INSTRUCTIONAL DESIGN AND ASSESSMENT

Use of Online Modules to Enhance Knowledge and Skills Application During an Introductory Pharmacy Practice Experience

Valerie Ruehler, PharmD, Cameron Lindsey, PharmD, Maqual Graham, PharmD, and Linda Garavalia, PhD

University of Missouri-Kansas City School of Pharmacy, Kansas City, MO

Submitted September 28, 2011; accepted December 11, 2011; published May 10, 2012.

Objectives. To implement and assess the effectiveness of online instructional modules to increase the consistency of learning outcomes related to students' patient-care practice knowledge and their skills application and confidence across introductory pharmacy practice experience (IPPE) sites.

Design. Twenty online modules were created to provide uniform delivery of instructional content that complemented classroom instruction and to introduce students to common pharmacy-practice skills in the patient-care arena.

Assessment. Quantitative data were collected by means of a survey and pre- and post-module quizzes, which were completed by students to assess knowledge. More than 85% of students applied the IPPE skills. During the course, students' confidence increased significantly in all areas. For all but 1 of the 13 competencies, more than 70% of students agreed or strongly agreed that the competencies were met.

Conclusions. Online instructional modules in patient care can effectively increase students' knowledge, skills application, and confidence, and improve the consistency of achieving outcomes for instructional content and activities across diverse practice settings.

Keywords: introductory pharmacy practice experience, curriculum, Internet, patient care

INTRODUCTION

Guideline 14.4 of the 2007 Accreditation Council for Pharmacy Education (ACPE) Standards states that introductory pharmacy practice experiences (IPPEs) should begin early in the curriculum, interface with classroom coursework, and continue in a progressive manner throughout the first 3 years, until student pharmacists begin their advanced pharmacy practice experience (APPE). With this change to the standards, pharmacy students have the opportunity to assume direct patient-care responsibilities and learn to provide patient-centered care early in the curriculum.¹

At the University of Missouri-Kansas City (UMKC) School of Pharmacy, the 5-year doctor of pharmacy (PharmD) program involves 2 sites and enrolls approximately 125 students per year. As a required course in the IPPE, students complete Health Assessment & General Medicine I, which provides a continuum of patient-care activities throughout the fourth year. Students spend a full academic year (fall and spring semesters) working with

full-time faculty members in a patient-care setting. This course requires a minimum of 160 contact hours (80 per semester). Emphasis of study is on the care of patients with common illnesses such as obesity, hyperlipidemia, hypertension, diabetes, heart failure, asthma, chronic obstructive pulmonary disease, infectious disease, and depression. As is typical for experiential learning, preceptors were given broad objectives and wide latitude to facilitate student achievement of the learning outcomes. Students were expected to be directly involved in providing patient care and improving rational drug therapy in a practice environment. Because the IPPE is closely tied to pharmacotherapy coursework, students must be concurrently enrolled in Pharmacotherapy and the IPPE. Students who do not successfully complete any portion of either the classroom lecture or experiential course must repeat both courses.

There are inherent challenges in maintaining consistency across pharmacy practice experiences. In this IPPE, course and preceptor evaluations along with individual student feedback have raised concerns, including disproportionate time spent at the practice site and/or with preceptor-guided activities, disparity in time spent on patient-care activities, and broad variability in the application of practice skills. The lack of structure in content delivery and skill application to achieve the learning objectives may have contributed to student perceptions of inconsistency across practice sites. To further explore

Corresponding Author: Maqual Graham, PharmD, Associate Professor of Pharmacy Practice and Administration, University of Missouri-Kansas City School of Pharmacy, Division of Pharmacy Practice and Administration, 2464 Charlotte Street, 4250 Health Sciences Building, Kansas City, MO 64108. Tel: 816-235-6819. Fax: 816-235-6008. E-mail: grahammr@umkc.edu

these perceived problems, a satisfaction survey was administered to students completing the IPPE in 2007. The results showed inconsistent content delivery for skill-based learning outcomes and variations in experience among preceptors across practice sites.

To address the potential weaknesses identified, an ad hoc committee of pharmacy practice faculty members modified the course design by adding online modules. The committee felt that this modification would be a more learner-focused method of delivering content that would allow for greater flexibility in instructional time and pace and provide an efficient method of review for students who demonstrated poor understanding of the material on the post-module quiz or in the practice setting. This report describes the development and instructional effectiveness of this IPPE innovation.

