



Experiences in Teaching and Learning

Evaluation of a Newly Established Layered Learning Model in an Ambulatory Care Practice Setting



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ABSTRACT

Background and Purpose: Given the need to accommodate overlapping longitudinal Introductory Pharmacy Practice Experience (IPPE) students and Advanced Pharmacy Practice Experience (APPE) students at regular intervals while meeting clinical demands, the opportunity to establish a layered learning model (LLM) became evident at University of Missouri - Kansas City School of Pharmacy. The purpose of this project was to establish an LLM at an ambulatory care site, observe the teaching-learning interactions between IPPE and APPE students, and evaluate student perceptions of the experience.

Educational Activity and Setting: The LLM was implemented over the course of three traditional semesters during Spring 2016 through Spring 2017. Clinical services were offered 2.5 days per week. Overlapping student instructional time was established in conjunction with the provision of clinical pharmacy services and the structure of each rotation type. Third-year (P3) IPPE and fourth-year (P4) APPE students, who participated in the LLM at this site, completed a course evaluation pertaining to their experiences. The evaluation focused on APPE and practice readiness, as well as strengths and limitations of the LLM.

Findings: All 16 students completed the evaluation (100% response rate). All IPPE students indicated the LLM prepared them for APPEs in either an excellent (n = 3, 37.5%) or above average (n = 5, 62.5%) manner. Of the APPE students, most indicated the LLM prepared IPPE students for APPEs in an excellent (n = 3, 37.5%) or above average (n = 4, 50%) manner. Similarly, the majority of APPE students indicated the LLM prepared APPE students for practice in an excellent (n = 3, 37.5%) or above average (n = 5, 62.5%) manner. In addition, the following common themes developed, which highlight the benefits of the experience: reinforcement of knowledge through instruction, enhanced understanding of APPE expectations, exposure to multiple teaching styles, and creation of a comfortable learning environment. Students suggested the LLM include increased time for interaction with other learners.

Summary: An LLM involving P3 IPPE and P4 APPE pharmacy students, in an ambulatory care practice setting, was associated with positive student perceptions. Student feedback was best utilized to generate the hypothesis that this LLM may increase both APPE and practice readiness. However, further study is needed to confirm direct cause and effect.

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Background and Purpose

Through the provision of Introductory Pharmacy Practice Experiences (IPPEs) and Advanced Pharmacy Practice Experiences (APPEs), administrators, faculty, and adjunct preceptors continually contemplate the most effective manner to maximize experiential education while balancing a demanding workload. Thus, it becomes increasingly important to consider how to manage all responsibilities while ensuring students receive a progressive and extensive education. This challenge continues as enrollment in Pharm.D. programs at Schools and Colleges of Pharmacy in our country remains steady, with the experiential program comprising at least 30% of the curriculum.^{1,2} Instructional methods, such as the Layered Learning Model (LLM), may facilitate successful achievement of these expectations for both preceptors and learners.

The LLM allows multiple learners at various levels of instruction to educate, and actively learn from each other, under the direction of a pharmacist preceptor. Pinelli, et al. sought to identify the optimal conditions for an LLM in hospital and health-system pharmacy practice settings. The authors identified seven key attributes needed to create and execute this instructional model: shared leadership, a systematic approach, good communication, flexibility for attending pharmacist, adequate resources, commitment, and evaluation.³ It is important to continually reflect upon these attributes when developing an LLM, to ensure optimal design and quality assurance. Historically, this instructional method has included an attending pharmacist, postgraduate year 1 (PGY-1) or postgraduate year 2 (PGY-2) pharmacy resident, APPE student(s) and/or IPPE student(s).^{4–11}

Peer teaching models have a well-established role in medical education.^{12–14} The benefits of this instructional model have also extended into pharmacy education and the provision of clinical pharmacy services. Available literature has discussed the gains achieved through the LLM as an extension of pharmacy services.^{4,5,7,8,15,16} In addition, improved clinical time management for learners,⁶ positive effects on institutional metrics,^{5,7} and increased provision of patient care experiences for pharmacy students have all been observed.^{4–7,11,16–18} However, emphasis on the teaching-learning component between students (near-peer instruction) in the LLM remains essential. Studies have evaluated varying aspects of near-peer instruction,^{16,19} yet the literature is generally more robust for an LLM including residents as one of the key players.^{3–11} Research appears to be more limited where the instructional relationship is specifically between IPPE and APPE students.^{16,17,20}

