

## INSTRUCTIONAL DESIGN AND ASSESSMENT

### Impact of a Pharmacy Education Concentration on Students' Teaching Knowledge and Attitudes

Therese I. Poirier, PharmD, MPH, and Cathy Santanello, PhD

School of Pharmacy, Southern Illinois University Edwardsville

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**Objective.** To describe the introduction of an education concentration in a doctor of pharmacy (PharmD) program and to evaluate its impact on students' knowledge and attitudes about teaching.

**Design.** A concentration consisting of 3 elective 2-credit didactic courses and an advanced pharmacy practice experience with a teaching focus were developed and implemented into the PharmD curriculum.

**Assessment.** An attitudes survey instrument and knowledge test were administered to students enrolled in the education concentration track at baseline and after completing the 3 didactic education courses. Students' attitudes toward using various assessment tools and instructional strategies improved and knowledge about concepts in higher education and interest in pursuing a career in academia increased.

**Conclusion.** Pharmacy students completing an education concentration were more likely to consider a career in higher education.

**Keywords:** education concentration, advanced pharmacy practice experience, faculty recruitment, career

## INTRODUCTION

Recruiting and retaining pharmacy faculty members are major issues facing academic pharmacy. Previous reports have described efforts to prepare pharmacy students and residents for teaching responsibilities.<sup>1-6</sup> Attempts to enhance students' skills and depth of knowledge by offering focused concentrations also have been described in the literature.<sup>7-10</sup> The Southern Illinois University Edwardsville (SIUE) School of Pharmacy has developed an education concentration for PharmD students to address faculty recruitment and retention. The concentration requires that more than 50% of a student's didactic electives, ie, 6 or more of the 11 didactic elective credits and 1 advanced pharmacy practice experience (APPE) focus on a specialized track.

In this education concentration, third-year (P3) students completed 3 elective education courses (6 credits) and 1 elective APPE with a teaching focus during their fourth year (P4). The goals of this concentration were to prepare students interested in an academic pharmacy career; to enhance student's competitiveness for selected pharmacy practice residencies and potential placement at a school of pharmacy; and to stimulate interest in be-

coming involved in higher education as a component of their pharmacy career.

The purpose of this study was to evaluate the impact of the concentration on knowledge and attitudes about teaching. Three hypotheses were postulated regarding enrollment in an education concentration: it (1) will increase positive attitudes towards using various assessment tools and instructional strategies to enhance teaching effectiveness; (2) will increase knowledge about concepts in higher education; and (3) will increase interest in pursuing a career in academia.

## DESIGN

During the fall semester 2007, P3 students completed the first 2-credit, 14-week didactic course, Orientation to Teaching. During the first 7 weeks of the following spring semester, students completed the 2-credit Instructional Design and Strategies course. During the second 7-weeks of the spring semester, students completed the 2-credit Assessment Strategies course. The elective APPE was offered during the subsequent fall and spring academic terms.

The instructors for this concentration had backgrounds in higher education and assessment and their experience aided them in the design of the 3 didactic courses and APPE for this concentration. Their involvement in P1 and P2 courses also allowed them to promote the concentration to first- and second- year students. Additionally, the

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**Corresponding Author:** Therese I. Poirier, PharmD, MPH, E-mail: tpoirie@siue.edu, Southern Illinois University Edwardsville, 200 UP, Edwardsville, IL 62025. Phone: 618/650-5155

APPE students' involvement in teaching activities in various courses further promoted the education courses and concentration.

In the Orientation to Teaching course, students explored learning and motivation theories, teaching philosophies, the culture of higher education and pharmacy education, the scholarship of teaching and learning (SoTL), and the design of learning units. Students became acquainted with the higher education literature by delivering a journal club presentation. They became familiar with Fink's principles of backward course design.<sup>11</sup> They were also expected to draft a teaching philosophy statement and complete journal reflections based on the assigned readings. Issues faced by pharmacy educators, including matters of promotion and tenure, were also discussed. Panels of invited faculty members shared thoughts about what constitutes excellence in teaching and learning, while another group of faculty panelists provided tips on publishing on the scholarship of teaching and learning.

