

## RESEARCH ARTICLES

### **Availability and Acceptability of Distance-Learning Delivery Systems for Continuing Pharmaceutical Education**

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**Objectives.** A study was designed to (1) identify the best replacement for the Educational Teleconference Network, a distance-learning method that had been used in Wisconsin for over 30 years; (2) evaluate the availability of computer technology for pharmacists as a means of receiving distance education; and (3) determine the acceptability of various distance-education systems.

**Methods.** A survey instrument was mailed to over 5000 pharmacists licensed in Wisconsin. Distance-education preferences and pharmacist demographics were gathered. Survey results were analyzed based on selected demographic variables, and findings were compared to a survey of a similar population conducted in the early 1990s.

**Results.** Pharmacist responses revealed that computers were readily available and pharmacists preferred computer continuing education (CE) to audio teleconferencing.

**Conclusion.** These findings from Wisconsin pharmacists may be used in future planning of adult education activities nationwide, including the selection of distance-education technologies.

**Keywords:** distance education, continuing education, audio teleconferencing, adult education

#### INTRODUCTION

The first reported use of the telephone in a conference mode was in 1939 with the initiation of a program in Iowa to meet the needs of homebound and hospitalized students.<sup>1</sup> Teleconferencing, or group communication through electronic media, began at the university level in 1947 at the College of Dentistry at the University of Illinois.<sup>1</sup> The University of Wisconsin's Educational Teleconference Network (ETN), originally called the Educational Telephone Network, was created in 1965 to provide continuing education (CE) to physicians.<sup>2</sup> The teleconference method utilized an amplified telephone call to disseminate and share information and ideas among groups of individuals assembled at various locations throughout the State of Wisconsin.<sup>3</sup>

From 1968 to 2002, Extension Services in Pharmacy at the University of Wisconsin School of Pharmacy offered at least 1 pharmacy CE teleconference course each academic year (fall through spring). Historically, these courses reached 15% to 20% of the registered pharmacists in Wisconsin, a state where CE had been mandated by the Legislature only since 1998. Advantages of ETN included: (1) convenience for pharmacists and fac-

ulty members, as it reduced travel expenses and travel time; (2) provision of a cost-effective way to disseminate educational information to widely dispersed groups or individuals; (3) minor costs to maintain and operate the system; (4) adaptability to many educational and instructional needs; (5) provision of at least 1 listening location in each county in the state of Wisconsin; and (6) ability to reach sites in states adjacent to Wisconsin.<sup>1</sup> The prerecorded lecture was broadcast over the network on a dedicated phone line. An open-microphone, live question-and-answer session followed each broadcast. Over the past 20 years, an average of 500 Wisconsin pharmacists were able to access the annual continuing education program over the ETN system, most from within 10 miles of their home or workplace. Due to the applicability of the educational content of the programs to other disciplines and the ease of access to ETN, nurses, physician assistants, and other health professionals have taken advantage of pharmacy ETN programming since its inception, as noted by ETN program registrations.

Research on teleconferencing was originally pursued to determine its utility for business conference meetings. Studies on business applications concluded that tasks low on interpersonal involvement, such as information transmission, problem solving, and generation of ideas, were ideally suited to the use of teleconferencing for educational purposes.<sup>3</sup> Conversely, tasks high on interpersonal involvement, such as negotiating, conflicts of

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opinion, and getting to know someone, were poorly conveyed via teleconferencing.<sup>3</sup> Various studies have reported the effectiveness, defined as an increase in knowledge and retention of the same, of the teleconference method for pharmacy continuing education, as well as positive attitudes toward ETN with respect to the acceptability of the medium and the amount of people reached.<sup>4-7</sup> A 1987 study attempted to evaluate the application of knowledge gained via the ETN broadcast to the pharmacist's practice setting.<sup>8</sup>

The fall 2002 pharmacy ETN program was the last such offering by Extension Services in Pharmacy because the ETN network was discontinued in June 2003. Due to the increased costs to maintain a system that was experiencing decreased usage by disciplines other than pharmacy, the system was abandoned by the University of Wisconsin System. Thus, Extension Services in Pharmacy was forced to identify a replacement method for distance education.

