

Attitudes of Doctor of Pharmacy Graduates of One U.S. College Toward Required Evaluative Projects and Research-related Coursework

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This study examined Pharm.D. graduates' attitudes towards both a required evaluative research project and research-related coursework. Mean attitudinal responses were on the agreement side of neutral for all items; modal responses were "agree" on all items. Respondents agreed most strongly that the college should continue to require a project of all students, that there was sufficient time to do the project, that the advisors' support was adequate, and that the drug information and literature evaluation course adequately prepared them for the project. The 1992–94 graduates (149) had a minimum of 13 publications and 15 presentations of the projects at professional meetings and 30 (46.2%) had conducted another project since graduation. Opportunities also exist for current practitioners to participate in projects with students, potentially leading to solutions of real world problems and ultimate benefit to the profession. Graduates generally thought that the project and coursework were beneficial. Other colleges may wish to consider providing their students the opportunity to conduct an evaluative project.

Keywords: Education; Evaluation; Pharmacy; Research; Students

INTRODUCTION

To study, to finish, to publish. Benjamin Franklin

Evaluating the value and appropriate use of medicines requires both the development of drug therapy knowledge and the ability to analyze the quality and applicability of research. Thus, pharmacy practitioners should be equipped with these skills. In an effort to provide new pharmacy practitioners with such skills, a number of schools

and colleges of pharmacy emphasize the role of research in educational efforts (Kirking, 1988; Murphy *et al.*, 1999).

Teaching research evaluation skills in traditional lecture format is one approach that can help students learn to effectively critique the literature and obtain information from well controlled studies. However, some research indicates that students must actively participate in order to enhance the learning process (Chickering and Gamson, 1987). Active learning can be categorized as instructional activities involving students performing learning functions and using reasoning abilities (Bonwell and Wison, 1991). For the pharmacy profession, it has been suggested that "optimal patient outcomes are more likely to occur if pharmacists have access to the scientific research literature, the motivation and skill to read, understand and evaluate the research, and the ability to translate theory and research into practice decisions and behaviors" (Dolinsky, 1994). Furthermore, pharmacists are more likely to read, translate research into practice, and make better decisions regarding patients, if as "students they became skilled in evaluating behavioral and clinical research and in translating research and theory into practice" (Dolinsky, 1994).

For many years the University of Arizona College of Pharmacy has been using active learning to develop research-related skills. All students in the entry level Doctor of Pharmacy programme must take research-related courses (statistics, drug information and drug literature evaluation and research design) and complete an evaluative project before

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graduation. The project enables students to become active participants in learning evaluation skills; furthermore, it is believed that the project helps students develop other problem solving skills. One publication described a study that examined attitudes of the faculty toward the required project and also described the project experience (Murphy, 1997). The study determined the faculty opinions on the effectiveness of the evaluative project and required research-related courses in developing research skills in the students. Results indicated that, in general, the faculty believed that the evaluative project was of benefit to both the faculty and students, and that the courses adequately prepared students for the projects.

A research project on undergraduate research in science found that both students and mentors believed that the students developed important research-related skills (Kardash, 2000). Though the author did not think that the experience necessarily developed the higher order inquiry skills that are the foundation of critical scientific thinking, it was found that the students and mentors rated skill development as high in several areas. These areas included: observing and collecting data, understanding the importance of controls, interpreting data, orally communicating the results and thinking independently. The areas where students had more difficulty developing skills were identifying a specific question for research, formulating a hypothesis and designing a test for the hypothesis.

Although the faculty at the University of Arizona College of Pharmacy tended to agree that the required project enhanced learning and analytical thinking in the students, the attitudes of pharmacy graduates who had been required to conduct the projects had not been assessed. Evaluating the student perspective would complete the information necessary to assess the utility of the project for the college and perhaps for other colleges contemplating similar requirements for their students. However, determining when the graduates might best be able to evaluate the utility of the projects and courses is unclear, because skills developed in these courses and projects may not be used immediately upon graduation. Rather, as graduates progress in their careers there may be a greater likelihood that the benefits of having conducted a project and taken the research-related courses can be recognized. Conversely, skills of analysis and research may be learned during the practice of one's profession. Thus, a class that had graduated relatively recently, yet had some time to practice their profession, might be better able to provide a more informed assessment of the professional value of the required project than students currently involved in conducting projects. They might also have had less chance for skills learned while working to confound their evaluation.

