

Impact of recorded lectures on classroom attendance in PharmD didactic courses

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ABSTRACT

Background and purpose: Low in-person attendance in didactic courses is a major concern for pharmacy, medical, and other professional schools across the country. The objective of this study was to categorize student and faculty perceptions on access to recorded lectures, examine the need for mandatory in-person class attendance, and provide suggestions to increase student in-person class attendance. **Educational activity and setting:** A survey instrument was sent out to a total of 481 pharmacy students and 67 faculty members in the College of Pharmacy. The survey examined participants' perceptions on whether recorded lectures improved learning, whether students/faculty felt the need for students to attend classes even when given access to recorded lectures and lecture slides, how students and faculty prioritized (i.e., ranked) seven suggestions to increase student interest in attending class in person and whether participants had any comments on recorded lectures and student attendance. Faculty members were also asked if they supported a mandatory attendance policy. **Results:** Ninety-nine percent (99%) of the participating students and 76% of faculty responded that lecture capture enhanced students' learning ability. Sixty-five percent (65%) of students felt that it was necessary to attend class in person, even when lecture notes and recorded lectures were provided. Statistical analyses revealed the lack of a statistical relationship between recorded lectures and in-person class attendance within student participants and a lack of a statistical relationship between recorded lectures and the need for a mandatory attendance policy within faculty participants. Out of the seven options given, the highest percentage of students (27.5%) indicated that their first preference to attend classes is to be able to ask questions and clarify the misunderstanding. While 25.9% of the faculty chose unannounced quizzes to increase students' classroom attendance, only 14.3% of students preferred it. Forty-four percent (44%) of the College of Pharmacy faculty stated they were in favor of a mandatory attendance policy. The majority of the students and faculty agreed that in-person classroom attendance improves students' learning, although their perceptions on how to improve students' classroom attendance vary. **Conclusion:** Pharmacy students desire interactive in-person learning environments and recorded lectures did not replace the desire of students to be engaged with content in innovative ways. This study can provide guidance and insight into attendance issues faced by colleges of pharmacy and other health professional schools as they struggle to institute attendance policies.

Keywords: Lecture recording, mandatory attendance, active learning strategies

Background and purpose

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In-person class attendance is a growing concern for institutions of higher education, in particular pharmacy, medical, and other professional schools ^[1-4]. In pharmacy schools, in-person classroom interactions among students and faculty show a positive influence on students' grade and professional socialization ^[1-3, 5]. The authors feel that the challenge for administration and faculty is to identify effective means to promote active learning and student engagement with and without technology ^[6]. There is little doubt that audio and video-recorded lectures have greatly impacted pharmacy and medical practice education, as predicted well over a decade ago. ^[7]

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Students use recorded lectures, along with other technologies, to review lecture materials and even as a substitute for attending lectures in person. [7-9] Consequently, pharmacy educational institutions have strived to implement technology solutions, such as digital learning using online assignments and assessments, podcasts, telemedicine, and virtual cadaver tables for hands-on teaching and learning anatomy in face-to-face classroom learning environments, in order to meet student learning needs [8, 10-17]. In order to meet the demands of a digitalized society, many professional schools provide students with a wealth of enhancements to aid student learning [7, 9, 18, 19]. A commonly implemented technology is the creation of on-demand audio and/or video recording of face-to-face lectures that can be accessed by students outside of regularly scheduled class times [9, 19]. Although technology alone cannot meet all student learning needs, on-demand audio and video recordings of lectures allow students to review course material at their convenience and at their own pace. Faculty and administration in many disciplines have expressed concerns that the integration of such technology greatly reduces in-person (i.e., face-to-face) class attendance in pharmacy, medical, graduate, and undergraduate institutions across the country [7, 9, 19-23]. This perceived drop in student attendance has led professional school administrators and faculty members to debate whether online access to course materials should be limited or reduced [5, 7, 19]. However, previous research studies in other disciplines (i.e., psychology, education, and medicine) have not provided clear empirical evidence to substantiate these concerns surrounding student lack of in-person class attendance [24]. Research studies have previously shown varied results in regard to recorded lectures and student attendance. These results ranged from a significant drop in attendance [7, 21], and a minimum/low decrease in attendance, [9] to no decrease in attendance [9, 24-27], when students were given access to recorded lectures.

