



The Effectiveness of Distance Education Systems for Training Paraprofessionals in WIC

Literature Review



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INTRODUCTION

A. Background

State Women, Infants and Children (WIC) agencies within the Western Region of the U.S. Department of Agriculture (USDA) are currently exploring the efficiency and effectiveness of training WIC program paraprofessional staff using a distance learning education model. This potential change in training methods is occurring simultaneously with the advent of Value Enhanced Nutrition Assessment (VENA) and the participant-centered education initiative. Because of the rural nature of many of the western states, it is important that efficient methods are examined to provide WIC staff with the tools, skills and confidence to effectively implement VENA and participant-centered education. This report explores the literature related to the effectiveness of distance education systems for training paraprofessionals in WIC and in other health-related settings, and aims to identify issues for the Western Region to consider as they move forward with their training efforts.

WIC encourages clients to adopt healthy eating and nutrition-related behaviors (e.g., breastfeeding and fruit and vegetable consumption) for themselves and their children. Due to the broad reach of the program, WIC nutrition education offers the potential to promote healthy behaviors among a large number of low-income women and children. However, it is important to understand that WIC nutrition education is very limited, both in terms of time available to provide nutrition education and the scope of topics covered. These limitations must be considered when discussing opportunities to transform WIC nutrition education services to a more participant-centered approach.

WIC nutrition education is usually offered either at the time of certification, recertification, or when a WIC participant goes into the clinic to get the food instrument (WIC Check). Traditionally, WIC nutrition education is provided to the client in either a one-on-one consultation or in group classes. Information is provided primarily by “Competent Professional Authorities” (CPAs) who are often paraprofessionals trained in conducting WIC certification and nutrition education. These individual consultation and group classes traditionally have been didactic in nature, using the limited amount of time available to improve participant knowledge. More recently, WIC agencies in some states have been transitioning nutrition education to a more participant-centered approach, hoping to be more effective in changing behaviors.

Adopting a more participant-centered approach to nutrition education requires that WIC program staff develop new skills and change their overall approach to nutrition education delivery. This transition will require a significant amount of training and practice for paraprofessionals and other nutrition educators in the WIC program.

Distance education methods have been used to train paraprofessionals in a number of contexts, including state and regional WIC, Head Start, and Healthy Start trainings, and CPA certification. Various methods of distance education are currently being used across the United states, such as video teleconferencing in Missouri, Webcasts in Michigan, an interactive CD-ROM in Oregon, and Web-based modules in Louisiana, to name a few.

While most of these trainings have not undergone concrete evaluations for overall effectiveness and learner outcomes, some advantages and disadvantages have been identified by program staff and

distance learners. For instance, distance learners have been overwhelmingly positive regarding distance learning due to the convenience and ease of attending conferences and trainings, the travel time saved, and the perceived cost-savings. In addition, it appears that the distance education opportunities offered to WIC paraprofessionals have been successful in meeting their training goals, as participants often report an increase in training-related knowledge and self-efficacy. Some disadvantages have also been identified by paraprofessionals participating in trainings at a distance. The primary focus of most paraprofessionals' dissatisfaction with distance education has been technical issues that arise during education sessions. This often results in participants missing or being unable to participate in parts of the training, and may reduce its overall effectiveness. Another common complaint is that question and answer sessions are not well-managed, so many questions are repeated and not all are answered.

The state of Arizona has contracted with the Altarum Institute to conduct a review of literature that would shed light on the following topics related to distance education and paraprofessional learners:

- Types of distance education
- Learner outcomes
- Learner satisfaction
- Learning styles
- Topics and skills that can be delivered effectively
- Cost-efficiency

The following sections describe our methods and findings related to each of these topics.

B. Methods

An initial search was conducted to examine the use of distance education to train paraprofessionals in the WIC program. However, only a limited amount of information was available related to WIC, so the search was expanded to more general use of distance education in training health care paraprofessionals that work in settings that may be considered similar to WIC. Individual searches were conducted for relevant articles to address the previously mentioned topics. The following outlines those searches and their applicability to this review.

Paraprofessional learner outcomes and learner satisfaction

To address WIC paraprofessional learner outcomes and learner satisfaction with distance education, a search of the literature was conducted using relevant education and social sciences databases. As noted above, initial search results were very limited, and identified only one published article and one master's degree thesis that evaluated or discussed the distance education experiences of WIC paraprofessionals and nutrition educators. An additional search of the USDA Food and Nutrition Service (FNS) Web site (www.fns.usda.gov) and the WIC Works Resource System (www.nal.usda.gov/wicworks) identified two additional evaluations and one Microsoft PowerPoint presentation reporting on evaluation findings.

We also examined whether or not we could acquire information directly from states using distance education approaches to training. An Internet search identified a number of distance education/training events for WIC paraprofessionals in many states. Efforts were made to contact program representatives to determine if evaluations had been conducted, and if so, to request the findings for the purposes of inclusion into this literature review. This met with very limited success, with staff identifying only two more evaluations and one presentation given at FNS National Conferences. However, the latter was a poster presentation with an accompanying Microsoft PowerPoint presentation that reported limited evaluation findings and did not describe the evaluation methodology. (See Appendix A for distance education opportunities offered by state and regional WIC programs.)

Due to the limited number of articles published and evaluations conducted on distance education programs or events for WIC paraprofessionals, Altarum decided that it would be appropriate to broaden the search criteria by including training for other paraprofessionals, such as those in the Expanded Food and Nutrition Education Program (EFNEP), Food Stamp Nutrition Education (FSNE), Head Start, and Healthy Start.

Overall, 88 articles related to distance education for paraprofessionals were identified using the databases, ERIC, Academic Search Premier, CINAHL, PsycInfo, and EBSCO EJS, and the following criteria: “paraprofessional OR healthy start OR head start OR EFNEP OR WIC” AND “training OR education OR professional development” AND “online OR internet OR Web OR teleconference OR satellite.” Of those, only three addressed training for paraprofessionals in the fields described above and, as such, were appropriate for inclusion in this review. A snowball technique was used to identify two additional articles and one unpublished evaluation relevant to this topic.

