

RESEARCH

Pharmacists' Perception of Synchronous Versus Asynchronous Distance Learning for Continuing Education Programs

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Objective. To evaluate and compare pharmacists' satisfaction with the content and learning environment of a continuing education program series offered as either synchronous or asynchronous webinars.

Methods. An 8-lecture series of online presentations on the topic of new drug therapies was offered to pharmacists in synchronous and asynchronous webinar formats. Participants completed a 50-question online survey at the end of the program series to evaluate their perceptions of the distance learning experience.

Results. Eighty-two participants completed the survey instrument (41 participants from the live webinar series and 41 participants from the asynchronous webinar series.) Responses indicated that while both groups were satisfied with the program content, the asynchronous group showed greater satisfaction with many aspects of the learning environment.

Conclusion. The synchronous and asynchronous webinar participants responded positively regarding the quality of the programming and the method of delivery, but asynchronous participants rated their experience more positively overall.

Keywords: continuing education, professional development, distance learning, webinar

INTRODUCTION

The "classroom" for continuing education is changing. There has been a shift in popularity from the traditional live classroom-learning approach to a virtual environment, especially within the areas of continuing education and nontraditional adult learning.¹ There are many potential reasons for this shift, including reduced travel costs, time commitments, and greater scheduling flexibility for the learner. There have been several studies comparing computer and Web-based instruction with live classroom instruction.²⁻¹³ The Woo and Fulkerson studies concluded that there was no difference in learning between the 2 methods of instruction.^{7,8} There was also no difference in scores on identical final examinations comparing campus-based and remote students.⁷ Distance-learning participants were positive about their experience and more inclined to pursue additional distance-learning opportunities when available. Prunuske compared a Web-based, asynchronous lecture with a live lecture for medical students for orientation before their medical practice experiences and both formats were equally effective.⁹

Williamson and colleagues concluded that webcasting was a good option for students because of positive interactions between students and lecturers, and the webcasting provided savings in time and money.¹⁰ Allen and colleagues found overall student satisfaction with distance education as an alternative to traditional classroom instruction.⁶ However, their study examined undergraduate courses and not professional development programming. Buxton and De Muth found that while both local and distance learners were satisfied with their learning experiences, the local learners were significantly more satisfied.^{12,13} The previously mentioned studies compared local vs distance learning, but did not examine perceptions of strictly distance learners who were choosing only the timing of their course, not the delivery medium. Hrastinski contended that synchronous and asynchronous e-learning are both beneficial, but that each supports different purposes.¹⁴ When surveying pharmacists about webinar preferences, Buxton and colleagues found that scheduling was a major factor in determining participation.¹⁵

The fall distance-learning experience is an 8-week annual continuing education course designed for pharmacists and offered by Extension Services in Pharmacy at the University of Wisconsin-Madison. It originated as a distance-learning program over a dedicated telephone

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service that was available at designated sites in all 72 Wisconsin counties. Over the years the format and delivery system have changed. Attendees have had the option to participate at 1 of several designated sites or via home study using recorded media. The broadcast medium was later changed to Internet rather than telephone lines. This technology update removed site constraints and allowed learners to participate from any location with access to high speed Internet. Learners could participate in small groups or individually. The home study option was not changed, though participants no longer had to order a CD ROM to listen to the lectures. Both options featured a prerecorded lecture. The live program added a question-and-answer session following the lecture. The home study option lacked the question-and-answer session, but gave the learner greater flexibility in accessing the lectures and the ability to replay portions of the lecture. Because each method contained the same lecture materials, it was possible to evaluate participant satisfaction for the 2 different formats of distance education.

The main difference between formats was interaction, either between the lecturer and the learners or among fellow participants. Some educators consider interaction to be vital for distance education.^{16,17} Garrison and colleagues' e-learning model combined social, teaching, and cognitive presence as part of the communication medium for an educational experience. Their model predicted that teaching and social presence play a major role in setting the educational climate by supporting discourse. The synchronous participants had full chat access with the instructor and among themselves. In addition, participants in the group setting had the opportunity for face-to-face interaction. However, those who signed up for the asynchronous course were doing so voluntarily with full knowledge that there would be no face-to-face interaction. The associated independence via time control may have provided more incentive than any potential interactions with fellow learners or instructors. Also, continuing education requirements for pharmacists vary by state, and some states require a live component for at least a portion of continuing education activities.¹⁸

The purpose of this nonexperimental postintervention study was to evaluate pharmacists' satisfaction with content and learning environment for a distance learning webinar lecture series, and to compare participants' perceptions of the value of the 2 delivery methods, synchronous vs asynchronous, for continuing education.