The first course was discussion-based and designed by the faculty members, whereas the subsequent 2 courses were more student-driven with application of principles learned from the first course. Appendix 1 outlines course topics and the grading scale for assignments. Various books were used as the core texts for the courses, including Zlatic's *Revisioning Professional Education: An Orientation to Teaching*, Nilson's *Teaching at its Best*, and Davis's *Tools for Teaching*.<sup>12-14</sup>

In the second course, Instructional Strategies and Design, students were introduced to various instructional strategies, including case-based learning, problem-based learning, team-based learning, service learning, experiential education, distance education, lecturing with active learning, use of humor in teaching, and interprofessional education. Active-learning strategies were identified and the various pros/cons of each strategy were highlighted. Students led a facilitated class discussion on a chosen instructional strategy described in the educational literature. They also designed and presented a learning unit and gained experience performing a peer observation and review for a faculty member. The course assignments and grading scale are highlighted in Appendix 1.

In the third course, Assessment Strategies, students were introduced to various formative and summative assessment strategies, including use of multiple-choice examinations, learning portfolios, objective structured clinical examinations (OSCEs), progress examinations, writing assignments, and measuring group work. The textbook, *Classroom Assessment Techniques: A Handbook for College Teachers*,<sup>15</sup> was used to acquaint students with the general principles of assessment and as

a guide for deciding which classroom assessment technique to use when facilitating one for a faculty member. Students gained experience on the use of rubrics by developing and critiquing grading rubrics for course- and program-specific assignments. Appendix 1 outlines course assignments and the grading scale for this course.

Although the APPE was part of the concentration requirement, this report does not evaluate that component. The APPE consisted of students providing 2 didactic lectures, facilitating 2 small group discussions, presenting an education journal club article, maintaining a teaching portfolio, updating their teaching philosophy statement, and completing a scholarly teaching project over a 5-week period.

## EVALUATION AND ASSESSMENT

During both the 2007-2008 and 2008-2009 academic years, 9 and 7 students, respectively, enrolled in the education concentration. These numbers represented 11% of the first pharmacy class (n = 81) and 9 % of the second pharmacy class (n = 77) at SIUE. In fall 2009, 10 students (13%, n = 77) selected the concentration.

An attitudes survey instrument and knowledge test were approved as an exempt study by the Institutional Review Board of SIUE. The survey instrument and test were administered on the first day of the first course in fall 2008 (ie, they were administered to the second class of students enrolled in the concentration). The same instruments were administered at the end of the following semester, in spring 2009, to the same students after completing the third didactic teaching course. The paired response data were evaluated for significance using the Wilcoxon signed rank test. Additionally, a specialized end-of-semester student evaluation of teaching was administered for each class. The following is evidence supporting the 3 hypotheses:

**Hypothesis 1: It will increase positive attitudes towards using various assessment tools and instructional strategies to enhance teaching effectiveness.** For most of the instructional and assessment strategies, positive attitudes increased following the third didactic course as reported in Table 1. The only exceptions were with the responses to likely to use humor, peer-led teaching, team-based learning, problem-based learning, service learning, multiple-choice tests, short answer tests, and essay examinations. A significant difference ( $p < 0.05$ ) was found in attitudes about likelihood to use the strategies between students' responses on pre- and post-course survey instruments (Table 1). There was:

- Increased likelihood of using instructional strategies such as interprofessional education.

Table 1. Results of a Teaching Attitudes Survey Administered to Pharmacy Students at Baseline and After Completion of Three Courses in an Education Concentration (N = 7)

Question	Baseline, Mean (SD)	After Completion of Three Teaching Courses, Mean (SD)	P <sup>a</sup>
Likelihood to pursue career with teaching focus	4.1 (0.7)	4.0 (1.0)	0.59
How likely is it that you would use the following instructional strategies in your teaching?			
Lecturing	4.4 (0.5)	4.6 (0.5)	0.59
Active learning	4.3 (0.8)	4.7 (0.5)	0.22
Case-based learning	3.9 (0.7)	4.3 (0.5)	0.27
Use of humor	4.6 (0.5)	4.3 (0.8)	0.18
Peer-led teaching	3.1 (1.2)	3.1 (0.7)	>0.99
Team-based learning	3.9 (0.4)	3.1 (0.9)	0.07
Problem-based learning	3.9 (0.7)	2.9 (0.7)	0.04 <sup>a</sup>
Distance education	1.3 (1.6)	2.4 (1.0)	0.17
Inter-professional education	1.6 (2.1)	4.0 (0.8)	0.04 <sup>a</sup>
Service learning	3.6 (0.8)	3.6 (1.0)	>0.99
How likely is it that you would use the following assessment strategies in your teaching?			
Grading rubrics	3.7 (1.3)	4.0 (1.0)	0.69
Multiple choice tests	4.6 (0.5)	4.6 (0.5)	>0.99
Short answers, essay examination	4.1 (0.7)	4.1 (0.4)	>0.99
Use of writing assignments	3.0 (0.8)	4.0 (0.6)	0.03 <sup>a</sup>
Journals/learning portfolios	2.9 (0.7)	3.4 (1.0)	0.18
Measuring group work strategies	1.3 (1.9)	3.3 (0.5)	0.06
OSCEs (objective structured clinical exams)	0.4 (1.1)	2.6 (1.0)	0.03 <sup>a</sup>
Capstone exams or progress exams	1.3 (1.6)	2.9 (1.1)	0.03 <sup>a</sup>
Capstone experience projects	1.3 (1.6)	2.7 (1.4)	0.04 <sup>a</sup>