DESIGN

Twenty online modules were developed and incorporated as a component of the IPPE to increase the consistency of instructional material delivery; facilitate common learning outcomes across practice sites; and enhance students' knowledge, application of practice skills, and practice-skill confidence. These modules were designed as a complementary instructional tool to help bridge the gap between classroom learning and practical application of knowledge and skills in the patient-care setting. Appendix 1 presents a curricular map delineating how these modules support the 13 course competencies assessed throughout the longitudinal experience.

Capitalizing on existing resources was essential to the success of the innovation. Blackboard (Blackboard Inc., Washington, DC), UMKC's course-management system, was used to create a central site that enrolled all students and course instructors and housed all of the modules, videos, and associated quizzes and exercises. The designers of the instructional model anticipated that students would need to spend approximately 2 hours per week completing the online modules to adequately prepare for applying their knowledge and skills at their practice sites.

Eighteen of the modules included pre- and post-module quizzes to track acquired knowledge. Because students received their scores immediately after completing a module quiz, they were able to reflect on their learning and determine if further review of the material was necessary. Students were allowed to review the module content and take the quizzes as many times as needed to master the content. Instructors could readily use these scores in conjunction with the students' practice-site performance to determine if supplementary instruction was necessary. If deficiencies were identified, the preceptor could suggest additional instructional modalities related to the deficit,

such as further review of a specific online module(s), supplementary readings, and additional practice in the application of skills needing improvement. The 2 modules that did not include a pre- or post-quiz (Conducting a History and Physical and Multidisciplinary Patient Interview) were designed to prepare students for a specific practice-site activity. The process used to determine health-assessment module topics and content included administration of a survey instrument soliciting faculty and preceptor stakeholder opinions about which health-assessment skills future pharmacists should have in order to provide contemporary patient-centered care in the pharmacy practice setting.

Based on the survey findings, a series of 4 health-assessment modules were created, covering the following topics: vital signs; head, eyes, ears, nose, and throat; cardiac, pulmonary, gastrointestinal, and vascular assessments; diabetes foot examination; neuromuscular assessment; and finger stick, intramuscular, and subcutaneous drug administration. Because of the complex nature of this new content, all sites were equipped with a standardized evaluation checklist to ensure mastery of skill application. A checklist rubric was devised to increase inter-rater reliability and provide consistency of assessment across practice sites (rubric available upon request from the corresponding author). Students were required to complete all health-assessment modules and have their skills validated by the end of the first semester so they could continue applying and honing these skills throughout the experience. This project was approved by the UMKC Social Sciences Institutional Review Board.

EVALUATION AND ASSESSMENT

Online modules were implemented in part to ensure consistent delivery of the same instructional content to all students across practice sites. The consistency of learning outcomes was facilitated by allowing students to complete the modules at their own pace and with as many opportunities for review as necessary to master the material. Completion of the modules required appropriate time management, adequate preparation, and self-learning on the part of the student. These professional attributes were assessed in the overall evaluation instrument (available upon request from the corresponding author). Gains in knowledge were computed as the difference in post-module quiz scores minus pre-module quiz scores. Pre- and post-module quizzes were identical and included a range of 5 to 15 questions. Course instructors reviewed the quiz scores, considered each student's application of the module content at the practice site, and determined if knowledge had been mastered or if further instruction was necessary.

Although quiz scores did not contribute to the calculation of a final course grade, students were required to

demonstrate sufficient skill in applying the module content in the practice setting in order to pass the course. Quiz scores for students enrolled in the course during the 2008-2009 and 2009-2010 school years were entered into Predictive Analytics SoftWare (PASW), version 18 (Predictive Analytics, Chicago, IL) for statistical analysis and evaluated using a paired Student *t* test. Scores for each student were summed and pooled for the 2 years. Pre- and post-IPPE module scores demonstrated significant improvement for all modules ($p < 0.001$).

To determine if knowledge gained from module instruction was applied in the pharmacy practice setting, students in each year of the study responded to a post-IPPE survey instrument. Participation in the survey was voluntary but highly encouraged as a component of the course. The survey instruments were administered online via SurveyMonkey.com (SurveyMonkey, Palo Alto, CA), which allowed for anonymous student responses. Average response rates for 2008-2009 and 2009-2010 were 96.9% and 83.4%, respectively. Students were asked to report the degree to which they were able to apply the knowledge gained from the module activity at their assigned practice sites, using a 4-point Likert scale ranging from 1 = very much to 4 = none. Pooled responses for both years are presented in Table 1.