METHODS

A continuing education program consisting of a series of 8 webinars, each approximately 60 minutes, was offered to pharmacists through the Division of

Pharmacy Professional Development at the University of Wisconsin-Madison. Each presentation covered a different therapeutic area on the topic of new drug therapies. The topics and dates presented in the synchronous course are listed in Table 1. All 8 lectures for both formats were recorded prior to the program's start date. They were created using Articulate software (Articulate, New York, NY). The program fee was \$150 for either format. Forty-one participants enrolled for the live webinar offered Tuesday evenings. The program was broadcast to the participants using Blackboard Collaborate (Blackboard, Washington, DC). Twenty-one participants met in small groups and 20 participated individually. The majority of participants were located in Wisconsin, but some were located in other states. A live question-and-answer session followed each presentation. Participants could type questions that would be read by the lecturer who would then discuss a possible answer.

The asynchronous webinar series started on the same date as the synchronous series. Participants watched lectures at their own pace and were not required to wait a week between sessions. They also completed the course at their own pace. However, all 8 lectures had to be completed to obtain course credit. The asynchronous webinar series has been available for enrollment for 3 years following the release date. To date there have been 89 participants. To match sample sizes, the first 41 participants to complete the asynchronous course were used as comparators. Because the lectures were prerecorded, the participants for both options received identical presentations. Thirty-five learners in the asynchronous cohort participated individually, while 6 learners participated as a group.

Participants attended via a variety of settings ranging from work offices and conference rooms to a home

Table 1. Topics for a Live Webinar Continuing Education Program Series on Drug Therapies

Date	Topic
September 11	Updates in Lung Cancer
September 18	New antimicrobial development and use in the multi-drug resistance era
September 25	New Therapies and Strategies for Type 2 DM
October 2	Psychotropic Update: New Medications, Formulations, and Indications
October 9	New Oral Anticoagulants
October 16	Advances in the Treatment of Epilepsy: Revisiting the Old, and Exploring the New
October 23	Intravitreal Pharmaceutical Therapeutics
October 30	Newer Opioid Products

setting, and could see only the slides via the computer monitor accompanied by the simultaneous audio lecture. In addition to desktop computers and laptops, participants could access the lectures via smartphones or tablets. The lecturer answering questions could not see the participants, but could communicate with them by reading any electronic questions received and giving an audio response for the synchronous participants. All enrollees had access to the lecture slides to facilitate note taking during the lectures. Participants answered 50 questions following course completion to obtain their opinions on the learning environment and their preferences for synchronous and asynchronous learning. The questions were designed to measure participant perceptions regarding the quality of their learning environment and were also posed as part of accreditation requirements. Their answers were based on a 5-point Likert scale, with 5 representing strongly agree, 1 representing strongly disagree, and 3 indicating a neutral response. All participants completed the survey instrument online. The data were analyzed using Minitab 16 (Minitab 16, State College, PA) with demographic information evaluated using chi-square and 2-sample *t* tests. Because the evaluation responses represented an ordinal scale, a nonparametric procedure was used to evaluate the individual questions.¹⁹ The data for

the Likert scale responses were analyzed using the Kruskal-Wallis test with adjustment for ties. All tests were performed with a 0.05 level of significance.

RESULTS

The survey instrument included demographic information in addition to the questions evaluating the presentations and environment (Table 2) and no significant differences were identified between the 2 groups. The educational backgrounds and years of practice of both groups were similar. Most of the respondents in each group had bachelor of science in pharmacy degrees. The average number of years in pharmacy practice was 24 for asynchronous participants and 23 for synchronous webinar participants. Most of the participants in both groups were institutional pharmacists and their employers covered the course fee. Respondents were familiar with distance learning and the majority (over 90%) had participated in at least 1 online program in the previous year. Approximately half of the respondents participating in the synchronous program attended in a group environment with other pharmacists, whereas only about 15% of the asynchronous learners participated in a group-learning situation.

