Introducing project management to student pharmacists in a healthcare informatics course

Sarah P. Collier [ID] , Elizabeth A. Breeden [ID]

Department of Pharmacy and Pharmaceutical Sciences, Lipscomb University College of Pharmacy, Nashville, Tennessee, United States

Correspondence
Sarah P. Collier
Department of Pharmacy and
Pharmaceutical Sciences
Lipscomb University College of Pharmacy
Nashville
Tennessee
United States
sarah.collier@lipscomb.edu

Abstract

Background: Project management (PM) is a desired skill for pharmacists regardless of their practice settings. However, PM skills often develop as a by-product of the pharmacy curriculum rather than by design. This study describes an immersive, active learning exercise aimed at introducing PM skills and methods to student pharmacists.   **Methods:** A didactic lecture and team-based case to evaluate a technology purchase for a small-scale, independent pharmacy was implemented in a second-year Healthcare Informatics course. Teams applied PM concepts to task completion timelines, budget constraints, and stakeholder engagement. A subset of students (N=36) participated in the research study to evaluate intervention impact.   **Results:** A net positive shift in student perceptions and confidence was observed following exposure to the skill and methods of applying PM in the active learning experience. Notably, student appreciation grew for the PM skillset relative to pharmacy as did their openness to additional PM training.   **Conclusion:** PM is a marketable skill, and it is foundational to any area of pharmacy practice. Herein, an active learning exercise is described to meet the objective of introducing PM principles and methodology to student pharmacists. The competencies gained will be useful in navigating the demands of the professional curriculum and their future practice.

Introduction

Project management (PM) is a methodology and common language used internationally across corporate and healthcare enterprises. PM is a globally important business process defined as the application of knowledge, skills, tools, and techniques to project activities to meet project requirements (Project Management Institute, n.d.). PM is also an essential competency (Hämeen-Anttila *et al.*, 2010; Zellmer *et al.*, 2013) for future pharmacists, regardless of their destined practice setting. It offers the potential to assist pharmacists by ensuring projects are completed on time, can meet budgetary constraints, and include desired quality standards. The American Society of Health-System Pharmacists (ASHP) required competency areas, goals, and objectives for Postgraduate Year Two (PGY2). "*Pharmacy Informatics*" residencies include PM as Competency Area R5 with associated goals and objectives (American

Society of Health-System Pharmacists, 2017). It is also beneficial to pharmacy educators in assisting with the organisation of work and gaining efficiencies (Dilly *et al.*, 2021).

Unfortunately, this skill set is expected to emerge as a by-product of pharmacy curricula rather than through intentional instruction or exposure. Limited reports of inclusion in didactic or experiential settings are recorded in the literature. For example, PM is reported as a benefit in the context of research training (Henchey *et al.*, 2020; Lucas *et al.*, 2021; Morbitzer *et al.*, 2021), informatics experiences (Fox *et al.*, 2011), and experimental structures of Advanced Pharmacy Practice Experiences (O'Sullivan *et al.*, 2019). More recently, direct exposure to PM skills development was reported to support student-perceived innovations (Portillo *et al.*, 2021). However, a gap in the pharmacy landscape remains.

PM skills (Udo, 2004) readily map to the Accreditation Council for Pharmacy Education 2016 Educational Outcomes: effective decision-making and problem-solving (3.1), interprofessional collaboration (3.4), communication (3.6), leadership (4.2), and professionalism (4.4) in the United States (ACPE, 2016). PM skills enable pharmacists to effectively manage, lead, and foster interprofessional collaborations, solve problems, enhance quality assurance, and continuously improve patient care. Therefore, introducing student pharmacists to PM methodology while still pursuing their Pharm.D. degree can significantly impact their careers and the quality of care they provide.

In response, a dedicated PM introduction was developed in a required second-year Healthcare Informatics course offered by a four-year, USA-based doctor of pharmacy programme. The Healthcare Informatics course was selected for this intervention due to the relevance of PM and specialists in the emerging field of informatics and digital health. The primary aim of this project was to introduce PM concepts and methodologies to student pharmacists through a didactic and active learning class session and subsequently assess student pharmacists' awareness, confidence, and perceptions around the simulated experience. The secondary aim was to advocate for the role of PM skills in the pharmacy profession.