The LLM has historically received more attention in the acute care setting, as opposed to ambulatory care.^{3,5–8,16,17} However, a variety of initiatives aspire to develop a consistent model of practice across diverse pharmacy practice settings.^{21–23} Additionally, Pinelli et al. have outlined an encouraging educational framework for immersing learners in an LLM through the use of cognitive apprenticeship. This framework for LLMs would theoretically be transferrable to any pharmacy practice environment and offer consistency as well.²⁴ However, unique logistical considerations are present in the ambulatory care setting. Therefore, best practices for the establishment of LLMs in ambulatory care are prudent.

At the University of Missouri-Kansas City (UMKC) School of Pharmacy, third-year (P3) students participate in a longitudinal IPPE course during the Fall and Spring semesters. The course requires 90 hours of direct patient care, or related activities. Students are placed with the same faculty member throughout the course for observation of continuity of care. The course performance competencies are directly mapped to the Pre-APPE Core Domains in the ACPE "Guidance for Standards 2016."²⁵ During the same academic year, faculty members may have fourth-year (P4) APPE students assigned to them. For ambulatory care faculty, the duration of APPEs may be one or two calendar months. APPEs require 160 hours of direct patient care activities per calendar month.

UMKC School of Pharmacy employs one faculty member who maintains an ambulatory care practice at the Harry S. Truman Memorial Veterans' Hospital (Truman VA). The faculty member independently provides direct patient care in the management of various chronic disease states, with the most common disease states being diabetes, hypertension, smoking cessation, dyslipidemia, and anticoagulation. Patient encounters occur both in clinic and by telephone. The faculty member is responsible for an average of 15–20 patient encounters over 2.5 days per week. Given the need to accommodate overlapping IPPE and APPE students at regular intervals while meeting clinic demands, the opportunity to engage in the establishment of an LLM became evident.

Ideally, an LLM effectively prepares IPPE students for APPE experiences (i.e. APPE readiness), prepares APPE students for practice (i.e. practice readiness), and maximizes faculty resources. Enhancing achievement of applicable 2013 Center for Advancement of Pharmacy Education (CAPE) Educational Outcomes while recognizing the newly established AACP Entrustable Professional Activities for New Pharmacy Graduates (EPAs) becomes paramount in this process.^{26,27} The purpose of this project was to establish an LLM at an ambulatory care site, observe the teaching-learning interactions between IPPE and APPE students, and evaluate student perceptions of the experience.

Educational Activity and Setting

The LLM at the Truman VA was implemented over the course of three traditional semesters, during the spring of 2016 through the spring of 2017. The learners involved in the LLM were P3 IPPE (n = 8) and P4 APPE students (n = 8). APPE students were continuously present at the practice site over the course of their rotation. However, each IPPE student was only present one-half day every other week, on days when clinical pharmacy services were available. Each level of learner was paired and assigned patient care duties appropriate for their abilities. The specific time frames for learner overlap are outlined in Table 1. IPPE students 1–3 had exposure to one set of APPE students over two months, while IPPE students 4–8 had exposure to three sets of APPE students over five months. When both types of students were present at the clinical site, each IPPE student spent approximately 8–10 hours per month with APPE students. The IPPE schedule varied throughout each semester, with some IPPE students attending alone or in pairs. As a result, overlap for each APPE student was approximately 25–30 hours per month.