<sup>a</sup> Significant differences using Wilcoxon signed rank test at  $p < 0.05$ .

- Increased likelihood of using assessment tools such as writing assignments, OSCEs, progress exams, and capstone projects.

**Hypothesis 2: It will increase knowledge about concepts in higher education.** Students' knowledge about topics in pharmacy education and higher education increased based on pretest and posttest scores using the knowledge test. The pretest score was 50%, while the posttest score was 65.7%. (Wilcoxon signed rank test,  $p = 0.018$ ). Knowledge and skills reported about the various concepts introduced in the didactic education courses also increased following completion of the third didactic course (Table 2). A significant difference ( $p < 0.05$ ) in knowledge and skills perceptions between pretest and posttest results was noted (Table 2). There were:

- Increased skills in designing a learning unit.
- Increased skills for conducting a classroom assessment technique.
- Increased awareness of components of a teaching philosophy statement.
- Increased knowledge about learning and teaching styles inventories.

- Increased knowledge about various instructional strategies including lecture, active learning, case-based learning, peer-led teaching, distance education, interprofessional education, service learning, writing assignments, and journals/learning portfolios.
- Increased knowledge about various assessment tools including measuring group work, OSCEs, progress examinations, and capstone experience projects.

**Hypothesis 3: It will increase interest in pursuing a career in academia.** At the onset of the concentration in fall 2007, 57% of students reported they were likely or very likely to pursue a career in teaching. Upon completion of the 3 courses in the education concentration, 86% of the students reported they were likely or very likely to pursue teaching as a career path; however, the mean responses actually decreased after completing the 3 courses. No significant differences in likelihood to pursue teaching between pretest and posttest were noted (Table 1).

Table 2. Results of Perception of Teaching Knowledge and Skills (N = 7)

Question	Baseline, Mean (SD)	After Completion of Three Teaching Courses, Mean (SD)	P <sup>a</sup>
Skills in designing learning unit	2.7 (0.8)	4.1 (0.7)	0.04 <sup>a</sup>
Skills in facilitating a class discussion	3.3 (1.1)	4.4 (0.5)	0.06
Skills to design grading rubric	3.1 (0.7)	3.9 (0.9)	0.12
Skills for critically evaluating pharmacy education literature	3.0 (1.3)	4.1 (0.4)	0.07
Skills to conduct peer review and consultation	3.4 (0.8)	4.4 (0.5)	0.06
Skills for conducting classroom assessment about learning environment	3.3 (0.5)	4.4 (0.8)	0.04 <sup>a</sup>
Knowledge about the scholarship of teaching and learning	2.9 (0.9)	3.9 (1.1)	0.11
Aware of contemporary pharmacy education issues	3.1 (0.7)	4.0 (1.0)	0.21
Knowledge in enhancing student motivation	3.7 (0.5)	3.9 (0.4)	0.59
Aware of components included in a teaching philosophy statement	2.3 (1.0)	3.9 (0.9)	0.04 <sup>a</sup>
Knowledge of learning and teaching styles including inventories	2.7 (1.0)	4.3 (0.5)	0.04 <sup>a</sup>
How much knowledge do you have of the following instructional strategies?			
Lecturing	2.7 (1.1)	4.3 (0.8)	0.03 <sup>a</sup>
Active learning	2.6 (0.5)	4.1 (0.7)	0.03 <sup>a</sup>
Case-based learning	2.7 (0.8)	3.9 (0.7)	0.04 <sup>a</sup>
Use of humor	3.1 (0.4)	3.7 (1.0)	0.11
Peer-led teaching	2.7 (0.8)	3.4 (0.5)	0.04 <sup>a</sup>
Team-based learning	2.9 (0.7)	3.6 (1.1)	0.25
Problem-based learning	2.7 (0.5)	3.7 (0.8)	0.07
Distance education	1.6 (0.8)	3.9 (0.9)	0.02 <sup>a</sup>
Inter-professional education	1.7 (0.8)	3.9 (0.9)	0.02 <sup>a</sup>
Service learning	3.0 (0.6)	3.9 (0.7)	0.04 <sup>a</sup>
How much knowledge do you have of the following assessment strategies?			
Grading rubrics	3.0 (0.6)	3.6 (1.0)	0.25
Multiple choice tests	3.7 (1.0)	4.0 (0.8)	0.58
Short answers, essay examination	3.3 (0.8)	4.0 (1.0)	0.14
Use of writing assignments	2.9 (0.7)	3.9 (1.1)	0.04 <sup>a</sup>
Journals/learning portfolios	2.3 (0.5)	3.7 (0.8)	0.03 <sup>a</sup>
Measuring group work strategies	2.1 (0.7)	3.6 (1.1)	0.04 <sup>a</sup>
OSCEs (objective structured clinical exams)	1.0 (0.0)	3.7 (1.0)	0.02 <sup>a</sup>
Capstone exams or progress exams	1.3 (0.5)	3.7 (0.8)	0.02 <sup>a</sup>
Capstone experience projects	1.4 (0.5)	3.4 (1.0)	0.02 <sup>a</sup>