Participants were asked a series of questions about their learning environment and preferences. These results

Table 2. Demographic Information on Participants in a Study Comparing Synchronous and Asynchronous Delivery of a Webinar Series

Variable	Live Webinar Group	Asynchronous Webinar Group
Format Attended, No. (%)	41 (50)	41 (50)
Practice Setting, No. (%)		
Ambulatory	6 (14.6)	10 (24.3)
Inactive	4 (9.8)	5 (12.2)
Institutional	29 (70.7)	24 (58.5)
Other	2 (4.9)	2 (4.9)
Years of Practice Experience, Mean (SD)	22.5 (14.4)	23.6 (12.6)
Pharmacy Degree, No. (%)		
BS	25 (61.0)	30 (73.2)
PharmD	13 (31.7)	10 (24.3)
Other	3 (7.3)	1 (2.4)
Who Paid for Registration, No. (%)		
Individual	14 (34.1)	17 (41.4)
Employer	24 (58.5)	21 (51.2)
N/A	3 (7.3)	3 (7.3)
Online Programs Participated in Past 12 Months, No. (%)		
1-5	30 (73.1)	33 (80.5)
6 or more	8 (19.5)	5 (12.2)
None	3 (7.3)	3 (7.3)
Attended with Group or Alone, No. (%)		
Alone	20 (48.8)	35 (85.4)
Group	21 (51.2)	6 (14.6)

Abbreviations: BS=bachelor of science in pharmacy; PharmD=doctor of pharmacy.

and comparisons of responses between synchronous and asynchronous learners are summarized in Table 3. There were no significant differences with respect to user friendliness of the webinar formats, the participant feeling part of a group (as opposed to an individual), or the surroundings being conducive to learning. However, level of agreement of the asynchronous webinar participants was significantly greater for the following items: the audio quality was good (4.3 vs 3.4, $p=0.001$); the visual quality of the slides was good (4.6 vs 4.2, $p=0.03$); the presentations were worth the fee paid for the program (4.5 vs 4.2, $p=0.005$); I was not distracted by my surroundings (4.4 vs 3.9, $p=0.02$); and I was physically comfortable during the presentations (4.6 vs 4.3, $p=0.04$). The live course attendees provided a significantly more positive response (4.3 vs 3.6, $p<0.001$) to the statement, “If I had a question during the presentations, I felt I would be able to have it answered during the discussion sessions.”

The learners were asked whether they would have preferred to participate in the synchronous format and whether the asynchronous format was the best learning option. There was no significant difference in the responses of the 2 groups in their preference to participate in the live presentations, though the median answer was 3 (neutral) for the synchronous group and 2 (disagree) for the asynchronous group (Table 3). The asynchronous group’s mean rating was significantly higher (4.8 vs 4.2, $p<0.001$) for the item stating that the asynchronous format met their learning needs.

There were no significant differences in responses between the 2 groups for all questions related to program

content and objectives, except to the statement, “I can discuss the pharmacology and pharmacokinetics of the new oral anticoagulants as well as important information related to their use in practice” (Table 4). The mean response of the asynchronous group was more positive (4.3 vs 4.0, $p=0.02$). Both groups had a median responses of 4 (agree) to all questions and were equally satisfied with program applicability to employment and fulfilling personal objectives. Both groups also agreed that the program was fair, balanced, and not commercial in nature.

The participants were asked a series of questions regarding the lecturers (Table 5). There were no significant differences in responses to the following items: the presenters respected me (and the rest of the audience), the presenter seemed concerned that I was receiving a positive learning experience, and the presenter was enthused about presenting this topic. They were also asked to rate each lecturer’s effectiveness, value, and depth of topic. While there were significant differences among participants’ ratings of the effectiveness and value of the lectures, there were no significant differences in responses between the synchronous and asynchronous groups. However, there were some significant differences between synchronous and asynchronous groups’ ratings of some lecturers on depth of topic.

For those respondents in the live webinar group, all the items in Table 3, Table 4, and Table 5 were evaluated based on whether the pharmacists participated in a group learning experience ($n=21$) or individually ($n=20$). There were no significant differences in any of the responses except for the item “the audio quality was good” ($p=0.025$), where the independent learner responses were more positive.