The primary objective of this study was to identify the best replacement for ETN's distance-education delivery system. In order to accomplish this objective, the study focused on collecting data: (1) to evaluate the availability of computer technology for Wisconsin pharmacists as a means of receiving distance education; and (2) to determine the learners' acceptability of different distance-education delivery systems and techniques.

## **METHODS**

The study population was drawn from a mailing list maintained by Extension Services in Pharmacy (ESP). The list combined participants of previous ESP program offerings and pharmacists from the mailing list of the Wisconsin State Board of Pharmacy/Wisconsin Department of Licensure and Regulation. The combined list was considered to be superior to the Wisconsin State Board of Pharmacy's mailing list, since it is updated on a quarterly basis in contrast to the Board's biennial update based on biennial renewals for licensure. Pharmacists primarily made up the ESP list; however, several other disciplines were represented including physician assistants, nurses, and dentists, demonstrating the appeal of ESP's courses to other disciplines.

The study used a mailed survey instrument to gather data. The study and the survey received exempt status from the University of Wisconsin Health Sciences Institutional Review Board. Survey participants included pharmacists who had taken a course via ETN in the past, as well as those who had never taken a course via ETN. Demographic data on the respondents were collected and used to identify differences in the pharmacists' responses.

The first objective of the study, to identify the best replacement for ETN's distance-education delivery system, was accomplished through the use of a survey instrument, mailed to 5,699 potential study participants in January 2003. In order to determine how study participants earned their CE credits in 2002, they were asked to list which type(s) of continuing education they utilized and how many hours of CE they participated in during 2002.

To evaluate the second objective, the availability of computer technology for Wisconsin pharmacists as a means of receiving distance education, study participants were asked to indicate whether they had access to a computer, what types of operating systems and media software their computers used, and how their computers connected to the Internet.

To fulfill the third objective, determining the learners' acceptability of different distance-learning delivery systems and techniques, scenarios of distance-learning experiences that may be implemented in the future were presented. Participants were asked to mark an X on that point on the continuum (from very acceptable to completely unacceptable) that best represented their degree of acceptance with the scenario. Scoring the acceptability of distance-learning experiences was accomplished by measuring the point at which the "X" was marked on the 10-cm scale and assigning a corresponding numerical value between 0 and 100 to the response.

Data were analyzed using *Minitab* software. The primary statistical tests used in the study were two-tailed *t* tests and one-way analysis of variance tests for continuous outcome, and chi-square tests of independence for discrete outcomes. In a few instances, because of possible confounding due to multiple predictor variables interacting, a general linear model (available on *SPSS*) was used to evaluate significant outcomes. Unless otherwise specified, all tests were performed with a 95% level of confidence ( $p < 0.05$ ).

## **RESULTS**

Of the 5,699 survey instruments mailed, 1,067 were returned. From those, 991 usable survey instruments were obtained for a response rate of 17.4%. Survey instruments were deemed unusable if they were returned blank, if the majority of the questions were unanswered, or if survey responders were not pharmacists.

Table 1 summarizes the demographics that were statistically evaluated for the responding pharmacists. Since the Wisconsin State Board of Pharmacy does not maintain demographics on license holders, determining how representative these results were compared to the actual composition of licensed pharmacists in Wisconsin was

Table 1. Demographics of Responding Pharmacists

	n (%)
Highest Academic Degree	
BS in pharmacy	855 (86.8)
Advanced degree	130 (13.2)
Total Years of Pharmacy Practice*	
10 years or less	157 (16.0)
11-20 years	241 (25.6)
21-30 years	325 (33.2)
31 or more years	256 (26.2)
Practice Environment	
Retail	468 (58.7)
Institutional	328 (41.3)
Practice Position	
Management	230 (28.9)
Staff	797 (71.1)
Participate in any pharmacy CE programs in 2002?	
Yes	869 (88.6)
No	112 (11.4)

\*N=979; Mean=23.5 years, SD=11.7 years

not possible. However, because these pharmacists were willing to respond to this survey, these are probably the same pharmacists interested in future offerings by ESP and represent the target market that future programs are intended to serve.

