaches. New instructors expressed confidence in the approach. **Implications:** The use of precisely defined criteria to set expectations and evaluate student performance is a practical and useful teaching and learning technique.

Developing and Assessing Oral Communication Skills in a PharmD Curriculum. Michelle M. Kalis, David E. Tanner, and John R. Reynolds, *Massachusetts College of Pharmacy and Health Sciences.* Oral communication skills are developed and assessed across the six-year PharmD curriculum through three major strategies. 1) At the point of admission, all students are tested for oral proficiency. Individuals not meeting the proficiency standard complete one of three specialized courses. Students are assigned to the most appropriate course based on their first year or transfer status and their native speaking or ESL background. Successful completion of the Oral Proficiency Exam or a required remedial course is a prerequisite for continuation in the program. 2) Students complete a 3-credit course on Interpersonal Communication in the Health Professions during the second or third professional year. Students learn the fundamentals of communication theory and develop abilities in the effective use of empathy, assertiveness, group dynamics, verbal and non-verbal expression, and intercultural communication. 3) Formal and informal oral presentations are required components of courses throughout the professional phase of the curriculum. The development of each student's oral communication skills culminates during Advanced Practice Experiences. In addition to these formal testing and course requirements, at

any time students can be referred to faculty members from the School of Arts & Sciences to address issues related to oral communication. Programs are offered to assist experiential education preceptors in the assessment of students' communication skills. Utilizing both curricular and non-curricular activities, MCPHS ensures its graduates are effective oral communicators.

82nd School in Full Swing. Monina Lahoz, Kevin Kearney and Blaine Smith, *MCPHS School of Pharmacy -Worcester.* Students enroll in a Service-Learning (SL) course in the first quarter of Year One where they learn about *caring* and *being responsible for others.* Course goals and objectives include: to develop a better understanding of individuals and populations served, especially factors that affect health and wellbeing, and to develop social analysis skills. Students spend two hours weekly for ten weeks at their sites, performing volunteer community service work in schools, school-based programs, elder care facilities, homeless shelters, soup kitchens, and community health centers. Students meet weekly in small groups to engage in activities aimed at learning from their service work, which is documented in their SL journal. The SL instructor reviews the journals. In addition to the standard MCPHS course/instructor evaluation form, students complete two questionnaires: one assesses the sessions, assigned readings, and the course; the other assesses opportunities for service and learning at each site. Building upon the SL course, an elective course entitled "Addressing the Health Literacy Challenge" is being pilot-tested in the third quarter of Year One to raise awareness about low health literacy and its impact on health and delivery of pharmaceutical care. In addition to weekly class meetings, students develop and implement field projects, in collaboration with physicians at the Family Health Center of Worcester (FHC-W), to combat the problem in the Center's diverse patient population. Students document and reflect on their activities in their SL journal.

Implementation of an Integrated Lab in a Professional Pharmacy Curriculum. Gregory S. Wellman and Rodney A. Larson, *Ferris State University.* **Objective:** To provide an active learning environment, for students in the Doctor of Pharmacy curriculum, that integrates didactic coursework, practice skills and early experiential visits into a common laboratory series for students. **Methods:** As part of the curricular revision for the Doctor of Pharmacy program, a single laboratory series was developed, concurrent with the first three years of the four- year professional program. This Integrated Lab series provides for a weekly active learning environment for students with exercises, problems or cases that parallel material being covered in the classroom. Examples include: sterile and non-sterile compounding (pharmaceutics), computer simulations (pharmacology), and case studies (medicinal chemistry, pharmacy administration, therapeutics). Faculty from the respective disciplines participate in the design of the lab exercises. Practice skills instruction runs in parallel and includes prescription and drug profile review, patient interviewing and counseling, drug therapy monitoring and physical assessment. Web-based prescription simulations have been developed to provide for a problem-based learning environment. In addition, early experiential visits to hospital, community and long-term care facilities are coordinated through the lab to synchronize them with the objective assessment components of the Integrated Lab. **Results:** Preliminary feedback from students has been positive. Students find the laboratory helpful in reinforcing material and providing a practice-based perspective for didactic material. **Implications:** The Integrated Lab provides an active learning environment for the students that is more coordinated and synchronized with the didactic coursework.

Early Pharmacy Education with Community Teachers (EPhECT): Development of General and Professional Abilities through an Early Community Based Longitudinal Care Experience. Michael C. Brown, Patricia R. Lind and Todd D. Sorensen, *University of Minnesota.* **Objectives:** The University of Minnesota College of Pharmacy is dedicated to educating pharmaceutical care practitioners that possess strong general and professional abilities. As the development and assessment of these abilities in traditional lecture courses can be difficult, EPhECT was introduced to provide an innovative method to facilitate the development of these abilities. **Methods:** Residents of the Minneapolis-St. Paul area interested in sharing their health experiences with students are appointed "community teachers". First and second year students are divided into threesomes and paired with a community teacher and a faculty liaison. During the first four semesters of their curriculum, students visit their community teacher approximately 10 times. Students have three objectives: *(i)* build a relationship with their community teacher; *(ii)* learn about their community teacher's health experiences; and *(iii)* identify and help meet various needs their community teacher may have. These visits expose students to true patient perspectives on the interplay of providers, conditions, medications, and life issues. Following each visit, students document "teacher progress", debrief with their faculty liaison, and reflect in small group discussions. **Progress:** As Spring 2001 marks the first full semester of EPhECT, it is premature to predict the impact, however feedback has been positive. Assessments and changes will continue in order to mold EPhECT into

a critical component of the professional curriculum.