For the purposes of this study, these assumptions were considered valid.

Current pharmacy practice is founded on research and many problems requiring solutions continue to plague the profession and our patients. Pharmacists are increasingly required to document activities and a complete understanding of how data can be most appropriately used is becoming essential for everyone. Thus, all pharmacists and the entire profession have a stake in advancing research.

The purposes of this study were to: (1) assess the general attitudes of former students toward the required research-related courses and project; (2) gather recommendations for improving the project; (3) determine if the graduates believed the project experience prepared them to conduct other projects; (4) determine if they published or presented the results of their project; and (5) determine whether they conducted and published or presented other work.

MATERIALS AND METHODS

A questionnaire was developed to assess the attitudes of three consecutive classes of pharmacy graduates at the University of Arizona toward the required project and other research-related course work. The questionnaire items were based in part on items from the survey of faculty attitudes toward the project (Murphy, 1997) and consisted of 27 items on demographics, project outcomes, and attitudes. It also provided opportunities for written comments from the respondents. Prior to the mailing, comments on the survey instrument were requested from several members of the faculty and the questionnaire was revised accordingly.

A total of 117 questionnaires were mailed on January 31, 1997 to all 1992, 1993 and 1994 Doctor of Pharmacy graduates of the University of Arizona College of Pharmacy for whom addresses were available on the alumni mailing list. The potential sample was 149 for those graduation years but the remaining addresses were not available. A pre-addressed, stamped envelope was provided for return of the questionnaire. No follow-up measures were taken. Questionnaires received by February 28, 1997 were included in the analysis.

Attitudinal items were statements regarding the projects and research-related courses. The respondents were asked to rate the degree to which they agreed or disagreed with each of these statements using a five-point, Likert response scale (1 = strongly agree through 5 = strongly disagree). Demographic data collected included year of graduation, type of position currently held, the setting in which the respondent had been employed most of the time since graduation, other degrees

obtained, whether a residency or fellowship was done, faculty status of project advisor (internal or external), whether the project was published and/or presented, whether the respondent had conducted research since graduation, whether any post-graduation project resulted in publication or presentation, and whether the respondent was currently a member of a professional pharmacy organization. Data from the respondents were entered into a computer spreadsheet (Microsoft Excel, version 7.0, Redmond, Washington 98052-6399) for analysis of descriptive and attitudinal statistics.

RESULTS

Of the 117 questionnaires mailed, 65 (55.6%) were returned. Three respondents left out single responses to different attitudinal questions. Those omissions were not included in the analyses. Of the respondents, 25 (38.5%) were currently employed in a staff position, 25 (38.5%) in a management position, and 15 (23.1%) listed their current position as other than staff or management. Three (4.6%) respondents had an M.S./MBA and eight (12.3%) had a B.S./BA in addition to their Pharm.D. degree. One respondent was currently enrolled in a MBA program. Thirty-one (47.7%) respondents had completed a residency after graduation from pharmacy school; none reported completing a fellowship. Thirteen respondents (20.0%) reported that they had worked most of the time since graduation in community chain store settings, 27 (41.5%) in hospitals, 7 (10.8%) in managed care and 18 (27.7%) in various other settings.

Twenty-one (32.3%) respondents graduated from pharmacy school in 1992, 19 (29.2%) in 1993, 24 (36.9%) in 1994 and 1 did not indicate year of graduation. Forty-one (63.1%) respondents had a member of the main college faculty serve as their project advisor (internal), 20 (30.8%) had an external advisor, 3 (4.6%) had both an internal and an external advisor and 1 respondent (1.5%) was unsure of the status of their project advisor.