These discussions have raised the issue of whether or not students who do not attend class in-person should be given online access to recorded and/or video-captured lectures [9, 28]. However, Romanelli et al raised the question, "Does it matter how students learn or only that they master the material and course-related objectives?" [29] Others remain concerned that if this trend continues, it could negatively impact the faculty's abilities to foster the development of student critical thinking and problem-solving skills necessary to make sound patient-centered clinical therapeutic decisions, as well as negatively impact student professionalism [1-4]. Furthermore, Cardall et al. state that the lack of classroom attendance may not indicate a lack of commitment by the students to learn materials, but more of an acceptance of these technologies as providing the means by which students can maintain the balance between academic demands and personal responsibilities [7]. Therefore, the implementation of recorded and/or video-captured lectures should not be contingent upon classroom attendance, but on whether the selected technology facilitates learning and enhances the face-to-face learning process [29, 30].

Although there is much research on classroom attendance, there is little research regarding the impact of audio- and/or video-recorded lectures upon student attendance within schools of pharmacy. Hidayat et al. conducted a study to examine the relationship between the academic performance of pharmacy students and classroom attendance. [1] The study concluded that low-performing students were more likely to miss class if it was before or after an examination and that "creating a culture of attendance" may be the first step to foster academic success, maturity, accountability, and professionalism within pharmacy students [1, 5]. The objective of this study was to examine pharmacy student and faculty perceptions of whether or not access to recorded lectures impacted students' learning and attendance and how to improve student in-person classroom attendance. The results of this study will provide data supporting the ongoing dialogue within institutions of pharmacy education as administrators work to develop strategies for increasing classroom attendance.

Methods

This study was conducted at a College of Pharmacy located at a tier I research institution in the Southwest United States. The study participants were full-time students enrolled in the college's four-year PharmD program, which included all students from the second year (P2) of the graduating class of 2020, third-year (P3) of the graduating class of 2019, fourth-year (P4) of the graduating class of 2018 and the immediate graduating class of 2017, along with every faculty of the College of Pharmacy. The P1 class was not included in this study because it was felt that at the time the study was conducted, they were not in the college long enough to experience the vigor of the program, and were not attending all classes.

In order to allow students greater access to course materials, in the fall of 2015, the College of Pharmacy approved a policy to video/audio record classroom lectures granting students access to lectures online. Since faculty members were given the option to opt out of one or both recording types, all faculty decided to solely audio record their lectures. As the year progressed, faculty grew concerned that the new policy caused a significant, 60-70% drop in students' attendance of classroom lectures, particularly prior to exams. This was based on recording the number of students who took unannounced quizzes throughout the course and their grades posted on Blackboard. As a result of this noted drop in attendance, two surveys were created, one for students and one for faculty. Each survey instrument was composed of four questions that consisted of two closed-ended questions, one rank-order question, and one open-ended question. These surveys were not based on any previous tools and the questions were written based on observational data. The survey instrument was designed as an exploratory measure to investigate student and faculty opinions about recorded lectures and in-person class attendance. No pilot was conducted. The survey questions were distributed and managed in cloud-based software, Qualtrics Research Suite (Provo, UT) licensed by the College of Pharmacy.

After securing permission from the Institutional Review Board (IRB)(University of Houston IRB ID: STUDY00000441), participants were sent an anonymous survey and an anonymous survey link via email. In alignment with IRB standards and guidelines, students could omit responses and opt-out at any time during the survey. The survey instrument can be viewed in Appendix A. The purposeful non-probability convenience sample was comprised of all 67 faculty members and all 481 students in all four years (P2, P3, P4, and the graduating class of 2017). In order to have a 95% confidence level and a 3% margin of error, the required sample size was $n=332$ for students and $n=63$ faculty. The faculty survey was sent to all faculty participants in the sample and the student survey was sent to all student participants in the sample at the same time. Three reminders were sent to both students and faculty to complete the survey. The survey instrument can be viewed in Appendix A. Data were analyzed in Qualtrics, Matlab, and R.

Quantitative Analysis

To address research questions one, two, and three responses were compiled and presented in the form of percentages. Research questions four and five were analyzed using the chi-square tests of independence to examine whether there was an association between the two variables. Research question six was analyzed using both percentages and Medium (IQR) Ranking of factors

Qualitative Analysis

Research question six was analyzed using qualitative content analysis. To begin the analysis of student and faculty comments, summative content analysis in the form of a frequency table along with an accompanying word cloud was created using the Matlab Text Analytics Toolbox (The MathWorks Inc., Natick, MA). The first step was creating a program that preprocessed the data for analysis. This program consisted of six steps: Erasing punctuation, converting text data to lowercase, tokenizing the text, removing stop words (i.e., and, or etc.), removing short words, and removing long words. Next, Matlab created a bag of words along with accompanying word counts. Additional two-word and three-word phrases were also analyzed.