Methods

Design

To introduce PM fundamentals, a didactic introduction paired with a team-based active learning exercise was designed and implemented (Figure 1). Student pharmacists were introduced to PM methodology and resources within a two-hour course meeting that was divided between an abbreviated didactic lecture followed by an instructor-developed team-based active learning exercise. The didactic lecture introduced terminologies, standard methods, technologies applicable to their present training, and phases in the project life cycle. Real-world examples were emphasised by the instructors to further reinforce the practical application of these concepts. After the didactic segment, students received instructions for the team-based active learning simulation that followed in the second portion of the class meeting.
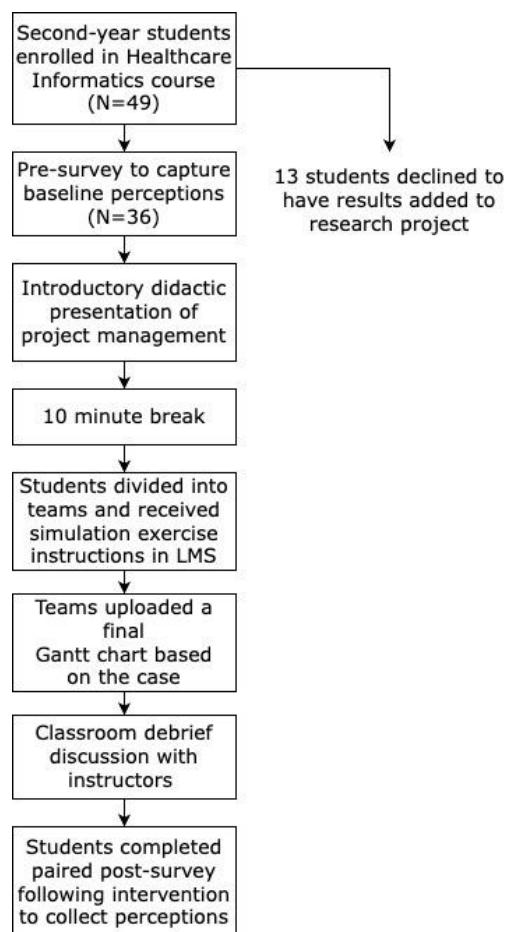
**Figure 1: Schematic representation of project management activity**

Student pharmacists self-selected approximately six students each into groups to complete the active learning simulation. Assuming the role of project managers, each team was charged with the task of evaluating the purchase of barcode scanner technology for use in a community pharmacy setting. Groups received the scenario describing the challenge, expected deliverables, available budget, and related materials to complete the required activity within the course learning management system (LMS) site. Next, teams were guided by the instructions and project tasks along with the provided estimated completion times to create a project roadmap. Each group identified a lead project manager and a stakeholder liaison to role-play the project team's management and interface with the course instructors who served as the stakeholders (owners) of the community pharmacy. During a 50-minute experience, groups applied the introductory didactic concepts and submitted a final Gantt chart visualising the overall project schedule from a provided template. After the activity, a debrief was facilitated by the instructors, related to the experience of the teams as well as the critical decision points in the simulation when

unanticipated events transpired (i.e. need for an increased budget; float time, reevaluation of a prescription workflow etc.).

Students (n=36) participated in paired pre- and post-surveys built using Google Forms (Appendix A). The paired surveys were developed for this project to capture general awareness of PM and its association with pharmacy, ranking confidence in one's ability to describe PM on a Likert-like scale and assigning value to the skillset personally as well as to the profession of pharmacy. Results were analysed, and statistical values were generated on an Excel sheet. A paired Student's *T*-test was used to determine the statistical significance ($p < 0.05$).