Therefore, a total of four articles, one master’s thesis and five unpublished evaluations were identified to address learner outcomes and satisfaction among paraprofessionals participating in distance education.

Learning style

The search for articles relevant to distance education and complementary learning styles was not limited to paraprofessionals, since that body of literature is already limited. Initially, 72 articles were identified using ERIC, Academic Search Premier, CINAHL, and PsycInfo databases and the search criteria “learning style” AND “distance education OR distance learning.” Of these, six considered the influence of learning style of preferences for instructional and environmental formats and, as such, were identified as appropriate for the purposes of this review. The findings in these studies are generally limited, however, due to small sample sizes and participant self-selection.

Cost-efficiency

Cost-efficiency, as opposed to cost-effectiveness or cost-benefit analysis, of distance education generally compares the costs of two distinct educational formats, for instance, teleconferencing and traditional classroom education (Rumble, 1999). As such, only those studies that compare the costs of alternative means of education are included in this study, though researchers performing cost-

effectiveness studies and cost analyses may include cost-efficiency comparisons in their report. Therefore, search criteria for relevant articles were expanded to include cost-efficiency and cost analysis studies. In addition, only studies published after 1990 were used due to the expectation that the costs of distance education have likely decreased in current years, though as Jung (2005) notes, the majority of studies were conducted prior to the mid-1990s and from a brief review, most of those appear to be prior to 1990 (Rumble, 1999). Using the ERIC, Academic Search Premier, EBSCO EJS, Business Source Premier and Google Scholar databases and the search criteria, “cost-efficient OR cost-effective OR cost analysis” AND “distance education OR distance learning” a total of 14 articles were identified as appropriate for this review.

This report summarizes the results of Altarum’s review of the existing literature and includes the following seven sections:

- Distance education: definition and formats
- Paraprofessional learner outcomes
- Paraprofessional learner satisfaction
- Distance education and learning styles
- Distance education topics
- Cost-efficiency
- Conclusion

II. DISTANCE EDUCATION FOR PARAPROFESSIONALS

A. Distance Education: Definition and Formats

For the purposes of this review, distance education has been defined as any formal education or training that occurs when students are separated geographically from the instructor for the duration of the training. Distance education, as such, can be provided using synchronous formats, in which instruction is provided in real time, offering the opportunity for interaction between student and instructor, or asynchronous formats, in which students participate independent of the instructor (Johnson, 2003). (See Appendix B for distance education formats, technological needs, and interactive capabilities.)

Synchronous learning formats

Audio teleconferencing requires the least amount of expertise and technology of the synchronous learning formats. Many offices may already have telephones with conferencing capabilities, and it is often as simple as dialing a phone number to join the training. Video teleconferencing also utilizes conference phones for instructional delivery, but requires video cameras and monitors, and ISDN or IP connection and the appropriate software. As such, a higher level of expertise is needed for initially installing the components onsite, but once installed is easily accessible to most users. Video teleconferencing uses compressed digital video, which is often transmitted on a dedicated T1 phone line (Willis, 2007). Both audio and video teleconferencing allow interaction among the students and instructors, though this may not always be preferable when reaching a large audience. In these cases, instead of allowing participants to pose questions during the instruction session, questions are frequently submitted via fax or e-mail during the training and addressed by the instructors during a question and answer period.

Webcasts, or online streaming videos, can also be used to instruct learners at a distance. Webcasts provide live audio and video via the Internet and can be viewed anywhere by users that have a high-speed Internet connection. According to the University of Missouri - St. Louis' "Roadmap to Effective Distance Education Instructional Design," streaming video requires roughly the same amount of technical expertise and support for development and delivery as video teleconferencing. Streaming video and video teleconferencing can both support the use of multiple cameras for switching views and easily intersperse pre-recorded video into the program. Webcasts and streaming video, however, do not provide for two-way audio or video but may encourage interactivity through online "chats" in which questions can be posed to the instructors in real time (Fleishman, 2004). For this reason, Webcasts may be preferable to video teleconferencing when reaching a large audience, but the reverse may be true of reaching smaller audiences separated by a distance, since video teleconferencing can allow greater interaction through two-way audio and video.

Broadcast TV and Instructional Television (ITV) use satellite technology to offer live classroom instruction in multiple locations. Depending on the desired level of student-instructor interaction, these courses can be either pre-recorded and broadcast (asynchronous) or broadcast live via cable or satellite. Live broadcasting has been used to broaden the reach of university and college courses for a number of years, but implementation is limited to host sites that have broadcast technology, production facilities and personnel. In addition, interactive ITV may require specialized equipment, such as video cameras, microphones, and satellite, as well as facilities and dedicated personnel (Willis, 2007), though a low level of interactivity can be implemented using audio teleconferencing communication.

One other factor that may be considered as a supplement to the use of technology is the presence of onsite facilitators to support discussion. On-site facilitators have been used to enhance the interactivity of synchronous learning formats by encouraging and motivating students, maintaining equipment, answering questions and guiding onsite activities (Sherry, 1996). As seen in the following review of paraprofessional experiences with distance education, onsite facilitation and interaction, such as role-playing, can contribute a great deal to effective and enjoyable trainings.

Asynchronous learning formats

Computer-based training is delivered using a computer, usually through the use of a CD-ROM. Typically, computer-based training does not require the participation of an instructor, and in some cases, the instructor is responsible only for the development of the course materials. Using this format, students can study at their own paces and are responsible for learning on their own. Moreover, the instructional program is developed in advance and does not make use of an instructor, which may be convenient for some types of training, an example of which would be new staff orientation. Development of effective computer-based training modules, such as CD-ROMs, require a considerable amount of expertise, however, learners only need moderate computer literacy skills to make use of this medium (University of Missouri - St. Louis, 2007). Many instructional CD-ROMs include video and audio segments, in addition to text formatted in a way that will capture and maintain the readers' interest.