General and Professional Education Abilities: Identifying Opportunities for Development and Assessment across the Curriculum. Alicia S. Bouldin, Noel E. Wilkin, Christy M. Wyandt, and Marvin C. Wilson, *The University of Mississippi.* The University of Mississippi School of Pharmacy adopted an abilities-based curriculum in 1998 and instituted a step-wise plan for the programmatic assessment of that curriculum. Guided by the input of both an Assessment Committee and a Curriculum Committee, this plan was designed to fulfill the accreditation requirements of SACS and ACPE reviews, which came within one year of each other (1999 and 2000, respectively). A curricular mapping exercise was undertaken to identify the opportunities embedded throughout the professional curriculum for fostering the development of both general and professional educational abilities. Both macro- and micro-models were developed to guide the assessment process of those abilities. A variety of instruments (both standardized and original) were incorporated to determine ability acquisition and to examine perceptions regarding certain aspects of the program. These initial efforts met with both successes and obstacles, but progress was made in understanding the current state of programmatic assessment and in identifying potential areas for curricular revision and improvement of the assessment plans.

Integrating General and Professional Ability Outcomes through Writing. Thomas Zlatic, M. Maddux, Peter Hurd and John Beale, *St. Louis College of Pharmacy.* **Background:** A writing-to-learn strategy within an ability-based pharmacy program was established to enhance an integration of general and professional ability outcomes. Writing activities were integrated in all six years of the College's curriculum. **Methods:** A writing-to-learn approach was promoted through faculty development, and a Writing Emphasis (WE) program was developed. The curriculum was modified to require two WE courses (at least one in the professional area), each requiring a minimum of four writing assignments, a minimum of twenty pages total writing, rewriting opportunities after peer and expert feedback, course grade based at least 50% on writing assignments, and an enrollment cap of 25 per course. Following an abilities-based approach, general and professional abilities were identified; writing assignments were created to allow students to practice the knowledge, skills, and attitudes that comprise those abilities; criteria were developed to assess abilities; and feedback mechanisms were created. A campus writing center was created to support faculty in the development of assignments and assessments and to assist students in writing. A writing award was created to promote excellence in writing within WE courses. **Results/Discussion:** The WE program enabled a greater number and variety of electives, smaller class sizes, and expansion of writing to the later years of the curriculum. The WE program allowed more in-depth study within professional contexts. Improvements in student writing have been documented in course-specific journals and introductory/advanced clerkship portfolios.

University of Missouri – Kansas City Curricular Model Integrating Instruction and Assessment of General and Professional Abilities. Harold J. Manley, Cameron C. Lindsey, Jennifer P. Dugan, Maureen E. Knell, *UMKC School of Pharmacy.* **Background:** Pharmacy schools should prepare graduating students to be generalists as well as instill professional behavior. To accomplish this, pharmacy schools should integrate instruction and assessment of both general and professional abilities throughout the curricula. We describe the UMKC curricular model of integration and assessment of general and professional abilities. **Model:** UMKC is a five-year, entry-level PharmD program that emphasizes critical thinking, problem solving, and fosters professional behavior through service learning and various professional socialization activities. UMKC curricular instruction contains five core areas: *(i)* biomedical sciences; *(ii)* pharmaceutical sciences; *(iii)* behavior, social, and administrative pharmacy sciences; *(iv)* pharmacy practice; *(v)* pharmacy practice experiences. Professional socialization begins early through pharmacy practice innovation project (year one), service learning requirements (year two), and shadowing senior professional members (years three through five). Early and advanced experiential programs provide 4th and 5th year students opportunities to shadow senior members in patient care and serve as mentors to junior profession members. Faculty assess students: students assess themselves and senior professional members on general abilities and professional behaviors ongoing. Web-based technology and a consistent evaluation tool have provided opportunities to track various professional and general abilities over time and provide a forum for students to learn from each other. **Conclusion:** UMKC model prepares students to be generalists and active members of the pharmacy profession.

Student Assessment of Program Outcomes. Todd G. Cochran, Douglas R. Allington, Gayle A. Cochran, Vincent J. Colucci, Charles L. Eyer, Michael P. Rivey and Ann K. Williams, *The University of Montana.* For the past 20 years the School has used an exit interview to obtain student feedback on the professional pharmacy curriculum. The process was revised this year to shift the focus from assessment of the curriculum to assessment of programmatic outcomes. The School's Assessment Committee developed a list of pro-

gram outcomes derived from School and University mission statements, statements of program goals, strategic plans, and external documents such as the CAPE report. The list of outcomes was discussed and revised by the faculty during a retreat held in October 2000. A survey was developed that asked students to assess how well the PharmD program prepared them to achieve 52 specific outcomes. The outcomes were in nine general categories that included knowledge base, communication skills, thinking abilities, information resources, career development, professional attitudes, pharmaceutical care skills, management abilities, and citizenship. The assessment tool was incorporated into the fall 2000 exit interview of graduating PharmD students. Students provided a "grade" for each outcome using an A-F, 4.0 grading scale. They also provided written comments on a separate form. Students then met as a group with a faculty facilitator to discuss the program outcomes. The three components of the assessment process (survey, written, group discussion) each provided unique information valuable for program assessment.

