Palmer RH, Moulton MK, Stone RH, Lavender DL, Fulford M, Phillips BB. The impact of synchronous hybrid instruction on students' engagement in a pharmacotherapy course. 2022 Jan-Mar;20(1):2611.

https://doi.org/10.18549/PharmPract.2022.1.2611

Original Research

The impact of synchronous hybrid instruction on students' engagement in a pharmacotherapy course

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Received (first version): 12-Jan-2022 Accepted: 05-Mar-2022 Published online: 07-Mar-2022

Abstract

Background: Background: Synchronous hybrid instruction offers flexible learning opportunities by allowing a portion of students to attend class sessions on campus while simultaneously allowing the remaining students to attend remotely. Although such flexibility may offer a number of advantages for pharmacy students, one area of concern is whether online participation options within synchronous hybrid courses can promote similar levels of engagement as courses that are designed entirely for face-to-face (FTF) participation. **Objectives:** The objective of this study was to evaluate the impact of synchronous hybrid instruction on pharmacy students' engagement in a pharmacotherapy course. An evaluation was completed to determine if students were more likely to actively engage in class when they were participating remotely via teleconferencing technology or when FTF. Additionally, students' perspectives were evaluated to determine their views of the benefits and challenges of the hybrid model for engagement in learning. **Methods:** The course utilizes team-based learning to apply critical thinking skills and develop a comprehensive care plan. A mixed methods approach was used to examine students' engagement in the hybrid learning environment by quantitatively analyzing students' responses to likert-scale survey items and qualitatively analyzing their responses to open-ended survey questions. **Results:** Students reported they were more likely to actively listen (p=0.004), avoid distractions (p=0.008), and react emotionally to a topic or instruction (p=0.045) when FTF. There were no significant differences found in student reported note taking, asking questions, responding to questions, or engaging in group work between the two modes of participation. Content analysis identified other benefits that supported student engagement, including perceived flexibility and enhanced ability to interact during class via the teleconferencing technology. For some students, challenges that negatively impacted engagement included difficulties with internet connectivity and a sense of dislocation or isolation in the course. **Conclusion:** This study demonstrated that when participating in a synchronous hybrid course, students participating remotely were less likely (compared to in-person attendance) to pay close attention and react emotionally, but were just as likely to take notes and communicate with teachers and groups. Key benefits of the hybrid approach were increased flexibility and the usefulness of online communication tools, while key challenges focused on technical and psychological isolation from others. The principles of flexible learning environments and self-regulated learning provide opportunities for pharmacy educators who are interested in improving hybrid instruction in the future.

Keywords: Distance learning; Online learning; Self-Directed learning; Pharmacy education; Pharmacy students

INTRODUCTION

Given that students have differing needs, such as when they need to learn, where they need to access the resources that will enable them to learn, and how they like to learn, it is no surprise that recent research has demonstrated many students' desire for flexible learning opportunities that do not always require their physical presence in campus classrooms.[1-3] In pharmacy education specifically, many pharmacy students prefer blended course structures (with online and classroom components) throughout the curriculum.[3] At the same time, as the American Association of Colleges of Pharmacy (AACP) has made increasing the PharmD applicant pool a priority, schools that are willing to offer flexible approaches to course and curriculum delivery may support recruitment efforts by meeting the learning needs of a greater number of potential qualified candidates.[4]

Synchronous hybrid delivery models offer one such approach for making learning opportunities more flexible for pharmacy students. Synchronous hybrid instruction involves designing courses so that a portion of students attend class sessions on campus while simultaneously allowing the remaining students to attend from the location of their choice.[5] This method of teaching provides increased flexibility by allowing students, who, for example, have limited time and/or resources for travel, live long distances from campus, or become ill for an extended period of time, the opportunity to participate in class sessions and interact with all students and the teacher from a distance.[5]

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https://doi.org/10.18549/PharmPract.2022.1.2611

