

## SPECIAL ARTICLES

# The Development and Structure of a Web-based Entry-level Doctor of Pharmacy Pathway at Creighton University Medical Center

Patrick M. Malone, PharmD,<sup>a</sup> Graham E. Glynn, PhD,<sup>b</sup> and Sidney J. Stohs, PhD<sup>a</sup>

<sup>a</sup>School of Pharmacy and Health Professions, Creighton University Medical Center

<sup>b</sup>Royer Center for Learning and Academic Technologies, Penn State University

Submitted May 28, 2003; accepted December 17, 2003; published May 27, 2004.

The establishment of the first entry-level web-based pathway to obtain a doctor of pharmacy degree is described. An overview of all aspects of the development of the web-based pathway, including how it was integrated with the on-campus pathway is provided. Students in the web-based pathway take all of their didactic classes via the Internet, but come to campus for a short, intensive laboratory session each summer. Clerkships are provided in the same manner as for on-campus students. The third year of this innovative pathway has been completed, with students so far achieving similar outcomes to traditional on-campus students.

**Keywords:** web-based, distance education, Internet, doctor of pharmacy

## INTRODUCTION

In 1999, the National Association of Chain Drug Stores and the American Pharmaceutical Association co-authored a white paper entitled "Implementing Effective Change in Meeting the Demands of Community Pharmacy Practice in the United States," which succinctly described the challenges facing community pharmacy practice.<sup>1</sup> One major challenge described in this report was the existence of a relatively stable population of pharmacists with both an ever-expanding prescription volume and an ever-increasing need for patient care. This prediction has been supported by information showing a 4.5% increase in the number of prescriptions in community pharmacies in 2001, which follows a 7.5% increase in 2000.<sup>2</sup> In addition, a report published on the AACP Web site projects a shortage of 157,000 pharmacists by the year 2020.<sup>3</sup>

The shortage of pharmacists obviously can be addressed by increasing the number of pharmacy graduates, which requires increasing the applicant pool to ensure that new seats can be filled with quality students. A potentially effective and efficient method of increasing the applicant pool is to open pharmacy education to a previously untapped segment of the population by providing a more flexible education option that enables nontraditional

and place-bound students to pursue a pharmacy career through programs similar to other nonpharmacy education programs that have been described.<sup>4</sup> Other common solutions to increasing the number of pharmacists include an increase in class sizes in the existing schools and colleges of pharmacy or the establishment of new programs, with a total of 17 new schools planned or coming into existence since 1990.<sup>5</sup>

The School of Pharmacy and Health Professions at Creighton University Medical Center addressed the need for additional pharmacists by implementing the first web-based entry-level Doctor of Pharmacy degree pathway in 2001 with an inaugural class of 55 students. In discussions with members of this class, many have conveyed that they otherwise would not have been able to pursue a pharmacy education because their family situations would not permit them to translocate for the 4 years necessary to complete the program. Our experience has shown that these are extremely desirable students who would be admitted to any program. Therefore, this new method of education potentially could be used to increase the number of pharmacy graduates without significantly affecting the number of quality applicants to traditional programs.

The purpose of this paper is to provide an overview of this new and unique entry-level pathway to obtaining a PharmD degree. General information about the pathway may be obtained at <http://webpharmd.creighton.edu>.

## INITIAL ORGANIZATIONAL EFFORTS

This pathway was initially funded via a \$1 million

---

**Corresponding Author:** Patrick M. Malone, PharmD.  
Address: Director, Web-Based Pharmacy Pathway, Creighton University Medical Center, 2500 California Plaza, Omaha, NE 68178. Tel: 402-280-5725. Fax: 402-280-1287. E-mail: [pmalone@creighton.edu](mailto:pmalone@creighton.edu).

grant awarded to Creighton University by the Institute for the Advancement of Community Pharmacy. While additional funding from other sources was obtained in order to initiate the program (see Acknowledgments at the end of this paper), the plan was to ensure the pathway would be self-sufficient based on tuition funds by the time the third class entered the pathway. Grant funds were used for initial development costs including technology (file servers, etc) and personnel (eg, faculty, technical staff, instructional designers).

Once the funding was in place, a Steering Committee was established and began planning the pathway starting approximately June 1, 2000. That committee consisted of the Director and Associate Director of the Pathway (who was also the Chair of the Curriculum Committee), the Director of the Office of Information Technology and Learning Resources (the office that supports computer use in the School, including desktop computers, laptop computers, file servers, web servers, e-mail, etc), assistant/associate deans, department chairs, the Chair of the ad hoc Pharmacy Program Assessment Committee, the Professional Experience Coordinator, and various other appropriate support personnel. This Committee met weekly during the year preceding the start of the first class and every 2 to 4 weeks thereafter. All aspects of developing the pathway were addressed by this Committee, including the items specified in a recent review of distance pharmaceutical education, which provides numerous resources for readers interested in the theoretical aspects of this topic as well as experiences in nonpharmacy-related programs.<sup>6</sup> In addition to the efforts expended by the Web-Based Pathway Steering Committee, essentially all members of the pharmacy faculty were placed on 1 of 9 task forces, which addressed specific areas described in Table 1.

The philosophy followed from the beginning was to get as many faculty members involved as possible so that everyone would have "ownership" in at least part of the pathway, to get faculty approval and support whenever necessary, and to provide as much information as possible to everyone. The faculty members voted on and approved any significant programmatic changes. In addition, faculty and staff members were requested to be innovative and flexible whenever possible, but not to sacrifice the quality of the pharmacy education. In order to provide for the maximum distribution of information, a web site was set up at which faculty and staff members could access reports, documents (eg, Task Force Reports, policies/procedures, American Council on Pharmaceutical Education [ACPE] communications), minutes of the Web-Based

Pathway Steering Committee, etc. Also, a Microsoft Team Folder (now referred to as a SharePoint folder - <http://www.microsoft.com/windowsserver2003/technologies/sharepoint/default.aspx>) was established for the Web-Based Pathway Steering Committee, which in addition to documents, included functions for tracking who was responsible for completing specific tasks, a team calendar, and other functions.

Prior to initiation of the pathway, information was presented to and discussed by the faculty. The pharmacy faculty approved implementation of the Web-Based Pathway in September 2000, but reserved setting the date that the first students would begin the pathway until further information was gathered and progress in setting up the pathway was adequate. During fall 2000 the various Task Forces conducted their work and a report was prepared and submitted to ACPE. This report went through all ACPE Accreditation Standards and described how the pathway would affect the information reported in the School's previous Self-Study from 1999. Based on the information collected and the fact that no insurmountable obstacles had been identified, in January 2001 the faculty approved that the first class could be admitted to begin classes in August 2001. The Admissions Office started its main effort to publicize the program at that time (<http://webpharmd.creighton.edu>).

Over the course of the first half of 2001, the functions of establishing the pathway were turned over to the appropriate committees and responsible persons within the School. Rather than establish a parallel organizational structure, all efforts were made to integrate this new web-based pathway into the existing administrative structure. Whenever possible, policies and procedures were the same in both entry-level degree pathways ([http://spahp.creighton.edu/Acad\\_SAffairs/policies.asp](http://spahp.creighton.edu/Acad_SAffairs/policies.asp)) and program outcomes were designed to be the same for both pathways. It must be noted that the Nontraditional Pathway (post BS PharmD degree) provided a great deal of useful information and experience in setting up the web pathway, particularly in regard to initial experiences in online classes and policies and procedures for such areas as examination proctoring.