To prepare APPE students to take on a teaching role, the faculty preceptor provided an informal explanation of their

Table 1
Learner Overlap at Clinical Site.

| | Spring 2016 | Fall 2016 | Spring 2017 |
|-----------|--------------------------|--------------------------|--------------------------|
| January | | | IPPE # 4–8 APPE # 5–6 |
| February | | | IPPE # 4–8 APPE # 7–8 |
| March | IPPE # 1–3 APPE # 1–2 | | IPPE # 4–8 APPE # 7–8 |
| April | IPPE # 1–3 APPE # 1–2 | | |
| September | | | |
| October | | IPPE # 4–8 APPE # 3–4 | |
| November | | IPPE # 4–8 APPE # 3–4 | |

APPE = advanced pharmacy practice experience; IPPE = introductory pharmacy practice experience

responsibilities before each near-peer interaction. APPE students were encouraged to coach IPPE students through the process of preparing for patient encounters. Specifically, the faculty preceptor discussed the use of pertinent questioning and redirection of inappropriate thought processes and conclusions. APPE students were also encouraged to recommend the use of appropriate references to enhance IPPE students' understanding. During patient encounters, APPE students were encouraged to model appropriate interpersonal skills with patients. Following interactions with the IPPE students, the faculty preceptor periodically debriefed with the APPE students. A description of the IPPE and APPE experiences are outlined in Table 2.

The majority of near-peer teaching took place when the IPPE and APPE students prepared for direct patient care activities. IPPE students were paired with an APPE student for each of their assigned patients. Early in the IPPE, each level of learner worked more collaboratively during the patient "work up" and APPE students modeled skills necessary for direct patient care. When the IPPE students were ready to take on their own direct patient care responsibilities, the APPE students moved into more of a coaching role. Prior to the day of clinic or telephone encounters, the APPE students worked up their assigned patients independently and confirmed patient management decisions with the faculty preceptor. The advanced discussion was intended to ensure APPE students would be comfortable coaching the IPPE students through the thought process behind clinical decision-making. On the actual day of patient encounters, IPPE students initially worked up their assigned patients independently. Should questions arise, they were encouraged to consult with an APPE student before the faculty preceptor. Upon completion of the independent work up, IPPE students presented their patients to the APPE student paired with them. Once a tentative plan was in place, the IPPE student presented the patient formally to the faculty member, with or without other students observing. During a clinic encounter, the IPPE and APPE students saw the patient collaboratively. IPPE students conducted medication histories and medication reconciliation while APPE students gathered additional patient subjective/objective information and relayed clinical decisions to the patient. During telephone appointments, usually one learner conducted the entire encounter (either an IPPE or an APPE student) and relayed clinical decisions to the patient. Both learners documented the patient care activities in the electronic medical record. All direct patient-care activities were completed under the supervision of the faculty preceptor. Additionally, the faculty preceptor directly observed the teaching-learning interactions between IPPE and APPE students on a routine basis.

IPPE and APPE students, who participated in the LLM at this site, completed a course evaluation pertaining to their experiences. The course evaluation included four open-ended questions and two Likert-scale questions, with the opportunity for additional

Table 2
IPPE and APPE Description.

| | IPPE (P3) | APPE (P4) |
|---|--|--|
| Structure of Rotation | <ul style="list-style-type: none"> ● 90 h Split Between Fall and Spring Semester of the Academic Year | <ul style="list-style-type: none"> ● 160 h/Month Over One or Two Consecutive Months |
| Patient Care Focus With Instructional Overlap at Clinic Site | <ul style="list-style-type: none"> ● Medication Histories ● Assessment of Vitals ● Documentation in Electronic Medical Record (EMR) ● Clinical Management of Anticoagulation and Smoking Cessation | <ul style="list-style-type: none"> ● Documentation in EMR ● Clinical Management of All Disease States |
| Teaching and Learning Structure | <ul style="list-style-type: none"> ● Patient Discussion/Work Up with APPE Students ● Patient Presentation to Preceptor and/or APPE Students | <ul style="list-style-type: none"> ● Clinical Questioning of IPPE Students ● Coaching IPPE Students During Process of Patient Work Up ● Modeling Patient Presentations and Patient Encounters for IPPE Students |

APPE = advanced pharmacy practice experience; IPPE = introductory pharmacy practice experience; EMR = electronic medical record

Table 3
Evaluation Questions.