Although the increased flexibility of synchronous hybrid instruction may offer a number of advantages for pharmacy students, one area of concern is whether online participation options within synchronous hybrid courses can promote similar levels of engagement as courses that are designed entirely for face to face (FTF) participation. Broadly defined, 'student engagement' refers to the effort and commitment that students invest in their learning.[6] It is critical for educators to understand students' engagement because it has been documented as a prerequisite for effective learning.[7,8] Thus far, research on student engagement in hybrid learning environments has been mixed. Advantages may include increased flexibility and personalization as well as increased engagement through the use of information technology.[9,10] However, other studies have shown that technical difficulties with online learning can cause students to have reduced commitment to their coursework, and online elements of courses can place challenges on students self-regulatory capacities, which in turn may result in challenges with engagement.[11,12] To our knowledge, no studies in pharmacy education have attempted to investigate if online participation within a synchronous hybrid course can promote similar levels of engagement as face to face participation within the same course. Additionally, few if any studies in pharmacy education have explored pharmacy students' perspectives regarding the benefits and challenges of participating in a course that was designed for synchronous hybrid delivery. Thus, we asked the following research questions:

In a 2nd year PharmD pharmacotherapy course, are students more likely to actively engage in class when they participate remotely or when participating face to face in the physical classroom?

In a 2nd year PharmD pharmacotherapy course, what are the benefits and challenges of the synchronous hybrid model for engagement in learning from the students' perspective.

An investigation such as this has the potential to inform instructional design decisions for pharmacy educators who are interested in the potential for synchronous hybrid approaches to support students' learning in PharmD programs. In the following section, we describe the design of the synchronous hybrid pharmacy course and the methodological approach that was used to address the research questions.

METHODS

Course design

At the College of Pharmacy where this research occurred, the Pharmacotherapy course sequence is a didactic series that extends over 4 semesters (Pharmacotherapy I to IV). Each semester lasts 15 weeks and emphasizes team-based learning-requiring pharmacy students to apply their foundational knowledge and critical thinking skills to collaboratively develop comprehensive patient care plans.

At the beginning of the 2020 Fall semester, a synchronous hybrid delivery model was implemented for the Pharmacotherapy I course with the intention of allowing for a mix of FTF and remote participation. To achieve this, the course coordinators split the student roster into thirds and created a rotation: each week one-third of the students were assigned to attend class FTF while the other two-thirds were assigned to participate remotely. This meant that for 10 weeks of the 15 weeks course, each student had the flexibility to attend from any remote location of their choice. In an attempt to further increase flexible learning options within the course, the instructional technology office recorded all of the class sessions and made them available for students to re-watch as needed to enhance comprehension and prepare for course exams.

The course required students to prepare for class sessions in advance by watching a recorded lecture, completing readings, working on pre-class patient cases, or some combination thereof. Six unannounced quizzes were administered throughout the semester in order to assess pre-class preparation. The class sessions focused on engagement in case-based activities, which were designed to promote collaborative critical thinking and problem solving skills.

The case activities in the course focused on specific disease states (e.g. hypertension; diabetes etc.) and were completed by teams of four to six students during the class sessions. The groups were responsible for defining the roles of each team member as they worked collaboratively to develop patient care plans. During the case activities, the instructor walked throughout the room to field questions from teams who were present in the physical space, and also took questions from students who joined the class remotely using the virtual meeting platform (Zoom® Video Communications, Inc). After students completed the case, the instructor facilitated a discussion by asking student groups to share their answers and describe how they reached their recommendations. The instructor also modeled their own approach to the case, including the best possible recommendations.

The pharmacotherapy course is a required core course in the curriculum. Students were expected to attend each class session. To evaluate participation and attendance, the coordinator of the course required that the teams submit each completed case within twenty-four hours of the end of the class session, and throughout the semester six cases were randomly selected and graded for completion. There were also 8 unannounced quizzes throughout the semester. Any student who was not present on the day of a quiz received a score of 0.

Research design

We used a mixed methods approach in this study to address the research questions stated in the introduction. To answer the first question, we conducted a quantitative analysis of fixed-choice survey responses to evaluate if pharmacy students were more likely to actively engage in class when they participated FTF or when they participated remotely. The survey items used to collect data were part of the assessment of the PharmD program during the COVID-19 pandemic. The survey asked students to rate how often they engaged in the following activities when FTF: taking notes, actively listening in class, asking questions, responding to questions, avoiding distractions, engaging in group work, and reacting in class emotionally to the topic or instruction. Students were able to respond on a

4-point Likert scale with never, very little, somewhat often, or very often. The students were then asked the same questions but pertaining to how often they engaged when joining the class remotely via the virtual meeting platform (Zoom® Video Communications, Inc). Prior to implementation, face validity of the survey questions was obtained by requesting a panel with expertise in educational assessment to review and comment on each question's relevance to the student engagement concept. This process continued until consensus was reached for all survey items. The unique timing of the opportunity to conduct this research made conducting a test-retest reliability analysis unfeasible (i.e. it was uncertain if a synchronous hybrid approach to the course would be used in subsequent semesters after 2020). However, the results of both the FTF and remote participation surveys showed high internal consistency, with cronbach's alphas of $\alpha = 0.96$ (for both surveys).

