

INSTRUCTIONAL DESIGN AND ASSESSMENT

An Elective Course on Postgraduate Residency Training

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Objective. To develop, implement, and assess the impact of an elective course for pharmacy students on postgraduate pharmacy residency training.

Design. An elective course on residency training was developed using short lectures, group discussions, and active-learning strategies, such as small-group exercises, mock match, and mock interview.

Assessment. Students were asked to self-assess their understanding and abilities related to residency training at the beginning and end of the semester based on course objectives. The median post-semester responses increased for all objectives compared to baseline ($p < 0.05$).

Conclusion. A residency elective using a variety of teaching methods increased student knowledge and confidence in their skills regarding residency training.

Keywords: active learning, elective, postgraduate education, residency, pharmacy curriculum

INTRODUCTION

The need for pharmacists in direct patient care roles is growing. Postgraduate residency training prepares pharmacy graduates for these roles. Professional organizations recognize this need and have called for all pharmacy graduates who enter careers with direct patient care responsibilities to complete residency training by the year 2020.^{1,2} The American Association of Colleges of Pharmacy also encourages completion of residency training, and in 2002, called for colleges and schools of pharmacy to actively develop and enhance residency programs.³

To meet these goals, it is critical to foster knowledge and interest in residency training among pharmacy students. Since 2005, the number of residency applicants submitting rank order lists for the residency match has tripled.^{4,5} Although the number of residency positions has increased over 30% in the last 5 years, it has not kept pace with demand.⁴ In 2011, there were 1250 unmatched postgraduate year 1 (PGY1) residency applicants, more than double the number of unmatched applicants in 2007.⁴ This unprecedented interest in residency training has created intense competition among applicants for the available positions. Student training and education related to

preparing and competing for these coveted positions is, therefore, timely.

At the University of Georgia College of Pharmacy, interest in residency training is increasing among students. The college admits PharmD students into a 4-year "2+2" program, where approximately 25% of students complete their last 2 years of the curriculum on the regional campuses in Augusta, and Albany, Georgia. The number of students entering residency programs upon graduation has increased dramatically in the last 5 years by approximately 20%. The need for residency-trained pharmacists is recognized by the faculty as an important issue affecting our profession. The capacity to train pharmacy residents in the college has increased twofold over the past 5 years by developing additional positions and programs. The college's strategic plan now includes a goal to increase the percent of graduating students pursuing postgraduate training from approximately 25% to 40%.

For many students, deciding to pursue a residency and making the commitment to follow through with applying to residency programs is a complicated process. Additionally, students often have difficulty navigating the residency application and match process. A majority of students entering pharmacy school are unaware of residency opportunities and find out about them at various points throughout the curriculum, sometimes after it is too late to pursue them. In addition to using professional organizations to heighten awareness of residency programs, colleges and schools of pharmacy educate students about residency training opportunities through a variety of methods. These often include informational handouts or

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brochures and 1-hour lectures, discussions, or seminars, and most often occur in the last year of the curriculum.⁶⁻¹¹ More recently, a preparatory seminar for fourth-year students on interviewing for residency positions has been described.¹² Studies that have evaluated the factors affecting completion of residency programs have recommended that instruction concerning residency training should occur early in the curriculum.^{6,7,13,14} A 2010 survey of US colleges and schools of pharmacy reported that 16 colleges and schools provided a structured program to promote and prepare students for residency training.⁸ These programs were diverse in nature and included components such as promotion by student professional organizations, financial support to attend the American Society of Health-System Pharmacists Midyear meeting, career pathways program, one-on-one mentoring during advanced pharmacy practice experiences (APPEs), pre-specified required or elective APPEs, required residency program visits, and participation in student clinical competitions.⁸

In response to interest among students, the increase in unmatched residency candidates nationally, and the college's strategic plan, an elective course in postgraduate residency training was developed and offered to third-year pharmacy students. This course supported the institution's competency statements and terminal and enabling objectives for the doctor of pharmacy (PharmD) degree relating to options for postgraduate education, leadership, and lifelong learning. Educating and preparing students for postgraduate residency training aligns most closely with Accreditation Council for Pharmacy Education Guideline 16.1, which states that colleges and schools of pharmacy should provide education on postgraduate residency training opportunities.¹⁵ The specific goals of the course were to increase knowledge, interest, and confidence among students about residency training; identify and develop the skills needed for application to these programs; and increase the number of students obtaining residency positions upon graduation.