| Question | Response Type |
|---|--|
| Please list and describe at least TWO strengths of your layered learning experience at the practice site. | Open-Ended Response |
| Please list and describe at least TWO areas for improvement of your layered learning experience at the practice site. | Open-Ended Response |
| Please compare and contrast this experience with any previous layered learning experiences, if applicable (i.e. opportunities for layered learning through different patient care activities and/or settings, length of time interacting with other pharmacy learners, opportunities to interact with different levels of pharmacy learners, etc.). | Open-Ended Response |
| To what level do you feel this layered learning experience at the practice site prepares IPPE students for APPE rotations? | Likert Scale + Comments <ul style="list-style-type: none"> ● Excellent ● Above Average ● Average ● Below Average ● Poor |
| To what level do you feel this layered learning experience at the practice site prepares APPE students for practice? | Likert Scale + Comments <ul style="list-style-type: none"> ● Excellent ● Above Average ● Average ● Below Average ● Poor |
| Please share any future recommendations you have to enhance the layered learning experience at the practice site | Open-Ended Response |

APPE = advanced pharmacy practice experience; IPPE = introductory pharmacy practice experience

comments (Table 3). The evaluation was developed and completed in REDCap®. A link for the evaluation was sent to the IPPE students approximately two weeks before the end of the spring semester, while the APPE students received the evaluation within the last three days of the rotation. Evaluations were due on the last day of the spring semester or rotation, respectively. The evaluation was required, but responses remained anonymous and were not utilized for grading purposes. Evaluation feedback was independently and manually coded by the authors for the presence of general themes. The authors compared findings to ensure consensus. No notable differences in the qualitative student feedback were identified through this process. Direct quotations, describing APPE and practice readiness, were chosen to best represent collective student feedback. Descriptive statistics were utilized to characterize data collected from the Likert scale questions. UMKC Office of Research Services, University of Missouri Office of Research, and the Truman VA determined the project to be a quality improvement activity.

Findings

All 16 students completed the evaluation. Common themes emerged in regards to strengths of the experience and areas for improvement. These themes are outlined in Table 4. Notable responses to the remaining evaluation questions also provided valuable insight (Table 3). According to students who previously participated in an LLM (n = 9, 56%), prior experiences tended to only offer IPPE students the opportunity to observe APPE students. In contrast, this experience afforded students a greater opportunity to interact and collaborate in the provision of patient care. Students indicated a greater expectation for APPE students to coach IPPE students, as opposed to only modeling patient care behavior.

All IPPE students indicated the LLM prepared them for APPEs in either an excellent (n = 3, 37.5%) or above average (n = 5, 62.5%)

Table 4
Evaluation Response Themes.

| Strengths | |
|-----------------------|---|
| IPPE Responses | <ul style="list-style-type: none"> ● Created comfortable learning environment ● Clarified performance expectations for future APPE rotations ● Offered variety of teaching styles that enhanced understanding |
| APPE Responses | <ul style="list-style-type: none"> ● Increased perception that students were able to contribute to patient care ● Reinforced knowledge through instruction |
| Combined Responses | <ul style="list-style-type: none"> ● Enhanced quality of patient care secondary to collaboration of additional learners ● No themes emerged |
| Areas for Improvement | |
| IPPE Responses | <ul style="list-style-type: none"> ● Provide opportunities for full group collaboration between IPPE and APPE students, as opposed to IPPE and APPE collaboration in pairs |
| APPE Responses | <ul style="list-style-type: none"> ● No themes emerged |
| Combined Responses | <ul style="list-style-type: none"> ● Allow more time to interact with other learners and prepare for patient encounters ● Include topic discussions ● Increase collaboration of responsibilities during patient encounters, rather than having separate responsibilities |

APPE = advanced pharmacy practice experience; IPPE = introductory pharmacy practice experience

Table 5
Representative Quotes Reflecting Level of APPE and Practice Readiness.