<sup>a</sup> Significant differences using Wilcoxon signed rank test at  $p < 0.05$ .

## DISCUSSION

Our results showed that students were more likely to pursue a career in teaching after the completion of the third didactic course; however, student attitudes about attaining such a career were relatively high at the onset, suggesting that students oriented towards academia would self-select electives in this area. In an international research study on the attitudes of students and teachers to teaching as a career,<sup>16</sup> the findings showed that those who chose this career path were motivated by intrinsic factors, such as wanting to make a difference and enjoying relationships with students, as well as extrinsic factors, such as being positive role models. Throughout the concentration, students identified family members in education, former teachers, and pharmacy faculty members as role models who motivated their interest to join higher educa-

tion. We believe this concentration further enabled students to envision themselves as future educators and gave them a better understanding of the life of a faculty member in higher education.

Upon completion of the 3 education courses, increased knowledge and skills for the various course topics, as well as instructional and assessment strategies were reported, including some with significant differences reported from baseline. The significantly increased skills in designing a learning unit, conducting a classroom assessment about the learning environment, knowledge about components of a teaching philosophy statement, and learning and teaching styles inventories can be attributed to these activities being significant components of at least 1 of the 3 education courses in the concentration. However, the students did not report a significant difference in skills used to design

a grading rubric, even though this was an activity in the Assessment Strategies course. A reason for this finding may be because of the complexity of designing grading rubrics.

No significant differences were found in the skills used in critically evaluating pharmacy education literature. The various courses did not address teaching these skills but required students to use skills learned in the first-year Statistics and Literature Evaluation course. No significant differences were reported in peer review and consultation skills. Students may have perceived the necessity for additional experience with these skills. During the education APPE, students are given the opportunity to develop further skills in conducting peer review.

Surprisingly, there were no significant differences in skills needed/used in facilitating a class discussion. Although this strategy was not discussed specifically in the courses, students were asked to facilitate a class discussion as a key activity of the Instructional Strategies course. In future offerings, a class session on leading classroom discussions may be introduced.

There were no significant differences in knowledge about the scholarship of teaching and learning, which was not surprising since there was no specific assignment related to this topic. During the APPE, however, students were expected to work on a scholarly teaching project. No significant differences were found in students' knowledge about student motivation and contemporary pharmacy education issues. Students already may have had more knowledge about some of these topics, and it is more difficult to demonstrate a significant difference when baseline knowledge already exists.

Even though increased knowledge was reported for most of the instructional and assessment strategies upon completing the education courses, there were certain strategies for which no significant differences in scores were seen. A larger sample size may have shown significant differences. Also there were other variables that could have influenced the results. A high pre-existing knowledge base about selected strategies may have caused a bias. The quality of the teaching and learning could not be controlled in this evaluation. The pedagogical approach for teaching the Instructional Strategies and Assessment Strategies courses placed significant responsibility on the students to serve in the role of teacher. In this role students chose an instructional strategy and selected instructional materials such as required readings. If a student chose a required reading that was less than adequate for introducing a particular strategy this ultimately could have affected student learning. Students, however, further developed skills in using various instructional and assessment strategies during the APPE.