After reviewing the data, a sentence unit of analysis was selected. For the purposes of this analysis, a sentence was defined as a statement having a subject and a predicate that ended with some form of punctuation. Sentences were also accepted without punctuation if the statement was complete and fulfilled the previous requirements. If a sentence appeared incomplete, it was grouped with a preceding and/or following statement. Overall, the researchers sought to analyze complete thoughts (i.e. sentences), and only combined phrases when absolutely needed. These comments were coded before being divided into sentences. It is important to note that the selected unit of analysis allowed for some student comments to be divided into two or more sentences. However, this division was accomplished

without losing the overall meaning of the comment outside of its original context.

Research Questions

The seven research questions guiding this investigation were: 1) How do students and faculty view recorded lectures and their ability to improve student learning? 2) How do students view their need to attend class, despite the availability of recorded lectures and class notes? 3) How do faculty view a mandatory student attendance policy? 4) Is there a relationship between in-person class attendance and access to recorded lectures within the student participants? 5) Is there a relationship between in-person class attendance and mandatory attendance within the faculty participants? 6) Which factors will increase student interest in attending lectures? 7) What comments would faculty and students like to add regarding recorded lectures and in-person class attendance?

Results:

Three hundred forty-four (344) out of 481 students (72%) responded to the first and second survey questions (confidence interval of 2.82, margin of error: $\pm 2.587\%$), while 335 out of 481 students (70%) responded to the third survey question (confidence interval of 2.95, margin of error: $\pm 2.746\%$). Additional comments were provided by 132 students in response to question four. Sixty-three (63) out of 67 (94%) faculty members from the College of Pharmacy answered survey questions one, two, and three (confidence interval of 3.04, margin of error: $\pm 2.786\%$). Twelve (12) faculty members provided comments in response to question four.

For research question one, ninety-nine percent (99%) of the student participants responded that lecture capture enhanced their learning ability of the subject, while only 76% of the participating faculty perceived that lecture capture enhanced learning. The results of the research question two indicated that sixty-five percent (65%) of students felt that it is necessary to attend class in person, even when provided with lecture notes and the recorded lectures. Research question three indicated that fifty-six percent (56%) of faculty were against the implementation of a college-wide mandatory attendance policy. To address research questions four and five, two chi-square tests of independence were conducted to analyze student and faculty data, respectively. The results of the first chi-square test of independence showed that there was no statistically significant association between access to recorded lectures and student in-person class attendance ($X^2(1) = 1.66, p = 0.20$). The results of the second chi-square test of independence also showed a lack of a statistically significant association between recorded lectures and faculty support for a college policy of mandatory attendance ($X^2(1) = 2.52$ and $p = 0.11$).

Research question six asked faculty and students to rank seven statements on how to improve classroom attendance and the top rankings were examined for each group. These results can be

seen in Figure 1. Twenty-eight percent (28%) of the students selected the ability to ask questions and clarify misunderstanding as to their top preference, while in contrast, twenty-six percent (26%) of faculty ranked unannounced quizzes as the number one activity to improve attendance. The Medium (IQR) rankings for each factor can be viewed in Table 1.

Table 1. Medium IQR Ranking of the Factors for Improving Students' Class Attendance

Factors for Improving Student Attendance	Medium (IQR)	Range
Ability to ask questions and clarify a misunderstanding	3	1 to 4
Access to information that is not provided in the books or lecture notes	3	2 to 5
Announced quizzes	3	2 to 5
Engagement in activities even though this means having to listen to prerecorded lecture content before class	5	3 to 6
Participation in classroom activities versus just listening to lectures	4	3 to 6
Unannounced quizzes	5	2 to 7
Use of case-based team activities and discussion in the classroom	4	3 to 6

+ The interquartile range (IQR) is a measure of statistical dispersion representing the mid-spread 50% (middle).

Research question seven allowed students and faculty to provide comments that expounded upon their answers to the earlier survey questions. These comments were analyzed using qualitative textual analysis.