| APPE Readiness | |
|--------------------|--|
| Excellent | <ul style="list-style-type: none"> • "...it allows more open discussion which promotes a better learning environment and the IPPE student can usually figure out the answers to their own questions by just openly discussing without the fear of judgment." • "In this setting, I was able to interact for a longer duration with the APPE students than any experiences previously. This was beneficial due to the fact that it helped me be more prepared for APPE rotations and what they entail." |
| Above Average | <ul style="list-style-type: none"> • "P3 students get the opportunity to see how [the preceptor] and P4 students interact, exposing them to the APPE environment early." • "This experience helps IPPE students get a feel for what their APPEs will be like in an ambulatory care setting." |
| Practice Readiness | |
| Excellent | <ul style="list-style-type: none"> • "When you learn to teach someone else, your comprehension significantly increases..." • "The APPE students were given a lot of responsibility allowing them to experience some of the things a pharmacist in this setting does on a regular basis." |
| Above Average | <ul style="list-style-type: none"> • "This layered learning experience opened my eyes to the positive aspects of being a preceptor." • "...I have gotten to help teach, correct, explain, and reinforce concepts. This experience benefits both my and P3 student's knowledge base and patient-care skills. With this kind of experience, I will feel more confident in my teaching skills when I am in practice." |

APPE = advanced pharmacy practice experience; IPPE = introductory pharmacy practice experience

manner. Of the APPE students, most indicated the LLM prepared IPPE students for APPEs in an excellent ($n=3$, 37.5%) or above average ($n=4$, 50%) manner. Only one APPE student indicated an average score for this question (12.5%). Similarly, the majority of APPE students indicated the LLM prepared APPE students for practice in an excellent ($n=3$, 37.5%) or above average ($n=5$, 62.5%) manner. IPPE students' responses were not included, as the authors felt the question of practice readiness was too anticipatory in nature. It should be noted that no students rated the perception of APPE or practice readiness, as a result of the layered learning experience, below average or poor. Representative quotes reflecting student perceptions of APPE and practice readiness are outlined in Table 5.

A total of nine students offered no recommendations for improvement. Of the seven students offering recommendations, three indicated a desire to have more time for interactions with the other learners. The desire for topic discussions between APPE and IPPE students was also highlighted.

Discussion

Institutional practice settings have comprised the vast majority of literature describing pharmacy LLMs.^{3-8,11,16,17} Of the limited publications involving ambulatory care LLMs, both preceptor perceptions^{3,9,20} and learner perceptions have been evaluated.^{9,20} Pinelli et al. utilized preceptor perceptions to identify essential qualities of an effective LLM across practice settings.³ In developing the LLM described here, the authors found the need for a systematic approach, attainment of adequate resources, flexibility for the attending pharmacist, and commitment were most applicable. Shared leadership, good communication, and evaluation were less applicable to this model, as the LLM only involved a single faculty member at the institution. Our study evaluated student perceptions of an ambulatory care LLM, within a primary care practice in the VA. Additionally, this LLM included only P3 IPPE and P4 APPE students. To our knowledge, limited literature has evaluated LLMs involving only IPPE and APPE students.^{16,17,20}

Previous publications have cited common reasons for establishing an LLM. Institutions often desired to extend clinical pharmacy services, accommodate increased numbers of learners, and/or enhance learners' educational experience.^{3-9,11,16,17,20} Similarly, the LLM described here was developed to accommodate the longitudinal P3 IPPE curriculum and inevitable overlap with P4 APPE rotations at UMKC School of Pharmacy. Additionally, we hypothesized that the frequent overlap between IPPE and APPE students could uniquely enhance the quality of the learning environment through synergistic means. Student perceptions of this LLM supported our hypothesis, based on both open-ended and objective evaluation responses. While patient care services and experiential learning are highly interrelated within the LLM, students consistently related the LLM to experiential learning. This finding may be explained by differences in the way students collaborated to prepare for and conduct patient encounters. The faculty preceptor observed the IPPE and APPE students having in-depth discussions in preparation for direct patient care. During patient encounters in clinic, the students continued their collaboration. However, their individual roles differed based on the level in the curriculum. As a result, the students may have drawn a stronger correlation between experiential learning and the LLM, as opposed to patient care services.

