

Participation of Graduate Students in the Undergraduate Instruction of Pharmaceutics

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INTRODUCTION

One very important goal of pharmaceutical education in schools of pharmacy should be to develop teaching skills in graduate students. Unfortunately, fulfilling the Ph.D. requirements is often considered adequate preparation for teaching in colleges and universities. Therefore, instructors go to classes without ever being trained how to teach. Despite this lack of formal education in teaching, many instructors show competent skills when teaching students in various classroom settings. Others do not reach their full potential, possibly due to the lack of instruction, guidance, and training during graduate study. Since teaching should be the most important mission of colleges and universities, it should be carried out with skill, confidence, and style.

Graduates have a multitude of job opportunities awaiting them when they finish the Ph.D. requirements, but the majority of students show a preference for pharmaceutical industry employment. Individuals with the greatest inclination and interest in academic teaching are in the minority, so it is not surprising that many gradu-

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ate schools do not provide specific training in teaching. Although mentoring of graduate students is a well-established practice, it is usually limited to assistance given by faculty members in course work, research projects, and career development planning (1). However, minimal attention is given to helping and monitoring graduate students in teaching skills and instructional proficiency. This trend has begun to change, and more schools now emphasize the need for teaching exposure and instruction during graduate education (2). It should also be noted that an improvement in communication skills and lecturing is of equal importance to graduates entering positions in the pharmaceutical industry. The presentation of research results at seminars, the discussion of clinical data in FDA committees, and the presentation of scientific/professional papers at national/international conferences can be more successfully carried out by those individuals who have had teaching instruction in their graduate education (3, 4). In this paper, we address a way of training graduate students to teach in the field of pharmaceuticals. This approach could be used in any other academic discipline, but our data reflect only the Division of Pharmaceutics.

PRESENT PROBLEMS

The quality of college teaching will be improved when teaching training is offered to graduate students who are most willing and motivated to obtain or improve classroom skills. The most conventional approaches for training graduate students in teaching are: (1) participation in organized seminars, workshops, and courses and (2) instruction and supervision of graduate students' teaching performance by a senior faculty member and evaluation of their performance by the students taking the course.

In the first approach, the seminars and courses are usually organized by teaching and learning centers rather than by individual schools and departments. These programs seem to have been effective in increasing the quality of college teaching, and continued support for these programs is justified. However, most often the time and effort required of both the instructors and participants (students) are too great for the benefit experienced from this type of

teaching instruction. Many graduate students are less than willing to spend time in teaching seminars and workshops when the emphasis of the graduate program is on graduate course requirements and the development of research skills. The Department of Pharmacy Practice at Purdue University has initiated a collaborative program of education, research, and instructional development for its graduate students (5). The department, together with the Center for Instructional Services, has developed a seminar series for graduate students to improve their teaching techniques and quality of instruction.

The second approach—consultation, supervision, and mentoring by senior faculty—is described in this paper as a tool to increase the teaching effectiveness and performance of graduate students. At universities and colleges today, the supervision of graduate students is, in many instances, unsystematic and unorganized and depends primarily on the willingness of senior faculty to participate in the process. Most often, faculty participation in this endeavor is not encouraged or rewarded by colleagues and superiors. However, one can easily see that a program of supervising graduate teaching presentations is better than allowing graduate students to learn on their own at the expense of undergraduate education. An interesting question might be, How many of the demonstrated inadequacies in undergraduate education are the results of teaching inadequacies?

Whatever approach is selected in structuring programs for the advancement of graduate student teaching training, faculty and administration must agree on the objectives of the program and the steps to be taken to achieve those objectives. All of these program aspects require significant effort, dedication, and sustained planning to ensure good results (6).

PROPOSED PROGRAM

Teaching training for graduate students should go beyond the customary assignment of a teaching assistant (TA) to grade papers, distribute handouts, proctor examinations, verify attendance, etc. In the program we propose, the graduate student would:

1. Read materials about classroom dynamics, instructional techniques, handout preparation, examination preparation, etc., before giving the first lecture.
2. Meet regularly with a faculty mentor to discuss the organization of topics, learning objectives, presentation techniques, handout materials, demonstrations, examination questions, etc., before each lecture.
3. Attend the classes presented by the faculty mentor in the course that the student will later be teaching.
4. Allow the faculty mentor to attend the student's lectures and hold a feedback session immediately after the presentation, possibly using videotape of the lectures.
5. Be willing to work with the faculty mentor for at least two semesters. After that time period, consultations with the faculty mentor are indeed encouraged, but the student may not need regular meetings before each lecture.