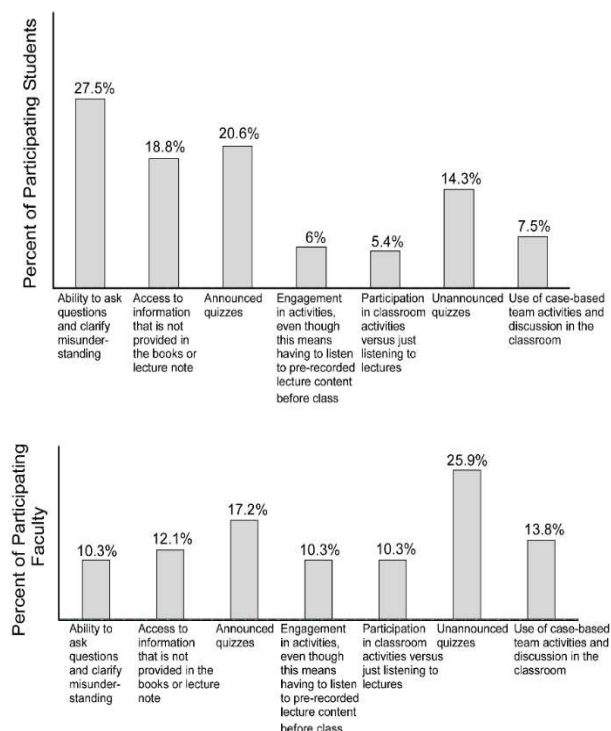


Figure 1. Student and faculty perceptions on how to increase students' attendance in didactic courses. Top, Students' ranking of activities that may increase students' interest in attending lectures. Given seven options, the highest number of students (27.5%) ranked 'Ability to ask questions and clarify misunderstanding' as their first choice of activities. Bottom,

Faculty ranking of activities that may increase students' interest in attending lectures. Given seven options, the highest number of faculty (26%) ranked 'Unannounced quizzes' as their first choice of activities. The survey was conducted with 481 students and 67 faculty members. 72% of the students and 94% of the faculty participated in the survey.

Student comments

A total of 132 out of 481 (27.44%) students submitted additional comments on the survey. The resulting student data resulting from the qualitative analysis above were divided into 434 units of analysis (i.e., sentences). Ultimately, the second coding resulted in the data being divided into five distinct categories:

- Suggestions to increase student in-person class attendance
- Reasons/Rationale for student unwillingness to attend class
- Comments that neither provided suggestions nor rationale
- Other comments that had nothing to do with attendance
- Negative comments

The data revealed two primary categories: Suggestions to increase student in-person class attendance (45%) and Reasons/Rationale for student unwillingness to attend class (28%). The suggestion comments contained information as to how the College of Pharmacy could enhance the classroom experience. The context within this second category directly contrasted the first category in that the comments provided reasons, rationales, and criticisms of the in-person classroom experience that justified student lack of attendance. These reasons included listening to recorded lectures at home, the need to study for upcoming exams, lowered grades due to attending class in place of personal independent study, and the costs of commuting. Faculty reading off PowerPoint slides was also frequently cited as a reason for not coming to class. The neutral category consisted of comments in which the student participant did not take a stance one way or the other in regard to providing a suggestion for increasing attendance or providing a rationale for not attending class. Many of these comments comprised student opinions and insights into the student's personal learning preferences. The lack of uniformity within this category of comments led them to be coded as *Neutral*. Approximately ninety statements were categorized as either "Other" (83) or "Negative" (7). The "Other" comments comprised of observations by students that may have aligned with the subject of attendance but did not fully address the subject. Comments were deemed "Negative" if they were outside the scope of the in-person class attendance study focus or employed personal attacks on College faculty and/or administration. The "Negative" comments contained several inappropriate statements and were completely eliminated from the data. Categories, number of comments, and percentages can be viewed in Table 2. Representative comments are shown in Table 3.

Table 2. Analysis of Student Comments.

Categories	No. of Comments	Percentage
Suggestions	197	45%
Rationale	122	28%
Neutral	25	6%
Other	83	19%
Negative	7	2%
Total	434	100%

Table 3: Student Comments (selected)**Suggestions to Increase Student In-Person Class Attendance:**

"I think the best way to do this is to require us to look at the recorded lectures and having us be actively involved during the class."

"I would love to have pre-recorded lectures and spend in class time refining those skills (especially for things like therapeutics) so that I spend less time outside of class simply memorizing PowerPoint slides with only 1 skills lab per week."

"I really strongly believe that if the professors can make the class more engaging (i.e. not just read from the PPT) and edifying, then students will come."

"I personally would be interested to see if using lecture time as a large group study session would be beneficial."

"Do more case-based or interactive activities that help enhance the materials and do the test better"

"To improve classroom attendance I think that class should be more interactive/case based."