Credit for the course was determined using the IPPE Evaluation Tool, an instrument that allowed for student self-assessment and faculty evaluation. Because the IPPE

Evaluation Tool was completed by the students first, preceptors considered self-assessed information when conducting their evaluation. This formative evaluation was completed after the first semester or first 80 hours of the IPPE. The final evaluation was completed at the end of the second semester. Successful completion of the course allows students to matriculate to the next year of study. When assessing data for the enhanced IPPE, 1 student did not matriculate because of inadequate performance, but overall, the matriculation rate remained consistent to that prior to implementation of the innovation.

At the beginning of the course and again upon course completion, student self-confidence was evaluated through self-reported ranking of confidence level for each of the 12 skills the IPPE was expected to foster. The survey instrument used a 4-point Likert scale ranging from 4 = very confident to 1 = not confident. Descriptive statistics are presented in Table 2. A total confidence score for the 12 skills was calculated pre- and post-course to derive a global confidence score for both years. A correlated *t* test was conducted using PASW to evaluate differences between the combined pre- and post-IPPE confidence scores ($p < 0.001$).

Students were asked on the postcourse survey tool how well the course fulfilled the 13 course competencies, with response selections provided on a 5-point Likert scale ranging from 1 = strongly agree to 5 = strongly disagree. Results for both years were pooled; response frequencies are reported in Table 3. Students were asked

Table 1. Pharmacy Student Responses^a Regarding Application of Module Information at Practice Sites (N = 190)

Module Title (No. of responses)	Degree to Which Students' Applied Knowledge Gained From Modules			
	Very Much, No. (%)	Somewhat, No. (%)	Very Little, No. (%)	None, No. (%)
Health assessment	46 (24.2)	84 (44.2)	43 (22.6)	17 (8.9)
Conducting a patient interview	61.0 (32.1)	97.0 (51.1)	24 (12.6)	8 (4.2)
Documenting patient inventions	51 (26.8)	94 (49.5)	35 (18.4)	10 (5.3)
Reviewing the medical record: inpatient and ambulatory care ^b	78 (41.3)	90 (47.6)	18 (9.5)	3 (1.6)
Interpreting laboratory values and performing calculations	92 (48.4)	82 (43.2)	13 (6.8)	3 (1.6)
Patient case presentations skills	60 (31.6)	100 (52.6)	25 (13.2)	5 (2.6)
Drug-related problems	86 (45.3)	90 (47.4)	13 (6.8)	1 (0.5)
Conducting a history & physical	37 (19.5)	84 (44.2)	43 (22.6)	26 (13.7)
Health literacy ^b	36 (19.0)	86 (45.5)	57 (30.2)	10 (5.3)
Drug-drug interactions	70 (36.8)	96 (50.5)	19 (10.0)	5 (2.6)
Cultural Competency	40 (21.1)	87 (45.8)	48 (25.3)	15 (7.9)
Multidisciplinary patient interview	34 (17.9)	92 (48.4)	49 (25.8)	15 (7.9)
Communications skills	69 (36.3)	87 (45.8)	28 (14.7)	6 (3.2)
Health disparities ^b	35 (18.5)	95 (50.3)	45 (23.8)	14 (7.4)
Ethical decision-making	35 (18.4)	96 (50.5)	47 (24.7)	12 (6.3)
Professionalism ^c	92 (48.9)	73 (38.8)	21 (11.2)	2 (1.1)

^a Responses based on a 4-point Likert scale on which 1 = very much, 2 = somewhat, 3 = very little, and 4 = none.

^b N = 189.

^c N = 188.

Table 2. Pharmacy Student Confidence Level in Skill Performance Pre- and Post-IPPE Quizzes^{a,b}