To answer the second research question, we conducted a qualitative analysis of open-ended questionnaire data to develop a more in-depth understanding of engagement in the course from the students' perspective. The open-ended questions asked students to describe in as much detail as possible the benefits (question #1) and challenges (question #2) of the synchronous hybrid model for promoting engagement during the course.

Students were included in the research if they completed the Pharmacotherapy I course in fall 2020. The distribution of the results for the F2F and remote surveys were similarly shaped (based on population pyramids), but departed significantly from normality. Therefore, the results were analyzed with a non-parametric test (Mann-Whitney U) using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp, Armonk, NY). For the Mann-Whitney U test, the scores were converted to ranks. The test then evaluated whether the mean ranks for the two groups (FTF vs remote) differed significantly from each other for each survey item. Case wise deletion was performed to address instances of non-responses. Open-ended response questions were analyzed using content analysis.[13] This consisted of a two-cycle inductive coding process conducted by a member of the research team to identify categories in the data. Then the coded material was reviewed and critically discussed with a second member of the research team until consensus was reached for all of the data.[14] To ensure that the amount of collected qualitative data was sufficient for the study, we used Guest, Namey and Chen's method for retrospectively assessing data saturation by identifying the point during data analysis at which new responses were generating little or no (<5%) new thematically useful information.[15] According to Guest, Namey and Chen, the starting point for retrospectively calculating data saturation is to define a base size. Base size refers to the minimum number of data collection events (i.e. survey responses) that should be reviewed to compare against new information. Previous studies have shown that novel information in a qualitative data set is typically generated early in the process, with a relatively steep decline occurring after just a small number of data collection/analysis events. Therefore, given the number of responses we received to the open-ended question focused on challenges (45) and the number of responses we received to the open-ended question focused on benefits (65), 20 student responses (for each question) was identified as a reasonable base size for comparison against the remaining responses. A new information threshold of <5% was set as an acceptable level for determining that saturation had been reached at a given point in data collection. Using a base size of 20, we reached the data <5% new information threshold at 20 responses for the survey question that focused on challenges and 40 responses for the survey question that focused on benefits. A detailed explanation of this method of calculating data saturation is available in Guest, Namey and Chen's report.

RESULTS

Quantitative

As described above, the fixed-choice survey was designed to examine the likelihood of pharmacy students FTF engagement versus their online engagement. There was a range of 110 to 138 responses for each question because students were not required to answer each question on the survey. Students reported that they were statistically more likely to actively listen (U=6262.5, z=-2.91, p=0.004), avoid distractions (U=6238.5, z=-2.66, p=0.008), and react emotionally to a topic or instruction (U=6595.5, z=-2.00, p=0.045) when FTF. There was no statisitically significant difference found in student reported note taking, asking questions, responding to questions, or engaging in group work between the two learning environments (table 1).

Table 1. Student Engagement in a Synchronous Hybrid Learning Model

How often did you engage in the following activities during class time?	FTF Mean Rank	Remote Participation Mean Rank	U	Z	P[b]
Taking Notes	132.08	118.36	6762.5	-1.719	0.086
Active Listening in Class	136.57	114.88	6262.5	-2.91	0.004
Asking Questions	120.82	128.37	7194.5	-0.852	0.394
Responding to Questions	122.33	126.23	7351	-0.445	0.657
Avoiding Distractions	136.80	114.54	6238.5	-2.66	0.008
Engaging in Group work	123.68	126.07	7512	-0.368	0.713
Reacting in Class Emotionally (laughing, sadness, etc)	134.58	117.29	6595.5	-2.00	0.045

Note: a. Results reported using Mann-Whitney U statistical analysis. b. The significance level is .050.

Qualitative

Findings from the qualitative component of the study aimed to complement quantitative findings and provide deeper insights into students' perceptions of the benefits and challenges of the synchronous hybrid model for supporting engagement in the course. Table 2 contains definitions of the categories that were identified along with representative quotes from the data.

Sixty-five students responded to the open-ended question about benefits. This resulted in the identification of two key categories: 1) flexibility enhanced engagement in the learning experience, and 2) the technology environment supported engagement and interactivity.