"Doing in class activities, discussions, and things we cannot just get from listening to lectures."

"If lectures are more interactive and focused on building on knowledge, then they can turn into informative discussions where questions can be asked and encouraged."

Reasons/Rationales for Student Unwillingness to Attend Class:

"So they elect to listen to the recording and go over the notes at their own pace."

"Students would take this time to study for the exam on Friday and catch up later via the recordings. Plus in class, we can't pause or speed up lectures and there is the added time of commuting."

"I and many students I've spoken to throughout the different classes noted that when they spend the time to come to class, they fail or barely pass, but if they stay home and use their time to listen to the lecture at their own pace, and study their grades improve significantly."

"Many live far away and coming to class does not provide them with any benefit over watching the recordings and also costs them more money in gas, mileage, time, etc."

"When all the professor is lecturing, we can just listen to the recorded lecture and not waste the time getting to campus, parking, etc."

"If they have a reputation for reading off the slides, word of that will travel and students are less likely to show up for that lecture."

"Lecturers should refrain from just reading from the slides."

"Mostly though, it is having lectures that are more than simply reading the slide."

"What good is attendance in this case? We are now adults and should have the option to decide whether a particular day, a person wants to come to class or not."

"I learn best when I listen to the lectures several times and take notes at my pace at home."

"There is no reason to waste time in traffic every day to be physically present at school every day with all the technology we have available right now."

"Believe it or not, most students don't skip class to goof around. They skip study because they feel like sitting in a class where something is being read to you at neck-breaking speed isn't worth the time. So they elect to listen to the recording and go over the notes at their own pace."

"If I were limited to only in-class lectures, I would be sitting there, trying to follow the professor, inevitably fall behind in note-taking, have a mini-panic attack, then I'd resign myself, and likely just sit there not learning at the best of my abilities."

"Also, the reason many students did not attend class is because of the lack of connection with speakers. If the speaker is not interesting, or compelling in any way, students will lose interest and will often skip the class because it is easier for them to learn the material themselves."

Comments that Neither Provided Suggestions and/or Rationales (Neutral):

"I am someone who regularly attends class and I know without the recordings I would struggle much more and believe that they are valuable whether we attend class or not"

"I do believe that attending the lectures and supplementing it with recordings is beneficial, but if I had to choose one over the other I would hand down choose lecture recordings because you can't rewind or pause a live lecture."

"It depends on classes, like for Med Chem. and therapeutic, I think it is important to be in class and then go home to listen to the lecture again, but for other classes, we can just stay at home and listen to the lectures once."

Other Comments that Had Nothing to Do with Attendance:

"Corporations and real life in the workforce has become a "what have you done for me lately?" business model"

"I am not the fastest writer, nor am I a fast typist"

"Thank you for your interest in my opinion"

"I love all the faculty members."

Faculty comments

A total of 12 out of 63 (19%) faculty submitted additional comments on the survey. The faculty data were divided into 18 units of analysis (i.e., sentences). Ultimately, second coding resulted in the data being divided into three distinct categories:

- Suggestions to increase student in-person class attendance
- Observations of the attendance problem
- Other comments

The first category comprised of statements that provided clear suggestions to increase in-person class attendance, along with faculty perspectives on changing teaching methodologies. Other

comments addressed the amount of money it costs students to attend class, purchase books, pay for parking, and live near the university. Some comments stated agreement with suggestions listed in the survey's questions. A few comments addressed the importance of in-person classroom interactions.

Comments that were categorized as *Observations* comprised of philosophical musings on the current state of the College of Pharmacy attendance issues. These statements ranged from philosophical issues of punitive punishment for missing class to criticisms of the current systems and the effect upon student development.

The statements categorized as "Other" comments comprised of observations by faculty that either questioned the survey questions, pointed out difficulties in completing the survey or stated that the respondent had no information. These *Other* statements were eliminated from the data because they were outside of the scope of the research study focus. Categories, number of comments, and percentages can be viewed in Table 4. Representative comments are shown in Table 5.

Table 4. Analysis of Faculty Comments.

Categories	No. of Comments	Percentage
Suggestions	10	59%
Observations	4	24%
Other	3	18%
Total	17	100%

Table 5: Faculty Comments (selected)

Suggestions to Increase Student In-Person Class Attendance:

"We can expect students to be in class, but we need to make it worthwhile for them to come instead of just reading off slides."

"If there is a need to increase activities in the classroom, I think perhaps one on one with designer would help, since it may be an overwhelming process for the faculty member involved."