"Standards 2016" and "Guidance for Standards 2016" continually reference the importance of APPE readiness.^{2,25} Three themes in students' responses indicate the LLM may enhance the ability of IPPE students to achieve this goal. The first theme was the LLM provided a greater understanding of, and appreciation for, expectations during APPEs. Based on faculty preceptor observance, a possible reason for this finding was the opportunities IPPE students had to observe the way APPE students and the faculty preceptor interacted. Second, students commonly cited greater comfort within the learning environment. In an acute care oncology LLM, a similar theme also emerged.⁶ One potential way IPPE students' comfort was enhanced was through the process of presenting patients. This LLM doubled the opportunities for IPPE students to present patients, as IPPE students presented to both an APPE student and then the faculty preceptor. The additional repetition seemed to increase students' confidence when presenting. Third, the variety of

teaching styles amongst various student collaborators appeared to enhance understanding. As students may respond best to select teaching and learning styles, the LLM has the potential to meet the needs of a greater variety of learners.

The concept of practice readiness has been a major point of discussion amongst pharmacy educators in recent years. Standard 13 of "Standards 2016" outlines the role of APPEs in establishing practice ready graduates.² While the 2013 CAPE Educational Outcomes have been the primary framework to develop assessments of practice readiness,²⁶ EPAs²⁷ are emerging as a mechanism to "operationalize the CAPE 2013 into discrete tasks that can be measured."²⁸ In this LLM, students identified the most common positive correlation between the LLM and practice readiness as knowledge reinforcement through instruction of the IPPE students. Anecdotally, the faculty preceptor observed that APPE students consistently provided appropriate explanations of concepts to the IPPE students, during discussion of individual patient work ups. These near-peer teaching opportunities work to support APPE students' achievement of the EPA Patient Provider Domain. This EPA Domain links most closely to CAPE 2013 Educational Domains 2 (Caregiver) and 3 (Educator, Problem Solver) in this LLM, according to the Report of the 2016–2017 AACP Academic Affairs Standing Committee: Entrustable Professional Activities Implementation Roadmap.²⁸

Students' evaluation responses also associated the LLM with a greater appreciation for the role of preceptors in pharmacy education. In pharmacy residency training, the four preceptor roles include direct instruction, modeling, coaching, and facilitating.²⁹ The same principles are also applied to pharmacy students.²⁹ By placing APPE students in near-peer teaching roles, they were able to directly apply these preceptor roles. The faculty preceptor frequently observed APPE students modeling and coaching. APPE students modeled patient presentations to the faculty member, patient interviewing skills, and elements of professionalism for IPPE students. During patient discussions between learners, APPE students coached IPPE students through the development of clinical reasoning, application of evidence-based medicine, and promotion of self-directed learning. Facilitation occurred by allowing APPE students to take on these preceptor roles. Direct instruction occurred on occasion, but was not as common. Formal training in pharmacy preceptorship typically does not occur until post-graduate training programs. However, many pharmacists may not complete post-graduate training and still assume precepting responsibilities during their pharmacy career. Early exposure to preceptorship during APPE's may enhance the overall quality of experiential education and increase the desire to seek precepting opportunities.

Both IPPE and APPE students indicated the LLM would be enhanced by increasing the amount and type of collaboration between learners. The authors consider this a positive finding that speaks to the value students drew from the experience. Although students would prefer more time discussing the application of clinical concepts to patient care, clinic schedules do not afford the opportunity in all instances. Alternatively, increasing the variety of activities available for collaboration is a feasible area of improvement supported by the faculty preceptor. Among the activities suggested were to include collaborative topic discussions. Such opportunities would be expected to reinforce foundational knowledge for both the IPPE and APPE students. Additionally, APPE students would be afforded the opportunity to utilize direct instruction in another manner. Leong C, et al. describe a similar method of near-peer teaching in a hemodialysis unit.⁹ Providing additional opportunities for APPE students to model patient presentations to the faculty preceptor, especially at the beginning of the IPPE, was also indicated to be of benefit. Such changes may continue to enhance the depth and breadth of the learning environment. These will be considered for this ambulatory care LLM.