Twenty-three graduates (34.4%) reported that their Pharm.D. project resulted in a publication and/or a presentation at a professional meeting. Eight projects resulted in a publication, 10 projects resulted in a presentation and 5 of the twenty-three graduates' projects resulted in both a presentation at a professional meeting and a publication. Thus, since non-responders may have also had publications and presentations, at a minimum there were a total of 13 publications and 15 presentations of the Pharm.D. projects at professional meetings from the 1992 to 1994 classes (149 students). Four respondents also indicated that their project had resulted in an award or other honour. Having an internal project advisor

(41 graduates) or both internal and external advisor (3 graduates) led to a better chance for publication or presentation (19, 43.2%) compared to an external advisor alone (three presentations or publications from 20 external advising relationships, 15.0%). Since graduation, 30 respondents (46.2%) reported that they had conducted one or more research projects. Sixteen of these thirty respondents reported that the research projects conducted after graduation had resulted in presentation as a poster, and eight indicated that the project had been published.

Table I shows the responses to the attitudinal items on the questionnaire. All mean attitudinal responses were on the agreement side of neutral. The modal response was two (agree) for all statements. Respondents were asked to provide suggestions for

TABLE I Response to attitudinal statements

Statement	Mean (SD)*†
I had sufficient time to do the project	1.9 (1.0)
The written guidelines on developing a project provided adequate information for me to begin the project	2.5 (1.0)
The project advisors' support was adequate to conduct the project	1.8 (1.0)
Graduate students or other faculty were available to provide research design suggestions if asked	2.5 (1.1)
The project experience helped in improving my writing skills	2.6 (1.1)
The project experience helped in improving my presentation skills	2.5 (1.1)
The project experience helped in improving my problem solving skills	2.8 (1.0)
The project experience helped in improving my analytical skills	2.7 (1.0)
Doing a project was a valuable experience	2.5 (1.1)
The project developed important skills that have been used in my work as a pharmacist	2.9 (1.1)
All students in Doctor of Pharmacy programs in the U.S. should be required to conduct a research (evaluative) project.	2.3 (1.2)
The College of Pharmacy should continue to require a project of all students	2.2 (1.1)
The following courses in the curriculum adequately prepared me to conduct the project:	
Statistics	2.6 (2.0)
Drug information and drug literature evaluation	2.1 (0.9)
Research design	2.3 (0.8)

* The scale was 1: strongly agree; 2: agree; 3: neutral; 4: disagree; 5: strongly disagree. † The mode for all items was 2 (agree).

improving the project experience. There were many recommendations, only a few of which had a recurring theme. One recommendation made by nine graduates was to begin the project earlier than the fourth year in pharmacy school. Another recommendation made by three graduates was to integrate the Pharm.D. project into one of the research-related required courses. Other suggestions included: scheduling time outside of clerkships to conduct the project; having students work in groups; requiring that all projects be important to the profession; providing assistance with statistics; requiring all projects to be submitted for publication; reducing variability in complexity of projects; placing more emphasis on practical aspects of statistics and research design and relating them to the Pharm.D. project; providing better guidelines; and assistance with writing and presentation skills.

DISCUSSION

Similar to the responses from the faculty (Murphy, 1997), responses from the graduates generally indicate that they are supportive of the Pharm.D. project experience. The respondents agreed most strongly on the following issues: that the college of pharmacy should continue to require a project of all students; that there was sufficient time to do the project; that the project advisors' support was adequate to conduct the project; and that the drug information and literature evaluation course adequately prepared them to do the project.

Some individuals were able to use the acquired research-related skills to their benefit after graduation from the College. Of the 65 respondents, 30 (46.2%) had conducted one or more research projects since graduation, more than half of which resulted in a presentation as a poster and/or a publication. Of the individuals who conducted a research project after graduation, 24 out of the 30 (80.0%) had completed a residency. However, graduates who had not undertaken a residency also had three presentations and two publications from their post-graduation projects. In retrospect, because so many individuals who conducted research after graduation had undertaken residencies, it might have been useful to know if these individuals had completed projects other than a residency project. Since many residency programs require projects, individuals who go on to a residency are particularly likely to use the skills acquired through a research project and research-related courses and, having already conducted a research project, would likely have some advantage over residents who had not. All other things being equal, it would seem reasonable that residency program directors may prefer to select students who have conducted projects in the past.