## **PATHWAY STRUCTURE AND METHODS**

The total numbers of credit hours, both as prerequisites and within the program, are the same for the web-based and on-campus pathways. While the selection criteria for both pathways are officially identical, students in the web-based pathway have been subjected to more rigorous scrutiny in order to ensure they are prepared for

Table 1. Task Forces

<b>Task Force Name</b>	<b>Function</b>	<b>Succeeded by</b>
ACPE Report	Oversee reports requested by ACPE	Web-Based Pharmacy Pathway Steering Committee took over this function
Admissions	Work with the Admissions Dept. and Admissions Committee to determine the best ways to market the program and identify appropriate students.	School's Admissions Committee and Admissions Department now cover functions for all pharmacy pathways
Assessment and Outcomes	Dealt with the evaluation of student performance. Included determining need for comprehensive examination.	Pharmacy Assessment Committee; a new Associate Dean for Faculty Development and Assessment responsible for School program assessment
Didactic Curriculum	Worked on items dealing with didactic issues that need to go to the curriculum committee. Sequenced didactic curriculum. It also addressed pedagogy and the need for electives.	Curriculum Committee
Experiential Curriculum	Worked on items dealing with experiential issues (eg, clerkship, early experience, required clerkships with Creighton faculty) that needed to go to the Curriculum Committee. It also addressed pedagogy.	Curriculum Committee; some work done by Professional Experience Coordinators and Early Experience faculty
Faculty Development	Dealt with the training of faculty to participate in the pathway.	Associate Dean for Faculty Development and Assessment
Lab and Summer Courses	Dealt with how these courses can best be done during the on-campus sessions.	Curriculum Committee
Mentors	Defined what mentors do and deal with other mentor-related issues.	Mentor Coordinators
Professionalization and Socialization	Dealt with how these items can be best instilled in the students.	Office of Academic and Student Affairs; experiential faculty; ad-hoc Professionalization Committee
Student Services	Dealt with student services, communications, student organization issues.	Office of Academic and Student Affairs

a very self-directed and self-disciplined learning modality and are technologically capable of handling web-based education. The Admissions Committee contacts the prospective web-based students via phone to assess these characteristics, a process that is not generally done with on-campus students. In addition, the admission application was changed to gather information about a prospective student's time management skills, technology experience, and strategies for achieving success. As of fall 2003, the Admissions Committee used the Pharmacy College Admissions Test (PCAT) to evaluate all applicants (both web and campus). The PCAT was not previously required. This was instituted, at least in part, because some applicants to the Web-Based Pharmacy Pathway had completed a significant amount of the requirements (eg, Chemistry/Organic Chemistry) several years previously. Use of the PCAT will help determine

how well those applicants have retained material and are currently prepared for admission. The PCAT may eventually be found to be valuable in the admission process in other ways, but that will be determined in the future.

The curriculum and graduate outcome expectations for both pathways are identical, and only the timing and delivery methods have been changed. With the exception of laboratory-based courses and clinical rotations, courses are delivered primarily via the Internet for the Web-Based Pathway. Course content is housed in web sites and/or on CDs, and supported with traditional textbooks and library resources. In a few cases, the material may be provided by a streaming audio and/or video format over the Internet (an example can be seen at <http://winstream.creighton.edu/pmm11756a/PHA458/QALecture/QALecture1/QALecture1.htm>). Such streaming media is kept to a minimum at this point because a sizeable

minority of the class only has dial-up Internet connections; however, this is expected to change with the growing availability and popularity of satellite and broadband Internet connections. Such high-speed connections will be mandatory for all students starting with those entering the pathway in fall 2004. An increasing number of courses are starting to use streaming media and it is likely to become more of a standard at sometime in the near future.

Student-student and student-faculty asynchronous communications occur via e-mail (Microsoft Outlook, via Microsoft Exchange server), online threaded discussions, and faxes. Synchronous communications occur in chat rooms, within online conferencing environments (eg, Microsoft Netmeeting or Instant Messenger) that include audio, video, and application-sharing tools, via telephone, and face-to-face interaction during orientation and laboratory courses that are held on campus. Learning management systems such as Blackboard and the Learning Environment for Asynchronous and Distance Education (LEADE), a management system developed in-house, have been used to integrate many of these systems, although the students have requested, nearly unanimously, that BlackBoard be eliminated from use and LEADE is no longer employed. Problems identified in BlackBoard appear to be addressed in the newest version, which is currently being evaluated. For now, the ~30% of courses using BlackBoard will continue to do so. Faculty members have been able to use WebCT, although none are currently doing so and the University plans to discontinue use of WebCT. Many courses use ordinary web sites developed using Microsoft FrontPage, which may also link to the various communication tools. Students in the program are located throughout the United States, the Bahamas, Germany, and Canada, and have continued to participate in courses during visits to other countries. Some on-campus students from Saudi Arabia have participated in web courses while spending the summer in their home country. During the next academic year several students are expected to spend extended periods of time in other countries, including Bosnia.

The online pathway is a full-time program that is designed to be completed within 3 didactic years followed by a year of clinical rotations. Originally, the pathway was proposed to be a 3-year condensed degree format, but the faculty felt the new method of education delivery would be too stressful for many students if given in an accelerated format. As a consequence, a 4-year degree program was instituted. All students follow this 4-year program, with no acceleration or part-time

status being allowed under normal circumstances. However, while students in the web-based pathway receive the same number of courses per year as the on-campus students, the courses are delivered over 3 semesters (fall, spring, and summer) that extend throughout the calendar year rather than in a semester academic year timeframe. This results in lower credit loads each semester and is designed to compensate for the increased time required for online communications and the increased flexibility required by the nontraditional student. In essence, a 2-semester course load is redistributed to create a third summer semester for each didactic year as shown in Table 2 and Table 3.

Students are required to attend a 5-day on-campus orientation in the summer prior to their first semester. In addition to the traditional orientation to policies and procedures, they receive intensive computer and Internet application training. The students are also provided with a self-assessment survey shortly before orientation to determine whether they need to seek additional training. Starting in Fall 2004, an elective course will be available to all students to provide additional training. The students are provided a leased Windows-based laptop with all of the software (eg, Microsoft Office, secure browser for examinations) that they will need installed and pre-configured for the Creighton network and services. The technical and student support services needed for web-based students will be addressed in a subsequent paper.

The curriculum contains 2 laboratory-based courses, namely, a course in parenteral drug products and a course in dispensing and pharmaceutical care. The early experience, communications, and physical assessment courses, along with some electives, also require some live assessments and exercises. The hands-on components of these laboratory courses are taught in a condensed format over a 1- to 2-week period of time each summer, with the didactic component being conducted online during the remaining time over the summer semester.

There were 6 early experience courses of 1 credit each within the curriculum, although this is being changed to a single 1-credit course for each of the first 2 years in the program and a 2-credit hour course in the third year. Normally, these courses were offered on-campus during each semester of the first 3 years. In the web-pathway, some of these courses have been offered in the normal academic year, with experiences obtained in pharmacy sites near the students' locations. In these cases, the students can work with the campus clinical clerkship coordinators to identify appropriate sites or may locate sites on their own based on their knowledge of their local area, which are then approved by Creighton