Using Performance-Based Assessments to Evaluate an Abilities-Based Curriculum. Michael S. Monaghan and Ronda M. Jones, *Creighton University.* **Introduction:** Creighton University received a grant from the Department of Education's Fund for the Improvement of Post-secondary Education (FIPSE). The purpose of this project is to develop, validate, and disseminate a performance-based assessment plan for evaluating curricular effectiveness. This plan incorporates four performance assessments corresponding to each curricular year. Assessments are composed of cases that focus on the program's educational abilities for graduates. The student performance data generated will then be used to improve the learning environment and hence curricular effectiveness. The cases developed will be validated by a national panel of pharmacy educators and disseminated through the Internet for all pharmacy schools to share. Also, the Internet will be used to share how the student data were used to effect curricular change. **Project Goals:** *(i)* Develop two web-based computer assessments (for years one and two) and two pharmacy objective structured clinical examinations (P-OSCEs, for years three and four); these examinations will assess the student's ability to perform the program's educational outcomes, *(ii)* Pilot these examinations for two consecutive years at all four levels. *(iii)* Evaluate the content and structure of the curriculum based on results, *(iv)* Develop a website to disseminate the assessment instruments, programmatic results, and how these results are used for curricular reformation, *(v)* Use the website as a national repository for assessment cases that can be downloaded and used by other programs.

Assessment of Students' Abilities and Competencies Using a Curriculum Mapping Procedure. David M. Scott, Edward B. Roche, Samuel C. Augustine, Dennis H. Robinson and Clarence T. Ueda, *University of Nebraska Medical Center.* The University of Nebraska Medical Center (UNMC) College of Pharmacy has reformed its Doctor of Pharmacy curriculum and is engaged in a systematic development of outcomes assessment measures. The core curriculum has been revised to monitor programmatic abilities and competencies (A/C) in a longitudinal fashion. Early Practice Experience and Advanced Experiential Programs also have been developed based on expected curricular programmatic A/C outcomes. Through the use of a Professional Program Curriculum Abilities and Competencies Guide, course syllabi identify pertinent A/C to be addressed in each course. Students complete a Self-Assessment Survey of their A/C performance at the end of each academic year. The Survey contains A/C items compiled using a curriculum mapping procedure. The mapping procedure sums the number of courses in which a particular programmatic A or C is cited. The Survey contains those A/Cs addressed in four or more courses in a given year, *i.e.,* P-1, P-2, etc. Student Self-Assessment Surveys were administered to the P-1 and P-2 classes at the end of the 1999-2000 academic year. The Curriculum and the Educational Outcomes Committees use the survey data, together with faculty course assessments, as a continuous quality improvement (CQI) measure to identify and correct apparent omissions of A/Cs in the professional curriculum.

A Model for Assessing the Integration, Horizontal Reinforcement, and Longitudinal Development of Critical Thinking, Problem-Solving and Writing Skills in Course-Based Activities and Assessments in an Entry-Level Doctor of Pharmacy Curriculum. Martin E. Brown, *Long Island University.* The development of essential skills across the curriculum has received increased emphasis and scrutiny by educational institutions, policy makers, and the public in recent years. In order to address the concerns of policy makers and the public it is necessary to provide evidence that these skills are developed and inculcated by educational institutions. A six-step model for assessing the integration, horizontal reinforcement, and longitudinal development of critical thinking, problem-solving and writing skills in course-based activities and assessments throughout the professional phase of an entry-level Doctor of Pharmacy curriculum is presented. Comprehensive operational definitions of these essential skills developed through a project of the National Postsecondary Education Cooperative, U.S. Department of Education, along with locally developed scoring rubrics, were utilized in the design of the model's instrumentality. Instrumentality includes assessments not only for the

extent and complexity of the essential skills required for the completion of course-based activities but also for the degree to which faculty appropriately incorporate these skills as part of their own course-based assessment strategies. Implementation of the model may serve to identify particular strengths and weaknesses from the microcosm of individual course-based activities to the macrocosm of the overall curriculum with respect to these essential skills.

Drugs and Disease: A Novel Integrated Course Design. Joseph Brocavich, Joanne Carroll, Joseph Etzel, Vijaya Korlipara, Somnath Pal, Bhagwan Rhohera, Michael Torre and Louis Trombetta. *St. John's University.* The need for pharmacy professionals with ability to synthesize, evaluate and incorporate new information in the clinical decision-making process requires novel approaches to their education. Drugs and Disease is a sequence of interdisciplinary courses spanning the 4th and 5th years of the curriculum, integrating material from pathophysiology, pharmacology, medicinal chemistry and therapeutics. Each module focuses on an organ system, the therapeutics used to treat diseases of this system, the associated mechanisms of disease and the pharmacology and medicinal chemistry of the drugs used. Interdisciplinary faculty teams for each module use current therapeutics as the guide for selection of topics. During recitations, the faculty team meets with students to discuss case-based applications. A faculty course coordinator assembles the exams, which emphasize the synthesis of knowledge from the individual disciplines. In addition, the concurrent Pharmacy Practice Lab courses are coordinated with material being studied in the Drugs and Disease course. Students in the Pharmacy Practice Lab perform simulations of dispensing in community and institutional setting, physical assessment, compounding and demonstration projects. Finally, students will take a comprehensive exam, which will assess the effectiveness of the integrated approach. The goal is to prepare pharmacists for the challenges in clinical medicine in which they will be increasingly involved.