Category 1: Flexibility Enhanced Engagement in the Learning Experience

Many students suggested that the flexibility of the hybrid format benefitted their learning in the course. Most comments focused on flexibility in one of three areas: the when of learning, the where of learning, or the how of learning. For example, many students focused on the time saved from travel and how that time could be refocused on studying. Students also described benefitting from having a choice of where to attend class that worked best for them. Additionally, students frequently identified a benefit from the flexibility of being able to re-watch class recordings as needed to better prepare for class and exams.

Category 2: The Technology Environment Supported Engagement and Interactivity

Some students described the benefit of technology that supported their engagement and interactivity in the course. Many comments focused on features in the online meeting platform (Zoom® Video Communications, Inc). These comments included approval of the 'chat' tool for creating more productive and involved discussions with faculty, and recognition of the group meeting rooms (i.e. 'breakout rooms') feature for facilitating better group discussions. Some students also described advantages of their personal technology configuration such as the ability to use dual monitors at home for easier note-taking, which would not be possible in the classroom.

In addition to the open-ended question about benefits, students also had the opportunity to respond to a question about the challenges that the hybrid model presented for engagement in the course. Forty-five students responded to this question, and two additional categories were identified: 3) challenges with internet or other communications technology impacted engagement, and 4) a sense of dislocation and/or isolation made it harder to engage in learning. Table 3 contains definitions of the categories along with representative quotes from the data.

Category 3: Challenges with Internet or other Communications Technology Impacted Engagement

Some students described encountering challenges with internet connectivity or other technologies that impacted their engagement in a class session or sessions. These comments often centered on inconsistent home internet performance. Additionally, some students commented on experiencing some difficulty with the virtual group meeting room (i.e. 'breakout room') configurations. A few students also described situations when the course instructor encountered difficulties managing technologies involved in the course.

Category 4: A Sense of Dislocation and/or Isolation Made it Harder to Engage in Learning

Table 2. Benefits for Student Engagement: Category Definitions, Example Quotes, and Prevalence

Benefits of the Hybrid Learning Environment			
Category	**Category Definition**	**Example Quotes**	**Prevalence**
Flexibility Enhanced Engagement in the Learning Experience	This code was applied when students suggested that their learning in the hybrid format benefited from flexibility in the areas of when, where, or how to engage with different aspects of the course.	"I am now able to re-watch lectures on my own time more and I have more time." "I gained approximately 12 hours of time each week by not having to drive back and forth to Athens from my parents' home. I was able to use this time for studying or resting and taking care of myself. I believe my semester was much more productive and I learned so much." "The hybrid learning format allowed me access to multiple learning styles which helped determine which best worked for me and how it could help me succeed in the course."	Coded 30 times
Technology Environment Supported Engagement and Interactivity	This code was applied when students suggested that the technology environment in the course supported engagement or interactivity that enhanced their learning	"Within our breakout groups in class through Zoom, I felt as though we had better discussions than if we were to have had them in the classroom." "My note taking process and class interaction became more streamlined, being able to utilize multiple monitors." "As a class, I think we asked more questions due to the fact that class was on zoom, and zoom has the chat function. I learned so much more from listening to the professors' answer everyone's questions."	Coded 14 times

Table 3. Challenges for Student Engagement: Category Definitions, Example Quotes, and Prevalence

Challenges of the Hybrid Learning Environment			
Category	**Category Definition**	**Example Quotes**	**Prevalence**
Challenges with Internet or other Communications Technology Negatively Impacted Engagement	This code was applied when students described a technical difficulty that affected their engagement in a class session or sessions.	"Occasionally my internet would go out making it difficult for me to catch up when I got logged on again." "If I had issues with wifi there was nothing I could do." "Sometimes we were not able to be in our groups because of technical difficulties."	Coded 25 times
A Sense of Dislocation and/or Isolation Made it Harder to Engage in the Learning Process	This code was applied when students expressed a perspective that dislocation and/or isolation from the in-person class sessions made engaging in the learning process more challenging.	"The main challenge was not being able to talk to my group in-person." "It is hard to not be able to walk up to the professor and ask questions." "Not being in-class in person is just difficult. It is hard to focus."	Coded 22 times

Some students expressed a perspective that dislocation and/or isolation from the in-person class sessions made engaging in the learning process more challenging. Many of these comments focused on expressing an inclination towards in-person communication such as being able to "walk up and ask the teacher questions", or "sit with group members" for discussion. Additionally, some students expressed concern that they lacked motivation when they participated online compared with when they could interact with faculty and students in-person.