Table 2. Web-Based Curriculum

<b>Doctor of Pharmacy Program, Web-Based Pathway (4 years)</b>						
<b>Summer (12 weeks)</b>		<b>Fall Semester (16 weeks)</b>			<b>Spring Semester (16 weeks)</b>	
<b>Course Title</b>	<b>Hrs</b>	<b>Course Title</b>	<b>Hrs</b>	<b>Course Title</b>	<b>Hrs</b>	<b>Hrs</b>
<b>First Professional Year</b>						
Orientation	0	PHA 304 Anatomy	2	BMS 404 Physiology	4	
Computer Camp	0	BMS 301 Biochemistry	4	PTG 105 Introduction to Disease	3	
		PHA 313 Pharmacy Calculations	2	PHA 325 Dosage Forms and Drug Delivery Systems	2	
		PHA 315 Physical Pharmacy	3	PHA 444 Biostatistics & Research Design	3	
		PHA 316 Health Care Systems	3	PHA 442 Pharmacy Practice Management	3	
		PHA 329 Introduction to Drug Information & Pharmaceutical Care	1			
		<b>Total</b>	<b>15</b>	<b>Total</b>	<b>15</b>	
<b>Second Professional Year</b>						
PHA 443 Basic Pharmacokinetics	2	MIC 541 Microbiology	4	PHR 242 Pharmacology II	5	
PHA 320 Communication Skills*	2	PHR 241 Pharmacology I	5	PHA 447 Chemical Basis of Drug Action II	2	
PHA 334 Parenteral Drug Products*	3	PHA 337 Chemical Basis of Drug Action I	3	PHA 324 Nonprescription Therapeutics	5	
PHA 402 Early Pharmaceutical Care Experience I	1	Electives	3			
Electives	4					
<b>Total</b>	<b>12</b>	<b>Total</b>	<b>15</b>	<b>Total</b>	<b>12</b>	
<b>Third Professional Year</b>						
PHA 326 Patient Assessment*	2	PHA 450 Pharmacotherapeutics I	7	PHA 460 Pharmacotherapeutics II	7	
PHA 454 Pharmacy Practice Law	3	PHA 459 Immunopharmacology	2	PHA 464 Clinical Pharmacokinetics	2	
PHA 412 Early Pharmaceutical Care Experience II*	1	PHA 458 Drug Information Systems and Literature Evaluation OR	3	PHA 456 Ethics in the Health Care Professions OR	3	
Electives	3	PHA 456 Ethics in the Health Care Professions	3	PHA 458 Drug Information Systems and Literature Evaluation	3	
				PHA 422 Early Pharmaceutical Care Experience III	2	
				PHA 478 Issues in Dispensing and Pharmaceutical Care	1	
<b>Total</b>	<b>9</b>	<b>Total</b>	<b>12</b>	<b>Total</b>	<b>15</b>	
<b>Fourth Professional Year</b>						
PHA 479 Principles of Dispensing	2	PHA 5__ Clerkship #3	5	PHA 5__ Clerkship #6	5	
PHA 5__ Clerkship #1	5	PHA 5__ Clerkship #4	5	PHA 5__ Clerkship #7	5	
PHA 5__ Clerkship #2	5	PHA 5__ Clerkship #5	5	PHA 5__ Clerkship #8	5	
<b>Total</b>	<b>12</b>	<b>Total</b>	<b>15</b>	<b>Total</b>	<b>15</b>	

\*Lab component of course on Creighton University campus.

*American Journal of Pharmaceutical Education 2004; 68 (2) Article 46.*

Table 3. On-Campus Curriculum

<b>Doctor of Pharmacy Program, Campus-Based Pathway (4 years)</b>					
<b>Course Title</b>		<b>Hrs</b>	<b>Course Title</b>		<b>Hrs</b>
<b>Fall Semester, First Professional Year</b>			<b>Spring Semester, First Professional Year</b>		
PHA 304	Anatomy	2	BMS 404	Physiology	4
BMS 301	Biochemistry	4	PTG 105	Introduction to Disease	3
PHA 313	Pharmacy Calculations	2	PHA 325	Dosage Forms and Drug Delivery Systems	2
PHA 315	Physical Pharmacy	3	PHA 444	Biostatistics and Research Design	3
PHA 316	Health Care Systems	3	PHA 442	Pharmacy Practice Management	3
PHA 320	Communication Skills	2	PHA 402	Early Pharmaceutical Care Experience I	1
PHA 329	Intro to Drug Information and Pharmaceutical Care	1		Electives	2
		Total			Total
		17			18
<b>Fall Semester, Second Professional Year</b>			<b>Spring Semester, Second Professional Year</b>		
MIC 541	Microbiology	4	PHR 242	Pharmacology II	5
PHR 241	Pharmacology I	5	PHA 443	Basic Pharmacokinetics	2
PHA 334	Parenteral Drug Products	3	PHA 447	Chemical Basis of Drug Action II	2
PHA 337	Chemical Basis of Drug Action I	3	PHA 324	Nonprescription Therapeutics	5
	Electives	3	PHA 326	Patient Assessment	2
			PHA 412	Early Pharmaceutical Care Experience II	1
				Electives	1
		Total			Total
		18			19
<b>Fall Semester, Third Professional Year</b>			<b>Spring Semester, Third Professional Year</b>		
PHA 450	Pharmacotherapeutics I	7	PHA 460	Pharmacotherapeutics II	7
PHA 454	Pharmacy Practice Law	3	PHA 478	Issues in Dispensing and Pharmaceutical Care	1
PHA 456	Ethics in the Health Care Professions or	3	PHA 456	Ethics in the Health Care Professions or	3
PHA 458	Drug Information Management and Literature Evaluation	3	PHA 458	Drug Information Management and Literature Evaluation	3
PHA 459	Immunopharmacology	2	PHA 464	Clinical Pharmacokinetics	2
			PHA 422	Early Pharmaceutical Care Experience III	2
			PHA 479	Principles of Dispensing	2
		Total			Total
		18			18
<b>Summer Semester, Fourth Professional Year</b>					
PHA 5__	Clerkship #1	5			
PHA 5__	Clerkship #2	5			
		Total			
		10			
<b>Fall Semester, Fourth Professional Year</b>			<b>Spring Semester, Fourth Professional Year</b>		
PHA 5__	Clerkship #3	5	PHA 5__	Clerkship #6	5
PHA 5__	Clerkship #4	5	PHA 5__	Clerkship #7	5
PHA 5__	Clerkship #5	5	PHA 5__	Clerkship #8	5
		Total			Total
		15			15

· One half of the class will take Ethics in the Health Care Professions in the fall semester of the third professional year, and the other half will take Drug Information Management and Literature Evaluation. In the spring semester, students will take the course they did not take in the fall.  
 · The Doctor of Pharmacy degree requires nine semesters of professional course work (thirteen semesters including the two years of pre-pharmacy courses). Students are required to attend clerkship rotations during the summer prior to the last year of the program. A full semester of tuition is charged for the summer clerkship experience.

faculty using a detailed evaluation procedure that has been developed by the Early Experience faculty and Professional Experience (clerkship) Coordinators. In addition, some early experience courses are taken during the summer, with at least a portion of the work occurring while the students are on campus for laboratory courses, as previously mentioned.

With respect to clinical clerkships, the curriculum requires a total of eight 5-week clinical rotations. Five of these rotations are required and 3 are elective. Because Creighton University Medical Center is a private institution with a global mission, students are currently assigned rotations throughout the country and abroad. As a consequence, the University has over 500 contracts with clinical sites and is in the process of expanding the number and scope of sites to accommodate the additional students. Rather than simply expanding the number of clinical faculty members, it is often preferable to contract with outside clerkship sites whenever possible to be able to react to changes in geographic distribution of students from year to year. Some Creighton faculty members have been added to handle local web-pathway students and to handle needs of students that cannot be addressed in their home location. For example, obtaining the drug information rotation is often difficult, so a faculty member was added in that area and the main campus Drug Informatics Center was significantly expanded. A second Professional Experience Coordinator was hired to assist in developing new sites. Students may suggest possible sites in their area that they identified through their own activities and the Coordinator also may work to identify sites through her contacts. Sites are surveyed using the same detailed evaluation form as used in Early Practice Experience courses to assess the site resources, qualifications of preceptors, and procedures for handling of students. Currently, 3 students in the pathway reside in Canada and will likely prefer to take clinical rotations in their country. ACPE has indicated that foreign clerkships are allowable if they meet the same quality standards as other clerkships. Initial contacts with the National Association of Boards of Pharmacy (NABP), the Ontario (Canada) College of Pharmacy (the Canadian licensing agency), and some United States state boards of pharmacy indicate they appear to be willing to accept any clerkships that are considered to be in compliance with quality standards established by the individual schools.