Several of the recommendations made by respondents have already been implemented, and others are being considered, for improvement of the project experience. Students are now allowed to start their projects during the third year, faculty members who have taught statistics and research design are available to provide assistance with statistical analysis, and a program is being planned for statistical consultation for the students.

Though the survey response rate was good (55.6%), the potential for non-response bias remains, potentially limiting the ability to generalize study results to the remainder of the graduates or a larger population. That there were only 117 addresses available for the 149 graduates may add to the potential for non-response bias. In interpreting these results, it is also important to note that 47.7% of the respondents had completed a residency. The average percentage of students going onto residencies directly after graduation for these graduating years was between 30 and 40%, indicating some potential for bias even among the college's graduates. It may also be important that it was assumed that this group of individuals, who graduated at least three years earlier, could appropriately evaluate the value of the project to them. The lack of a control group of students may also limit the conclusions to some degree. However, a control group could only be evaluated relative to projects completed after graduation in students who have not had the project experience. Only that particular section of the study results and conclusions would be affected by lack of a control group.

Many of the respondents (51, 78.5%) belonged to professional pharmacy organizations. Graduates belonging to organizations may see greater value in research secondary to receiving professional journals or, one might assume, from attending meetings, although whether or not they attended meetings was not a question asked of respondents. The overall percentage of pharmacists in the U.S. belonging to pharmacy organizations is not this high, so this may also limit the generalizability of the results.

Few U.S. colleges and schools of pharmacy require research projects of their Doctor of Pharmacy candidates, though most require research-related coursework (Murphy *et al.*, 1999). Based on the results of the previous study of the faculty attitudes toward the project (Murphy, 1997) and these results from the students who participated, other colleges and schools of pharmacy might consider implementation of some form of project. However, the workload associated with the projects is extensive and a strong commitment is required. For colleges and schools with large class sizes, who might contemplate a required project if sufficient resources were available, the idea proposed in both the faculty and graduate surveys for group projects might be

a viable alternative. A potential benefit of group projects would be the learning of team approaches to conducting projects and development of team leadership skills. However, one difficulty in such an approach might be appropriate work sharing among the students.

If more colleges were to begin requiring projects, there would be both opportunities and problems for adjunct faculty as well. Since it is probably ideal for such projects to focus on real world problems in the profession and patient care, practitioners are in an ideal position to suggest projects of value to them and their work site and to mentor students. At the same time, the need for a reasonable understanding of research methods would be important for the adjuncts so that they might provide the best mentoring possible for the students. Since external advisors were not as successful in leading students toward publication and presentation, they may need to work closely with internal faculty, at least initially, while they enhance their own research skills.

The profession of pharmacy has a sound science base. However, many problems need to be resolved and questions need to be answered. The project experience at the University of Arizona College of Pharmacy helps to develop research capabilities in students and has resulted in both presentations and publications. Efforts such as this should not, however, be considered as a replacement for further enhancement of research skills through graduate work or research fellowships or as some panacea for dramatically increasing scholarly output of the profession. That the profession might benefit from additional scholarship seems likely. At the same time, the scholarly output of even college of pharmacy faculty has been shown to be fairly limited (Mathys and Thompson, 2000). Thus, there appears to be room for improvement that should be encouraged in a variety of ways.

Although the majority of post-graduation projects were done by those who had completed a residency (and may well have been their required residency project), a reasonable number of graduates without residencies also conducted projects. This provides some hope of continuing to

stimulate research interest in future graduates, whether or not they complete a residency. Obviously, these graduates may have been required to do the projects as part of their job and would have done them whether or not they had the experience at the University of Arizona, but this information was not gathered as part of the study. However, no matter whether self-initiated or required, it seems likely that the experiences the graduates gained in conducting their first project added to their ability to conduct the subsequent projects.

The results of this study indicate that the graduates regard the required project and research-related courses at the University of Arizona College of Pharmacy to be of value. Other colleges could evaluate the results of this study and consider whether similar programs or variations on the theme might be implemented. As pharmacists become more involved in evaluation of literature and conducting projects, a good knowledge base in these areas becomes increasingly important. An evaluative project may serve as one tool to impart these skills to future pharmacists.

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