DISCUSSION

This study produced mixed results. In this section we discuss the challenges and benefits of hybrid learning for student engagement, and potential implications for pharmacy educators interested in designing hybrid learning environments in the future.

Challenges of hybrid learning for student engagement

The results of the fixed-response survey indicated that students were less likely to actively listen, avoid distractions, and react emotionally when they joined class sessions from a remote location. Additionally, categories identified through the qualitative component of the study indicated patterns of technical difficulties and perceptions of isolation when participating remotely. It is not difficult to imagine students becoming distracted and disengaged during an online class session when they experience a sense of separation compounded by internet connectivity problems (which in some instances may literally disengage them from the class.) Other studies of online and blended learning environments have demonstrated similar challenges. These include reports of students feeling isolated due to physical separation, and perceptions that isolation and lack of community negatively influenced learning experiences.[16,17] Additionally, technology-focused studies have reported students' perceptions that internet disruptions prevented seamless engagement, technology prevented easy access to course resources, and technology prevented the kinds of interactivity required by course learning goals.[18-20,11] The challenges we observed align with the results in these studies and indicate the need for careful planning when developing online components of hybrid courses in pharmacy education to ensure successful student engagement. Also of interest, the fact that this study produced survey results demonstrating specifically that pharmacy students' attentional engagement and emotional engagement were negatively impacted when participating remotely provides new conceptual areas for pharmacy educators to focus attention when seeking to improve synchronous hybrid learning experiences. To our knowledge, these specific qualities of engagement in synchronous hybrid instruction had not yet been sufficiently highlighted in the pharmacy education literature.

Benefits of the hybrid learning approach for engagement

Although some problems with engagement were discovered (noted above), students reported they were just as likely to take notes, ask questions, respond to questions, and engage in group work when they were online as when they were in-person. In contrast to the technical difficulties reported by students (such as connectivity problems), the pattern of qualitative responses indicating technological benefits may help to explain why the online aspect of the course did not lessen students' engagement in these areas. For example, some students noted that Zoom® allowed for better ways of communicating because it has a 'chat' feature that is more convenient and more comfortable to use than speaking aloud in a large class. Other students highlighted the utility of Zoom® for supporting group meetings, and some students described improvements in how they were able to take class notes because their remote technology configuration (such as multiple monitors) was superior to their in-class configuration. These findings align with other recent studies indicating that live chat features offered better access to faculty and increased student-to-student and student-to teacher interactions; as well as studies reporting that collaborative learning experiences in online courses were successful through the use of meeting room (i.e. breakout room) features in online teaching platforms.[21-24]

In addition to technological benefits, students also suggested that their learning benefitted from increased flexibility

provided by the hybrid approach compared with traditional models. The benefit of flexibility has been a consistent theme in the blended and hybrid learning literature. For example, Hill noted that flexibility is the key value that will allow educators to integrate practices from traditional and online learning in order to provide the best possible environments to support students with the learning process. Students have a range of needs and require varying amounts of flexibility to meet these needs.[1] As was evident in this study, opportunities for engagement expand when students have the option to attend class sessions from multiple possible locations and review course content in multiple formats. At the most basic level, when hosting large groups of people in-person becomes highly challenging (such as during the COVID19 pandemic), the locational flexibility provided by online learning makes student engagement possible when it otherwise would have been impossible. Although the findings in this study reinforce findings in other studies from different domains, our review of the literature revealed no prior studies from the field of pharmacy education that identified these specific challenges and benefits for students' engagement in synchronous hybrid learning experiences.

Potential implications for pharmacy educators interested in designing hybrid learning environments

The results suggest that shifting a course to a synchronous hybrid delivery format may pose challenges for students' engagement in some areas, while increased flexibility and specific technological tools may make engagement in other areas at least comparable to an in-person experience. Previous literature has proposed strategies for addressing the challenges identified in this study. For example, Hill recommends techniques for both students and faculty that may support engagement in hybrid learning environments— particularly those that have been created with the advantages of flexibility in mind.[1] For students, these techniques include recognizing that hybrid learning environments often require more initiative and self-direction than traditional learning environments; creating spaces at home that are specifically dedicated to online coursework; becoming more comfortable communicating in writing (email, chat tools, discussion boards etc.); and letting the instructor know if engagement problems arise. On the faculty side, Hill and others recognize that technological challenges can pose one of the greatest threats to successful engagement in hybrid and online courses.[1,25,26] Faculty should collaborate with technologists to create learning environments that are as free of technical errors as possible and, just like students, sharpen abilities to communicate at a distance. As suggested by Hill and Hollenbeck, internet-based communication tools enable more learner control and flexibility than what is found in most traditional classrooms.[1,27] Thus, faculty should look to develop skills that will help both the instructor and student make the most of these opportunities.