Web-based trainings can include computer-based training modules available on the Internet or instructor-led courses using e-learning platforms. In either instance, Web-based courses are self-paced and usually do not involve real time interaction with the instructor. Greater interaction can be achieved, however, through the use of online forums and chat rooms. Students need access to computers with Internet access and only a moderate level of computer literacy to utilize this method of distance education. The distance education developer/instructor will need a high level of Web programming skills unless using an e-learning platform, which requires only a minimal level of programming experience (Kolasa, 2003).

Some advantages and disadvantages to both synchronous and asynchronous learning formats are discussed below as they relate to paraprofessional learner satisfaction. A complete review of the advantages and disadvantages of these formats is outside the scope of this review, but should be considered prior to deciding which format best fits the needs of a paraprofessional training program.

B. Findings Related to Paraprofessional Learner Outcomes

The relatively small body of literature relevant to paraprofessional learner outcomes in distance education indicates that distance education formats, including teleconferencing, computer-based modules, Web-based modules and interactive television, can effectively educate the paraprofessional audience. These findings, however, rely heavily on self-reports of learning and effectiveness by program participants.

The Southwestern Region WIC office has hosted a number of teleconferences since 1995 to educate and train WIC paraprofessional and professional staff. Three evaluations that were available for review indicate that the majority of participants reported an increase in knowledge of the teleconference topic areas. Pennsylvania State University developed and evaluated the 1995 satellite teleconference, “Garden of Excellence: WIC Facilitated Discussions,” which was supplemented by local hands-on activities. Using a pre-test/post-test questionnaire, AbuSabha (1997) found that only 26 percent of participants knew how to conduct a facilitated group discussion prior to the training, compared to 88 percent immediately after the training, and 87 percent at an 8-month follow-up. In addition, 85 percent of participants rated the teleconference as “effective” or “very effective.”

Since that time, the Southwestern Region WIC office has hosted a series of video teleconferences, titled “On the Road to Excellence.” An evaluation of the 2001 video teleconference also demonstrated a significant increase in participants’ knowledge. Again, using a pre-test/post-test comparison, researchers at the University of Nevada found that WIC paraprofessionals reported a statistically significant increase in three of the training’s four topic areas: client readiness to learn, adult learning, and getting clients to participate. The teleconference was also able to reach its goals in increasing the paraprofessionals’ level of understanding regarding the link between the four topic areas and their own role in WIC and their self-confidence in the ability to facilitate change in clients’ behaviors. (Sigman-Grant et al, 2002)

The Pennsylvania WIC office also hosted a satellite teleconference in 1995, “Building communication bridges in family nutrition programs,” which was broadcast to 20 sites and provided for one-way video and two-way audio in order to promote student-instructor interaction. Shearer (1995) found that participants reported a statistically significant change in knowledge of communication from pre-conference to post-conference, which was closely linked to learner satisfaction and perceived effectiveness. Participants also reported a significant positive change in comfort with the satellite broadcast.

In 2002, the USDA hosted an online course to disseminate updated information about the *Dietary Guidelines for Americans, 2000* to registered dietitians and nutrition educators, including paraprofessionals. Kolasa et al (2003) concluded that this technology was a useful tool for providing nutrition educators with updated nutrition information. Quizzes completed before and after the training modules, indicated that participants demonstrated an increase in knowledge. In addition, a large majority of the participants (89 percent) indicated that the course provided them with new information.

The National Head Start Association (NHSA) initially launched *HeadsUp! Reading (HUR)*, a distance learning initiative for Head Start teachers and paraprofessionals, in 2000. A 2002 NHSA report included preliminary evaluation findings from the program’s pilot year. NHSA reported that researchers from the Center for the Improvement of Early Reading Achievement (CIERA)

conducted a pre- and post-test to assess teachers' knowledge, skills, and practice regarding early literacy. The report further summarized that participants showed an improvement in early literacy knowledge after 8 weeks of the program, as well as in their practice after 16 weeks (NHSA cite Neuman et al, 2001).

The early years of the California and Nebraska HUR programs have also been evaluated. Conducted by the Center for the Study of Evaluation at the University of California Los Angeles, an evaluation of the California program also indicated that this course was an effective means of training paraprofessional Head Start and child care personnel. Matsumura et al (2004) utilized a pre- and post-test survey, and results indicated that participants were successful in changing their instructional practices after completing the course. HUR participants were also more likely than a control group to report the use of more literacy strategies and creation of a more literacy-rich environment. Participants also reported that the program was successful in positively influencing their interaction with parents regarding their children's literacy development.

Jackson (2004) reported that HUR in Nebraska had a significant and positive effect on Head Start classroom environments and teachers' instructional practices. Additional onsite mentoring of a subsample of participants for the duration of the program (15 weeks) also showed positive impact on improving writing practices. It is also worth noting that participants' level of education did not influence the program's effectiveness. A pre- and post-assessment of preschoolers in both the intervention and control groups also indicated that the distance education program was successful in positively impacting the literacy skills of preschool children. These evaluations provide evidence that courses offered to paraprofessionals and professionals via interactive television and prerecorded interactive television (as was the case with the majority of California participants) can be effective in producing positive learner outcomes.

C. Findings Related to Paraprofessional Learner Satisfaction

While little formal research has been conducted regarding paraprofessional learner satisfaction with distance education formats, evaluation data provides us with evidence that paraprofessionals are often pleased with both interactive programs, such as Webcasts and video teleconferences, and non-interactive programs, including Web-based and computer-based trainings. All of these methods of distance education are being used in a number of states for training WIC paraprofessionals (Appendix A).

AbuSabha et al (1997) found that the majority of participants in a satellite teleconference were satisfied with the program (83 percent), found the program effective (85 percent), and would like to attend future teleconferences (78 percent). These positive outcomes were found despite only 43 percent of participants reporting a positive attitude toward the teleconference prior to attending, and only 18 percent choosing to attend, versus at a supervisor's request or requirement. Participant satisfaction with the teleconference was maintained at the 8-month followup. It is noteworthy, as well, that the onsite role playing was rated very highly by participants as contributing to learning (63 percent); more than print materials, feedback from a local facilitator and the video screening, though these aspects were also rated positively. This may indicate that some interactivity is preferred by WIC paraprofessionals and professionals even when the information is being provided at a distance.