Table 3. Comparison of Learning Environment for Synchronous Versus Asynchronous Webinar Series

Question ^a	Synchronous Group (n=41)		Asynchronous Group (n=41)		P
	Mean (SD)	Median	Mean (SD)	Median	
The audio quality was good.	3.4 (1.3)	4	4.3 (0.7)	4	0.001 ^b
The visual quality of the slides was good.	4.2 (0.9)	4	4.6 (0.5)	5	0.03 ^b
The webinar was user friendly.	4.2 (0.8)	4	4.4 (0.7)	5	0.07
The presentations were worth the fee paid for the program.	4.2 (0.7)	4	4.5 (0.6)	5	0.005 ^b
The asynchronous (anytime) format meets my learning needs.	4.2 (0.6)	4	4.8 (0.5)	5	<0.001 ^b
I was not distracted by my surroundings (ie, the location where I listened to the webinar, home/work distractions).	3.9 (1.1)	4	4.4 (0.9)	5	0.02 ^b
These surroundings were conducive to learning.	4.2 (0.8)	4	4.5 (0.7)	5	0.07
I was physically comfortable during the presentations.	4.3 (0.7)	4	4.6 (0.5)	5	0.04 ^b
I feel part of a group of students (as opposed to an individual).	3.9 (0.8)	4	3.5 (1.0)	3	0.05
If I had a question during the presentations, I felt that I would be able to have it answered during the discussion sessions.	4.3 (0.7)	4	3.6 (1.0)	4	<0.001 ^b
I would have preferred to participate in the live presentations of the course materials.	2.9 (1.0)	3	2.6 (1.1)	2	0.09
I learn best with the available anytime format.	4.0 (0.8)	4	4.6 (0.7)	5	<0.001 ^b

^a Based on a 5-point Likert Scale with 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

^b Significant, $p<0.05$.

Table 4. Comparison of Program Contents and Obtaining Objectives for Synchronous Versus Asynchronous Learners

Question ^a	Synchronous Group (n=41)		Asynchronous Group (n=41)		P
	Mean (SD)	Median	Mean (SD)	Median	
I will be able to apply what I have learned from these presentations to my job.	4.2 (0.6)	4	4.2 (0.6)	4	0.64
The material covered in this course was directly applicable to my professional practice.	4.0 (0.9)	4	4.0 (0.7)	4	0.77
The program was fair, balanced and not commercial.	4.4 (0.6)	4	4.6 (0.5)	5	0.08
The webinar delivery technique as a means of obtaining “in depth” continuing education.	4.2 (0.5)	4	4.3 (0.6)	4	0.38
Overall I found this webinar program to be very valuable.	4.4 (0.5)	4	4.4 (0.5)	4	0.50
I can interpret the impact of mutations on selection of cancer drug therapy.	3.6 (1.0)	4	3.8 (0.9)	4	0.42
I can identify the potential uses of antimicrobials in the development pipeline and advantages/disadvantages over current therapies.	4.1 (0.6)	4	4.2 (0.5)	4	0.52
I can explain the urgent need to find new strategies for the treatment of type 2 diabetes.	4.0 (0.6)	4	4.3 (0.6)	4	0.06
I can identify psychotropic medications and medication formulations that have been approved by the FDA within the past three years.	4.0 (0.6)	4	4.2 (0.5)	4	0.06
I can discuss the pharmacology and pharmacokinetics of the new oral anticoagulants as well as important information related to their use in practice.	4.0 (0.5)	4	4.3 (0.5)	4	0.02 ^b
I can describe the major molecular targets for anti-seizure medications	4.1 (0.5)	4	4.0 (0.6)	4	0.71
I can compare the costs and effectiveness of ranibizumab and bevacizumab and aflibercept.	3.9 (0.6)	4	4.0 (0.7)	4	0.56
I can list the new opioid drugs or formulations released in the US within the past five years.	4.1 (0.5)	4	4.3 (0.5)	4	0.1
My personal objectives in attending the course were fulfilled.	4.2 (0.6)	4	4.5 (0.6)	4	0.1

^a Based on a 5-point Likert Scale with 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

^b Significant, $p < 0.05$.

DISCUSSION

This professional development program offered multiple delivery options to meet the continuing education needs of each group of pharmacists successfully. The professional demographics for both groups were similar.