A comprehensive plan such as that outlined above would adequately prepare graduate students for classroom presentation and provide them with a realistic perception of their performance. Allowing a faculty mentor to supervise the training for a period of time would contribute to a sustained improvement in the student's quality of instruction and confidence. All of these factors taken together would eliminate ineffective and deficient classroom instruction and ensure a program of excellence in college instruction.

Our graduate student TAs experience many disappointments and discouragements in the early instructional experiences. An experienced faculty mentor can evaluate the discrepancies between their expectations and accomplishments and provide remedial advice and guidance. It is often said that good teachers are born rather than made. But experience is a key factor that can accelerate the development of a mediocre beginning teacher into an excellent one.

QUESTIONNAIRES

To evaluate the proposed program in the Division of Pharmaceutics, two groups of students (graduate, undergraduate) were asked to

complete questionnaires (7). Graduate students were asked to indicate their feelings about the need for such a proposed program (Table 1) and the extent to which they performed the steps of the program before lecturing in a required undergraduate pharmaceuticals course (Table 2). All of the pharmaceuticals graduate students

TABLE 1. - EVALUATION OF GRADUATE STUDENT PERCEPTION OF THE NEED FOR TEACHING TRAINING

Survey Questions	Graduate Students ⁺					Score [*]
	A	B	C	D	E	
How important is it to you to:						
1. Read materials about classroom dynamics, instructional techniques, handout preparation, examination preparation, etc., before you lecture?	3	3	1	2	3	2.40 ± 0.39
2. Meet regularly with a faculty member to discuss the organization of topics, presentation techniques, handout materials, demonstrations, examination questions, etc., before you lecture?	4	4	4	4	4	4.00 ± 0.0
3. Attend the classes of the faculty member in Item 2 in the class you'll be lecturing in before presenting your lecture?	1	1	4	3	3	2.40 ± 1.34
4. Meet with the faculty member in Item 2 in a "feedback" session regarding your class presentation?	3	4	4	4	4	3.80 ± 0.45
5. Have a faculty mentor work with you for two semesters regarding teaching training?	2	2	3	4	3	2.80 ± 0.84
6. Receive any teaching training at all if you have decided to pursue an industrial pharmaceuticals position?	2	3	3	3	4	3.00 ± 0.71

*Mean ± SD (S) on the basis of: 4 = Very Important; 3 = Somewhat Important; 2 = Somewhat Unimportant; 1 = Not Very Important (n=5)

⁺A, B, C, D, E = Graduate student participants in class teaching

TABLE 2. - EVALUATION OF GRADUATE STUDENT PREPARATION FOR LECTURE PARTICIPATION IN UNDERGRADUATE PHARMACEUTICS TEACHING

Survey Questions	Graduate Students ⁺					Score [*]
	A	B	C	D	E	
1. Did you read materials about classroom teaching before you lectured?	1	1	1	1	1	1.00 ± 0.0
2. Did you meet regularly with a faculty member to discuss your classroom teaching before you lectured?	2	4	3	2	4	3.00 ± 1.00
3. Did you attend the classes of the faculty member in Item 2 before you lectured?	1	1	1	1	3	1.40 ± 0.0
4. Did you allow the faculty member in Item 2 to attend your classes and have a "feedback" session with you after your lecture?	2	4	4	4	4	3.60 ± 0.89

* Mean ± SD (8) on the basis of: 4 = Always; 3 = Often; 2 = Seldom; 1 = Never (n=5)

⁺ A, B, C, D, E = Graduate student participants in class teaching

who presented lectures during two academic semesters were surveyed ($n = 5$). Each of the five graduate students presented two lectures in the same required undergraduate course (Basic Pharmaceutics). Undergraduate students ($n = 125$) were given a questionnaire to evaluate the outcomes of classroom instruction for each graduate student. The survey contained questions related to the presentation of material, knowledge and confidence of the presenter, class discussion, use and significance of handouts, development of examination items, and availability of graduate instructors outside classrooms (Table 3).

DISCUSSION

The graduate students were unanimously able to identify several vital needs for the development of their teaching skills (Table 1).