Survey Question Related to Skill Performance	Test	Very Confident, No. (%)	Confident, No. (%)	Limited Confidence, No. (%)	Not Confident, No. (%)	Response, Mean (SD) ^a
Performing a physical examination and review of systems	Pre	3 (1.4)	16 (7.6)	80 (38.1)	111 (52.9)	1.6 (0.7)
	Post	19 (9.0)	101 (48.1)	63 (30.0)	7 (3.3)	2.7 (0.7)
Interacting and communicating with patients and caregivers	Pre	24 (11.4)	108 (51.4)	75 (35.7)	3 (1.4)	2.7 (0.7)
	Post	70 (33.3)	112 (53.3)	7 (3.3)	1 (0.5)	3.3 (0.6)
Performing patient-related calculations	Pre	7 (3.3)	74 (35.2)	115 (54.8)	14 (6.7)	2.4 (0.7)
	Post	59 (28.1)	117 (55.7)	14 (6.7)	0	3.2 (0.6)
Evaluating patient-related laboratory data	Pre	2 (1.0)	23 (11.0)	108 (51.4)	77 (36.7)	1.8 (0.7)
	Post	48 (22.9)	126 (60.0)	16 (7.6)	0	3.2 (0.6)
Identifying drug-related problems	Pre	1 (0.5)	41 (19.5)	141 (67.1)	27 (12.9)	2.1 (0.6)
	Post	59 (28.1)	117 (55.7)	14 (6.7)	0	3.2 (0.6)
Reviewing medical records	Pre	6 (2.9)	50 (23.8)	109 (51.9)	45 (21.4)	2.1 (0.8)
	Post	61 (29.0)	119 (56.7)	10 (4.8)	0	3.3 (0.6)
Writing a SOAP note	Pre	1 (0.5)	38 (18.1)	138 (65.7)	33 (15.7)	2.0 (0.6)
	Post	41 (19.5)	93 (44.3)	48 (22.9)	8 (3.8)	2.9 (0.8)
Making case presentations	Pre	3 (1.4)	43 (20.5)	96 (45.7)	68 (32.4)	1.9 (0.8)
	Post	41 (19.5)	121 (57.6)	28 (13.3)	0	3.1 (0.6)
Interacting and communicating with other healthcare professionals	Pre	20 (9.5)	96 (45.7)	87 (41.4)	7 (3.3)	2.6 (0.7)
	Post	47 (22.4)	132 (62.9)	11 (5.2)	0	3.2 (0.5)
Researching clinical questions	Pre	15 (7.1)	90 (42.9)	89 (42.4)	16 (7.6)	2.5 (0.7)
	Post	42 (20.0)	120 (57.1)	27 (12.9)	1 (0.5)	3.1 (0.6)
Selecting and recommending drug and non-drug therapy	Pre	3 (1.4)	34 (16.2)	132 (62.9)	41 (19.5)	2.0 (0.6)
	Post	44 (21.0)	130 (61.9)	16 (7.6)	0	3.1 (0.5)
Devising and implementing a patient-specific monitoring plan	Pre	4 (1.9)	26 (12.4)	125 (59.5)	55 (26.2)	1.9 (0.7)
	Post	43 (20.5)	125 (59.5)	22 (10.5)	0	3.1 (0.6)

Abbreviations: IPPE = introductory pharmacy practice experiences; SD = standard deviation; SOAP = subjective, objective, assessment, plan.

^a Student responses based on 4-point Likert scale on which 1 = not confident, 2 = limited confidence, 3 = confident, 4 = very confident.

^b Test result data were pooled for the school years 2008-2009 (n = 110 pre-IPPE and n = 109 post-IPPE) and 2009-2010 (n = 100 pre-IPPE and n = 81 post-IPPE).

2 additional opinion questions on the postcourse survey instrument for each academic year. In response to the first question ("To what degree did your instructor incorporate concepts from the modules into discussion and practice?"), students in 2008-2009 and 2009-2010 reported an application frequency of 98% and 97%, respectively. The second item asked students to rate the overall value of the modules as a complementary learning tool to achieving the course objectives on a scale ranging from 5 = very valuable to 1 = no value. Most students (92% for 2008-2009, and 94% for 2009-2010) reported that the modules were of value.

The major resource allotted for this innovation was faculty time for the design and development of each module, creation of quizzes, integration of module topics into the practice site, tracking of module completion, and testing of application skills. Because video recordings of real patient interviews or healthcare professional team meetings by faculty members were incorporated into the module content, recording equipment was used in production of these videos. Students required computer access either through the campus technology laboratory or their personal

computer, which needed to be compatible with the various programs used to produce the modules. Blackboard was used as the platform, instructional technology personnel were available to troubleshoot any access issues students encountered, and in-house media production designers created all of the health-assessment modules.