Integration of General and Professional Abilities Across the Doctor of Pharmacy Curriculum at the University of North Carolina. Kimberly H. Deloatch, Pamela U. Joyner and Ralph H. Raasch, *University of North Carolina at Chapel Hill.* Consistent with the recommendations of the Center for Pharmaceutical Education (CAPE) Advisory Panel on Educational Outcomes, the faculty of the UNC School of Pharmacy have made considerable efforts over several years to develop teaching, learning, and assessment strategies and methods to facilitate the integrated development of general and professional abilities among Doctor of Pharmacy candidates. Efforts to date have focused on developing and assessing critical reasoning, problem-solving, written and verbal communication, social interaction, and ethical decision making abilities within the context of a patient care oriented professional practice. These integrative efforts occur through a combination of didactic and laboratory course activities, patient interactions, and independent learning experiences. Our poster summarizes course and curricular structure, specific learning activities, and student and curricular assessment tools and processes used to facilitate accomplishment of these goals. The poster highlights descriptions of the structure and teaching/learning strategies of integrated pharmacotherapy-medicinal chemistry course and pharmaceutical care (practice development) laboratory sequences; writing and presentation assignments shared between didactic and laboratory or experiential courses; cross-curricular behavioral assessment and professional portfolio requirements; use of student performance assessment tools; student assessment via objective structured clinical exams (OSCE); and a curricular evaluation process that reviews achievement of both general and professional abilities outcomes.

Profession of Pharmacy Sequence: an Introduction to Practice. Kimberly Broedel-Zaugg and Jeffery C. Allison, *Ohio Northern University.* Ohio Northern's Raabe College of Pharmacy accepts students directly from high school into the freshman year. During the first two years of study, students spend most of their time outside the college of pharmacy taking basic sciences and general education courses. In order to introduce these students to the profession of pharmacy, the college implemented a three year, nine quarter profession of pharmacy series. During the first year, freshmen, known as P-1s, are exposed to the operation of the University and College as well as pharmaceutical care within the healthcare system. P-1s are required to perform community services and shadow various healthcare professionals. Sophomores (P-2s) shadow pharmacists and continue to provide community service. In addition, P-2s learn pharmaceutical calculations, abbreviations, and professional language in preparation for internship. In the third year, students (P-3s) learn about Ohio law, drug information, and patient care including interviews and counseling. During the ninth quarter, each student must complete sixty internship hours in order to sit for a comprehensive computerized examination. Students must pass this exam in order to advance to the fourth year.

Professional and General Abilities Assessment in a Pharmacy Practice Skills Laboratory Sequence. William K Fant, Andrea Wall, Bethanne Brown and Cassandra Kessinger, *University of Cincinnati.* The entry-level Doctor of Pharmacy Curriculum includes a 5-quarter Pharmacy Practice Skills Laboratory coordinated with the delivery of didactic and case-based teaching of Pharmacotherapeutics. The Pharmacotherapeutics sequence integrates chemistry, pharmacology, pathophysiology, therapeutics and pharmaceutical care strategies to allow the student to develop the knowledge necessary to provide patient care in a professional manner. Students rotate through multiple stations in a newly-renovated skills laboratory where they demonstrate pharmacy practice and general abilities identified in CAPE. In dispensing and counseling exercises (prescription and OTC) in our new model pharmacy, students are expected to use the communication skills learned early in the curriculum. Physical examination and sterile and non-sterile compounding exercises build on prior knowledge obtained in previous basic science coursework. Self-assessment and faculty/preceptor assessments are incorporated into a Web-based portfolio. The faculty driven portfolio, developed by the Curriculum and Outcomes Assessment Committee, is available for student and faculty/preceptor review. The portfolio will serve to document the student's growth and development as a competent professional. The committee identified skills and competencies to be assessed in each course in the curriculum. The performance database matches these competencies to CAPE. The ability of students to meet our curricular goals will be reported to the faculty on an annual basis. The portfolio will assist the College in further refinement of the curriculum.

Continuous Integration of Skill, Attitude, and Knowledge Assessment across the Curriculum. William B. French, Christy Cox, Michael Deimling, David Ralph, Dennis Thompson and Virgil Van Dusen, *Southwestern Oklahoma State University.* The objective of this curriculum assessment process was to develop a seamless integration of skill, attitude, and knowledge assessment throughout the curriculum, and to insure that the Pharmaceutical Sciences and Pharmacy Practice departments had an ongoing awareness of what assessments were being conducted in the other area. For uniformity across the departments, definitions were agreed upon for four assessment categories: Skill, Attitude, New Knowledge, and Integrated Knowledge, which are referred to as S, A, NK, & IK. A one- to three-plus weighted scale to indicate the magnitude of assessment in a category was created. To discern an assessment profile of the entire curriculum, faculty were surveyed, and a table constructed containing all the courses in sequence, the weights for each of the four categories, and the methods used to assess the categories, such as new knowledge assessed by objective tests and case studies. Specialized assessment forms, when used, were collected as well. The Curriculum Committee then critically examined the table and conducted a follow-up to verify some data and obtain a more complete profile of others. The table produced a complete assessment profile which now allows a more direct comparison between the school's mission and competency objectives and where these objectives are taught and how assessed, and the table allows individual faculty to see how their assessments compare to companion courses.