Another area of relevant research in the learning sciences for faculty to consider is self-regulated learning. Self-regulated learning refers to approaches that students use to focus their thoughts, feelings, and actions on the achievement of their goals during learning experiences.[28] Such approaches are critical for student engagement and may be of particular importance for students who struggle when participating in courses remotely. Although self-regulation can take many forms, successful self-regulation during learning activities typically depends on positive self-efficacy for learning, beliefs that positive outcomes will result, and maintaining a positive emotional climate.[29] To design and develop engaging hybrid learning experiences, we suggest that pharmacy educators familiarize themselves with principles of flexible learning environments and self-regulated learning such as those highlighted above.

With sufficient attention to these issues, faculty and staff involved in developing pharmacy education have an opportunity to improve and expand flexible hybrid instructional options, which in turn may strengthen the capacity of pharmacy schools to appeal to a greater number of potential qualified applicants. Indeed, the research firm Ipsos recently conducted a survey with more than 2,000 participants in ten countries and found that among options from a list of seven choices, 47% of American students (the highest percentage) chose having more flexible learning options as the most important thing institutions can do to increase the wellness of students and staff (Anft, 2021).[30] The same survey indicated that twice as many students preferred hybrid classes to other learning approaches (Anft, 2021).[30] As more students begin to place emphasis on flexible learning options, pharmacy educators should continue to study and refine hybrid instruction. While hybrid approaches have the potential to expand the toolkit and reach of pharmacy programs, it is critical to address challenges (such as those highlighted in this study) that may pose barriers for students' learning.

Limitations identified in this study include that all survey questions were not completed by all students. Additionally, these data only include responses from students enrolled in the fall 2020 Pharmacotherapy I course at a specific college of pharmacy within a specific university. Therefore, these findings may not be generalizable to all students or courses. Future research should seek to understand students' engagement in online versus FTF components of hybrid courses in other areas of the PharmD curriculum. Also, this study was designed to survey students about their experiences in a synchronous hybrid course and was not set up to collect additional observational data (e.g. records of students' questions from the Zoom chat tool). Thus, the results should be narrowly interpreted as a study of students' perspectives on their learning experiences, similar to other educational survey research of this type. Future work may seek to expand on these results using methods (such as case-study methodology) that combine observations with students' perspectives for the purposes of data triangulation. Further, the current research intentionally focused on the nature and likelihood of engagement in a synchronous hybrid course and did not seek to quantify the potential impact of the different modes of participation (FTF versus remote) on students' grades. Future research may build off the current research to investigate how differences in students' engagement in hybrid courses may impact their performance. Last, this study did not explore how lack of community impacted student learning, engagement, and development of professional identity. The

limited in-person time took away opportunities for networking between classes, role modeling by faculty members, and social learning that comes with FTF instruction and experiences.

CONCLUSION

When participating remotely in a P2 pharmacotherapy course that was designed to allow for a synchronous hybrid delivery format, students were less likely (compared to in-person attendance) to actively listen, avoid distractions, and react emotionally, but were just as likely to take notes, ask questions, respond to questions, and engage in group work. Additionally, a deeper qualitative analysis of student's perspectives about engagement within the course revealed beneficial patterns (such as advantages associated with increased flexibility and the usefulness of online communication tools) alongside challenges (such as difficulties with reliable internet connectivity and feelings of isolation when participating remotely). The principles of flexible learning environments and self-regulated learning provide opportunities for pharmacy educators who are interested in improving hybrid instruction in the future.

CONFLICTS OF INTEREST STATEMENT

The authors have nothing to disclose.

FUNDING

None.

CONTRIBUTOR ROLES

Russ Palmer: Conceptualization, methodology, formal analysis, investigation, resources, data curation, writing – original draft, review and editing.

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Mike Fulford: validation, writing – review and editing.

Beth Phillips: Conceptualization, methodology, formal analysis, investigation, resources, writing– review and editing.

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