Shearer (1995) reported that participant feelings of satisfaction with a WIC satellite teleconference were closely related to their perceptions of effectiveness, so it is not surprising that participants were very satisfied with the training. Participant expectations and the reason they attended the training were the strongest predictors of satisfaction. Overall participant satisfaction was rather high (mean of 7.3 on a 10 point scale), though participants who were required by their supervisors to attend were, on average, less satisfied than those who chose to attend. Participants ratings of the importance that an instructor be present were not associated with learner satisfaction. It is also worth noting that the teleconference did not result in a significant positive or negative change in participants' feelings about whether or not it is important for an instructor to be physically present.

Two Southwestern WIC video teleconferences in 2001 and 2003 reported similar satisfaction with this medium. The 2001 teleconference saw an increase in participants' likeliness to support the use of information learned during the conference, and only 4 out of 564 evaluation comments stated a preference for an onsite conference versus a video teleconference (Sigman-Grant et al, 2001). Similarly, evaluation of the 2003 video teleconference elicited a positive response from all 2,266 participants completing the evaluation, only 13 of which included suggestions for improvement (Hayes, 2003).

The Virginia WIC office uses Web-based modules in conjunction with onsite activities to train WIC paraprofessionals on various topics, including breastfeeding promotion, cross-cultural counseling and communicating with clients. Soon after its inception, the Web-based course was piloted and evaluated for use nationwide. The executive summary of this evaluation was provided by the Virginia Department of Health, though complete evaluation data were not available. The summary indicates that participants were, overall, very satisfied with the course, and felt that the course could be used for CPA training or new staff orientation. The majority of participants (79 percent) reported that they preferred online training to classroom, self-study or other forms of distance education, and a full 97 percent felt that Web-based courses were easiest (Cogburn, 2000).

Kolasa et al (2003) also reported high levels of satisfaction with an online course for registered dietitians and nutrition educators. Sixty-nine percent of those completing the survey rated the course as excellent, despite the fact that 66 percent reported that this was their first online course. Participants also rated the online method as an effective means of instruction.

The Michigan Public Health Institute (MPHI) coordinates and hosts Webcasts for the Michigan WIC office as a staff training tool. Raw evaluation data, which was provided by MPHI for the purposes of this review, indicate that 90 percent of participants completing a post-Webcast survey thought that the teaching methods were effective, and 85 percent reported that the Webcast was successful in keeping their attention and interest. In addition, 96 percent would recommend that others view the archived Webcast for training purposes. Again, participants were satisfied with the training, despite a low rate of familiarity with the technology: only 25 percent of those completing the survey reported having participated in a live Webcast before. Only 1 out of the 40 participants completing the survey reported a preference for live training. A number of participants also reported satisfaction with this method of training as a way of saving travel time and funds.

While the formal evaluation results were not available for review, the Oregon State University Extension Service developed a multimedia Web-based module/CD-ROM to train staff on teaching teen parents to feed their children. In a presentation to the FNS Nutrition Education Conference in 2003, Schuster et al (2003) reported on the pilot testing of this module with 12 extension faculty and program assistants. Although the sample is small and not representative, 83 percent felt that the

module was easy to use, and only 1 out of the 12 reviewers would not recommend it to others. Participants were evenly split, however, between those preferring the module and those preferring more traditional methods of training. In 2005, it was reported that cooperative extension programs, WIC services, and nutrition educators in 26 states were using the module (Oregon State University, 2005).

The California HUR program also elicited satisfactory reactions from participants. Many of the participants and facilitators indicated that there were no weaknesses evident in the program, and nearly all of the administrators and facilitators were enthusiastic about continuing the program in some manner. Participants were especially positive regarding the video clips of classroom practice and onsite collaboration with peers and the program facilitators, as well (Matsumura et al, 2004).

There are a few specific aspects of learner dissatisfaction that were mentioned by participants of various distance education formats. The greatest source of dissatisfaction in most of the aforementioned trainings involved various technical problems during teleconferences, Webcasts, or while viewing interactive television. Technical issues in viewing and listening sites prevented some of the participants from participating fully in each of the trainings. In fact, one site scheduled to participate in the 1995 WIC satellite teleconference was unable to participate at all due to technical difficulties (Shearer, 1995). The Oregon State University Extension piloted a Webcast in 2000 and reported similar difficulties, finding that all county Extension offices were not equipped for live Webcasting (Aldrich-Markham et al, 2000).

Suggestions were also made for improving the question and answer sessions of the teleconferences and Webcasts, as well. A number of participants in each of these trainings felt that the question and answer sessions were repetitive and that efforts should be made to screen and combine questions, when appropriate, prior to the session. Despite these issues, overall satisfaction with the distance education formats discussed remained high with the majority of participants.

Common threads can also be seen regarding satisfactory aspects of the distance education opportunities reviewed. The use of onsite facilitators and/or onsite activities appears to be an effective means of increasing interactive learner participation. Shearer (1995) reported that the onsite activities led by local facilitators were recognized by participants as very helpful and were listed among the most helpful aspects of the conference. AbuSabha et al (1997) also reported that satellite teleconference participants (63 percent) felt that role playing had had a positive impact on learning the materials presented. Of the Virginia Web-based course participants who completed the onsite activities, only one reported that they were "not very valuable" (Cogburn, 2000). Participants in HUR also indicated that one of the major strengths of the program was the onsite collaboration and interaction with the facilitator and other learners (Matsumura et al, 2004). In addition, the use of video and film clips in HUR, the 1995 Pennsylvania WIC teleconference, and the 2003 Southwestern WIC teleconference, as well as animation in the Virginia WIC training modules, were recognized by participants as very useful aspects of the trainings (Matsumura et al, 2004; AbuSabha et al, 1997; Hayes, 2003; Cogburn, 2000).