A consistent finding with respect to web-based online learning is that teacher-student interactions increase significantly as compared with classroom-based teaching, and an estimated 50% more time is required to teach a web-based course than the same course delivered in a

classroom setting. Furthermore, because distance students are isolated, more mentoring is required for them than for on-campus student. The solution to both the increased faculty time demand and the need for mentoring has been innovatively solved with a mentoring system. One mentor per 20 students per 3 credit hours is allotted to each course to assist the faculty members, although in some courses the faculty members have determined that they require fewer or no mentors. The functions of the mentors range from serving as online teaching assistants to professionals in the field who contribute real life experiences. The qualifications of the mentors are set by individual instructors and may vary from students who have previously completed the course (eg, pharmacy calculations), to medical residents (eg, pathology), graduate students (eg, physiology), PhDs (eg, biochemistry), and pharmacy practitioners (eg, anatomy, early experience). A Mentor Coordinator position was established to work with faculty members to identify appropriate mentors, and to train faculty members, students and mentors in how to work successfully with one another in order to improve the educational experience. A second position was later established to assist with coordinating mentors and the Early Experience courses, although the allocation of time between mentor coordinators and early practice experience faculty continues to change as volume of duties change. The mentor program will be addressed in greater detail in a subsequent paper.

## **STUDENT ASSESSMENT**

One of the greatest challenges in online education is effective and reliable student assessment. The traditional method of scheduling an examination in which arrangements are made for students to show up at the same place and the same time does not work in a web-based pathway. Therefore, other methods had to be developed. In some cases, examinations are minimized through the use of graded discussions, term papers, or other projects. In other cases examinations continue to be the norm, but with some changes.

When examinations are used, they are proctored at the student's location, except in a few cases where proctoring is not used for either campus or web-pathway students (eg, Pharmacy Calculations uses a 30,000 question database to test students, who must continue to retake examinations until a sufficient level of performance is demonstrated). Approximately two thirds to three fourths of examinations for the web-based students are delivered via the QuestionMark Perception (<http://www.questionmark.com/>)

web-based examination system, although the BlackBoard (<http://www.blackboard.com/>) quiz system or hard-copy examination mailed to the student's proctor can be used. In the last case, it is necessary for student examination papers to be faxed back to the School in order for grades to be submitted on time. A toll-free fax for all of North America was installed for that purpose, although faculty members are encouraged to use electronic examination procedures, at least for the final examination. If grades are not recorded promptly because the instructors are waiting for examinations to be returned via mail, students lose the ability to be on the Dean's list and are not eligible for some scholarships. Therefore, delays in grading examinations must be avoided. QuestionMark Perception provides the ability to handle nearly any type of examination for students. The one exception is that it does not enable students to draw things, such as chemical structures.

The students are given a window of time during which they must complete an examination. This has varied from 1 hour to 1 week to any time during the course for mastery-based examinations. Early in the first semester we found that requiring all students to take the examination at the same moment, regardless of their time zone or situation, does not work well. There are many reasons for this difficulty, but common ones include the proctor unexpectedly is not available at the time necessary (eg, proctor was ill, had a death in the family, was not scheduled to be at work at that particular time, or just did not show up), technical problems at the time of the examination (eg, loss of Internet connectivity), and conflicts with the student's schedule (eg, some students were recalled to active military duty and were working their coursework around duty schedules). While nearly all students reside in North America, students may reside far outside North America, making concurrent examination times very difficult. In all cases, the duration of the examination is fixed (ie, each student may have a long window of time in which to start the examination, but then will have only a set amount of time to finish it once the examination is started).

There are 3 major areas of concern with distant assessment: ensuring the identity of the person taking the examination; ensuring that the person is not cheating; and preventing redistribution of the examination. There are some factors that mitigate these risks and some controls were put in place.

- The students are aware that they must pass the board examinations at the end of their education and training before they can practice. These are comprehensive and highly secure examinations.
- The online class is an older student group, many of whom have advanced degrees or are profes-

sionals changing careers (eg, dentist, podiatrist).

- Given the geographic dispersion of the class it might be difficult for the distant student to find a knowledgeable stand-in for an examination.
- The examination software can create a unique examination for each student by randomly selecting questions from a large question bank. For example, a nearly infinite variety of parameters can be supplied for pharmacokinetics problems. Faculty members are strongly urged to use this method and are provided with technical support to accomplish the establishment of large question banks. With a sufficiently large question bank, it does not matter if old examinations are distributed, since students trying to memorize the old examinations will end up learning the material.
- The faculty has considered implementing a comprehensive examination prior to the clinical year, but has not done so.
- Not all examinations need a high level of security. For example, timed, open book examinations do not need to be as carefully monitored, although this type of examination is rarely administered.
- For many examinations the students are required to have a proctor who either distributes the paper copy of the examination or unlocks the electronic version with a password. The proctor monitors the student during the examination and may collect it for return to Creighton when given in hard copy form. The School has very defined rules and procedures about who can serve as a proctor, but in general they are trusted members of the student's local community such as librarians, educators, law enforcement officials (eg, Royal Canadian Mounted Police), or members of the clergy. Pharmacists are currently not used as proctors due to problems experienced in the Nontraditional PharmD Pathway, in which inappropriate collusion between some of the pharmacists and students occurred. After the examination, both the proctor and student must sign a form attesting that the rules were followed and return the form to the School. In cases where there is any concern about a student/proctor relationship, a new proctor is required and the student may be specifically sent to a college examination center, with Creighton University paying for the service. Given the increased availability of examination centers since the initiation of the Web-Based Pharmacy Pathway, consideration is being given to requiring their use in all cases where they



Table 4. Comparison of On-Campus and Web-Based Students at the End of the First Semester

	<b>Campus Students</b>	<b>Web-Based Students</b>
Average QPA	3.23	3.17
Median QPA	3.32	3.30
Maximum QPA	4.0	4.0
Minimum QPA	1.56	1.7
% Dean Honor Roll	35%	31%
Students Failing a Course	12	2
Total in Class	105	51

\* Note: This table compares the first semester of the first year. Courses taken by students were identical with the exception that web-pathway students did not take the Communications Skills course.

are locally available; however, issues of payment for the use of such centers remains a question.

- To prevent printing or e-mailing examinations to other students, a secure browser was developed by the School's Office of Information Technology and Learning Resources. This browser prevents printing, screen captures, and opening unallowed applications during web-based examinations. Use of this program exceeds the security recommendations of the software manufacturer.<sup>7</sup>

Given these controls, the students in the web-based pathway appear to be accurately and fairly assessed, with few problems occurring.

Based on results to date, web-based students appear to be achieving outcomes as good as or better than those obtained by on-campus students. A brief review of letter grades received by all students, both web and campus, in all required courses from the first 2 professional years demonstrated a statistically significant difference (using Mann-Whitney U) in only 11 of 35 courses offered during that period. In 5 cases the campus students did better and in 6 cases the web-pathway students had a statistically higher grade. In 1 course that was offered to 2 class years during that period, the web-pathway students performed statistically better 1 year and the campus students performed better the next year. Interestingly, the web-pathway students in both classes performed better than campus students in the communications skills course. In nearly all classes, the examinations were identical for web and campus students. One exception was pharmacology, where the instructors have elected to write similar, but different, examinations for the classes. Also, the pharmacy calculations and basic pharmacokinetics use extremely large test banks where every student in each class receives a different set of questions on their examination. A more detailed analysis of all courses complet-

ed by web-pathway students is currently in progress and will be reported in a future paper. A different comparison can also be seen in Table 4, which is another example of data that show that results from the 2 classes are nearly identical in most regards. The one major difference in this example is the lower number of failing grades given to the web-based students. Similar results have been seen in data from other semesters that have been analyzed.