Making Professional Posters Meaningful for Students. Melissa S. Medina, Mary Ann Halloran and Tracy M. Hagemann, *University of Oklahoma.* **Background:** Despite the vast acceptance of poster presentations as a medium for presenting work in the professional community, the literature reports a dearth of information related to creating and critiquing the effectiveness of posters in promoting viewer learning. As a result of this need, the classroom is an opportune environment to introduce students to professional posters. **Methods:** During an Advanced Drug Literature Evaluation course, students' understanding of professional poster presentations with respect to evaluating the professional literature and presenting evidence about pharmacy-related topics was explored. Sixty-one third-year Doctor of Pharmacy students were surveyed before a poster presentation lecture and evaluation activity and again after completion of a group poster creation project. A baseline and follow-up questionnaire reviewed students' exposure to, understanding of, experience with and perceived value of professional posters. In addition, an active learning exercise was designed to facilitate the application of their newly acquired knowledge of drug literature evaluation and evidence-based medicine to the creation of professional posters as well as promote value and relevance of the topic. **Results:** The poster presentation exercise exposed the students to the key components of effective poster presentations and facilitated their creation of quality posters. **Conclusions:** Poster creation and presentation exercises promote active learning in the classroom and enhance students' professional development through the use of presentation methods to which they have previously not been exposed.

Implementation and Assessment of General Ability-Based Competencies. Marc Harrold, Shane Desselle, Vincent Giannetti, Patricia Keys, Michael Miller, Christine O'Neil and Therese Poirier, *Duquesne University.* Duquesne University adopted six general ability-based competencies for its entry level PharmD curriculum. These competencies included: (*i*) critical thinking and decision-making abilities; (*ii*) communication abilities; (*iii*) responsible use of values and ethical principles; (*iv*) social awareness and responsibility; (v) self-learning abilities and habits; and (*vi*) social interactions and citizenship. Their implementation required a rethinking of how course material should be taught. For the most part, these competencies were inte-

grated into required courses that also focused on professional practice functions. Strategies included essay examinations, presentations to lay audiences, formalized debates, informal group discussions of peer reviewed literature, written reflective journals, problem solving exercises, interactive asynchronous discussions, use of course management software such as WebCT, and poster presentations. This presentation will highlight specific course examples. These include both required courses—Professional Communication, Advanced Law and Ethics, Clinical Skills courses, Integrated Case Studies, Pharmacy Practice Issues and Quality Assessment Methods in Health Care— and elective courses—Selected Topics in Drug Development, Pharmacoeconomics, Health Care Economics, and Selected Topics in Geriatrics. Current reflection has identified that although ability-based competencies are incorporated in various courses throughout the curriculum, a systematic, school-wide strategy to identify and measure their attainment is not evident. Thus, we intend to survey all faculty to determine if and how general ability-based competencies are incorporated and achieved across the entire curriculum.

Development, Integration and Assessment of Oral Communication Skills in an Entry-Level and a Nontraditional Doctor of Pharmacy Program. Eric Boyce, Lisa Lawson, John Connors, Sarah Spinier and Karen Tietze, *University of the Sciences in Philadelphia.* Oral communication skills were the top priority for assessment during the 2000-01 academic year. The development, integration and assessment of those skills were examined in the college's entry-level and nontraditional PharmD programs. The entry-level PharmD program is designed to develop students' oral communication skills in an integrated manner with the development of professional abilities. One-on-one oral communication skills are developed and assessed during introductory pharmacy skills (P1), patient communication (counseling) (P2), introductory pharmacy practice experience (P2), and therapeutics laboratory (P3) courses. Small group communication skills are developed during drug literature evaluation (P2), ethics (P2), and case studies (P3) courses. Public speaking skills are developed and assessed through introductory communication (P1) and professional seminar (P3) courses. Development and assessment of the students' oral communication skills culminates during advanced pharmacy practice experiences (P4). Students in the non-traditional program specifically develop and are assessed in public speaking during professional seminar and drug literature evaluation courses. One-on-one and small group interactions are developed and assessed during continuity of care and acute care clerkships. Oral communications skills are developed in both communications and discipline-specific courses in both curricula. Competency in oral communication skills is documented using a variety of methods, but standardization of student assessment methods and more objective documentation of student progression should be considered.

Implementation of Sequential Learning Activities Integrating Professional and General Abilities. Ina Lee Calligaro, Michael R. Borenstein, Michael R. Jacobs and Cynthia A. Burman, *Temple University.* Pharmacy Science and Practice faculty have incorporate the professional and general educational outcomes, developed by the CAPE Advisory Panel, across the curriculum. A set of sequential learning experiences designed to integrate communication, critical thinking, self-learning and interpersonal skills with the professional outcomes has been implemented. First year students in Medicinal Chemistry/Biochemistry I work in teams to prepare a poster describing the biochemical correlates of a specific disease. Posters are displayed in the Health Sciences Center Faculty/Student Union at the end of the semester. During the spring semester students participate in a Pharmacology/Medicinal Chemistry recitation where they work in small groups to solve problems and then present their solution(s) to faculty and classmates. Second and third year students participate in the Pathophysiology/Therapeutics recitation sequence. These recitations provide students with increasingly complex cases requiring greater independence as they work in teams to prepare written and verbal case reports. Fourth year students continue to develop general and professional abilities as they complete clerkship requirements in various practice settings. This curricular design provides students with the opportunity to work closely with a variety of students and faculty mentors. Performance expectations increase as students progress through the program and portfolios will provide the opportunity for longitudinal assessment.