D. Findings Related to Distance Education and Learning Styles

While a multitude of learning style scales exist to describe student preferences for different facets of learning (for example, social interaction or information processing), this report will focus on the relationship between learning style and instructional and environmental preferences. As such, the articles discussed consider student preferences in terms of sensory perception or the physiological aspects of learning: visual, auditory, read-write, and kinesthetic, or VARK learning styles (Byrne, 2002 cited Fleming, 1987). As one would expect, visual learners prefer information presented visually, such as charts and graphs, video, and animation, while auditory or aural learners prefer such formats as lectures, discussions, and tape recordings. Read-write learners make best use of lists, textbooks, and lecture notes while learning, and kinesthetic learners prefer hands-on activities, concrete examples, and real-life experiences. (Byrne, 2002) Learners may also show preferences for multiple styles.

Little research has been conducted to describe sensory perception learning styles as they relate to preferences for particular distance education formats, and the research that has been conducted is largely inconclusive. In addition, the research generally focuses on university Web-based courses or course components as opposed to other forms of distance education. Every effort has been made, however, to include research that involves both non-traditional students and adult learners and additional forms of distance education, including audio and video teleconferences.

Drago & Wagner (2004) described the learning styles of 238 online MBA students in relation to the perceived effectiveness of the course. Online students scored significantly higher than traditional classroom students on the visual and read-write learning styles, which may indicate a preference for distance education among these learners. Read-write learners and learners demonstrating all four styles equally were less likely to be satisfied with the online delivery than other online course participants. Bimodal auditory/read-write learners, however, were more satisfied with the online course than any other participants.

Byrne (2002) found a preference for interactive multimedia among kinesthetic users of an online course, though none of the read-write learners preferred the written words category of the online component as the researchers had expected. This data, however, is not generalizable due to the relatively small sample of students ($n = 31$).

Ross & Schulz (1999) described the potential applications of Web-based courses in relation to visual, auditory and kinesthetic learner preferences, which may also hold true for other forms of distance education. Online animations, hypertext, clickable diagrams or video clips may aid the visual learner in understanding concepts that could be missed in the classroom or using a regular lecture format. Tape-recorded segments of lectures or entire lectures, as well as sound resources, posted to a Web site may be useful to auditory learners in reviewing class materials or listening to missed classes. Kinesthetic learners can also benefit from online components by practicing problems, participating in course-related activities, or role-playing with an online video when course content allows.

While specific learning styles were not formally assessed, Cragg (1991) found that a number of the audio teleconference students participating in a Nursing Issues course were dissatisfied with the lack of visual stimulation, and those who were not auditory learners found it difficult to maintain their concentration in light of classroom distractions and other stimuli. Some correspondence students

taking the same course, on the other hand, seemed dissatisfied with the lack of auditory stimulation, finding it necessary to speak out loud to themselves to promote learning.

Cragg et al (1999), however, discovered that student preferences for distance education in a nurse practitioner program were more strongly correlated with technological reliability and comfort with distance education technology than learning style. As such, a number of students identified materials provided in print and CD-ROM as preferable to audiotapes and audio-teleconferences because they were more reliable means of obtaining information. Zhang (2005) found that neither learning style nor computer experience were predictive of distance learning receptivity to Web-based course components. Zhang also noted that the multitude of approaches used in online course content may, in fact, meet the needs of learners with different learning styles.

E. Findings Related to Distance Education Topics

No formal research has been conducted to describe the course content or topics that are most effectively taught in distance education formats. A simple Internet search, however, reveals that many universities in the United States and abroad offer a wide variety of Web-based courses in topics ranging from computer science to mystery fiction. In reviewing the literature regarding distance education formats and paraprofessional learner outcomes and satisfaction, it is evident that a wide array of courses are being offered at a distance even for this small sample of learners.

Distance education topics reviewed as having positive paraprofessional learner outcomes and satisfaction (see above) include:

- Facilitated group discussion
- Communicating with WIC clients
- Talking to parents about childhood overweight and obesity
- WIC client readiness to learn
- Encouraging WIC client participation
- Dietary Guidelines for Americans, 2000
- Stages of change
- Early childhood literacy strategies

This diverse list of topics indicates that communication and counseling skills, as well as fact-based subjects, such as nutrition and income eligibility training can effectively be taught via distance education. In addition, Shafer et al (2004) found that five live 3-hour video workshops were successful in increasing participants knowledge of and skills in motivational interviewing, based on pre- and post-workshop questionnaires. Few if any changes were observed, however, in a small subsample of participants who submitted recorded counseling sessions. A master's level class on informational counseling skills for audiologists also realized positive results, indicating that an online counseling course can be as effective as traditional classroom instruction (English et al, 2000). While the evaluation results have not yet been reported, the Michigan WIC program has been using a client-centered counseling training module to train WIC paraprofessionals throughout the state, demonstrating another instance in which non-fact-based skills are being taught via distance education (www.wichealthmn.org). It is also worth noting that crosscultural counseling and

communications were the only topics in Virginia WIC's 11 module Web-based course that did not need to be tailored to provide state-specific information when tested nationwide (Cogburn, 2000).

F. Findings Related to Cost-efficiency

The cost-efficiency studies of various distance education formats encompass university, governmental and organizational settings; however, the number of articles identified related to this topic was limited. It must be noted that while a number of university and college programs offer distance education as a part of their curriculum, the costs associated with use of ongoing distance education systems at these educational institutions are not as comparable with the type of distance education a WIC program would use for training purposes. A number of factors differ, including:

- Universities can amortize the cost of distance education equipment, support, and maintenance over a large number of cost centers, including different departments within the university and through general funds resulting from tuition for taking specific classes. In addition, the ability to use this technology over long periods of time and for multiple classes has the effect of reducing the "unit cost" per learner.
- Universities and colleges often have cost structures that differ significantly from state programs such as WIC. Universities tend to have multiple overhead categories based upon their organizational structure. Additionally, because trainers are often professors, salaries of trainers would be higher than those of state employees providing training.
- In normal WIC training settings, there are cost savings associated with limiting travel and per diem costs of employees that would be attending an in-person training. In a university setting there is no such savings comparison. The assumptions made around participant costs are either the student would not attend the training if it were not available through distance education, or would be attending the university as a regular student, thus have all the costs associated with that attendance.