Results

Student perceptions related to the PM session were captured on a short survey containing a Likert-like scale (1=Very Low to 5= Very High; 1= Not Important/Confident at all to 5= Extremely important) for all items (Figure 2; Appendix A). First, students self-reported their *"understanding of project management"* (pre- 2.19±0.77 to post- 4.14±0.60; *p* < 0.001), *"confidence in explaining the term"* (pre- 1.92±0.81 to post- 4.14±0.68; *p* < 0.001) and described *"the importance of the skill in your future career"* (pre- 3.61±1.03 to post- 4.39±0.69). Paired perceptions revealed a net positive increase in agreement toward *"Agree"*-to *"Strongly agree"* for these three items following the two-hour experience. A marked and statistically significant increase was observed in students' *"understanding"* and *"confidence in explaining the term"* following the session. In contrast, only a modest increase was observed in evaluating the skills in their future careers.
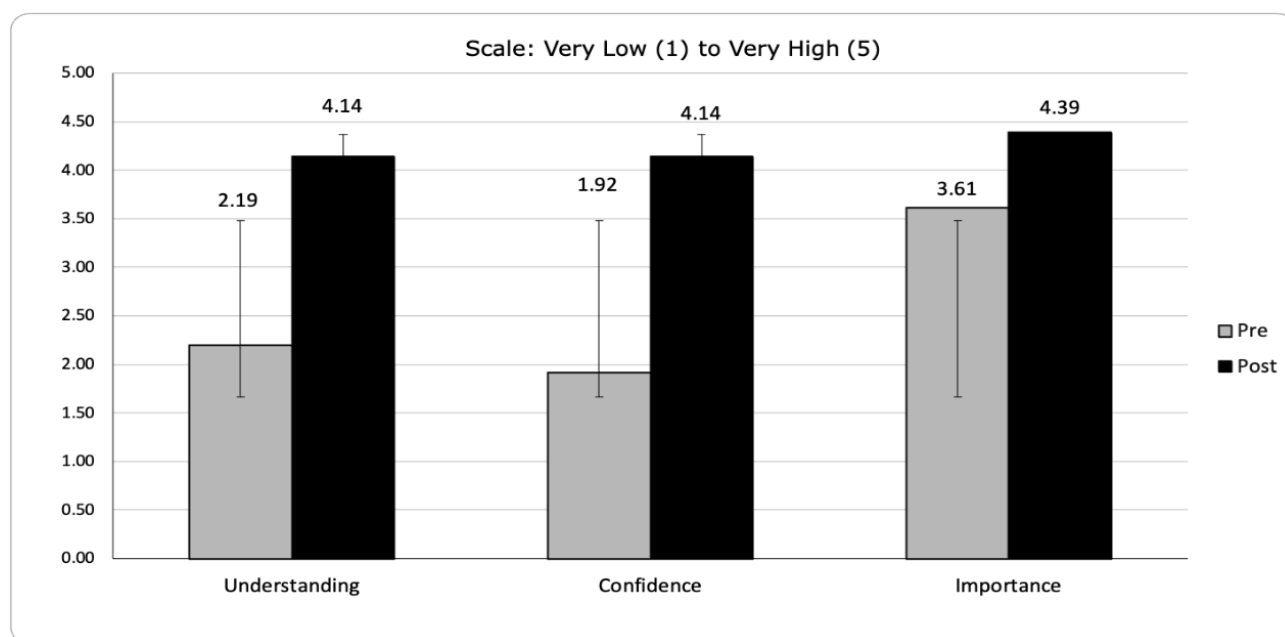
Figure 2: Evaluating student pharmacist competency in project management terminology and perceptions of importance to pharmacy careers

A second set of items evaluated students' perceptions of PM as a skill in a pharmacy context (Table I). In the survey, students tended to agree that PM is an essential (94.4%), valuable (94.5%), and growing skill (97.3%) in their profession. Additionally, students reported a modest increase in their curiosity about PM compared to the baseline.