"However I prefer to use free software/apps and not to pass along fees to students"

"We need to be mindful of low price apps since each faculty member may require one and then it is extremely expensive for the student as a whole."

"I feel that following the priorities listed in this survey would enhance the student's decisions about their willingness to attend classes."

"Students participating in the classroom allow them to interact with the faculty lecturer and fellow students, which cannot be done when they are not participating"

"The interactions (voice, body language, etc.) should be a valuable part of education"

Observations of the Attendance Problem:

"Strategies to increase attendance are all reduced to either incentivize (students gain something by attending) or punish (students lose something by skipping)."

"The current system only encourages asking "what is needed" to answer the test questions correctly rather than understanding the breadth of the material."

Other Comments:

"How are the "engagement", "participation" and "use of case-based activities" different?"

"I am unable to rank reasons in chrome; this does not work."

"I really have no information about whether recording lectures enhances learning."

Discussion

Research has demonstrated that in-class, in-person attendance has dropped and is a problem for health professional schools across the country, causing faculty and administrators to question the student level of professional engagement within the discipline [5, 31]. The challenge to college administration is to identify ways to encourage active student participation within the classroom to promote student engagement with academic content and the professional community at large. However, and despite the concerns, there still remains a question as to what active student engagement looks like and whether or not this engagement translates into student academic gains. The objective of this research study was to examine and categorize College of Pharmacy student and faculty perceptions on access to recorded lectures, and elements that would increase interest in in-person class attendance. The study revolved around five questions.

The first research question revealed that ninety-nine percent (99%) of the student participants responded that lecture capture enhanced their learning ability of the subject. In contrast, only 76% of the participating faculty perceived that lecture capture enhanced learning. One explanation is a potential discrepancy between faculty and student perception of the role of technology in learning. For instance, faculty may view recorded lectures as supplementary to events that occur within the classroom. Conversely, students may perceive that class attendance can be replaced by technology such as discussion boards, audio/video recorded lectures, social media, and electronic communication (i.e., email). For instance, some students identified recorded lectures as the reason they chose not to attend class. Furthermore, student participants may not identify online resources such as discussion boards, audio/video-recorded lectures, social media, and electronic communication (e.g., email) as an extension of the face-to-face classroom, but as a replacement for the in-person classroom experience. Some students commented that since students can "access" their instructions from anywhere, then they should have the right and ability to schedule other more pressing activities during class time. This result aligns with Newman-Ford's assertion that students who listen to recorded lectures may be doing so to save time and attend to personal responsibilities [32]. Some students also provided free-response comments stating that educational institutions should have some component of "on-demand" media,

substantiating the observation that students perceive student technology differently than faculty. Further, several students in the current study stated that attending class in-person did not align with their learning styles. Therefore, the audio-recorded lectures provided these students with comfort and supplemented their face-to-face learning experience. While students overwhelmingly view recorded lectures as advantageous to their learning, students also perceive the classroom experience as vital to their education. Rae and O'Malley have suggested that more motivated and focused students may view attending class as essential, due to their vested interest in academic success^[9]. This is supported by sixty-five percent (65%) of students in our study responding in favor of attending class in person, despite being provided recorded lectures and notes online.

In summary, the subject of recorded lectures was mentioned approximately seventy times within the student comments with the issue of recorded lectures in the form of audio and/or video being advantageous to student learning while detrimental to in-person class attendance.

In examining the third research question, fifty-six percent (56%) of faculty responded that they were against a mandatory attendance policy. Although students were not asked this question, several student comments indicated that such a policy was unnecessary. However, it is important to note that not all (44%) of the faculty respondents were in favor of a mandatory attendance policy and few faculty provided a rationale for their response. The one faculty comment that directly addressed this issue stated, "Strategies to increase attendance are all reduced to either incentivize (students gain something by attending); or punish (students lose something by skipping)." The institution of a mandatory attendance policy possesses a high risk of falling within the latter category as many student comments attest. Collectively, all of these responses align with Hidayat *et al.*'s important caveat that although attendance is important, mandatory attendance may not necessarily improve student academic performance^[1]. Consequently, these results may point to the need for administration and faculty instituting attendance policies to focus on those that increase student academic performance striking the right balance between faculty and student concerns.

Research question four found a lack of statistical significance between recorded lectures and in-person attendance, suggesting that students may believe that listening to lectures on their own has any adverse effects on their in-person class attendance. This is in alignment with research question 2, where 65% of students were in favor of attending class, despite having access to recorded lectures. The lack of statistical significance between recorded lectures and a college policy for mandatory attendance may also represent a faculty view that the provision of recorded lectures to students and the possibility of a resulting drop in in-person class attendance did not constitute a need to institute a mandatory attendance policy (Research Question 5).