There were significant relationships among the various demographic variables. Pharmacists with fewer years in practice (20 years or less) were more likely to have advanced degrees (20.0%) than their more senior counterparts (7.2%,  $p<0.001$ ). Also, the pharmacists in this group were more likely to be staff pharmacists (75.7%) than the more senior pharmacists (66.5%). Pharmacists in the more senior groups (21 or more years of practice) represented a greater proportion of those holding management positions ( $p=0.004$ ). Interestingly, pharmacists with fewer years of experience represented a greater percentage of institutional practitioners than retail pharmacists, 47.2% and 54.7%, respectively ( $p<0.001$ ). Finally, more recent graduates (54.1%) tended to be located closer to Madison or Milwaukee (based on median distance groupings), than those with more experience (45.6%,  $p=0.008$ ). Pharmacists with advanced degrees were more prevalent in institutional practices than in retail practices, 19.2% and 7.4%, respectively ( $p<0.001$ ). Pharmacists with advanced degrees were more likely to be in staff positions than in management (14.2% vs. 7.4%, respectively). Consistent with the finding that more recent graduates were located closer to Madison or Milwaukee, those with advanced degrees were more likely to be closer to these 2 learning centers with respect to median group distances from

Madison or Milwaukee (advanced degree = 16.4%, BS = 10.0%;  $p=0.003$ ). Finally, significant differences were found in the proportion of management pharmacists in the 2 practice environments (retail = 40.0, institutional = 13.1;  $p<0.001$ ).

### Findings Regarding Access to Computers and Other Technologies

As compared to a study published in 1991, accessibility to computers increased from 51.9% of respondents in 1990 to 92.6% in 2002, with the biggest increase seen in the number of homes with computer access.<sup>9</sup> There were no significant differences among practice experience groups with respect to access to computers at home. The vast majority of respondents had access to computers capable of using external software. The most common site for access to computers capable of downloading software was the respondent's home (96.7%), with fewer having that capability at work (54.8%). For work locations, retail pharmacists had less access to computers capable of downloading software (42.7%) than their institutional counterparts (75.24%) or those at other sites (61.3%;  $p<0.001$ ). A significant difference was found when relating Internet access to the pharmacist's years of practice. Pharmacists with 31 years or more of practice experience were less likely to have Internet access (83.8%) than the groups with less practice experience, 95.4% to 96.8% ( $p<0.001$ ). The majority of respondents had access to Windows type platforms (97.5%) with few using Macintosh exclusively (2.2%). Internet connections via telephone modems increased over the past 13 years from 51.7% to 98.8% for those pharmacists with access to computers. High speed Internet access via DSL or cable modem has increased recently (those with access averaged only 1.6 years of DSL service) and an additional 14.1% of those currently using telephone modems reported that they plan to switch to DSL within the next year. Finally, of those with Internet access, 99.9% of the respondents indicated that they maintained an e-mail address; only 1 respondent did not have an e-mail address.

### Findings Regarding Previous Participation in Continuing Education

In 2002, 88.6% of the respondents reported participating in continuing education programs. In Wisconsin, pharmacist license renewal is on a biennial basis, requiring 30 hours of continuing education credit over a 2-year period from June 1, 2002, through May 30, 2004. It is assumed that the 12.4% who responded that they did not participate in any continuing education programs in 2002, the period

Table 2. Reported Hours of Continuing Education by Delivery Method, N= 722\*

<b>Response</b>	<b>n (%)</b>	<b>Mean (SD)</b>
Live programs	531 (74.5)	11.3 (8.5)
Journal/magazine article	459 (71.9)	12.5 (10.8)
Web based home study course	201 (28.2)	10.7 (11.3)
Audio teleconferences	191 (26.8)	9.0 (5.2)
Audio cassette and/or CD-ROM audio home study course	60 (8.4)	5.6 (4.8)
Video teleconferences	56 (7.9)	4.6 (4.4)
CD-ROM computer program and/or DVD home study course	54 (7.6)	7.1 (5.4)
Video cassette and/or DVD home study course	28 (3.9)	4.4 (11.0)