DISCUSSION

Given the variety of IPPE settings to which students are assigned, tools that provide standardization of learning across practice sites are considerably valuable. Our IPPE instructional innovation, which is consistent with cutting-edge strategies and techniques used by other colleges and schools of pharmacy,⁴ increased the uniform delivery of instructional material while providing more time for applying skills in the pharmacy practice setting, enhancing students' confidence in their knowledge and skills, and minimizing differences in preceptors' training styles. Consolidation of this self-directed learning allowed students to come to the site prepared to apply what they had learned at the patient-care setting with faculty members and enabled

Table 3. Pharmacy Student Opinions^a of Course-Competency Attainment for the Introductory Pharmacy Practice Experience (N = 190)

Course Competency (No. of respondents)	IPPE Fulfills the Course Competencies				
	Strongly Agree, No. (%)	Agree, No. (%)	Neutral, No. (%)	Disagree, No. (%)	Strongly Disagree, No. (%)
Conducting patient interviews to obtain patient information ^b	64 (33.7)	93 (49.2)	17 (9.0)	10 (5.3)	5 (2.6)
Extracting and organizing information from a variety of sources ^b	62 (32.8)	107 (56.6)	17 (9.0)	3 (1.6)	
Interpreting and evaluating patient information	78 (41.1)	97 (51.1)	14 (7.4)	1 (0.5)	
Identifying patient-specific factors that affect health, pharmacotherapy, and/or disease state management	77 (40.5)	100 (52.6)	11 (5.8)	2 (1.1)	
Assessing patient health literacy and compliance	40 (21.1)	94 (49.5)	37 (19.5)	17 (8.9)	2 (1.1)
Performing calculations required to recommend a patient-specific medication dose	60 (31.6)	90 (47.4)	25 (13.2)	15 (7.9)	
Conducting physical assessments	31 (16.3)	80 (42.1)	34 (17.9)	33 (17.4)	12 (6.3)
Documenting interventions in a concise, organized format that allows readers to have a clear understanding of the content	56 (29.5)	93 (48.9)	27 (14.2)	11 (5.8)	3 (1.6)
Presenting patient cases in an organized format covering pertinent information	68 (35.8)	93 (48.9)	25 (13.2)	4 (2.1)	
Responding to drug information inquiries ^b	46 (24.3)	97 (51.3)	34 (18.0)	10 (5.3)	2 (1.1)
Interacting with other healthcare professionals ^b	66 (34.9)	95 (50.2)	23 (12.2)	4 (2.1)	1 (0.5)
Participating in educational offerings designed to benefit the health of the general public (n = 190)	44 (23.2)	91 (48.1)	36 (18.9)	14 (7.4)	5 (2.6)
Communicating with patients and other healthcare providers ^c	61 (32.4)	102 (54.3)	19 (10.1)	4 (2.1)	2 (1.0)

^a Student responses based on 5-point Likert scale on which 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree.

^b N = 189 for this item.

^c N = 188 for this item.

preceptors to work with students to apply and build on this knowledge through direct patient-care activities. Our results suggest that students are able to apply information learned in online modules to their interactions with patients and confirm that course competencies can be achieved through the combination of various teaching techniques. The modules provided a method of consistent content delivery that was actively accepted and applied by both faculty members and students as an effective learning tool that contributed to the achievement of course competency.

More than 85% of student respondents reported some level of application of the knowledge they had learned through the modules within the patient-care setting (Table 1). While a small number of students reported “none” for the survey question pertaining to application of material, limitations in student perception of activities and interpretation of the survey response options may have impacted this result. Of the 20 modules created, 2 areas of module content (health assessment and conducting a history and physical) accounted for the lowest ratings

regarding application. Limited opportunities at practice sites for students to practice physical-assessment skills on patients may account for this result, particularly in high-acuity patient-care environments. In these settings, student peers practicing on each other may have served as the primary application of this content. Additionally, while there was a module related to history and physical, there was no standardized exercise to incorporate the material at all practice sites, which may further account for the lower ratings.

Student confidence improved from course entry to completion in all areas. The health-assessment ability was identified as having the lowest confidence level upon entrance to the IPPE for both years, which may be attributable to new material presented in the modules for health assessment compared with some other modules’ review or integration of material previously learned either through coursework or internship. Students may have felt that the 2-semester experience did not provide sufficient time to gain proficiency in these skills (Table 2). Students

indicated that the online modules were a beneficial complementary learning tool. For all but 1 of the 13 course competencies, more than 70% of respondents reported that they strongly agreed or agreed that the course met the competencies. The construct “conducting physical assessments” was the lowest-scoring element, with only 58.4% of students agreeing with this statement (Table 3).