In addition to the grades, relatively few students have left the web-based pathway compared with the 21% to 23% attrition rates seen in other web-based degree programs.<sup>8,9</sup> A total of 5 web-pathway students in the first class (~9%) completely left the program. In most cases the reasons for leaving were financial or personal and not related to the web pathway. Only one student is believed to have left the pathway because of the educational method. One web-pathway student did receive failing grades in 2 courses, resulting in dismissal from the program. This was a result of not participating in class assignments and activities. At various times, students in the first class have been on leave for medical, family, or military reasons. In addition, 2 students in the first class transferred from the web pathway to the campus pathway. One student transferred because he felt that he needed the structure of the classroom to help him keep up with the material and the other student transferred in order to obtain financial aid for living expenses, which was not possible as a web student. Several other students in that first class are no longer officially considered part of that class because they have taken a leave of absence or have had some other factor that led them to be out of sequence (eg, one student had to temporarily switch to part-time status because of family obligations and has now returned as an official member of the next class). Those out of sequence students are not counted as having left the program, since they are expected to complete the program at a slightly later date. Two students have entirely switched from campus to the web pathway for family reasons. Several other campus students have requested to transfer to the web pathway, usually for family reasons, but have not been permitted to do so because they were struggling on-campus and there was concern about their ability to succeed in the web pathway or because there was no space in the web pathway program, which is capped at 60 students per class. In addition, a couple of students have made a temporary switch to the web pathway for a semester due to pregnancy, and ~6 students from the campus pathway have taken individual web classes because they were out of sequence, which caused a time conflict preventing taking the on-campus class. On several occasions a web student who lived near campus has taken

an elective class on campus when that elective was not available via the Internet.

The second class accepted into the pathway had even better retention, having lost only 2 students (3.3%) during the first academic year, one from academic difficulties and one for no stated reason. The third class lost one student (1.7%) as of midterm in their first year. That student left the program because she realized very quickly that she could not handle the self-direction required. These figures can be compared with a 6% attrition rate noted over many years from the on-campus classes.

## **OTHER POLICIES**

Several specific policies had to be developed to support the web pathway. Some policies, such as those dealing with test proctors or course mentors (ie, online teaching assistants) have previously been mentioned. One of the most important policies, from the faculty point of view, dealt with intellectual property. Initial discussions within the School ultimately spread to the entire University community. A University committee of faculty members and administrators developed an intellectual property document (<http://www.creighton.edu/President/PresOfc/FacultyHandbook/FacultyHandbook.pdf>) that satisfied the needs of the University and individual faculty members. This plan is summarized as follows and is applied to all web-based courses in the online pathway:

- If a course is developed by a faculty member on his or her own time, with minimal or no University resources, it belongs entirely to the faculty member, who can take it with him or her when he or she leaves the University. It should be noted that no courses so far developed in the web-based pathway meet these criteria.
- If a course is developed on University time and/or with University resources, the faculty member can take the course with him or herself when leaving the University, but the University also retains rights to use the material for a set period of time afterward. The faculty member can also ask to have his or her name taken off the material when leaving the University. The University will also pay the faculty member if the material is marketed to another university. This is divided into 2 levels, depending on the amount of University resources that are used.
- The University can have a separate contract, outside of the normal faculty agreement, with a faculty member to develop a course for the web. In this case, the University owns the course entirely

and the faculty member cannot take any of the material when leaving. This is mostly applicable to faculty with an academic year contract who may have a separate contract with Creighton University during the summer to develop a course that might be offered by others. No faculty members associated with the Web-Based Pharmacy Pathway fall within this category.

- Finally, faculty members are not allowed to personally take a course developed using University resources and directly market it through another university while employed by Creighton University. If the University were to allow licensing of the course material during the employment of the faculty member, there would be a sharing of income from the course, as described above.

Another policy developed for the web pathway deals with transfer between it and the on-campus pathway. The Assistant/Associate Dean for Academic Affairs is responsible for approving transfer between pathways. To date, few students have switched from one pathway to the other, as was described previously. In most cases the reasons have not been directly related to the pathway, but are more personal, family, or financial in nature. The temporary use of web-based classes for on-campus students is becoming more frequent.

## **FINANCING THE PROGRAM**

### **Start-up Funds**

Initial start-up costs for the first year prior to accepting students into the web-based pathway exceeded \$500,000. These initial costs were covered by a grant from the Institute for the Advancement of Community Pharmacy (IACP - <http://www.advancepharmacy.org/>), funds from several chain pharmacies, and the internal redistribution of funds and workloads within the School. The major expense involved salaries. Several faculty members were hired to begin planning and course development, and stipends were provided for the Director and Associate Director of the pathway. Furthermore, a part-time faculty member was hired to cover the teaching responsibilities of the Director.

Technical staff members added during the start-up year included an instructional design specialist, a programmer/webmaster, and a graphics artist, as well as secretarial assistance. Nonsalary-related expenses were associated with the purchase of file servers, other technology and computer-related hardware and software, office equipment, and general supplies, as well as the cost of marketing and advertising.

During the second year of the development of the program (first year students were enrolled), a total budget of ~1.3 million dollars was required. In addition to tuition revenues, funds from the IACP grant, as well as from the chain drug stores and drug companies, were used to meet the budget. Expenses included the addition of more faculty and staff members, as well as additional nonsalary operating expenses.

Budgets for subsequent years of the program have increased proportionately. The budget for the third year (second year of student enrollment) was approximately \$2.7 million, and the budget for the fourth year (2003–2004) was projected to be approximately \$3.5 million. As of 2003–2004 all support for the pathway (eg, faculty, staff, supplies, equipment) came from tuition. With the exception of being allowed to temporarily decrease the amount of overhead paid to the University as a whole, the program is completely self-supporting. An anticipated increase in the number of students enrolled once the Web-Based Pharmacy Pathway is fully implemented is expected to result in the additional funds necessary to pay the same amount of overhead as the on-campus pathway.

### **Tuition and Fees**

The decision was made to make the total tuition and fees for both the on-campus and web-based pharmacy pathways as nearly identical as possible in order to avoid having students choose one pathway over the other for purely financial reasons. Because the web-pathway students actually take 2 additional semesters of classes (11 vs 9 for on-campus students), the tuition rate per semester for the web-pathway students was set at 82% of the tuition costs for on-campus students.

While total fees are kept the same on an annual basis for students on and off campus, the distribution of the fees differs. For example, on-campus students have fees for use of the student center athletic facilities that are not levied on web-pathway students (the latter can use those facilities during their time on campus for a relatively small additional fee). A much larger amount of the total fees for the web-pathway students are allocated for technical support and library resources. The library has used these revenues to purchase subscriptions to additional electronic resources that are available to all University students. These additional resources are purchased with the input of pharmacy faculty members.

In cases where a student transfers from one pathway to another, their tuition and fees are adjusted during the next year so the total costs incurred by graduation are approximately the same as would have been incurred had the student remained in the original pathway.

### **Financial Aid**

An educational program is not likely to be viable unless students are able to obtain financial aid. After pursuing information regarding financial aid through officials in Washington, DC, we found that not only is financial aid available to students enrolled in a web-pathway program, but it would be illegal not to offer them that aid. The only major difference between financial aid to on-campus and web-pathway students is that the web-pathway students can receive aid for living expenses only for the time that they are on campus. Therefore, while the web-pathway students cannot get aid for living expenses for most of the year, they can obtain it for the period of time each summer that they spend on campus to complete the laboratory courses. This difference is believed to be insignificant by the University's Office of Financial Aid, since students usually receive their maximum amount of financial aid even without receiving aid for living expense. Nevertheless, financial aid for living expenses was the reason why one student switched from the Web-based Pharmacy Pathway to the traditional pathway.

### **OUTSOURCING**

The School of Pharmacy and Health Professions is part of the Health Sciences division of Creighton University. In an effort to promote interprofessional education and prevent unnecessary duplication, the School purchases specific courses from other schools in Health Sciences. In particular, the School purchases courses in biochemistry, physiology, pharmacology, pathology, and microbiology from the School of Medicine. This process has been used for a considerable period of time on campus, with the faculty of the School of Medicine teaching the courses and funds being transferred to compensate the School of Medicine for the service. This arrangement has been extended to the courses in the web pathway. The same faculty members are generally used to teach the courses in both pathways, although in team-taught courses there may be a different member of the team who is the official instructor of record on campus than for the web pathway. In addition to the transfer of funds, the Pharmacy Program provides the School of Medicine faculty with the same training and technical support as the pharmacy faculty. As an added benefit to the School of Medicine, their faculty members can use the material developed for either the web-based pharmacy pathway or the on-campus pathway for classes taught to medical, nursing, or other health science students.

