



Teaching and Learning Matters

Implementation of an elective course to introduce pharmaceutical sciences research

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Abstract

Objective: To describe the design, implementation, and student perceptions of a pharmaceutical sciences research elective course in a three calendar-year modified block curriculum.

Design: A two-credit elective course was offered to second year (P2) students in an accelerated doctor of pharmacy (Pharm.D.) degree program to provide research experience while focusing on problem solving and critical thinking skills. This 30-hour, 1-week long course with five different tracks was delivered using interactive lectures, group discussion, conducting laboratory experiments, and literature review. A survey was administered anonymously to collect student perceptions about the course.

Assessment: Formative and summative assessments, as well as student perceptions were used to assess the student satisfaction and knowledge. A midpoint evaluation was given at the end of day 3, and a summative assessment was administered in form of a written report at the end of day 5. Students reported a high degree of satisfaction with the course, indicating that the course was well-designed and implemented.

Conclusion: A structured and organized introduction to the research laboratory will provide pharmacy students with meaningful experience in the pharmaceutical sciences and help them interpret the scientific literature better. The course is a successful way of introducing students to laboratory research in pharmaceutical sciences.

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Background

The need for a strong research presence in the profession of pharmacy has long been acknowledged by the American Association of Colleges of Pharmacy (AACP),¹ the American College of Clinical Pharmacy (ACCP),² and the Accreditation Council for Pharmacy Education (ACPE).³

In pharmacy, as in any dynamic discipline, research is essential to the advancement of the practice. While only a fraction of practitioners will actively engage in research, effective practice necessitates that pharmacists read, understand, and disseminate the literature germane to their practice. While these skills may be developed in the absence of practical research experience, it has been suggested that the research experience improves critical thinking skills and decision-making.⁴

A research experience in the pharmaceutical and biomedical sciences within the Pharm.D. curriculum provides an opportunity for students to apply knowledge gained in

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the basic science courses to creatively think through problems in pharmaceutical and biomedical research. These experiences may facilitate the development of pharmacy professionals. One possible outcome is that students who participate in research activities will better understand how basic scientific research is conducted. This experience potentially benefits not only those students who go on to pursue careers in which research is integral but it could also help all future clinicians better interpret scientific literature. Furthermore, it is essential that the students who do choose to enter research careers be provided fundamental research opportunities to maintain the quality of pharmacy-related research.⁵

A second anticipated outcome of these research experiences is that students who participate in research will develop their problem-solving skills that are applied across pharmacy disciplines to all aspects of lifelong learning. The importance of the development of student problem-solving skills in the Pharm.D. curriculum has been reemphasized by the AACP in the development of the 2013 Center for the Advancement of Pharmacy Education (CAPE) educational outcomes,⁶ as well as in the 2016 ACPE Accreditation Standards.⁷ In 2013, the CAPE educational outcomes were restructured to emphasize broad skills expected of all pharmacy graduates. The third domain of these outcomes focuses on effective approaches to practice and care, and the first subdomain (3.1) is appropriately dedicated to problem solving. As discussed by others, the research experience enhances in the development of clinical reasoning skills in students.^{5,8–10}

The integration of research into the curriculum as a means of developing problem-solving skills has been employed in a variety of settings within and outside of pharmacy education.⁸ Multiple reports from various pharmacy schools describe the impact of research experiences on the pharmacy student.^{8–10} However, the majority of these focus on the role of clinical practice-based research and do not address research in the pharmaceutical and biomedical sciences. One study describing the implementation of a basic science research elective course in a doctor of pharmacy program highlights the effect of biomedical research in enhancing students' abilities to analyze clinical issues with a broader perspective.¹⁰

The three calendar-year modified block curriculum employed at University of Saint Joseph School of Pharmacy includes elective courses offered at the completion of the required didactic curriculum in the summer term of the second year of the program (P2). A modified block curriculum provides both challenges and opportunities for the implementation of a research-based elective course. The research elective is offered in block of five consecutive six-hour days. This accelerated schedule opens up lines of experimentation that are not amenable to the one- to three-hour blocks of time associated with typical course schedules, thus allowing the student to be more fully immersed in the research project during the period of engagement.

A challenge of the accelerated schedule is that the faculty must develop projects that can be addressed in a meaningful way in a five-day period. In an effort to ensure that students are properly oriented to the course methodologies, we employed a track-based research model that allows the student to select a pharmaceutical science/biomedical discipline and research supervisor based on stated learning outcomes (Table 1) prior to enrolling in the course. Students are encouraged to meet with the selected faculty member prior to the course to develop a strategy for success. In this report, we describe the design and implementation of a two-credit laboratory research course and present student responses to a survey on the effectiveness and value of this course.

Educational activity

In the modified block curriculum used at the University of Saint Joseph School of Pharmacy, each course is offered once during an academic year. The number of credit hours assigned to a course depends on the duration of the course, just as in most other academic institutions. For example, a two-credit course in a traditional program is equivalent to 30 instructional hours, (15 weeks, two hours each week). Similarly, in our block model a two-credit course generally translates into five days of six hours each day totaling 30 instructional hours. With that in mind, the nature and duration of the elective course PHCY892 “Directed Studies in Pharmaceutical Sciences Research” is rather unique. This course was designed with five distinct tracks of which a student must choose just one. The course is offered at the end of the didactic courses in P2 when the students take two or three one-week electives.

PHCY892 is a two-credit course with individual tracks offered as one elective block. Students have the opportunity to select up to two tracks within the same year, in addition to one didactic elective course, to fulfill their elective courses requirement. Due to the intimate nature of the course, the size of each track was limited to not more than two students/block/track in any one-week elective. This allows for the appropriate level of supervision and a favorable student to faculty ratio. It is also worth mentioning that faculty devoted their full effort to PHCY892 when they have students.

Description and resources

PHCY892 serves as an introduction to the research methodology in various fields of pharmaceutical sciences such as biochemistry, immunology, medicinal chemistry, microbiology, molecular and cellular biology, pharmaceuticals, and pharmacology. Five tracks are described in the syllabus for PHCY892. The course includes both classroom and laboratory activities and is strongly recommended for students considering taking an Advanced Pharmacy Practice Experience (APPE) in pharmacy research with a member of the Department of Pharmaceutical Sciences.

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