The program fee was the same regardless of the delivery format, and so cost difference was not an issue. The asynchronous group responded more positively to their choice of e-learning delivery. This may have reflected their desire for truly independent learning and having access to

Table 5. Comparison of Program Lecturers for Synchronous Versus Asynchronous Learners

Question ^a	Synchronous Group (n = 41)		Asynchronous Group (n = 41)		P ^b
	Mean (SD)	Median	Mean (SD)	Median	
The presenters respected me (and the rest of the audience).	4.2 (0.6)	4	4.2 (0.7)	4	0.85
The presenter seemed concerned that I was receiving a positive learning experience.	4.1 (0.7)	4	4.2 (0.7)	4	0.47
The presenter was enthusiastic about presenting this topic (wanted to be here).	4.2 (0.5)	4	4.4 (0.6)	4	0.15

^a Based on a 5-point Likert Scale with 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

^b Significant, $p < 0.05$.

the coursework at their convenience rather than at a regularly scheduled time. This corresponds with the pharmacist survey analysis by Buxton and colleagues.¹⁵ The convenience of controlling access may also have outweighed the desire for social interaction and the ability to have questions answered. The synchronous group responded more positively than the asynchronous group only on questions pertaining to meeting in a group setting and confidence in having a question answered. This is not surprising as only a few respondents (6/41) had participated as part of a group and no question-and-answer session was held in the asynchronous option.

The asynchronous group also responded more positively with regard to their physical comfort, external distractions, and audio and visual quality of the slides. This may have been because many of the synchronous participants were in a group setting. A group setting may have resulted in diminished audio and video quality because of limitations (eg, inadequate loud speakers, poor sight lines) in the meeting room and distractions from surroundings and/or group members. Participants could have had a better perception of audio and video quality with fewer distractions if they were seated in familiar surroundings in front of a home or office computer screen with the sound set at the individual's chosen volume. In addition, the asynchronous option allowed slide(s) to be repeated for clarification if desired. These environmental differences may explain why the asynchronous group had a significantly better rating for the perceived value of the program. However, both groups indicated that they knew more about new drug therapies than they did before the presentations and that their learning objectives were met. Both groups also responded that they could apply what they learned to their practice. Participants were able to achieve their goals with either form of learning delivery method, supporting Hrastinski's finding that synchronous and asynchronous e-learning are both beneficial, but that each supports different purposes. Both groups were satisfied with the learning process overall, but perhaps having the independence of controlling when the learning occurred provided an extra amount of satisfaction to the asynchronous group.

This study was limited by the relatively small data set, which makes it more exploratory in nature. Future investigations would benefit from a greater number of responses for both synchronous and asynchronous participants. The asynchronous data were used only from the first 41 participants who completed the course. There were more than 43 additional participants who were in the midst of completing the course, but had not yet done so when the data was gathered. Also, evaluation was completed following the entire course, leaving a time gap of

up to 12 weeks between the early lectures and when the questions were completed by those who took the live course. This may have influenced the responses given because the evaluators may have been more familiar with the latter portions of this program. There were obvious differences among the lecturers' presentation styles and the lectures they gave, but individual evaluations of each lecturer are beyond the scope of this study. Nevertheless, for the purposes of their own continuing professional development, the lecturers were provided summaries of their evaluations.

Both groups felt that the delivery methods met their learning objectives, they knew more about the course topic after the program than they did prior to taking it, and they could apply what they learned to their pharmacy practice. However, responses of participants in the asynchronous webinar series were significantly more positive in several areas compared to those of the live webinar participants.

The advent of on-demand entertainment and information combined with the desire to have more time control may be conditioning society to expect education on-demand as well. This "on-demand" mentality ranks independence over social interaction with either fellow learners or instructors. Learners who choose this option may be more satisfied with the product and results, not necessarily because of the quality of the material, but because they are able to control the timing of its availability. Pharmacists licensed in states that require live continuing education components may choose to take only the minimum live requirements to allow themselves the most time flexibility. Until state guidelines change, there will be a need for live programs, but their popularity may diminish as pharmacists select more asynchronous options for continuing education and professional development.

CONCLUSION

Distance learning offers the independence of location and asynchronous learning adds the flexibility of time. When using synchronous or asynchronous distance education delivery methods, pharmacists who participated in this study asynchronously showed greater satisfaction with their continuing education program. Both the synchronous and asynchronous groups were satisfied with their learning experience, but the ability to have greater control over the timing of the program offered greater satisfaction to the asynchronous learners. A dual-format program, like the one discussed here, offers the flexibility to meet either requirement and allows the learning provider to maximize the potential audience.

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