\*Median = 21.0, Overall Mean 24.09 (13.99)

covered by our survey, participated in continuing education programs in 2003 and will participate in continuing education programs in 2004. For those reporting, as seen in Table 2, the average number of hours of credit earned for 2002 was 24.1 hours (SD = 14.0), with a range from 1 hour to 120 hours. There were no significant differences in the number of total hours based on the demographics presented in Table 1. As presented in Table 2, live CE programming was the most popular method for earning CE credit, followed by reading journal articles and other print documents. Of particular interest were younger pharmacists as long-term future participants in CE programming: not only their current methods for obtaining their continuing education, but later in this section, their preferences for delivery methods. Although participants were not asked their age, the group with the least amount of experience (10 or less years of practice experience) was assumed to represent the youngest group of pharmacists. With 3 exceptions, there were no differences either in the proportions (by experience grouping) participating in the different methods listed in Table 2 (*p* values ranging from 0.143 to 0.335) or the average number of hours obtained through any of these methods (*p* values ranging from 0.105 to 0.681). Exceptions were: (1) members of the most senior group (31 or more years of practice) had a lower proportion of participation in both Web-based (*p* = 0.013) and CD-ROM or DVD home study programs (*p* = 0.016); and (2) the number of hours obtained through audio teleconferencing was significantly lower for pharmacists with 11 to 20 years of practice experience (*p* = 0.013). The first 2 exceptions seem logical in that the more senior pharmacists might be uncomfortable with these new technologies or not have access to the equipment required for their use. The last exception may be explained by the fact that the audio teleconferences in Wisconsin are presented in the evening, and pharmacists in the groups with 11-20 years of practice may have had work, family, or social commitments that precluded participation in programs scheduled at that time.

Pharmacists were asked to name their top 3 reasons for attending continuing education programs. The results showed that mandatory continuing education requirements were not the primary reason Wisconsin pharmacists participated in these types of programs. The reason given by the majority (84.4%) of the 852 pharmacists responding to this section was to enhance their general pharmacy knowledge. Fulfillment of continuing education requirements was the second most common response (71.9%). Education as part of their professional responsibilities (48.5%) and gathering information in more depth or detail (40.0%) were the third and fourth most common reasons, followed by networking opportunities (25.7%), development of a specialty pharmacy practice (12.2%), and to obtain help with a specific problem (7.6%). Ranked last was to take advantage of a free dinner along with continuing education (6.5%). When evaluating the 4 groups based on years of pharmacy practice, the ranking of reasons for participating in continuing education were virtually identical except for some minor flip-flopping in the middle range of ranks 3 to 5.

### **Preferences for Future Programming**

Individuals learn in different ways and prefer different types of educational experiences. The pharmacists were asked to indicate their preferred methods for obtaining continuing education credit. As seen in Table 3, pharmacists still prefer live face-to-face programs. As noted in the question, this was assuming all things were equal (tuition, travel expense, time requirements). Learning via reading (including free-standing monographs and journals) came in a distant second, followed by a variety of electronic delivery methods. Once again looking at age groupings (as estimated in years of pharmacy experience), rankings by each group were identical except that the most senior group ranked teleconferencing third and Web-based and CD-ROM computer programs fourth. The relationship between the methods of delivery preferred by pharmacists and what they actually accessed to

Table 3. Pharmacists' Reported Preferences for Type of Continuing Education Programs

	Ranked First	Ranked Second	Ranked Third	Weighted Results*	Rank
Live programs	485	153	99	1860	1
Reading (eg, journals/magazine articles/free standing publications/textbooks)	236	245	200	1398	2
Web-based programs	96	139	139	705	3
CD-ROM computer programs	64	147	195	681	4
Teleconference	45	132	79	478	5
Video cassettes	20	79	130	348	6
Audio cassettes	14	56	75	229	7
Other	4	0	0	12	8

\*Weighting: first x 3; second x 2; third x 1.

obtain the majority of their continuing education in 2002 was analyzed. In 2002, the majority of pharmacists participated in the kind of CE that they indicated was their preferred method for learning. However, many who preferred live programming resorted to reading or mediated instruction to meet their continuing education needs. This may be due to a lack of "on demand" conferences or programs within a reasonable driving distance.