Table I: Student perceptions of project management skillset

| Parameters | Project Management is… | | | | | | | | | |
| | *a skill I am curious about.* | | *an essential skill in pharmacy.* | | *a valuable skill in pharmacy.* | | *a growing skill in pharmacy.* | | *an essential skill for me as a future pharmacist.* | |
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Strongly agree	8 (22.2%)	14 (38.9%)	9 (25.0%)	16 (44.4%)	10 (27.8%)	20 (55.6%)	9 (25.0%)	20 (55.6%)	9 (25.0%)	19(52.8%)
Agree	21 (58.3%)	18 (50.0%)	19 (52.8%)	18 (50.0%)	20 (55.6%)	14 (38.9%)	16 (44.4%)	15 (41.7%)	19 (52.8%)	14(38.9%)
Neutral	5 (13.9%)	4 (11.1%)	7 (19.4%)	2 (5.6%)	6 (16.7%)	2 (5.6%)	11 (30.6%)	1 (2.8%)	7 (19.4%)	3 (8.3%)
Disagree	2 (5.6%)	0 (0.0%)	1 (2.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (2.8%)	0 (0.0%)
Strongly disagree	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	36	36	36	36	36	36	36	36	36	36

A final set of survey items captured student awareness of available PM resources (Table II). The perceived student connection between the applicability of PM to pharmacy was also explored. Students' awareness of available resources related to *"growing their newly found understanding of project management"* increased positively over baseline toward "*Agree*"-to "*Strongly agree*" following the exercise. Not only did the awareness of the next steps increase (from pre-22.2% to post-88.9%) but students also expressed interest in accessing scholarly publications on the matter (from pre-69.4% to post-78.3%). Students evaluated a connection between PM elements and the students' present doctor of pharmacy training. Following the intervention, the majority (pre-69.5%) Neutral-to-disagree/Strongly disagree respondents dissolved with 8.3% remaining Neutral demonstrating a newfound awareness and understanding of the skill relative to their lived experiences. Overall, a net positive outcome was observed related to students' perceptions of PM and its relation to their future profession.

Table II: Student awareness of project management resources and their application to their doctor of pharmacy training

| Parameters | *I am aware of the resources available to take the next step in growing my understanding of project management.* | | *There are elements of project management that I am currently applying to my training in pharmacy school.* | | *I am interested in learning more about research articles on project management resources which could be used by pharmacy students/pharmacists in their daily work (apps, websites, etc.).* | |
	Pre	Post	Pre	Post	Pre	Post
Strongly agree	1 (2.8%)	11 (30.6%)	2 (5.6%)	13 (36.1%)	4 (11.1%)	13 (36.1%)
Agree	7 (19.4%)	21 (58.3%)	9 (25.0%)	20 (55.6%)	21 (58.3%)	17 (47.2%)
Neutral	7 (19.4%)	3 (8.3%)	15 (41.7%)	3 (8.3%)	9 (25.0%)	4 (11.1%)
Disagree	13 (36.1%)	1 (2.8%)	8 (22.2%)	0 (0.0%)	1 (2.8%)	0 (0.0%)
Strongly disagree	8 (22.2%)	0 (0.0%)	2 (5.6%)	0 (0.0%)	1 (2.8%)	2 (5.6%)
Total	36	36	36	36	36	36

Discussion

The utilisation and application of PM principles can yield favourable outcomes for any area of pharmacy. For example, positive outcomes have resulted from the use of PM methodology in efforts such as clinical trials (McCaskell *et al.*, 2019), drug development and supply chain (Inflectra, 2022), and the pharmaceutical industry (Staples, 1989; Bashir & Abdelhakim, 2023). As an extension, these outcomes also promote skills

development in leadership (Turner *et al.*, 2021) and innovative thinking (Portillo *et al.*, 2021). The benefits of awareness and use of PM prompted the development of an innovative learning activity in this speciality for pharmacy students.

The design and implementation of an active learning PM simulation generally benefitted the student pharmacists. At baseline, understanding of PM application and confidence in PM terminology was minimal. In addition, a lack of awareness of resources to develop this skill set was observed in the initial responses. Not only is this anticipated, but it supports a need for PM exposure in a learning environment. The marked shift in direct result of the experience supports the achievement of primary learning objectives for this exercise.