The LLM provided several benefits to the faculty preceptor. As previously mentioned, a goal of the LLM was to maximize the number of learners on site while balancing patient care workload and to provide a valuable learning environment. Ambulatory care practice sites have historically been less abundant than acute care practice sites at UMKC School of Pharmacy. Most notably, this LLM allowed the faculty preceptor to accommodate two IPPEs and two APPEs simultaneously. By pairing students to provide care for the same patient, adequate supervision could be provided during patient encounters, and "Guidance for Standards 2016" could be maintained for preceptor to learner ratios.²⁵ This type of LLM could help allow the placement of increased students at ambulatory care practice sites.

Prior to implementing the LLM, more advanced planning was required to coordinate IPPE, APPE, and faculty preceptor schedules effectively. A number of lessons were also learned during the implementation of the LLM. Within the first semester of implementation, orientation evolved to ensure learners' roles and responsibilities were clear. This change led to more effective student collaboration by establishing a clear plan for IPPE and APPE student pairings. While APPE students were provided with informal precepting expectations, the authors recognize that a more structured and robust preceptor orientation would likely enhance the quality of the teaching-learning relationship in the LLM.¹¹ Unique challenges specific to the ambulatory care practice setting were also present. Most certainly, the situation of patient no-shows occurred. In order to maintain robust patient care activities for students to meet required contact hours, alternate methods of conducting patient encounters were utilized. Usually, this involved converting a clinic appointment to a telephone appointment. If the encounter could not be completed by an alternative means, different activities needed to be developed. The provision of adequate computer workstations, space for student discussion, and space for students to conduct patient encounters is important to the success of the LLM.³ Such needs can be particularly challenging in an ambulatory care setting. Lastly, this LLM was unique, as very limited literature describes an LLM incorporating only IPPE and APPE student learners.^{16,17,20} Much of the published literature includes LLMs with a PGY-1 or PGY-2 resident.^{3–9,11} Because APPE students still required a significant level of supervision for patient care activities in this setting, some inefficiencies in workflow remained. Each patient was presented separately to the faculty preceptor by an IPPE and APPE student. The additional time required was feasible for this LLM, as patient care was provided 2.5 days per week. However, for an ambulatory care preceptor with full time patient care duties, this may not be a sustainable characteristic. Incorporating a postgraduate pharmacy resident would likely overcome this inefficiency in the experiential learning process.

Several limitations of this study are important to note. Although students were directed to specifically reflect on the LLM, additional confounders could have contributed to their perceptions of the experience (e.g., learning opportunities during the P3 or P4 year outside of the LLM). Mechanisms were also put in place to ensure the integrity of student responses (i.e. anonymous reporting

and no impact on students' grades). However, positive feedback may have been overly generous if students were still hesitant to provide constructive criticism. In the evaluation tool, students were asked about APPE readiness and practice readiness. Both of these questions were anticipatory in nature and students would not be able to gain full realization of the impact of this LLM until they enter APPEs or practice. The sample size was small and due to the quality improvement nature of the project, the results may not be generalizable to other institutions. The amount of overlap for IPPE students 1–3, compared to IPPE students 4–8, was inconsistent. This was due to the start of the study in a spring semester and because APPEs had a duration of one month or two months at that time. These were factors beyond the authors' control. APPE students were provided with informal expectations for preceptor roles. Formal training may have enhanced the APPE students' understanding of the near-peer teaching model and the approach to IPPE instruction. Depending on the timing of the LLM during the academic year, APPE students likely possessed varied levels of clinical knowledge and confidence in teaching. As a result, APPE students' teaching quality may have improved from the beginning to the end of the academic year. Lastly, student perceptions are best utilized to generate further hypotheses about this LLM in the ambulatory care setting. Direct cause and effect cannot be established.

Summary

An LLM involving P3 IPPE and P4 APPE pharmacy students, in a VA ambulatory care practice setting, was associated with positive student perceptions. For IPPE students, notable strengths were increased comfort in the learning environment, exposure to multiple teaching styles, and enhanced understanding of APPE expectations. APPE students indicated knowledge reinforcement through instruction to be a significant benefit. Both levels of learners felt additional opportunities for collaboration would be beneficial. The student feedback also led to the hypothesis that the LLM may enhance both APPE and practice readiness. However, further study is needed to confirm direct cause and effect of these perceived correlations.

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Conflicts of Interest

None

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