To rate preferences for continuing education programming, pharmacists were asked to place a mark on a line rated from preferred (scored as 100) to unacceptable (0) for each CE programming option. The distance on the 10-cm line was measured and a score was assigned based on the location of each mark. In the first question "based on work and family schedules," pharmacists were asked to rate each day of the week as to their preference for live (face-to-face) learning. There was a significant preference for live CE programs on Tuesday, Wednesday, and Thursday. Major findings were that (1) pharmacists with advanced degrees favored weekday programs while their BS-degree counterparts favored weekend programs; (2) pharmacists in the more senior practice experience groups favored Sunday programs, while those with fewer years of experience preferred weekday programs (especially Monday, Wednesday and Friday); (3) pharmacists in institutional settings preferred weekdays for live continuing education programs, while the opposite was seen with retail pharmacists who preferred weekends; and (4) pharmacists in management positions rated live CE programs on Mondays or Fridays as unacceptable.

A second question addressed times for live/interactive distance education: "Based on work and family schedules, rate each time frame as to your preference for participating in a real time broadcast of a live continuing education program. This assumes that you can receive this broadcast at home or work via the Internet, or as a satellite broadcast at a site (work or other) within a ten mile drive." Weekday evenings from 7:00 PM to 10:00 PM were the most pre-

ferred time for continuing education activities. Once again there were differences based on the demographics of the pharmacists responding to the study: (1) pharmacists with advanced degrees favored broadcasts during the day (9:00 AM to 12:00 PM, 12:00 PM to 4:00 PM, and 4:00 PM to 7:00 PM); (2) pharmacists with 20 or less years of practice experience preferred the 12:00 PM to 4:00 PM time slot, and preference for Saturday programs decreased among each of the successively senior experience groups; (3) institutional pharmacists rated the 9:00 AM to 12:00 PM, 12:00 PM to 4:00 PM, and 4:00 PM to 7:00 PM time slots as more acceptable than did their retail counterparts; (4) retail pharmacists rated live distance-education programs on Saturdays and Sundays as more acceptable than did their institutional colleagues; and (5) pharmacists in management positions rated distance-education programs as less desirable during work hours (9:00 AM to 12:00 PM and 12:00 PM to 4:00 PM) than staff pharmacists.

To assess possible alternative methods for providing continuing education throughout the State of Wisconsin, pharmacists were presented with a series of potential scenarios, as seen in Appendix 1, and were asked to respond (once again using a 10-cm linear scale) to each scenario rated on a continuous scale from very acceptable (100) to completely unacceptable (0). For those scenarios where there was more than 1 significant demographic variable, the general linear model (GLM) was used to evaluate the relative importance of the different demographics.

## DISCUSSION

Compared to a study published in 1991, accessibility to computers at home has greatly increased. With few respondents currently reporting that they use Macintosh operating systems exclusively, the implication for adult educators is that mediated formats for pharmacy CE need not include compatibility with Macintosh operating

systems. Moreover, offering Web-based and CD-ROM programming has increasingly become an option for adult educators, as pharmacists prefer CE programs that can be accessed on demand. Of those with Internet access, all but 1 of the respondents indicated that they maintained an e-mail address. This finding indicates that a new venue for course promotion has opened up; a marketing venue not available in the 1991 study.

Audiocassette tape players are no longer the most accessible hardware for distance education, having been replaced in 2002 by the videocassette player and the personal computer with CD-ROM drive and/or Internet capability. In 2002, only the DVD player, a hardware item not available in the 1991 study, ranked lower in accessibility than the audiocassette tape player.<sup>9</sup> However, accessibility to DVD players is expected to increase in coming years. In automobiles, the availability of audiocassette tape players has been surpassed by the availability of CD players.

Mandatory pharmacy CE in Wisconsin is a relatively recent addition for licensure renewal, having been legislated in the State only since 1998. Wisconsin pharmacists traditionally have exhibited a high participation rate in continuing education offerings. During the period from 1969 through 1973, 43.8% of pharmacists registered in Wisconsin participated in one or more programs offered by Extension Services in Pharmacy.<sup>10</sup>

Although continuing education is mandatory in Wisconsin, the most popular reason given for participating in CE programs was to enhance general pharmacy knowledge. The second most popular reason was fulfilling continuing education requirements, and third was attending because education is a part of fulfilling one's professional responsibility as a pharmacist. Pharmacists who listed "fulfilling continuing education requirements" as their top priority for attending CE programs, were from the 2 older age groups, from retail settings, and more likely to be in management positions than their colleagues who chose "the enhancement of knowledge and professional responsibility" as their primary reasons for participating in CE. A significant difference was noted between the average number of CE hours earned by those citing mandatory as their primary reason for attending CE programs (22 hours) and those citing knowledge enhancement and professional responsibility as their primary reason (24.9 hours).