The modest impact observed for the *"importance of project management in future career"* is confounded by the perceptions collected (Table II). This is indicative of a viewpoint that PM is deemed *"essential"*, *"valuable"*, and *"a growing skill to pharmacy"* but also needed in their career trajectory. Perhaps the presentation of PM in the context of a healthcare informatics course may influence student perspectives away from applying this skill set in certain pharmacy settings. Another option is the initial perceptions being formulated at the onset of the introduction of a new concept and content to which students had no prior exposure or experience. Furthermore, the shift in student pharmacist awareness and interest in seeking additional resources offers additional positive validation for the active learning exercise. In summary, these observations support learning objective achievement and affirm the need for intentional advocacy for PM in pharmacy education.

Limitations

A significant limitation to disclose is the sample size at a single site. The dataset analysed represents sufficiently paired survey responses from 36 student pharmacists in a four-year traditional doctor of pharmacy programme in the United States. Additionally, a challenge related to replicating this exercise elsewhere is the awareness of PM training or professional experience among pharmacy instructors. Additionally, broadening the audience for such an intervention to include pharmacy residents and fellows can also be considered given the explicit mention of PM in post-graduate training standards. While the introduction to PM principles and methodology occurred in a healthcare informatics course, the active learning exercise can be applied across multiple disciplines.

Conclusion

An introduction to PM paired with a team-based active learning exercise was designed and implemented for second-year student pharmacists. Results support that the effort was successful as a marked increase in students' understanding of and ability to explain PM was observed. Additionally, there was significant agreement on the value of PM in pharmacy and that it is an essential and growing skill. Student completion of an active learning session detailing a technology procurement for community pharmacy exhibited the practical application of PM and the benefits which can be realised with its use.

Conflict of interest

The authors declare no conflict of interest in the study.

Source of funding

The authors did not receive any funding for this study.

References

ACPE. (2016). *Guidance for the accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree*. https://www.acpe-accredit.org/pdf/GuidanceforStandards2016FINAL.pdf

Dilly, C. K., Klochan, K. A., & Bosslet, G. (2021). Project management tools for healthcare education. *The Clinical Teacher*, **18**(2), 109–114. https://doi.org/10.1111/tct.13264

Fox, B. I., Flynn, A. J., Fortier, C. R., & Clauson, K. A. (2011). Knowledge, skills, and resources for pharmacy informatics education. *American Journal of Pharmaceutical Education*, **75**(5), 93. https://doi.org/10.5688/ajpe75593

Hämeen-Anttila, K., Saano, S., & Vainio, K. (2010). Professional competencies learned through working on a medication education project. *American Journal of Pharmaceutical Education*, **74**(6), 110. https://doi.org/10.5688/aj7406110

Henchey, C., Keefe, K., Munger, M. A., & Witt, D. M. (2020). Fostering PharmD skills related to research and quality improvement through mentored projects. *American Journal of Pharmaceutical Education*, **84**(9), ajpe7940. https://doi.org/10.5688/ajpe7940

Inflectra. (2022). *The emerging role of project management in the drug development life cycle and supply chain. Inflectra Corporation*. Retrieved October 6, 2023, from

https://www.inflectra.com/Ideas/Whitepaper/Project-Management-in-the-Drug-Development-Supply-Chain.aspx

Project Management Institute. (n.d.). *What is project management*? Retrieved April 28, 2023 from https://www.pmi.org/about/learn-about-pmi/what-is-project-management

Turner, K. M., Kaur, G., Shannon, M. T., Minjarez, A. G., & Henchey, C. (2021). Feasibility and benefit of using a community-sponsored, team-based management project in a pharmacy leadership course. *Journal of the Academy of Health Sciences: A Pre-Print Repository*, **2**. https://jahse.med.utah.edu/feasibility-and-benefit-of-using-a-community-sponsored-team-based-management-project-in-a-pharmacy-leadership-course/

Lucas, C., Shum, S. B., Liu, M., & Bebawy, M. (2021). Implementing a novel software program to support pharmacy students' reflective practice in scientific research. *American Journal of Pharmaceutical Education*, **85**(10), 8320. https://doi.org/10.5688/ajpe8320