DESIGN

The Introduction to Postgraduate Residency Training course was a 2-credit hour elective, offered to third-year students on all campuses who are in good academic standing. All class sessions were taught simultaneously using distance learning, with 1 or more faculty members at each campus leading or participating in small group discussions during class time. Each instructor in the course was a practicing faculty member with current or previous experience with residency training as a preceptor or residency program director. An online course management system was used for faculty members to deliver course

announcements, post course content, assignments, and grades, and for students to submit assignments. Class size was initially limited to 25 students because of the intensive commitment required by the faculty members to provide feedback to students on their curriculum vitae (CV) and letter writing and interviewing skills, and to optimize faculty-student interaction.

Because the students were learning and then applying new information, the course objectives were designed around and integrated several levels and approaches of Bloom's and Fink's taxonomy.^{16,17} Lower levels of Bloom's taxonomy were used when students were learning new information. Higher levels of analyzing and evaluating were used when students were expected to use information learned and apply it to real-life situations. Several approaches of Fink's taxonomy of significant learning were used, including foundational knowledge, application, and integration. A variety of teaching methods were used.

A textbook on curricula vitae and interviewing specific to pharmacy professionals was required for the course.¹⁸ For each topic taught in the course, students were expected to read the corresponding chapter in the textbook if applicable. The instructors presented short, interactive lectures during class, followed by discussion and small-group activities. Detailed information on course content and activities is provided in Table 1.

To demonstrate the matching process, students engaged in a mock residency match. Students were randomly assigned a realistic applicant profile containing information about residency interests, grade point average, performance on APPEs, publication and presentation experience, and comments from reference letters and interviewer perceptions. Students were then asked to review 4 program profiles, illustrating various program types, and develop a residency rank list. A mock residency match was performed manually based upon the candidate and predetermined program rank lists. Students were provided with a simulated e-mail message with their match results prior to class. A lecture was presented on the matching process, including the post-match process, often called the "scramble," and then a discussion was held on the match and results.

To practice interviewing skills, students were scheduled for 1 individual, 30-minute mock interview session. The interview session was intended to simulate a panel interview and students were expected to wear appropriate interview attire. Each panel consisted of 1 resident and 2 clinical faculty/resident preceptor interviewers. The interviewers asked the same 4 interview questions and were allowed to ask additional questions as time allowed. Students were given an opportunity to ask questions during

Table 1. Course Schedule and Teaching Methods for Introduction to Postgraduate Residency Training

Week	Topic	Content and Course Activities
1	Introduction to Residency Training	Benefits of residency training Professional organization Web sites ^{19,20} Career satisfaction literature
2	Types of Residency Programs	PGY1 program types PGY2 residencies Program characteristics Residency program accreditation
3	Day in the Life of a Resident	Activities common to residency programs Residency Learning System ²¹ How to succeed as a resident
4	Researching Residency Programs	Self-assessment and determining best “fit” Residency directories and Web sites Residency timeline Regional residency showcases Attend a regional residency showcase Interview at least 2 programs Choose one program for assignments (eg, letter of intent, thank you letter)
5	Curriculum vitae (CV)	CV workshop Prepare updated CV
6	Preceptor/Program Director Panel Interview	Panel discussion with preceptors and RPDs representing PGY1 and PGY2 programs: academic medical center, community hospital, VA, community, ambulatory and several specialty areas Discussion led with previously submitted questions
7	Preparation for the Midyear Clinical Meeting	What to expect at the meeting Residency Showcase Questions to help students determine best “fit” Choosing letters of reference
8	Letter of Intent and Thank You Letter	Letter of intent 3 paragraph approach: Positive professional attributes Relevant experiences Reasons for pursuing residency and specific program Thank you letter Styles Recipients Candidate identified program strengths Program interest, if applicable Small group critique of example letters Prepare hypothetical letter of intent and thank you letter to a program of choice
9	Current Resident Panel Interview	Panel discussion with residents from various programs Discussion led with previously submitted questions
10	“The Match”	Match process Post-match scramble Mock match
11	Interviewing Part 1: What to Expect	Scheduling interviews Interview itineraries Interview types Clinical competencies and formats Preparing for interview questions

(Continued)

Table 1. (Continued)

Week	Topic	Content and Course Activities
12	Interviewing Part 2: Skits	Interview skits demonstrating good skills and behaviors to avoid Undesirable candidate characteristics
13, 14	Mock Interviews	30 minute video-taped interview session Verbal and written Feedback Self-evaluation of taped interview session
15	Review of Mock Interview and Discussion	Review of interviewing skills Course summary

the interview. After the interview, immediate verbal feedback was provided. The interviewers used a sample interview evaluation form for written feedback. The interview sessions were video recorded and uploaded onto a secure Web site. Students watched their own password-protected interview and completed a self-evaluation with the same candidate evaluation form used by the interviewers. Students were graded on the quality of their self-evaluation.