As noted above, while the studies under review compare the costs of providing education in a variety of formats, they do not take into account other non-monetary benefits or the quality of the programs being offered as a cost-effectiveness model might. It is worth noting that comparison of these studies is limited because of different methodology and costing schemes used by the researchers, as well as the variety of different settings that the studies occur in (governmental, university, and commercial) and the year in which different studies were conducted. It is inadvisable to compare, for instance, the costs of computer conference training for the U.S. Army (Phelps et al, 1991) to online courses at a university (Milam, 2000).

Cost-efficiency, as presented in the studies below, incorporates a number of different methods of calculation including cost per student comparison (Jewett, 1998; Phelps, 1991) and break even point analysis (Whalen & Wright, 1999) to demonstrate the cost-efficiency or inefficiency of different programs. In addition, the monetary benefits to providing training and education at a distance are different for government and commercial organizations than universities or schools. For instance, employers may save the costs associated with employee travel and accommodations while employees will spend less paid time participating in training if it is less intensive. This is generally not the case in a university or school setting. As such, these studies have been separated into two categories.

University offered distance education

Milam (2000) conducted an analysis of four pairs of online and traditional courses offered at the same university. Results indicated that the total expenditures were relatively the same for three of the four pairs, though the net costs were somewhat higher for online courses due. This was due in part to lower enrollment and greater use of full-time versus part-time faculty in the online courses. Online course development resulted in significantly higher startup costs, but these costs were amortized over 6 or 12 semesters (depending on the expected lifetime of the course). The author speculated that the online courses may pay for themselves as startup costs are recovered over time and enrollment increases and also noted that as the costs of development decrease over time, the online courses will become proportionately less expensive than face-to-face courses.

Similarly, Bartolic-Zlomislic and Bates (1999) found that a sample of online courses studied in Canada is expected to recover costs and make a small profit by the third year of operation. This is due to high start up costs but relatively low costs of continuation associated with this type of course. This is demonstrated by Phelps et al (1991), as well, as seen in Figure 1.

Unlike online courses, Interactive or ITV courses do not incur substantial development costs. The State University of New York system in Western New York implemented an Interactive Television Network (ITN) to increase the availability of courses at five participating campuses. Jewett (1998) reported that the cost per course, based on total costs, were less expensive than regular lecture based classes would have been if offered on each individual campus. While the direct operating costs per ITN course are significantly higher than a regular lecture-based class, the savings in faculty staffing at the off-site campuses made up for this investment. As the number of off-site classes and student enrollment increases, the cost savings per student also increase, indicating that this format can realize economies of scale. Based on Jewett's cost estimates, a course offered at two sites would realize a 25 percent cost savings and a course offered at three sites would realize a 30 percent savings.

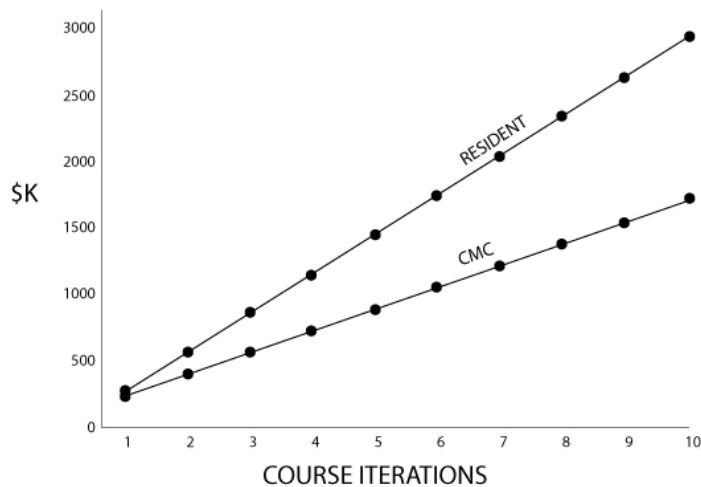
Brent (2001), on the other hand, found that a high school-based interactive television program intended to increase course offerings in six school districts was significantly more expensive than if the courses had been offered in each school individually. It is worth noting, however, that the two school district that offered five classes (other schools offered one or two classes) saw a lower percentage difference between the cost per pupil in distance learning versus onsite instruction. Although it is not stated, this is likely due to the site fee charged to each school to cover the cost of the fiber-based network (\$41,221 per district regardless of the number of classes offered.) Also, 11 of the 16 classes (69 percent) reported less than five students enrolled. Although it was not explored, it may have been possible for economies of scale to be reached by increasing the number of students per class or courses offered at each school, as Jewett (1998) suggested.

Employer paid distance education

Many corporations have claimed that distance education formats used for training employees have significantly reduced the costs of employee training. For instance, Lee & Chamers (2001) reported that companies, including Hewlett Packard, Siemens Business Communications, IBM, and U.S. Healthcare, realized significant savings after switching from onsite trainings to Web-based training. Saul Carliner (Neal, 2004), also pointed out that corporations are more likely than universities to see

cost reductions because of the greater effect on class sizes. In other words, online courses at universities are not likely to increase class size significantly, while corporations will be able to reach a far greater number of their employees than previous onsite trainings were able to. Some of the potential financial benefits to employers that have been identified as contributing to these savings include, reduction of employer-paid travel costs and employee “down-time,” greater employee retention, and improved quality (Kypreos, 2002). As such, the majority of the following studies take into account the employer-paid expenses or employee opportunity costs of traditional onsite training, including travel, accommodations, and employee salary.

Figure 1. Total course costs for 50 students over 10 iterations from Phelps et al (1991, p. 14)



Phelps (1991) compared the costs of computer-mediated communication (CMC), or computer conferencing, versus residence training in two U.S. Army Reserve training programs. The costs associated with developing and executing one course were used to project future costs and were amortized over 5 iterations with 50 students each. As such, the initial cost per student for both the CMC training and the residence training were similar, but over time the CMC course would realize significant savings versus the traditional training: 43

percent after 5 iterations and 48 percent after 10 (Figure 1). In addition, if the number of students were increased for any of the trainings offered, it would result in an increase in the cost savings.