McCaskell, D. S., Molloy, A. J., Childerhose, L., Costigan, F. A., Reid, J. C., McCaughan, M., Clarke, F., Cook, D. J., Rudkowski, J. C., Farley, C., Karachi, T., Rochwerg, B., Newman, A., Fox-Robichaud, A., Herridge, M. S., Lo, V., Feltracco, D., Burns, K. E., Porteous, R., Seely, A. J. E., Ball, I. M., Seczek, A., & Kho, M. E. (2019). Project management lessons learned from the multicentre CYCLE pilot randomized controlled trial. *Trials*, **20**(1), 532. https://doi.org/10.1186/s13063-019-3634-7

Tzer, K. A., McLaughlin, J. E., Ozawa, S., Beechinor, R., Dumond, J., Pomykal, C., Bush, A., Zhang, Q., Carpenter, D., & Lee, C. R. (2021). Implementation and initial evaluation of a research and scholarship training pathway in a Doctor of Pharmacy curriculum. *American Journal of Pharmaceutical Education*, **85**(1), 8079. https://doi.org/10.5688/ajpe8079

O'Sullivan, T. A., Sullivan, L., Webber, K., & Weber, S. S. (2019). A comparison of student outcomes between longitudinally and traditionally placed advanced pharmacy practice experiences. *American Journal of Pharmaceutical Education*, **83**(8), 7143. https://doi.org/10.5688/ajpe7143

American Society of Health-System Pharmacists. (2017). *Required competency areas, goals, and objectives for postgraduate year two (PGY2) pharmacy informatics residencies*. https://www.ashp.org/-/media/assets/professional-development/residencies/docs/pgy2-informatics-cago-2017.pdf

Portillo, E. C., Rothbauer, K., Meyer, J., Look, K., Wopat, M., Gruber, S., Dunkerson, F., Lehmann, M., Wagner, E., & Seckel, E. (2021). Impact of a novel project management course sequence on innovative thinking in pharmacy students. *Currents in Pharmacy Teaching and Learning*, **13**(8), 982–991. https://doi.org/10.1016/j.cptl.2021.06.005

Staples, R. G., Engelhart, J. E., Malkin, M. F., & Rhodes, R. R. (1989). Project management in the pharmaceutical industry. *PM Network*, **3**(6), 11–28.

Udo, N. K. S. (2004). *What are the core competencies of a successful project manager*? [Conference presentation]. PMI® Global Congress 2004—EMEA, Prague, Czech Republic.

Bashir, S., & Abdelhakim, H. (2023, April 25). Using project management principles to improve research projects. *The Pharmaceutical Journal*, **310**, 7972. https://doi.org/DOI:10.1211/PJ.2023.1.181906

Zellmer, W. A., Vlasses, P. H., & Beardsley, R. S. (2013). Summary of the ACPE consensus conference on advancing quality in pharmacy education. *American Journal of Pharmaceutical Education*, **77**(3), 44. https://doi.org/10.5688/ajpe77344

Appendix A: Pre- and post-survey items

Timestamp	Item format	Range
What is your current level of understanding of project management?	5-point Likert-like scale	Very low to Very high
What is your current level of confidence in explaining the term "*project management*"?		Not confident at all to Extremely confident
How important is the skill of project management in your future career?		Not important at all to Extremely important
Indicate your level of agreement with the following: Project management is a(n)...... [skill I am curious about]	5-point Likert Scale	Strongly disagree to Strongly agree
Indicate your level of agreement with the following: Project management is a(n)...... [essential skill in pharmacy]		
Indicate your level of agreement with the following: Project management is a(n)...... [valuable skill in pharmacy]		
Indicate your level of agreement with the following: Project management is a(n)...... [growing skill in pharmacy]		
Indicate your level of agreement with the following: Project management is a(n)...... [essential skill for me as a future pharmacist]		
Indicate your level of agreement with the following statements. [I am aware of the resources available to take the next step in growing my understanding of project management.]	5-point Likert Scale	Strongly disagree to Strongly agree
Indicate your level of agreement with the following statements. [There are elements of project management that I am currently applying to my training in pharmacy school.]		
Indicate your level of agreement with the following statements. [I am interested in learning more about research articles on project management resources which could be used by pharmacy students/pharmacists in their daily work (apps, websites, etc.)]		