Service Learning Approach to the Professionalization of Students. Anne Lin, Nicole Sparano, Jennifer Malinowski, Mary Campomizzi, John Conry, Renee Johnson, Jill Slater, Melissa Somma, Eric Wright, Edward Foote, Debbie Milz and Joyce Clay, *Wilkes University.* This course provides third year students opportunities to deliver pharmaceutical care and to develop an understanding of patient and social issues surrounding patients' ability to comply with health related instructions. Use of a service learning approach makes this course relevant to civic involvement, humanistic care of patients and social awareness of unfulfilled medical needs. This teaching method allows us to facilitate the development of students' ability to provide pharmaceutical care. Hepler & Strand indicate pharmacists must develop professional maturity,

which can be described as having a world view, "an expectation that one thrives best by using one's power to serve something bigger than oneself and acceptance of responsibility for one's actions." Additionally, the process of professional socialization is one by which an individual selectively acquires not only knowledge and skills of the profession, but also the appropriate behaviors, attitudes and values of the profession. Students are assigned to a patient from partner community agencies for one academic year. During weekly visits, students evaluate medication regimens, provide patient education and companionship to their assigned patients. SOAP notes are used as documentation of the visits. Additionally, reflection papers and faculty facilitated weekly group meetings further enhance the students' learning experience.

Interactive Learning and Teaching with Technology. Clinton O. Chichester and Norma J. Owens, *University of Rhode Island.* The new Doctor of Pharmacy program at the University of Rhode Island places increased emphasis on problem-based learning and the use of technology. Programmatic goals include the improvement of student's information retrieval techniques and the development of collaborative work and communication skills. A six semester series of one-credit courses (Interactive Learning or IALs) was implemented in the Fall 2000. Small group IALs are facilitated by faculty from all departments, and occur in a classroom in which student and instructor laptops are linked to a projector and smart board screen, allowing for presentations and information sharing from any computer. Wireless Internet access is provided so that students can access the College of Pharmacy Drug Information web site and server at all times. Students spent a third of the first semester learning drug information retrieval techniques and resources. Two case studies were discussed over the remainder of the semester with students answering complex questions about the case and presenting their answers orally with the aid of presentations from their laptops. In the second semester the students' analytical skills were extended by additional cases requiring an extensive written and oral research project. The final exam was administered via WebCT. Students and faculty report high satisfaction with this course due to the integration of technology with didactic material, and the problem based learning techniques that have improved communication and analytical skills.

Effective Integration of General and Professional Abilities in Instruction and Assessment at the University of South Carolina College of Pharmacy. L. Clifton Fuhrman, Jr., Wayne E. Buff and Farid Sadik, *University of South Carolina.* The USC College of Pharmacy has implemented and continues to enhance the PharmD curriculum to provide our students with personal and professional identity through innovative teaching and assessment modalities. Our five-semester laboratory sequence integrates didactic and professional practice skills. These courses utilize area practitioners to enhance practice skills and develop professionalism. An innovative web based program developed at USC, the "Virtual Patient Database", develops student responsibility and continuity of care concepts via weekly patient and student assessment methods. Newly developed Pharmacy Practice Experience rotations at sites such as the Columbia Free Medical Clinic provide students with not only direct patient care but also are expanded to illustrate the importance of service to the community. Assessment methods have been implemented to allow faculty, preceptors and employers the opportunity to become involved in ensuring our students development. The overall level of student performance in the areas of communication, drug knowledge critical thinking and professionalism are monitored on an annual basis. These evaluations are performed through student interviews and surveys as well as faculty committee discussions of one-on-one student interactions. Annually, clinical preceptors evaluate the overall level of our students' abilities in these categories. Finally, employers of our graduates all so provide important information on the development of our students through post graduation employer surveys.

Developing A Model for Outcome Assessment of an Entry-Level PharmD Program. Jane R. Moil, Kimberly A. Messerschmidt, *South Dakota State University.* The College of Pharmacy at South Dakota State University started the assessment process prior to initiating our entry-level PharmD program in 1994 by asking instructors the extent that their courses addressed each of our outcome statements. This information served to coordinate and refine course offerings before students took the classes. This assessment was repeated after two years of the program had been taught in order to determine if instruction had changed during implementation. Now the College has moved into assessment of the student's ability to perform the outcomes and has attempted to create a plan that is both effective and efficient. The plan is composed of three tiers that primarily use currently available assessment information and the tiers are organized in an integrated fashion. The design of this plan was influenced significantly by quality improvement concepts used in the health care setting. In addition, assessment tools and processes currently employed were grouped together based on similarities and examined for their strengths and limitations. Using this information a system was created that would avoid duplication, utilize the optimal assessment tool to measure achievement of a given outcome, probe more deeply into an issue only if a

problem appeared to exist, and bring about curricular revision if necessary. While limitations to the plan do exist, this model will serve as a starting point for our assessment process.