Additional educational activities regarding the residency application process included practicing clinical competencies 4 times throughout the semester. The first 2 competency assessments were treated as practice exercises. Immediately after administration of each competency, the key components were discussed in detail. Competency activities included identification and prioritization of drug-related problems, making recommendations to optimize drug therapy, completion of a SOAP (subjective, objective, assessment, and plan) note based on a given scenario, and completion of short-answer questions. The competency content included information students learned in therapeutics-type courses in the second and third years of the curriculum.

EVALUATION AND ASSESSMENT

Twenty-four students (12 from the Athens and Augusta campuses) enrolled in the first offering of the course in fall 2010. Because of the limitation in class size and scheduling conflicts, not all interested students were allowed to enroll. The course was offered again in spring 2011, with 12 students enrolling, all on the Athens campus.

Students were graded on content learned and class participation. The CV, letter of intent, and thank you letter were graded based on rubrics developed by the course coordinator and reviewed by the course instructors. Clinical competencies were graded using faculty-developed rubrics. The mock interview was graded on the quality of the self-evaluation. Other assignments such as the residency rank list and panel interview questions were assigned points based upon participation. Grades were recorded and posted. The course was graded as pass/fail, with a course average of 80% needed to pass. All students enrolled during the first year

of the course completed the assignments and participation requirements to a satisfactory level and passed the course.

Assessment of Course Objectives

We identified 4 enabling objectives from the professional curriculum that we directly mapped to this course. The course objectives, listed in Table 2, relate to these overall enabling objectives. To evaluate student confidence and achievement of course and curricular objectives, we conducted a pre- and post- course self-assessment as described below. In addition, we used rubrics to assess students' competency in specific skills and abilities related to these objectives.

Curriculum Vitae. For the CV assignment, students were provided with objective and subjective feedback. The CVs were evaluated by 3 faculty members for grading consistency and to optimize feedback provided. The objective section of the grading rubric included criteria from the course textbook, such as appropriate headings and use of action verbs in descriptions. The average grade on the CV assignment was 85%. The most common feedback provided to the students included passive and/or verbose descriptions of activities, typographical errors, and omission of relevant accomplishments. In the subjective section of the grading rubric, students were provided with a numerical score up to 5 points in several categories based on how well the students would be perceived if submitting their CV in application to a residency program. The average score was 22 points out of a possible 35 and did not count towards their grade on the assignment. This allowed the students to see in which areas they were weak and which needed attention prior to program application in their fourth year. All students received feedback on areas for improvement and many of the comments included seeking leadership, publication, or presenting opportunities; becoming more involved in professional organizations; and pursuing community service projects.

Letter of Intent. The letter of intent assignment was also graded using criteria from the course textbook and evaluated by 3 faculty members. The average grade on the letter of intent assignment was 88%. Typical areas for

Table 2. Self-Assessment of Student Abilities Before and After Completing an Elective Course in Residency Training

Course Objective	N	Median Score, Pre-Semester	Median Score, Post-Semester	P ^a
Identify characteristics of residency programs in various practice settings.	36	2	4	<0.001
Describe activities common to most residency programs.	36	3	4	<0.001
Identify skills and performance necessary to achieve a residency certificate.	36	3	4	<0.001
Compose a letter of intent and thank you letter.	36	2	4	<0.001
Develop a curriculum vitae appropriate for a residency applicant.	36	2	4	<0.001
Narrow the search for a residency program.	36	2	4	<0.001
Explain the matching process for residency programs.	36	3	4	<0.001
Explain what to expect on an interview.	36	2	4	<0.001
Provide answers to questions that may be asked in a residency interview.	35 ^b	2	4	<0.001

For each of the statements, students indicated their response on a Likert scale of 1 – 5, on which 1=not at all confident, 2=a little confident, 3=somewhat confident, 4=confident, 5=very confident.

^a Based on Wilcoxon signed-rank test.