Live CE programming remains the most popular form of participating in continuing education programs for all age groups, followed by reading journal articles and other print documents. In 2002, the majority of pharmacists participated in CE using their preferred method for learning.

When presented with scenarios reflecting alternate methods for providing continuing education, pharmacists responded by indicating their preferences. The first 2 scenarios involved either a real time broadcast over the Internet or a program on CD-ROM, both with the opportunity to participate in a live question and answer session with faculty members. There was no significant difference in preferences for the Internet versus CD-ROM with questions and answers (Q&A). When demographics were examined, those with fewer years in practice rated both scenarios as more acceptable than did their more senior colleagues. Likewise, those in management positions rated the Internet and CD-ROM scenarios as more acceptable than did their colleagues in staff positions.

The third and fourth scenarios focused on CD-ROM programs without a live Q&A session. CD-ROM programs with printed supplements were rated higher than CD-ROM only programs. When compared with the results from the CD-ROM with Q&A scenario, the CD-ROM with supplements was the most preferred, followed by CD-ROM with Q&A. CD-ROM only programs were rated a distant third. With respect to the CD-ROM programs with supplements, no significant differences were found based on demographics. However, the CD-ROM only scenario yielded significant differences based on demographics. Pharmacists with BS degrees found this scenario more acceptable than their PharmD colleagues, and those with less practice experience and in retail practice found the CD-ROM only program option more acceptable than their more senior and institutional counterparts.

The last 2 scenarios involved video presentations with either a DVD or a regionally based videoconference. DVD presentations were rated significantly higher than the videoconference approach, as pharmacists preferred the convenience of a home-study DVD over videoconferences that involved travel to a regional site. The most senior practice group rated the DVD option as significantly less preferable than the videoconference. Another significant demographic variable was that staff pharmacists were less receptive to regional video conferencing than their manager colleagues. While regional teleconferencing proved to be more acceptable to institutional pharmacists than those in retail settings, the difference was not significant. Regional teleconferencing was found to be the only format for which the distance one had to travel to live programming sites in Madison and Milwaukee influenced the response. Pharmacists in counties where live programs are currently being presented were significantly more accepting of video broadcasts than those farthest from live programming opportunities.

## CONCLUSIONS

The survey results provided useful information regarding distance-education technology preferences of practicing pharmacists, specifically that computer access is readily available across all levels of practice experience. Live programs continue to be the preferred method for obtaining continuing education. However, when planning future continuing education programs to be delivered via distance-education technologies, choosing CD-ROM or DVD technology, preferably with supplemental printed materials, rather than regional video broadcasts would be advisable.

Although these findings were gathered from a survey administered to Wisconsin pharmacists, we feel that they may be applied to planning future adult education activities on a nationwide basis, including the selection of distance-education technologies.

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## Appendix 1. Various Scenarios for Distance Education Presented to Study Participants

### Real Time Internet/Q&A

Using a home or work computer with an Internet connection, you would receive a live, real time broadcast of a continuing education program, to include both audio and video. Following the broadcast you could interactively participate in a question and answer session with the program speaker(s).

### CD-ROM/Q&A

You would receive a CD-ROM for use on your home or work computer. This program would include an audio lecture and slides (which could be printed as a handout). Having already viewed the CD-ROM, you would participate (using an Internet connection) in an interactive question and answer session with the program speaker(s) at a specific date and time.

### CD-ROM/Supplements

The continuing education program would be presented on a CD-ROM computer program without an interactive question and answer session. This program would include an audio lecture and slides that could be printed out as a handout.

### CD-ROM/only

The continuing education program would be presented on CD-ROM with audio lectures that could be played on a car playback unit, but without supplemental slides, or an interactive question and answer session.

### DVD/only

The continuing education program would be presented on DVD with audio lectures. Handout materials would be included in the packet. There would be no interactive question and answer session.

### Video Conferencing

Real time regional video conferences could be used to reach up to ten sites. Most likely, these sites would involve either the larger metropolitan areas or UW campuses.