In 1999, the Nebraska Law Enforcement Training Center offered, for the first time, both online and classroom training to jail management trainees. Schmeckle (2003) reported that all three of the online courses analyzed realized a significant cost savings versus the traditional classroom trainings. Amortized over a 5-year period, the jail management, reserve training, and radar certification courses would realize cost savings at \$590, \$1,140, and \$226 per trainee, respectively. The reserve training, which realized the highest savings (\$1,140 per trainee) also expects fewer participants per year compared to the other trainings. Therefore, this course could produce even greater efficiency if a greater number of trainees were to participate. It is also noteworthy that the online jail management trainees spent nearly 50 percent less time completing the course modules compared to the classroom trainees.

Whalen & Wright (1999) conducted a breakeven point analysis of Bell Canada’s newly developed Web-based training programs, which calculates how many students need to participate in distance training so that delivery costs are equal to that of traditional classroom training. Bell Canada piloted four different types of Web-based training platforms in order to compare the costs and cost savings of different distance education formats and traditional classroom training. In all, one synchronous and three asynchronous Web-based platforms were used to provide a total of 220 Web-based courses. The synchronous learning platform (Web conferencing) had the lowest total fixed costs

followed by the classroom trainings. Whalen & Wright (1999) also found that the high startup costs of the Web-based programs were offset by the lower variable costs in delivery, due in part to a reduction in employee time spent participating in each training and the reduction in employee travel costs. Web conferencing was found to be the most cost-efficient approach, requiring only four students to participate in order to match the cost per student of classroom training. Since an estimated 200 employees are expected to participate in each of the trainings offered per year, Whalen & Wright (1999) calculated the cost savings per student based on this number. As such, each of the Web-based trainings were more cost-efficient than the classroom based training. Cost savings per student ranged from \$625 for the asynchronous course using the Mentys platform to \$1,103 using the synchronous Symposium platform which provided Web conferencing capabilities (Table 1).

Table 1. Breakeven point and cost savings per student of Bell Online Institute Case Study
(Whalen & Wright, 1999)

	TCP/IP course using WebCT (Asynchronous)	TCP/IP course using Mentys (Asynchronous)	Frame relay course using Pebblesoft (Asynchronous)	Routing course using Symposium (Synchronous)
Breakeven point*	111 students	112 students	51 students	4 students
Cost savings per student**	\$632	\$625	\$850	\$1,103

*Number of students required so that the online course cost per student is equal to classroom cost per student.

**Based on an expected 200 students per year and a classroom cost per student of \$1,427.

While the following study was not an employer-paid training, learners' opportunity costs were calculated, which included the salary lost while participating in the training plus costs associated with the travel required. As such, this study is similar to Phelps (1991) and Whalen & Wright (1999) in which they were included as employer-paid costs. Jung (2005) conducted a study of a 60-hour teacher training in Japan offered online or face-to-face, in which fixed and variable costs, as well as opportunity costs of learners are compared. Again, the face-to-face training has higher fixed costs, while the online training has much higher variable costs. Prior to consideration of learners' opportunity costs, the face-to-face training appears to be more cost-efficient than the online training (\$432 versus \$598 per enrolled student). After calculating opportunity costs, Jung (2005) finds that the online training cost 59 percent less than the face-to-face training, or \$701 versus \$1,614 per student, respectively. The author also points out that as enrollment increases, the cost per student of online courses decreases, while the reverse is true of the face-to-face training.

While no one method of costing distance education programs has been identified as a "best practice," Bartley & Golek (2004) have developed a cost matrix to identify and compare the costs associated with online versus face-to-face instruction (Appendix C). Unlike the studies reviewed above, this matrix takes into consideration potential development costs of face-to-face training as well as that of distance education. In addition, this matrix provides insight into the complexity of costing and development involved in offering a new training either online or face-to-face.

III. CONCLUSION

Despite the limitations inherent in the body of literature under review, a number of themes emerge from the evaluations and articles related to paraprofessional distance education for those involved in WIC and similar organizations. Among the positive aspects of distance education identified was the convenience it allows paraprofessionals and the perceived cost-effectiveness; however, technological issues were a serious drawback to learning in a number of instances. In addition, lack of interactivity did not appear to be an issue due to various methods employed by program developers. From the information reviewed we can identify a number of practices that benefit distance learners as well as a number of practices that should be considered in enhancing distance education programs in the future.

A. Considerations for program development

Onsite facilitation and group activities were found to be very valuable aspects of a number of distance education courses, as noted above. It appears that developers, in these cases, sought to prevent a potential lack of interactivity by promoting collaborative activities and discussion between learners through the use of trained facilitators. It is also worth noting that the facilitators were trained beforehand both to provide valuable onsite leadership and to assist in use of the technology.

A number of the distance education opportunities reviewed made use of videos or computer animation to demonstrate particular skills, which many participants found useful for learning. Interactive videos and/or animations can be used in a number of distance education formats, including Web- and computer-based, video teleconferencing and ITV. While learning styles may or may not be important factors related to learner preferences for distance education formats, Ross & Schulz (1999) recognize the ability to address different learning styles using interactive media such as video and animation in Web-based distance education. This practice might also apply to other formats to successfully enhance learner receptivity and provide for learners of various learning styles.

The cost-efficiency of the distance education formats reviewed above make it appear likely that an organization with a large number of staff dispersed over a large geographical area who are in need of training would benefit greatly from Web-based distance education. Unfortunately, video and audio teleconferencing formats were not included in any of the reviews above, so it is difficult to state whether or not these would be cost-efficient compared to traditional training. However, similar savings would be seen regarding travel, accommodations and employee pay for time spent participating in onsite trainings. In addition, from the literature reviewed it cannot be determined which distance training method would result in the greatest cost savings for a particular program.

B. Considerations for program management

While participants' familiarity with distance education technology is not related to learner outcomes or satisfaction, it appears that the greatest hindrance to the effective implementation of the distance education programs reviewed above is the high rate of technological issues encountered.

Minimizing, if not preventing, these issues would greatly enhance participation in and completion of distance education courses or programs. As such, special consideration should be given to ensuring that all sites are (or will be) equipped with the appropriate technology prior to development of the distance education program and that appropriate personnel are available for technical assistance if issues do arise.