^b One student failed to provide an answer on the pre-semester assessment.

point deduction included formatting issues such as omission of letterhead or typographical errors, failure to describe professional attributes and experiences that would make the student a good candidate for the program, and failure to explain what program characteristics interest the candidate or reasons they are applying. Subjective feedback was also provided to the students in written format. Examples included identifying areas that need further clarification or development, feedback on how a particular statement may be perceived, and wording suggestions.

Pre- and Post-course Self-assessments. A 29-item assessment was administered to the students at the beginning and end of each semester to evaluate residency interest and intentions, fulfillment of course objectives, knowledge gained, and course value. A 5-point Likert scale (1 = not at all confident; 2 = a little confident; 3 = somewhat confident; 4 = confident; 5 = very confident) was used to indicate student confidence in completing residency-related skills and activities listed in the course objectives. The information was used to evaluate the effectiveness of the course in preparing the students for residency training and to update the course as needed. All 36 students completed the assessments. A majority of students enrolled in the course (54%) had earned a bachelor’s degree before starting the pharmacy curriculum, compared with 30% of the entire third-year class. Additionally, 14% of the students in the elective course were male, compared with 34% of all students in the class. For 2 of the questions, students chose 4 and 5 (confident and very confident) when assessing their post-semester confidence in identifying skills and activities necessary to achieve a certificate upon completion of the

residency and explaining the matching process. In these 3 instances, the post-semester responses were coded with the lower value (4). Descriptive statistics were used to evaluate the pre- and post-semester responses (Table 2). Responses were paired for each question and analyzed using the Wilcoxon signed-rank test, using an alpha level of 0.05 for significance. The intentions to pursue PGY1 and PGY2 training before and after completion of the course were evaluated using the Fisher exact test (Table 3).²¹

At the beginning of the semester, 61% of students stated they planned to complete residency training upon graduation, compared to 39% of students who were undecided about PGY1 residency training. At the end of the semester, 86% of students planned to complete residency

Table 3. Student Intentions Before and After Completing an Elective Course in Residency Training (N = 36)

Parameter	Pre-semester, No. (%)	Post-semester, No. (%)
Plan to complete PGY1 residency training upon graduation		
Yes	22 (61) ^a	31 (86) ^a
No	0	1 (3)
Undecided	14 (39)	4 (11)
Plan to complete PGY2 residency training		
Yes	6 (17)	6 (17)
No	4 (11)	4 (11)
Undecided	26 (72)	26 (72)

^a Difference between pre- and post-semester, p <0.05 based on Fisher exact test.

training, 11% were undecided, and 3% (n=1) decided against residency training. This represents a 25% increase in students planning to complete residency training ($p < 0.0001$). Almost one-third of students (31%) reported taking the course to determine whether they wanted to pursue residency training. Students were also asked about the type of PGY1 program and institution in which they were interested. The change in pre- and post-semester responses was significant. Overall student evaluations of the course were positive. Students were asked in an open-ended manner to list items they learned (Table 4). Most of the items listed directly related to the course objectives. All students responded they would recommend the elective course to their classmates.

DISCUSSION

This manuscript provides a detailed description of an elective course, Introduction to Postgraduate Residency Training, offered to third-year pharmacy students at the University of Georgia College of Pharmacy. This course was designed to educate students about residency programs and how to pursue residency training upon

graduation. The textbook was chosen due to its applicability to the pharmacy profession and served the course well, with general comments from students indicating they planned to keep the book for use during the following year when they applied to residency programs.

Greater knowledge and confidence in completing the skills needed to pursue residency training were demonstrated by significant improvements in self-rated student abilities from the beginning to the end of the course based on the course objectives. A limitation associated with this method is that students may not accurately assess their abilities and may unknowingly overestimate their skills in a particular area. However, the self-assessed improvement in skills for every objective suggests their abilities did improve compared to skills at course initiation.

Because this evaluation was conducted during the first year the elective course was offered, the number of students assessed was relatively small. Additionally, the pre- and post-course self-assessments were conducted as part of the course and therefore were not anonymous. No grades were assigned for the assessments but completing course activities did count for class participation. Although the course objectives did not change between the fall and spring semesters, there were small changes in course content. These changes may have had limited impact on the pre- and post-assessment responses. Significantly more students planned to pursue residency training upon graduation after completion of the course. Factors leading to the greater interest in pursuing residency training may include learning more about residency training itself, increased confidence regarding completion of training after further development of patient care skills during the third year of the curriculum, and advancements in the PharmD curriculum that allowed the students to learn and practice more patient-centered drug therapy. Some changes were found in the PGY1 program type and institution from the beginning of the course to the end. Students may have changed their minds after receiving education about the various types of programs, or it may reflect that the students do not have enough clinical experience in their third year to determine the best fit. No significant changes were seen in the number of students interested in pursuing PGY2 residency training. This is likely because this was not stressed during the course and it may have been too early in the curriculum for students to evaluate these options.