Our instructional innovation has several strengths. There was an increase in student knowledge on various topics, which was then applied routinely at each practice setting over the 2-semester course timeframe. A uniform rubric was administered by all faculty preceptors for the health-assessment topics to ensure consistent evaluation of skill development. While aiming for consistency and uniform achievement of competencies, the course still allowed for implementation of unique teaching techniques at each practice site. For example, Vyas and colleagues demonstrated how high-fidelity simulation and reinforcement of cultural competency concepts could supplement the standard learning environment for this IPPE.^{2,3} The substantial instructional change did not impact the rate of matriculation, thus maintaining student success. Overall, innovations in this IPPE course continue to support ACPE Standard 14, which encourages the transfer of learning from the classroom setting to real-life application.¹

There are also limitations associated with our approach. After the first year of implementation, preceptors were asked if they had set deadlines for completion of the module. Although we provided a method for the material to be consistently delivered, there was still variability in the timeliness of discussing and assessing the module content. Other possible limitations are that preceptors may have emphasized some topics over others based on their comfort level with material and the patient population served by their practice, and some practice environments may have presented a barrier to the practice of direct patient health-assessment skills.

To explore future directions for the course, a preceptor survey instrument was developed after 2 years of course delivery to assess the frequency of skill-performance opportunities provided at practice sites. Skills identified with low application frequency were congruent with those students identified as being associated with the lowest percentage of self-confidence. Based on the dynamic nature of the pharmacy curriculum, a thorough review of course content was conducted. These data, coupled with student and preceptor feedback, led to the removal of 6 online modules, and in turn, to the inclusion of new structured exercises to emphasize application of material through practice activities. These standardized exercises, which address deficiencies identified by

students and preceptors, incorporated practice skills consistently across practice sites. These activities provided direct patient-care opportunities plus additional health-literacy assessments, educational offerings, and avenues for case discussions with peers and providers. Integrating structured exercises that encompassed a history and physical, medication history, and patient-counseling form for each semester furthered the consistency of skill application. Additional opportunities for direct patient care, including cardiovascular risk screenings, immunizations, and education, were offered through participation in employee wellness fair programs. Finally, opportunities to practice physical-assessment skills and complement the onsite application of those skills have been integrated into the Pharmacotherapy course as periodic practical laboratory sessions. As pharmacy academia continues to evolve, the course is now mapped to ACPE Appendix D: Pre-AAPE Core Performance Domains and Abilities with structured activities demonstrating achievement of the identified performance competencies.¹

CONCLUSIONS

Online educational modules proved to be an effective method of providing uniform information to IPPE students across a variety of practice settings and for increasing student knowledge and confidence. The learned material was easily applied at the practice settings to meet the course competencies and technology was used to facilitate knowledge development. This online instructional innovation was embraced by both faculty members and students as an acceptable complementary learning tool sensitive to both individual and practice-site diversity.

ACKNOWLEDGEMENTS

The authors thank the entire UMKC School of Pharmacy Division of Pharmacy Practice and Administration faculty members and our students and patients, who make our efforts possible.

REFERENCES

1. Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree. Accreditation Council for Pharmacy Education. <http://www.acpe-accredit.org/pdf/FinalS2007Guidelines2.0.pdf>. Accessed February 28, 2012.
2. Vyas D, Wombwell E, Russell E, Caligiuri F. High-fidelity patient simulation series to supplement introductory pharmacy practice experiences. *Am J Pharm Educ*. 2010;74(9):Article 169.
3. Vyas D, Caligiuri F. Reinforcing cultural competency concepts during introductory pharmacy practice experiences. *Am J Pharm Educ*. 2010;74(7):Article 129.
4. Blouin RA, Joyner PU, Pollack GM. Preparing for a renaissance in pharmacy education: the need, opportunity, and capacity for change. *Am J Pharm Educ*. 2008;72(2):Article 42.