Agreements have been investigated to provide a bi-directional exchange of courses between pharmacy

schools. This would allow faculty members who teach an unusual subject to teach students at other universities. For example, Creighton University Medical Center offers a course on Veterinary Pharmacy as a web-based elective. Other schools can contract with Creighton to have their students enrolled in the course. In addition, other schools may be able to provide courses that are not currently available at Creighton.

A great deal of interest has been expressed from individuals from other schools and colleges of pharmacy to have individual students take web-based courses when those students are put in a situation that would take them out of the normal sequence of courses in their own university. These students are considered on a case-by-case basis.

While the School does not currently hire web-based faculty who reside far from the School, this is a possibility that the School is willing to consider. In addition, the School may hire or contract clinical faculty members who reside hundreds or thousands of miles from campus, but are near a concentration of web-based students in order to provide clerkship training.

## **DISTANT PARTICIPATION IN CAMPUS ACTIVITIES**

Web-based students can and are considered for membership on the same committees as on-campus students (eg, Curriculum, Admissions, Grade Appeals). The bylaws for the Pharmacy Program Assessment, Admissions, and Curriculum Committee specify that there will be one student each from the web and campus pathways. In addition, one web-based student sits on the Web-Based Pharmacy Pathway Steering Committee. On some committees, such as Strategic Planning and Implementation, there may be only one student representative allowed from any program (the School has 3 programs: Pharmacy, Occupational Therapy, and Physical Therapy), therefore, the student could be from any entry-level pathway. In the case of the web-pathway students, it is sometimes necessary to have a conference call phone in the meeting and to provide handouts electronically. In some cases, web-pathway students live close enough to commute to campus for meetings.

Students enrolled in the web pathway are eligible for membership in student organizations. Each of the organizations has differed in their acceptance of web-pathway students. Initially, the various organizations responded with varying degrees of enthusiasm to web-based students. In several cases, discussions concerning eligibility were held at the national level, and bylaws or policies

and procedures had to be changed. Over the past several years, changes have occurred whereby all major national pharmacy-related organizations now accept web-based students. While web-pathway students are generally eligible for membership in student organizations, it is mainly web-pathway students who live near campus who most often join these organizations. Those students have been very active in some organizations. For example, a web student was in charge of organizing, preparing, and displaying the students' poster at a meeting of the American Pharmacists Association. Also, a web student is currently president of the local chapter of Rho Chi; this is the second time a web student has held that office.

With respect to student government, the web-pathway classes all have typical class officers (ie, president, vice-president, secretary, and treasurer). Although they are considered a separate class from the on-campus class of students within the governing structure, they have an equal voice in student government.

## **PROMOTING THE PROGRAM**

### **Educating Faculty, Students, and Alumni**

Questions and concerns have been raised regarding the ability to educate and train a pharmacist using web-based technology. The impression of some individuals is that you cannot possibly teach students to be pharmacists in this manner due to the hands-on nature of traditional pharmacy education. Many individuals are misinformed and assume that the entire educational process is web-based. This is not the case. Only didactic classes are provided over the Internet, while laboratory classes and clerkships are offered via more traditional methods. However, because of the misperceptions, the first people needing education about the new pathway were the faculty members and students already enrolled in the School. A general perception was that this pathway would somehow cheapen the degree, would not be as rigorous, and would make it much more difficult for students to obtain employment after graduation. The solution, for both groups, was to improve communications and make more information available.

In the case of the faculty members, a great deal of discussion was held during both regularly scheduled and special faculty meetings. As previously mentioned, nearly the entire faculty was put onto Task Forces that addressed specific issues. In addition, all meetings of the Steering Committee have been open for faculty participation. Furthermore, all documents were opened for faculty review. Faculty members have been and continue to

Table 5. Demographics of Applicants to Web-Based and On-Campus PharmD Programs

	2003		2002		2001	
	Web	Campus	Web	Campus	Web	Campus
Applications	427	715	252	493	112	410
Admitted	78	194	88	228	72	229
Enrolled	60	110	60	111	54	102
Average GPA	3.4	3.47	3.31	3.36	3.18	3.21
Gender						
Male	20 (34%)	36 (33%)	19 (32%)	36 (32%)	22 (41%)	39 (38%)
Female	40 (66%)	74 (67%)	41 (68%)	75 (68%)	32 (59%)	63 (62%)
Previous Degree	44 (73%)	37 (34%)	31 (52%)	36 (32%)	34 (63%)	40 (39%)
Average Age	32	23	31	25	34	26

be encouraged to bring up all concerns so that the issues can be addressed.

With respect to student issues and concerns regarding the web pathway, all classes and organizations were requested to submit any questions or concerns to the Director of the Web-Based Pharmacy Pathway in preparation for a student town hall meeting. At that meeting the new pathway was described and the Dean, pathway director, and others answered both the previously submitted questions and new questions that arose. A document summarizing the answers to all questions was later prepared and distributed via e-mail to all students. In addition, meetings were held with concerned students and student organization representatives, during which questions were addressed. As a consequence, many student concerns were allayed and a variety of issues were identified that needed to be addressed in the new pathway. As the new pathway was implemented, an increasing interchange of information between students in the 2 pathways occurred, which led to greater acceptance of the web-pathway students by those enrolled on campus.

Alumni were also informed of the pathway via various publications. In some cases, the alumni felt concerned enough to call and discuss the matter. In one case, an initially unhappy alumnus changed his opinion to the extent that he wanted to teach in the new pathway and he has encouraged individuals to apply to the web-based pathway. The key to understanding the pathway is the provision of as much information as necessary and the willingness to address all questions.

### Advertising

In addition to normal admissions materials, the School put advertisements on Web sites, such as Gradschools.com, and in the newspaper *Stars and Stripes* to attract military spouses, since there might be a pool of potential applicants who could not attend traditional programs due to regular relocation. Sending

advertisements directly to groups that might be interested in career changes was explored, and the School eventually bought distribution lists from various organizations. Press releases were sent to pharmacy journals and news organizations, since this was the first pathway of its kind. An article about the program appeared in *Drug Topics*, which reached a great number of pharmacy technicians, resulting in 115 calls the first day after it appeared.

Information about the pathway has been presented at various state and national pharmacy organization meetings to educate practitioners, educators, and others. The Creighton student affiliate of APhA also presented information at their national convention, with the first web-based class volunteering to fund one of their members to attend the meeting and present information.

Overall, the number and quality of applications increased the second year. In the third year the number of applications increased more than 100% from the previous year, and included a large number of extremely well-qualified applicants. See Table 5 for applicant demographic information.

### PROGRAM REVIEW AND QUALITY CONTROL

A major concern of everyone involved in the implementation of this new pathway was that it produce educational and professional outcomes similar to those seen in the traditional on-campus pathway. In order to assure this, various groups were charged with overseeing the assessment of the pathway. Whenever possible, these assessments were integrated with other School program assessment and improvement activities.

### Internal Committees

As previously mentioned, a steering committee was established to oversee development of this pathway, as were numerous task forces (Table 1). The existing school

committees that were most involved with the establishment of the pathway were the Curriculum Committee, Admissions Committee, and Pharmacy Program Assessment Committee. Since integration of the pathway into existing administrative structure was desired, these committees worked to ensure that existing policies and procedures were appropriately modified where necessary.