At the end of the first semester, the instructors sought specific feedback from the students regarding each topic and assignment in the class. Student comments included that more detailed information on resident activities should be provided, a demonstration of the matching process should be given, the order of the topics taught should

Table 4. Student Responses in Introduction to Postgraduate Residency Training Elective (n=36)

Parameter	No. (%)
Reasons for Taking Course (open-ended, multiple responses accepted)	
Learn more about residencies	17 (46)
Prepare for residency	17 (46)
Develop my CV	13 (36)
Determine if I want to do a residency	11 (31)
Learn how to write a letter of intent	5 (14)
Narrow the search for residency programs	4 (11)
Learn how to write a thank you letter	1 (3)
Elective credit	1 (3)
What Students Learned (open-ended, multiple responses accepted)	
Interview and interviewing skills	35 (97)
How to prepare for residencies and application process	34 (94)
Curriculum vitae	30 (83)
Letter of intent	21 (58)
Clinical competencies	17 (46)
Residency training/benefits	13 (36)
Thank you letter	13 (36)
How to narrow the search for residencies	9 (25)
Matching process	4 (11)
Letter of recommendation	1 (3)
Would Recommend This Elective to Classmates	
Yes	36 (100)
No	0

be rearranged, and the resident panel discussion should be conducted in the absence of faculty members. Students also reported that they did not understand information presented on the Residency Learning System, the systematic process used in the design, conduct, and evaluation of the residency program.²² Because of the complexity of the information and limited time, the course coordinators felt this information could be minimized in future course content in favor of more detailed information on resident responsibilities.

Other revisions to the course included having a PGY2 resident lead the class describing daily and longitudinal resident activities, illustrating the match process using slide graphics, and assigning a PGY1 or PGY2 resident to organize and lead the resident panel interview. For the resident panel interview, potential topics of interest to the students were discussed with the residents prior to the discussion, such as weekend staffing, resident satisfaction, compensation, and moonlighting. The CV workshop was scheduled earlier in the semester to separate student assignment deadlines and give faculty members more time for grading. The students also requested moving one of the panel interviews later in the semester to give them a chance to ask questions after learning more about the process. As a result, the resident panel interview was also moved to week 9 of the semester. Based on student feedback regarding the letter of intent assignment and benefits of attending a regional residency showcase, attending a showcase became a requirement. Table 1 reflects the course schedule with these changes.

There are several issues to consider in future course offerings. As designed, the course does require a significant amount of faculty time and effort. Factors leading to greater faculty resources include having a faculty member present for each class on all campuses to facilitate small group discussion and active learning, the number of faculty members involved in the course and facilitating their participation, and the number of faculty members needed to evaluate and mentor students for the CV and letter of intent assignments, and mock interviews. As the college grows to include additional regional campuses, the course will need to be adapted to accommodate student interest in the course. This will include identifying faculty members on each regional campus to work with the students directly. At the time the course was developed, limited materials existed regarding pharmacy residency training. As materials become available, consideration will be given to determine the value for incorporating these into the course.²³⁻²⁵ Examples include the *Resident Survival Guide*²³ and key journal articles discussing residency-related topics.

Other descriptions of formal programs to educate and prepare students for postgraduate residency training

report a variety of structures, ranging from a specific curricular pathway to one-on-one mentoring and extracurricular programs. To our knowledge, this elective is the first course of its kind to educate and develop skills related to residency training for third-year students. Given the positive student evaluations and improvement in self-rated confidence in knowledge and skills needed to pursue residency training, we believe the course added value to the curriculum and will continue to offer it. This course could easily be implemented at other institutions. Some colleges of pharmacy with limited resources could adopt certain components of the course as initial steps in developing a formal course to educate and train students for residencies.

CONCLUSION

An elective course on residency training, Introduction to Postgraduate Residency Training, provided third-year PharmD students the opportunity to learn about residency training and enhance their skills. Pharmacy students rated the course positively and would recommend it to their fellow classmates. Students felt more confident in their understanding of and skills to pursue residency training after completing the course. As residency training continues to gain momentum, preparing students for postgraduate training will become increasingly important.

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