Appendix 1. Curricular Map Delineating How Online Modules Support the 13 Competencies for a Health Assessment and General Medicine I Course

Competency	Supporting Activity	Assessment
Conducting patient interviews to obtain patient information	<ul style="list-style-type: none"> ● Direct patient interviews ● Health assessment ● Modules <ul style="list-style-type: none"> ○ Health assessment ○ Patient interview ○ Multidisciplinary patient interview ○ Conducting H&P ○ Communication skills 	<ul style="list-style-type: none"> ● Evaluation tool ● Health-assessment checklist ● Blackboard module quizzes
Extracting and organizing information from a variety of sources	<ul style="list-style-type: none"> ● Review medical records and patient profiles ● Direct patient interviews ● Health assessment ● Modules <ul style="list-style-type: none"> ○ Health assessment ○ Patient interview ○ Reviewing medical records ○ Conducting H&P ○ Case presentation skills ○ Communication skills 	<ul style="list-style-type: none"> ● Evaluation tool ● Health-assessment checklist ● Blackboard module quizzes
Interpreting and evaluating patient information	<ul style="list-style-type: none"> ● Development of pharmaceutical-care plans ● Modules <ul style="list-style-type: none"> ○ Drug-related problems ○ Interpreting clinical laboratory data ○ Drug-drug interactions 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes
Identifying patient-specific factors that affect health, pharmacotherapy, and/or disease state management	<ul style="list-style-type: none"> ● Development of pharmaceutical-care plans ● Modules <ul style="list-style-type: none"> ○ Drug-related problems ○ Drug-drug interactions ○ Health literacy ○ Health disparities ○ Cultural competency ○ Multidisciplinary patient interview 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes
Assessing patient health literacy and compliance	<ul style="list-style-type: none"> ● Development of pharmaceutical-care plans ● Modules <ul style="list-style-type: none"> ○ Drug-related problems ○ Health literacy ○ Health disparities ○ Cultural competency 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes
Performing calculations required to recommend a patient-specific medication dose	<ul style="list-style-type: none"> ● Development of pharmaceutical-care plans ● Modules <ul style="list-style-type: none"> ○ Drug-related problems ○ Interpreting clinical laboratory data 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes

(Continued)

Appendix 1. (Continued)

Competency	Supporting Activity	Assessment
Conducting physical assessments	<ul style="list-style-type: none"> ● Development of pharmaceutical-care plans ● Health assessment ● Modules <ul style="list-style-type: none"> ○ Health assessment ○ Patient interview ○ Conducting H&P ○ Communication skills 	<ul style="list-style-type: none"> ● Evaluation tool ● Health-assessment checklist ● Blackboard module quizzes
Documenting interventions in a concise, organized format that allows readers to have a clear understanding of the content	<ul style="list-style-type: none"> ● Pharmaceutical care-notes ● Development of pharmaceutical-care plans ● Modules <ul style="list-style-type: none"> ○ Documenting patient interventions ○ Conducting H&P ○ Communication skills 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes
Presenting patient cases in an organized format covering pertinent information	<ul style="list-style-type: none"> ● Case presentations ● Modules <ul style="list-style-type: none"> ○ Documenting patient interventions ○ Communication skills ○ Patient interviews ○ Case presentation skills ○ Conducting H&P ○ Health literacy ○ Health disparities ○ Cultural competency 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes
Responding to drug information inquiries	<ul style="list-style-type: none"> ● Use appropriate resources to support recommendation and answer clinical questions as they arise in practice 	<ul style="list-style-type: none"> ● Evaluation tool
Interacting with other health care professionals	<ul style="list-style-type: none"> ● Case presentations ● Modules <ul style="list-style-type: none"> ○ Documenting patient interventions ○ Communication skills ○ Patient interviews ○ Case presentation skills ○ Conducting H&P ○ Health literacy ○ Health disparities ○ Cultural competency 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes
Participating in educational offerings designed to benefit the health of the general public	<ul style="list-style-type: none"> ● Site-based projects ● Modules <ul style="list-style-type: none"> ○ Health literacy ○ Health disparities ○ Cultural competency ○ Ethics in health care 	<ul style="list-style-type: none"> ● Evaluation tool ● Blackboard module quizzes

(Continued)

Appendix 1. (Continued)

Competency	Supporting Activity	Assessment
Communicating with patients and other healthcare providers	<ul style="list-style-type: none">● Development of pharmaceutical-care plans● Case presentations● Modules<ul style="list-style-type: none">○ Documenting patient interventions○ Communication skills○ Patient interviews○ Case presentation skills○ Conducting H&P○ Health literacy○ Health disparities○ Cultural competency○ Multidisciplinary patient interview	<ul style="list-style-type: none">● Evaluation tool● Blackboard module quizzes

Abbreviation: H&P = history and physical