Utilization of Pharmacy Alumni as External Assessors. Chander S. Mehta, Cedric P. Hunt, Andrew Anugwom and Barbara Hayes, *Texas Southern University.* Outside-class assessment provides the perspective of increased distance. To undertake such external assessments we have engaged our alumni members, as external assessors, to be teamed up with entering pharmacy students. These assessment exercises with alumni involve measurement in students of the level of synthesis of content from multiple courses. A group rather than an individual faculty will be involved in designing assessment exercise. The College has recruited alumni volunteers from various pharmacy practice environments. These alumni assessors will be trained each semester by faculty to assess P1 (First professional year) pharmacy students in early general education and P2 to P4 students at increasingly advanced levels in pharmacy. The purpose of this assessment is to provide the distance perspective and to supplement faculty-driven assessment. Developmental training program for the external assessors will consist of entering external assessors gaining experiences from Assessor Level I to Assessor Level IV using the Alverno model. Some of the secondary benefits of this program include, incoming students will be mentored by the College as they progress through the pharmacy program, increasing in the inventory of the practice sites, involvement of the participating alumni in the early experiential training, structured programmatic involvement of the alumni, organized recruitment of alumni for college-driven continuing education programs, and networking of the alumni and graduating students resulting in mutually beneficial outcomes after students graduate.

Incorporation of General Abilities to Enhance Learning. Julianna Szilagyi, Andrea Smesny, Lynn Simpson and Thomas Lemke, *University of Houston. A* college degree indicates achievement of a certain level of competency in a major plus an overall competency as an educated individual. In pharmacy, the evidence of professional competency is assured through national licensure examinations, while evidence of mastery of general skills are not assessed. The University of Houston has addressed this issue via the development of a series of standards which hold the students accountable for mastering specific levels of achievement in general abilities. The general abilities are defined as the ability to: Communicate; Analyze/Critically Think; Problem Solve; Socially Interact for Effective Citizenship; Exhibit Professional/Ethical Attitudes; and Life Long Learning. The college has accepted these abilities and has defined each ability, identified practice opportunities, established criteria to assess mastery of the skill, and formulated a method to provide assessment feedback to the student on their progress in demonstrating the skill. Whether or not there is a positive impact of holding students accountable for mastering the general abilities will be assessed in both the short-term (correlation with GPA, performance on the Mile Marker assessments) and in the long-term (performance on the national board examination). Mastering both the discipline specific outcomes of the profession and the general abilities should enhance the future professional and personal success of our graduates.

"UT-Connect"-Students Connecting with the Elderly to Create an Environment of Learning and Caring. Jamie C. Barner, and William Arlyn Kloesel, *The University of Texas at Austin.* "UT Connect" was developed to provide first-year pharmacy students with an opportunity to participate in service-learning in order to positively influence the quality of life of the elderly. A secondary purpose is to provide students with an opportunity to learn more about the elderly to better serve them as pharmacists in the future. The specific goals of the program are to enable students to learn more about: communicating with the elderly; common medical conditions and medications; and medication adherence. To accomplish these goals, students are assigned to at least one resident at an assisted living facility, and required to visit them at least two times a month for an entire academic year. Through these active learning environments, students are provided an opportunity to observe outcomes of drug therapy and treatment. One-hour laboratory sessions are held throughout the year, with the spring semester devoted to individual student presentations on their resident. In addition to learning about health-related issues, students also learn how social/behavioral issues impact health behaviors. During the course of the program, students "connect" with their residents and they learn about the importance of "care" in pharmaceutical care. Through the "UT-Connect" program, pharmacy students learn that their success as pharmacists in helping patients achieve optimal therapeutic outcomes will depend on their ability to "connect" with patients in different population subgroups.

Delivering Contemporary Pharmaceutical Education Built on Professionalism. Tara M. Jenkins, Barry Bleidt, Carmita A. Coleman and Arcelia Johnson-Fannin, *Hampton University.* At Hampton University School of Pharmacy, professionalism is the tenet upon which all else radiates. The process of preparing a pharmacist begins with a preadmission experiential requirement designed to expose students to professional expectations. Faculty integrate instruction and assessment of general and professional ability outcomes through components of courses and by serving as role models. This

paradigm is enhanced and fostered through early experiential exposure. While matriculating through the curriculum, students are engaged in activities that promote civic and professional responsibilities and focus on patient-centered care. Civic responsibility and professional development are demonstrated by the active roles students play in the planning, implementing, and facilitating of School of Pharmacy events such as National Pharmacy Week, Legislative Day, and the 22nd Annual Conference on the Black Family. During the Annual Preceptors' Conference, students greet participants and conduct tours of university facilities. They participate in a university-wide effort to improve the healthcare of all individuals on campus, Healthy Hamptonions. Students and faculty are also involved in community health fairs and local, state, national, and international pharmaceutical organizations as evidenced by the plethora of oral and poster presentations. Furthermore, during local pharmaceutical society meetings, students are invited to interact and network with practicing pharmacists in the community.