The increased likelihood of using specific instructional and assessment strategies after completing the 3 didactic courses in the concentration has been noted. Potential reasons for this increased likelihood of using the specific strategies include increased knowledge about the strategies. Even though high workloads and legal issues are associated with use of OSCEs and progress examinations, the data support that the likelihood of students using these assessment strategies increased. These results may not be generalizable to other students. Our students may not be overwhelmed by the workload and legal implications of using such strategies; however, a significant decrease in the likelihood to use problem-based learning (PBL) was noted even though knowledge gained about PBL increased. This anomaly may be related to the hybrid approach to PBL used in another course and students may have perceived that there was much more to learn about this strategy than what was discussed in the education courses.

Despite the increased knowledge gained about distance education, service learning, and journals and learning portfolios, students did not report significant differences in the likelihood to use these strategies after completing the course. Students may have had extensive experience with some of these strategies, such as service learning, and journals and learning portfolios prior to enrolling in the concentration, and they may have already determined when to use the strategies. At the SIUE School of Pharmacy, traditional distance education is not utilized; thus, students may not have been able to visualize the potential for teaching using distance education methodologies.

Another confounding influence on the increased likelihood of using specific strategies is that it may be influenced by the students' exposure in other pharmacy courses independent of the education concentration courses. Specifically, at the SIUE School of Pharmacy there is extensive use of journaling and learning portfolios as well as a required capstone experience project.

There were a few instructional strategies for which students actually reported a decrease in the likelihood of use, such as the humor, team-based learning, and problem-based learning. This decrease may have come from the students learning more about the difficulties and challenges associated with using these strategies. For example, the decrease in students' likelihood of using humor may have been due to their realization of its potential negative implications or their lack of confidence in their ability to be humorous in a teaching setting.

The end-of semester student evaluations of teaching were positive over the 2 offerings of these 3 courses. Minor suggestions included adjusting required books and course schedules, but otherwise no major modifications were suggested. Based on the results of the surveys,

course evaluations, and anecdotal comments made by students during the first 2 offerings of the 3 courses, the Education Concentration increased positive student attitudes toward using various assessment tools and instructional strategies, increased student knowledge about higher education concepts, and increased student interest in considering a career in academia. We recognize, however, that there are limitations to this evaluation. Students' selection of the concentration makes it likely that they would pursue an academic career independent of enrollment in the education concentration. Additionally, the small number of students surveyed (n = 7) provided insufficient evidence of significant differences in certain areas. We do plan to administer the same survey instruments to the third class of education concentration students. The evidence provided is also based upon student perceptions about knowledge and skills, and an objective examination. Evaluating students' skills in APPEs may provide us with stronger evidence of the impact of the education concentration.

## SUMMARY

As a result of introducing an education concentration into the PharmD curriculum, students who chose this track acquired knowledge about various education topics and instructional and assessment strategies. The increased likelihood of students using the various active-learning strategies and contemporary pharmacy education concepts, such as progress examinations, OSCEs, problem-based learning, and inter-professional education, was reaffirming. Exposing future pharmacy faculty members to a wider scope of instructional strategies and assessment tools increases the odds that these various strategies will be used since use of new methodologies is often related to the faculty members' comfort and experience with them. An education concentration as described and evaluated here is a good strategy to train and attract qualified pharmacy faculty members to the academy.

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Appendix 1. Assignments and Grading Scale for the 3 Didactic Education Concentration Courses

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**Course 1: Orientation to Teaching**

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Journal club presentation	60 points
Teaching philosophy	40 points
Portfolio including reflections	140 points
Learning activities and other assignments*	60 points
Total	300 points

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\* Included 2 quizzes on readings, panel questions for teaching excellence recipients and faculty panel on SoTL, learning styles exercise, and top 10 list for pursuing education concentration.

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**Course 2: Instructional Design and Strategies**

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Leading facilitated class discussion on specific instructional strategy	75 points
Portfolio reflections on discussions on specific instructional strategies, active learning, and working in groups	80 points
Design and presentation of learning unit	100 points
Classroom observation of teaching	45 points
Total	300 points

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**Course 3: Assessment Strategies**

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Application of specific classroom assessment technique	80 points
Leading class session on specific assessment strategy	110 points
Design of assessment rubric	80 points
Results of learning on specific assessment strategy	30 points
Total	300 points

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