Mostly under the oversight of the Web-Based Pharmacy Pathway Steering Committee, with the cooperation and participation of other appropriate committees and groups, the following have been or will be assessed for comparison with the on-campus pathway:

- Orientation appropriateness and effectiveness (student survey). This has resulted in changes to the orientation, such as the addition of material on time management and training in the use of Microsoft Excel.
- Student communication skills (evaluated during orientation to determine need for remedial English language training). This evaluation consists of a conversation with a faculty member using a standardized form. If the faculty member has any concern about communication skills, whether about the student's accent or their comprehension, the student is referred for a professional language evaluation, which will determine the need for specific interventions.
- Admissions (methods to establish formatively and summatively the effectiveness of various procedures in recruiting and accepting quality students). This has resulted in the changes to admissions procedures that were previously described.
- General formative student opinion (online surveys and focus groups while on campus). This has resulted in numerous changes to the program, particularly in regard to the way orientation and on-campus sessions are organized. Overall, the students have been very pleased, with the vast majority giving the pathway high ratings. The second incoming class ratings were even better than the first class, which is to be expected because of the improvements that were made based on the experiences during the first year of the pathway. Details of these surveys are expected to be published in a later paper.
- Student course performance (so far showing similar performance, as previously described).
- Computer skill survey. Students receive a survey that enables them to evaluate their skills to deter-

mine any need for remedial training during orientation or later.

- Course review. Groups were established to evaluate course Web sites and suggest improvements.
- Mentors. Survey of students, mentors, and faculty members about how to improve mentor use. This will be covered in detail in a future paper.
- Curriculum. The Curriculum Committee established forms and procedures to assure that the on-campus and web-based courses offer the same outcomes. Evaluations are conducted at least once per year.
- Faculty and staff satisfaction surveys. Overall, satisfaction has improved; however, faculty members still feel that they have an excessive teaching load as of Fall 2003. A retreat was scheduled to address issues that had been raised.
- Clerkships. Ongoing procedures to evaluate the quality of individual clerkship sites. Since any student, whether enrolled in the on-campus or web-based pathway, can use the same sites, these procedures are not specific to the web-based pharmacy pathway.
- Financial support. Regular evaluation of this factor is essential to ensure financial viability as well as to assess the impact on the entire School. This will continue.

The assessment of the above factors has already resulted in improvements being implemented in orientation and in various classes (eg, Web sites, course assignment expectations). While it is still early in the program development process, in general the outcomes of individual classes so far have been comparable between the web and on-campus students. More detail will be presented in future papers describing individual areas.

### **Accreditation**

A major area of focus related to program assessment when establishing this new pathway has been accreditation. Creighton University falls under 2 organizations for accreditation purposes. The Higher Learning Commission of the North Central Association of Colleges and Schools accredits the University as a whole as well as individual degree programs, and the Accreditation Council on Pharmacy Education (ACPE), which was formerly known as the American Council on Pharmaceutical Education, accredits the pharmacy program.

A report providing extensive documentation was submitted to the North Central Association of Colleges and Schools informing them of the intent to establish a

web-based pharmacy pathway. Interestingly, although they appear to have put a great deal of thought and effort into distance pathways,<sup>10,11</sup> their response was a simple acknowledgment of the new pathway, and a comment that nothing further was needed at that time. The School has established a good working relationship with the North Central Association of Colleges and Schools due to the development of various degree programs and web-based pathways.

The ACPE's interest in the new pathway was much more intense. After informing ACPE of the School's intention to establish the pathway, the Dean and either the Director of the pathway or the Director of the Office of Information Technology and Learning Resources appeared at the next 3 meetings of the ACPE Board of Directors to provide information and answer questions. ACPE requested a detailed report by December 1, 2000, covering how the new pathway affected the information presented in the 1999 Self-Study report. Focused Site Visits were conducted by the ACPE in April 2001 (~4 mo before the first web-based students started), November 2001 (~3 mo after the web-based students started), October 2002, and November 2003. Various groups and individuals, such as the Steering Committee, School administrators, faculty members, students (both on-campus and web), and others were interviewed at these times.

As visits from ACPE representatives have progressed, the focus has changed from items specific to the web pathway to issues more general to the School, such as the institution of program assessment processes and their integration with the Curriculum Committee functions, faculty workloads, and student satisfaction. As of January 2003, the action items in the ACPE report consisted of assurances that action items continued to remain on track and that the School continued to meet the timelines that had been set. The January 2004 report was the same, requesting only that information be included in the normal full self-study that is performed near the end of the 6-year accreditation cycle. The expected focused site visit in 2004 was cancelled, since there were no significant problems noted during the fall 2003 visit and the normal full accreditation visit is due in the Spring of 2005. The ACPE's general concerns about distance education pathways have been published elsewhere<sup>12</sup> and those concerns were very clearly reflected in the experiences described in this article.

A plan was developed and followed from the early stages of the Program to nearly double the size of the Program's faculty by the time the Program is fully in place. Faculty recruitment for courses typically takes

place ~6 mo prior to the offering of a particular class. To date, ~25 FTE faculty members have been hired in conjunction with the expanded teaching load associated with the pathway. In addition, ~12 staff members have been added, 8 of whom are associated with the Office of Information Technology and Learning Resources. A few additional faculty members are expected to be hired in the next year or so to accommodate clerkship needs. In some cases, these are shared positions with nearby hospitals. Most clerkship needs are expected to be met by contracting with outside sites in order to have flexibility in clerkship locations from year to year. However, the School's clerkship capacity is expanding in such required areas as drug information, due to the difficulty in obtaining sites elsewhere, and in other practice areas to address the number of web-pathway students near the University.

In order to ensure the success of the program, ACPE requested that class size remain at ~50 students until the first class graduates. The School agreed to do so by accepting no more than 60 students in each class, recognizing that projected attrition would decrease the number of graduating students to ~50. The size of the first class is now 45 students, with the 2 succeeding classes at 58 and 59 students, respectively.

Overall, ACPE has treated all pathways to the PharmD degree (on-campus, web-based, and post-BS nontraditional pathways) as one degree program. They have acknowledged on all occasions that the School is accredited for a full, 6-year interval, as it was before instituting the new pathway.

### **Boards of Pharmacy**

In general, the School has only dealt with Boards of Pharmacy indirectly. Students in the web pathway are required to obtain intern permits for both their permanent location and from Nebraska upon entering the program or as soon as the state allows (eg, a state may require successful completion of the first year of a pharmacy program before issuing such a permit). The students have therefore dealt with Boards of Pharmacy in over half of the United States and in Canada. While some Boards of Pharmacy have requested further information from the School about the web-based pathway and documentation that this is an ACPE-accredited program, all have accepted the pathway without a problem.

### **OUTSIDE SERVICES**

Much of this paper has dealt with the provision of educational services to web-pathway students. However,

students on campus are provided many other services. Some of those services are not directly applicable to web-pathway students, such as the provision of the Student Center with its exercise facilities. Web-pathway students can use such facilities when on campus, but as previously noted, are not assessed fees for services not used. Other services, such as student health, are obviously necessary for web-pathway students, and the School is required to provide or arrange for the provision of comparable services for web-based students in their home locations.

The University must provide some services to students, such as those provided by the Counseling Center. In some cases the services, such as providing advice on how to be a successful student, are provided via the web. However, counseling services that require professional licensing must be contracted for by the student at their home location or the student must travel to campus as Creighton University's counselors are licensed to practice only in Nebraska.

Services required by the American Disabilities Act are also provided in a distant manner. For example, the duration of web-based examinations is extended for some students with disabilities. In at least one case, a student with a hearing problem needed to have notes transcribed from streaming audio, a service which was done by the University until the student obtained a hearing aid. This had a side benefit in that such transcripts could then be provided to other students with minimal additional effort.

Lack of English language skills in some students for whom English is a second language can also be a problem. All students in the School are assessed for language skills during orientation, whether English is their primary/only language or a second language. Faculty members perform initial screening tests using a standardized interaction script, then any students with questionable communication skills are referred for professional evaluation. The School will work with those students in the web pathway needing remediation in obtaining services in their home location; however, so far this has not been necessary. There were 5 students in the initial class, one student in the second class, and no students in the third class who were referred for professional evaluation, but it was determined that none of these students required professional remediation.