Integration of Professional Abilities. Stanley S. Weber, *University of Washington.* It is our belief that students learn best when they are actively involved. Involved learning can model and teach the problem solving, communication, and discipline-specific skills necessary for a successful pharmaceutical care practice. Our faculty have implemented several courses using the principles of active learning to inculcate professional abilities. These range from small, targeted courses that teach a specific pharmaceutical care skill, to a collection of courses to provide in-depth knowledge, skills, and abilities in a broader area. One targeted course is "Pharmacy-Based Immunizations Programs" which develops the skills and knowledge required to administer immunizations, to administer and interpret tuberculin skin tests, and to initiate outreach activities for medication-related information and services. The course is designed to develop skills required to enable students to provide screening, drug administration, counseling and referral for immunizations in community-based settings. A similar course, "Community-Based Screenings," teaches the application of cholesterol, hypertension, bone density, body composition, wellness assessment techniques, and behavior modification counseling. Among other activities students are required to conduct a screening in the community or during "Pharmacy Day" for our State Legislature. In contrast, our "Pharmacy Retail Management Program" is interdisciplinary and designed to prepare students for ownership and management. Courses are required in marketing, management, finance, accounting, and retail management. A paid management internship in one of the collaborating retail partner organizations is also required. Integration of professional abilities is "alive and well" at the University of Washington!

Assessment of Professional Knowledge, Skills and Attitudes in 4th Year Doctor of Pharmacy Candidates. Lisa J. Woodard, G. Dennis Clifton and Tracy L. Skaer, *Washington State University.* The College of Pharmacy at Washington State University has developed a process to assess the 4th professional year advanced practice experience (APE) relative to the following: *(i)* student preparedness, *(ii)* formative and summative measures of student performance, and *(iii)* adequacy and satisfaction with the APE preceptors and locations. The ability of the curriculum to prepare students for their APE and for practice are assessed through surveys of preceptor's and employer's expected and perceived student or graduate performance, respectively. Expected and perceived performance relates to a pre-define and specific set of knowledge, skills, and personal attributes. Each student at the beginning of the APE and at graduation completes a self-assessment that tests preparedness for APE and practice, respectively. Formative student evaluations are performed at the mid-point and end of each rotation. Mid-year experience review is performed through review of each student's APE portfolio. Site assessment is performed utilizing a set of standards and guidelines adopted by the faculty. The Director of Experiential Education visits sites in the primary learning geographic region. APE sites outside the region are asked to complete a self-assessment. Preceptors are assessed using a standard evaluation form completed by the students at the end of each rotation. Results of these assessments will be used to evaluate each student's success in the program and preparedness for practice at the end of the curriculum.

Development and Implementation of a Comprehensive Programmatic Assessment Plan. Marie A. Abate, Diane L. Casdorph, Peter Gannett, Suresh Madhavan, Elizabeth Scharman and Mary Stamatakis, *West Virginia University.* The development and implementation of a programmatic assessment plan has involved several steps. The School of Pharmacy first prepared an extensive educational outcomes document that the faculty reviewed/approved. Many sub-items in this detailed document could be described as performance criteria reflecting key aspects of a broader outcome. Thus, from the outcomes document, the Assessment Committee developed 18 consolidated school-wide educational (student learning) outcomes that could reasonably be assessed programmatically. The program assessment plan will be based upon a "5 column" assessment model (*i.e.,* educational mission, related student learning outcomes, method for assessing outcomes that include criteria for success, summary of data collected, actions to be taken based upon

data) being used by West Virginia University for campus-wide program assessment. The School will incorporate a variety of direct (*i.e.,* actual measurement of learning) and indirect (*i.e.,* opinions about learning) student learning assessment strategies into its plan. A survey of the level (scale of 1 to 3) at which the curriculum is addressing general abilities such as critical thinking, communication, etc. is also being undertaken. This survey will be completed by the coordinator of each course and by the students. The results from this survey will help identify significant deficiencies in the curriculum with regard to these essential, non-discipline specific skills.

Objective, Structured, Clinical Examination (OSCE) for Assessing Professional Abilities. Beth A. Martin, Nathan L. Kanous, Michael E. Pitterle and Mara A. Kieser, *University of Wisconsin.* **Objective:** To incorporate the OSCE into the fourth year clerkships as an evaluation tool to assess students' skills. These include communication, physical assessment and monitoring, interpersonal skills, knowledge of technical tasks, and professional decision-making. **Methods:** The OSCE format is a series of timed stations where students complete a longitudinal patient scenario, including profile review, patient interview, identification and resolution of pharmacy-related problems, and documentation. The station activities require the student to view and assess material, interact with a standardized patient and clinician, and complete a SOAP note. All students experience the same clinical scenario. The OSCE is administered by pharmacy practice faculty after the fourth clerkship rotation and is graded pass/fail. Failures require remediation during their final clerkship rotations. **Results:** Students value this examination experience as preparation for real-life clinical scenarios. Ten students failed the OSCE due to the following problems: problem identification, appropriate therapy recommendations, or medication errors. Faculty viewed this format as a valuable method of assessing both process and product of clinical thinking. Preliminary analysis suggests the OSCE evaluates professional competencies different from, but complementary to, preceptor evaluations. **Implications:** The OSCE is one of multiple evaluation instruments used to identify skills necessary for entry-level pharmacy practice. The time expended on creative, operational, and assessment activities needs to be determined to justify this level of commitment by the school of pharmacy.