Next, both faculty and students (Research Question 6) were asked to rank potential factors that will increase student interest in attending lectures. The student ranking results indicated that

28% selected the ability to ask questions and clarify misunderstanding as their top preference to improve attendance; in contrast, twenty-six percent (26%) of faculty ranked unannounced quizzes as the top activity to improve attendance. These results display a clear disparity in student and faculty expectations within the classroom. Previous studies regarding attendance and lecture recording in schools of pharmacy emphasized that increasing student engagement and in-class activities were important motivating factors to encourage attendance^[29, 33, 34]. In alignment with these studies, our data demonstrate that students prioritize engagement in activities even if pre-recorded lectures were required to be viewed beforehand. These results also align with Fjortoft's^[31] observations that the faculty struggle with issues of how to deliver content, engage students, and assist in skill development within the Pharmacy discipline. This observation was supported by a few faculty comments that called for a "need to increase activities in the classroom" and the creation of "classrooms that allow for interaction with faculty lecturers and fellow students". These demands, in addition to required assessment and evaluation of student performance, can prove to be challenging to faculty who are concerned that these issues may sacrifice valuable in-person class time and instruction with their assigned content area. This factor was also identified by a faculty member who stated, "I think perhaps one on one with [a course] designer would help, since it may be an overwhelming process for the faculty member involved." Conversely, many students mentioned that the need to study for other examinations was more important than attending class. Hidayat *et al.* observed that this may be a result of teaching a generation having a "test-to-test" culture that forces students to sacrifice valuable class time in order to study for a required examination^[1]. Academic achievement, along with classroom attendance depends upon constructive alignment of the course^[35]. Additionally, the relevance of the content must be emphasized such that course design material and assessment can adequately influence student learning behavior. All of these factors (*i.e.* objectives, learning activities, and assessment) must be presented in line with appropriate technology resources and faculty buy-in^[22]. This places the responsibility on faculty to remain committed to creating interactive, engaging learning communities that provide value to the in-person classroom experience.

The purpose of the seventh research question was to solicit perspectives from faculty and student on the issues of recorded lectures and in-person classroom attendance. Though faculty participants were not as verbal in their opinions as the students, strong insight was gained from the faculty responses. Faculty responses contained two central themes: *Observation about the attendance problem* and *Suggestions to increase student in-person class attendance*. Research has uncovered that numerous faculty in diverse disciplines have express concerns over recorded lectures and their effect upon in-person class attendance^[1, 31, 34]. Other faculty have expressed concerns over how attendance can affect classroom performance^[1, 5, 36]. The central premise of faculty concerns may stem from the desire for students to "avoid

illusions of knowing” such that students misjudge their understanding of course content [37]. Attending class provides students with an environment in which they can assess their knowledge under the guidance of faculty who have the ability to objectively provide structure and guidance for improvement. Although misplaced confidence in one’s knowledge can indeed be embarrassing, the consequences within a health profession-based practice have the potential to become detrimental to all involved.

The rationale comments may point to the difference between the first two years of pharmacy academic education vs. the last two years of clinical rotation and hands-on application. Since pharmacy students are required to attend clinical rotations in their last two years, it may be possible that faculty and/or students may perceive that rotations may provide the “process of professional socialization” that the students will need before entering the field as professionals [14, 30, 34]. The introduction of Introductory Pharmacy Practice Experiences (IPPEs) and Advanced Pharmacy Practice Experiences (APPEs) in the latter years of the pharmacy curriculum have traditionally focus on patient-centered professional training. IPPEs are designed to provide students with baseline experiences in relationship and confidence building, empathy, concern, and caring for patients. They are also meant to positively socialize students with health care professionals and health care agencies. APPEs on the other hand provide the venues for students to demonstrate their mastery of didactic information through the application of information in a manner that is reflective of the professional expectations, and in a health care environment that provides direct patient care or other services. One means to assess the premise of academic understanding and performance would be to require that all students must take and pass the Pharmacy Curriculum Outcomes Assessment (PCOA) exam which assesses the knowledge of essential content areas of biomedical, pharmaceutical, social/behavioral/administrative, and clinical sciences. Faculty that teach academic discipline courses (i.e., Medicinal Chemistry, Pharmaceutics) may view their roles differently, in that it is their responsibility to impart knowledge to the students so that the students can advance in the pharmacy program. From that perspective, interactive learning experiences may be reserved for the final years in the program, almost as a reward for successful performance within academic coursework. Ultimately, the student responses to questions about recorded lectures vs. in-class attendance, student rankings of desired in-class learning experiences, and the wealth of student comments all point to a desire for change. Overall, students either need more interactive in-person classroom experiences, more time to study for exams outside of class, or the freedom to study at home with recorded lectures on their own schedules. However, faculty responses indicate the need for students to attend class without always viewing the need to change the in-person classroom experience. Although more than half of the student comments express a desire to attend class in-person, these same student comments state that students deeply desire to have a classroom experience worth attending.