A problem discovered early in the pathway was the ordering and delivery of books. Students were not able to obtain textbooks easily. A system was established to get the required book lists and number of students to the University bookstore manager well in advance of the

normal schedule. This allowed early ordering of books. The books were then packaged and shipped as a whole to students well in advance of the beginning of the semester. The students found the system to work much better. Additional problems have occurred due to turnover of bookstore management and confusion of faculty members who do not think they need to provide separate information to the bookstore on book requirements for their on-campus and web-based students. Students may still purchase books from online vendors, such as Amazon.com, as they desire. However, a disadvantage is that some textbooks purchased through the University bookstore provide online codes to access publisher Web site material that is not available other than through the University bookstore. In this case, the students must obtain the reference from the Creighton University bookstore.

One of the key benefits of attending Creighton University is the institution's Jesuit heritage. To allow web-based students to experience this heritage, campus ministry has established a Web site (<http://www.creighton.edu/CampusMinistry/>) that provides services, such as online spiritual retreats. These online services are now available to others in addition to our students and are well received. The Jesuit community is also involved with orientation while the students are on campus.

Computer support must be available and is provided to students at a distance since their education relies heavily on this connection to the University. In addition, reliable availability of campus computer resources is necessary. As a result, this web-based pathway, and other web-based pathways within the School, are requiring the University as a whole to expand its capabilities. Details about technical support will be discussed in detail in a separate paper. Some information about the School's Office of Information Technology and Learning Resources may be found at [http://pharmacy.creighton.edu/spahp/it\\_help\\_desk/overview.asp](http://pharmacy.creighton.edu/spahp/it_help_desk/overview.asp).

Library services are easily available to students on campus, but are a major concern for web-pathway students. Drug information faculty members have worked closely with the Health Sciences Library (<http://www.hsl.creighton.edu>) to provide numerous textbook, database, and journal resources online. Although these services have improved dramatically, some resources are not yet available in electronic format. When necessary, students can obtain copies of articles or book pages through the interlibrary loan service. The copies are provided in electronic format (ie, pdf file), which are "picked up" from the library Web site. The library also employs a copyright librarian who assists



faculty members in obtaining copyright permission for materials used in courses. This position is co-funded by the School and the Library.

On-campus students at Creighton University have access to a writing center in the English Department (<http://mockingbird.creighton.edu/english/writcen.htm>). This center can evaluate their papers and help them with their writing skills. The School funds a portion of a position in the Writing Center to provide these services via electronic means for web-based students. Students are invited to submit their papers to the Center for evaluation. Interchange between the Center and student takes place via e-mail. Student evaluations have shown that this is a useful, good quality service.

## **FUTURE DIRECTIONS**

The availability and sequencing of online courses, which makes many of the courses available during semesters in which they would not normally be offered, has been beneficial to on-campus students as well. Students can sometimes repeat failed courses without having to wait a year for the course to be offered again or take higher course loads to expeditiously complete the program. This is an advantage that has already been offered to students at other institutions.

Many other cooperative possibilities exist. Schools that do not have a particular faculty expertise, or have faculty members on sabbatical or with long-term illnesses, could offer online courses to fulfill these needs. Faculty members with an expertise that is not generally available or for which courses would not attract enough enrollment at a single institution to justify development could offer courses online to a national audience in a cooperative arrangement. Partnerships with other institutions are being explored.

The technical limitations of providing online education within other countries are also being explored. For example, the pathway has military personnel or their spouses who have been required to live for periods of time on foreign soil. The possibility of partnering with foreign institutions exists.

Newer technologies that would provide better and more efficient education services are being investigated. In particular, streaming media is seen by both faculty members and students as a definite area to be pursued.

## **SUMMARY**

Creighton University School of Pharmacy and Health Professions has initiated a web-based (assisted) entry-level Doctor of Pharmacy pathway. A large grant

from the Institute for the Advancement of Community Pharmacy (IACP) greatly aided the School in planning and initiating the pathway. Parity between the educational outcomes of the on-campus and online pathways has been a basic tenant of the faculty in establishing the web-based pathway. Furthermore, based on accreditation, comparable outcomes are expected. The faculty and staff have had to address numerous pedagogical, organizational, infrastructural, and philosophical issues. Of necessity, each issue must be addressed with an open mind and a creative spirit and on a case-by-case basis. The faculty members, with excellent staff assistance, have methodically and constructively sought solutions to the seemingly endless list of issues.

Several very positive outcomes have been achieved. The required assessments for the web-based pathway have resulted in better assessment of the on-campus pathway. Continuous adjustments in technology and course delivery are essential as we continually strive to optimize the learning environment. Furthermore, lessons learned with respect to the use of technology in teaching web-based students have resulted in better application of technology to on-campus students. Based on assessments over the first 2 and one half years of the pathway, comparable educational outcomes were achieved for the 2 pathways. However, several questions remain and can only be addressed over time. Longitudinal studies will need to be continuously conducted throughout the remaining education of the students, as well as upon graduation and into subsequent years of practice. These assessments will provide in depth information that will further aid in achieving the desired outcomes.

The pathway has offered a unique opportunity for many individuals to seek a pharmacy education who for various reasons would not have been able to translocate to a city with a school or college of pharmacy. As a consequence, the program has reached a new pool of applicants and students.

In general, the faculty and staff have risen to the challenges that have been presented, and have developed and designed a web-based pathway that is practical, can accomplish the goals and objectives set forth, and appears to be meeting the prerequisite expectations.

## **ACKNOWLEDGEMENTS**

The authors would like to acknowledge the following organizations and companies for their support, which contributed to the establishment of the Web-Based Doctor of Pharmacy Pathway: Institute for the Advancement of Community Pharmacy, Longs Drugs,

*American Journal of Pharmaceutical Education 2004; 68 (2) Article 46.*

Walgreens, CVS/pharmacy, Becton, Dickinson and Co, Eckerd, ShopKo, and Astra Zeneca.

**REFERENCES**

1. Implementing effective change in meeting the demands of community pharmacy practice in the United States. *Infusion*. 1999;5(Nov):43-8.
2. Gebhart F. Steady, not stellar, growth marked the pharmaceutical market last year. *Drug Top*. 2002;6:25.
3. Knapp DA. Professionally determined need for pharmacy services in 2020. Available at: [http://www.aacp.org/Docs/MainNavigation/Resources/4634\\_needsconferencefinalreport.pdf](http://www.aacp.org/Docs/MainNavigation/Resources/4634_needsconferencefinalreport.pdf). Accessed May 20, 2003.
4. DiPiro JT. The virtual university—Higher education ‘on-line’. *Am J Pharm Educ*. 1999;63:170-174.
5. Ukens C. Pharmacy schools become the new growth industry. *Drug Topics*. 2001;5:40.
6. Hunter TS, Deziel-Evans L, Marsh WA. Assuring excellence in distance pharmaceutical education. *Am J Pharm Educ*. 2003;67:Article 94.
7. Shepherd E, Kleeman J, Phaup J, Fair K, Belton M. Delivering computerized assessments safely and securely. Stamford, Conn: QuestionMark Corporation, 2003.
8. Terry N. Assessing enrollment and attrition rates for the online MBA. T.H.E. Journal. Available at: <http://www.thejournal.com/magazine/vault/A3299.cfm>. Accessed December 12, 2003.
9. Kemp WC. Persistence of adult learners in distance education. *Am J Distance Educ*. 2002;16:65-81.
10. Best practices for electronically offered degree and certification programs. Available at: [http://www.ncahigherlearningcommission.org/resources/electronic\\_degrees/Best\\_Pract\\_DEd.pdf](http://www.ncahigherlearningcommission.org/resources/electronic_degrees/Best_Pract_DEd.pdf). Accessed November 11, 2003.
11. Statement of commitment by the regional accrediting commissions for the evaluation of electronically offered degree and certification programs. Available at: [http://www.ncahigherlearningcommission.org/resources/electronic\\_degrees/CRAC\\_Statement\\_DEd.pdf](http://www.ncahigherlearningcommission.org/resources/electronic_degrees/CRAC_Statement_DEd.pdf). Accessed November 11, 2003.
12. Chung UK. Maintaining quality pharmaceutical education in the digital age. *Am J Health Syst Pharm*. 2003;60:943-946.