TABLE 3. - EVALUATION OF GRADUATE STUDENT TEACHING BY UNDERGRADUATE STUDENTS IN A REQUIRED UNDERGRADUATE PHARMACEUTICS COURSE

Survey Questions	Graduate Students [†]					Score*
	A	B	C	D	E	
1. Did the material follow a logical order?	1.92	2.50	2.42	3.00	3.68	2.70 ± 0.68
2. Were the basic concepts covered adequately?	1.92	2.50	2.42	2.89	3.68	2.68 ± 0.66
3. Did the material seem trivial?	1.67	2.58	2.00	2.42	3.16	2.37 ± 0.57
4. Did the material seem too theoretical?	1.67	2.58	2.00	2.52	3.16	2.39 ± 0.57
5. Were main points emphasized?	1.50	2.25	2.25	2.05	3.37	2.28 ± 0.68
6. Was the presenter prepared?	1.50	2.25	2.25	2.79	3.42	2.44 ± 0.71
7. Could the presenter answer questions asked in class?	1.50	2.25	2.25	2.85	3.37	2.44 ± 0.71
8. Were handouts and/or visual aids useful?	2.17	1.75	2.42	2.65	3.68	2.54 ± 0.42
9. Did examination questions correlate with major points emphasized in class?	1.75	1.67	1.75	2.00	2.95	2.02 ± 0.53
10. Availability of presenter for help outside of class?	1.75	2.42	2.25	2.82	3.42	2.53 ± 0.55

*Mean ± SD (8) on the basis of: 4 = Always; 3 = Often; 2 = Seldom; 1 = Never (n=125)

†A, B, C, D, E = Mean score for each individual graduate student

For example, in Question 2, all responded that it is very important to meet regularly with a faculty member to discuss the organization of and preparation for classroom teaching. In Question 4, four of the five students were of the opinion that it is very important to have a feedback session with the monitoring faculty after each lecture presentation. One graduate student considered videotaping the most beneficial way to assess and improve classroom teaching. Rather inconclusive views were expressed in response to Question 1 on the importance of reading books and articles about classroom teaching skills before lecture and on Question 3 on the usefulness of attending lectures given by the faculty before the graduate student lectures. Two graduate students wrote a comment about Question 3 stating, "I attended the same class as an undergraduate." However,

an undergraduate views the insight and effort in the preparation, presentation, and testing of course material differently from a graduate student who will be lecturing on the material. In Question 6, four of the five graduate students supported our perception that training in teaching is important in both industry and academe.

Although they were not specifically asked on the questionnaire, graduate students informally expressed the opinion that two lectures per semester would be optimal. The students felt that this commitment would not represent a heavy teaching load during the semester but would give them the opportunity to lecture in a classroom setting.

Table 2 shows that the graduate students went to their teaching assignments without reading classroom teaching literature or attending class presentations of mentoring faculty. Three of the students met regularly with a faculty member to discuss teaching before going to class. The other students met less often, although all five agreed that such meetings were very important.

The undergraduate student evaluations of graduate student teaching quality were highest in Questions 1 and 2 (aspects of the material presented) and Questions 8 and 10 (usefulness of handouts and availability outside class to provide help). The lowest assessment was given for Question 9, the correlation of examination questions with major points emphasized in class. It is interesting to note that the undergraduate student evaluations of our faculty are also the lowest in the correlation of exam questions and emphasized lecture points.

The graduate student sample size was limited, as might be expected, with only two semesters of data; therefore, only tentative conclusions are possible. Questions 1, 2, and 3 of Table 2 showed that graduate students did little more than prepare their material for class, and the undergraduate evaluation showed that the lectures marginally met the lecture criteria elucidated in Table 3. The next step in the development of the proposed program is to enlist willing graduate students who will complete the training and compare their performance with this baseline data.

CONCLUSION

This paper has identified the need for graduate students to learn how to teach at the university level. Students would benefit most if

this learning process was developed and organized within pharmaceuticals divisions (with faculty as mentors) rather than within university teaching and learning centers. A program is proposed based on the collaborative participation of faculty mentors and graduate students. The students would meet regularly with faculty mentors when preparing lectures. The faculty would attend lectures and provide immediate feedback to the graduate students using videotapes and undergraduate evaluations. Whether the graduate students pursue academic or industrial careers, it is important for them to develop instructional skills while in the graduate program.

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