As with all experimental studies, this study contained limitations. This study did not categorize the results for each professional year and as a result, was unable to provide demographic information on the participants. Other limitations include the fact that this survey was based on self-reported data which may have included recall bias on behalf of the participants regarding actual in-person classroom experiences. Furthermore, this survey may have been perceived to solely assess the effectiveness of a specific course. Comments provided by students may have addressed several courses within individual comments without differentiating between individual in-person classroom experiences. However, this limitation provides an opportunity for future studies to investigate questions and specifically address aspects of the pharmacy-required curriculum that need to evolve. Independent measures could be employed in future studies to specifically investigate in-person classroom engagement, student academic progress, or student perceptions on the concept of professional versus unprofessional behavior. Another limitation of this study is that it allowed for the reporting of student perception data. Therefore, even if a student acknowledged that attending class was important, the data collected did not reflect or verify that the student actually did attend that class.

Although this study was conducted at a single institution, these results possess the potential to provide insight into attendance issues faced by the pharmacy, as well as any other health professional schools, along with graduate and undergraduate institutions of higher learning. This study serves as a launch for future research into the areas of both student in-person attendance and in-class active learning activities. Some questions to be investigated include how faculty actually employed the use of lectures in their classrooms; how many of those lectures involve active learning activities; how faculty motivate students to attend lectures; and whether unannounced quizzes are used to increase student attendance or expand opportunities for student learning.

Summary and conclusion

The results of this study demonstrated that pharmacy students valued above all else interactive in-person learning environments. This study provides an analysis of the relationship between recorded lectures and in-person attendance issues from the perspective of students and faculty members. Some student participants stated that the addition of recorded lectures into the College of Pharmacy aid students in the learning process. However, other students also stated that they desired face-to-face classroom instruction that allowed them to engage with content in new and interactive ways. Faculty differed on how they prioritized actions and activities within their classroom, while the student responses clearly stated a desire to have interactive, case-based, and/or engaging learning activities within the in-person classroom experience. For students, the need to ask questions of faculty superseded engaging learning activities and even taking announced/unannounced quizzes. In the face of dwindling in-person class attendance and the

predominance of online learning opportunities, the results of this study could shape the future of health professional school attendance policies.

APPENDIX A: Survey Instruments

The student survey contained the following five questions:

1. Access to the recorded lectures improves students' ability to learn the subject. (Yes or No)
2. Do you feel that it is necessary to attend class in person, even though you are provided with lecture notes and the recorded lectures? (Yes or No)
3. Rank the following reasons that would increase your interest in attending lectures in person. Drag and drop the statements to order them by most important (#1) to least important (#7):
 - a) Ability to ask questions and clarify the misunderstanding
 - b) Access to information that is not provided in the books or lecture notes
 - c) Announced quizzes
 - d) Engagement in activities, even though this means having to listen to pre-recorded lecture content before class
 - e) Participation in classroom activities versus just listening to lectures
 - f) Unannounced quizzes
 - g) Use of case-based team activities and discussions in the classroom
4. Write any additional comments that you may have

The faculty survey contained the following five questions:

1. Access to the recorded lectures improves students' ability to learn the subject. (Yes or No)
2. Do you support the implementation of a mandatory attendance policy? (Yes or No)
3. Rank the following reasons that would increase your interest in attending lectures in person. Drag and drop the statements to order them by most important (#1) to least important (#7):
 - h) Ability to ask questions and clarify misunderstanding
 - i) Access to information that is not provided in the books or lecture notes
 - j) Announced quizzes
 - k) Engagement in activities, even though this means having to listen to pre-recorded lecture content before class
 - l) Participation in classroom activities versus just listening to lectures
 - m) Unannounced quizzes
 - n) Use of case-based team activities and discussions in the classroom
4. Write any additional comments that you may have

Conflicts of Interest

None.

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