Many of the distance education opportunities discussed above provided question and answer sessions, but failed to manage them effectively from the participants' point of view. If the distance education format pursued permits the use of real time question and answer sessions, special consideration should be given to proper management of this aspect of the training. The number of participants that distance education opportunities reach may make this a difficult task. However, some lessons can be learned from the cases mentioned above. In many of these cases, it appears that questions were received by program staff and sent directly to the moderators or instructors resulting in lengthy and repetitive sessions. Implementing a screening process whereby questions are received by program staff and combined with similar questions may help moderators reduce the repetitiveness of questions and the amount of time allocated to the question and answer period. Additionally, providing printed materials and/or archiving the actual program for review after the initial broadcast would make it possible for moderators to focus on questions that had not already been addressed by the program itself. This might also help alleviate perceived repetitiveness.

The wide array of topics addressed by distance education indicates that it is likely that participant-centered education can be effectively and efficiently provided via distance education. While the research is limited in many respects, incorporating onsite activities, such as role playing, along with interactive videos appear to be an effective means of doing so, provided issues such as technological problems and ineffective question and answer sessions are resolved. In this case, a well-developed interactive program, whether synchronous or asynchronous, should result in positive learner outcomes and satisfaction for WIC paraprofessionals.

APPENDICES

APPENDIX A. DISTANCE EDUCATION PROGRAMS OFFERED TO WIC AND OTHER
PARAPROFESSIONALS

	Distance learning opportunity	Description	Evaluation activities
STATE			
Alaska, Hawaii, Nevada	Competent Professional Authority Training Program	Blackboard self-paced modules, including CE for WIC CPA's combined with 1 instructor led course, etc.	None
Louisiana	EATSMART	Web Certification Program	Unavailable (Limited findings reported in an FNS poster presentation)
Massachusetts	WIC Training Web – The Learning Center	Online modules for new WIC staff / Interactive Multimedia Training on CD-ROM	None
Michigan	Client Centered Counseling Training Webcast/teleconferences Blackboard training Website	Online self-study modules	Unavailable Satisfaction survey None
Missouri	Nutrition Training Institute	nationwide teleconferences WIC staff training	None
Oregon	“Helping Teen Mothers...” CD-ROM	Multi-media training module http://extension.oregonstate.edu/efnep/html/start.html	Unavailable (Limited findings reported in an FNS poster presentation)
Texas	Interactive Distance Learning Teleconferencing	Courses offered via satellite	None
Virginia	Online WIC staff training	11 modules, Including CPA training	Satisfaction survey
REGIONAL			
Southwestern Region	WIC “On the Road to Excellence” teleconferences	Yearly teleconference	Knowledge pre-post Satisfaction survey
Pennsylvania State University	Facilitated Discussion in Community Dietetics	Distance education course on facilitated group discussion	None
USDA Food and Nutrition Service	ABCs of the Dietary Guidelines for Americans, 2000	Online continuing education course	Knowledge pre-post Satisfaction survey
WIC Works	WIC Learning Online	Online self-study modules	Unavailable
NON-WIC			
Nationwide (at least 10 States have participated)	<i>Heads Up! Reading</i> (Weekly televised broadcast with onsite facilitator)	Head Start staff, parents, other early child care professionals	California: 2003 Knowledge pre-post Nebraska: 2004, Knowledge pre-post
Florida	Teleconferences Online self-study modules	Healthy Start field staff	None

APPENDIX B. DISTANCE EDUCATION FORMATS, DESCRIPTIONS, TECHNOLOGICAL NEEDS, AND INTERACTIVE CAPABILITIES

Instructional Technology	Description	Technological needs	Interactive capabilities?
Synchronous			
Audio teleconferencing	Instruction delivered using two-way audio conferencing tools	Conference phone	Yes
Video teleconferencing	Instruction using one-way or two-way video and audio	Conference phone Video monitor Video camera ISDN or IP connection Appropriate software	Yes
Broadcast TV / Instructional TV (ITV)	Live video and audio delivered via satellite (can also be pre-recorded and broadcast asynchronously)	Video monitor Video camera Satellite or cable broadcasting capabilities Production facilities and personnel	Yes
Webcasts / streaming video	Live video and audio delivered over the World Wide Web	Computer High-speed Internet access Video camera	Limited
Asynchronous			
Computer-based training / Multimedia CD-ROM	Instruction is delivered via a computer	Computer with CD-ROM drive Host site requires multimedia developer	No
Web-based training	Instruction is delivered via a computer network	Computer Internet access Host site requires e-learning software platform and developers	Limited

Source: Johnson et al, 2003; Belanger et al, 1999; University of Missouri – St. Louis, 2007.

APPENDIX C. BARTLEY & GOLEK (2004) COST MATRIX FOR EVALUATING THE COST EFFICIENCY OF ONLINE AND FACE-TO-FACE INSTRUCTION

	Online Training		Face to Face Training	
	One Time Costs	Per Session Costs	One Time Costs	Per Session Costs
Analysis				
Analysis Team Costs ¹				
Office Supplies and Expenses				
Printing and Reproduction				
Outside Services				
Equipment				
General Overhead Allocation				
Miscellaneous				
Total	\$ *		\$ *	
Design / Development				
Design and Development Team ¹				
Design User Interfaces				
Asynchronous Computer Systems				
Synchronous Computer Systems				
Design Function Elements				
Asynchronous Computer Systems				
Synchronous Computer Systems				
Design Graphical Resources				
Asynchronous Computer Systems				
Synchronous Computer Systems				
Office Supplies and Expenses				
Program Materials and Supplies (i.e. Film, Videotape, Audiotape, overhead transparencies, artwork, manuals and materials, and miscellaneous)				
Printing and Reproduction				
Outside Services				
Equipment				
General Overhead Allocation				
Computer Resources				
Individual Computer Costs / Upgrades				
Computer Classroom				
Server Purchase / Upgrade				
IT Salary Support ¹				
Miscellaneous				
Total	\$ ^c	\$ ^d	\$ ^c	\$ ^d
Implementation				
Participant Costs ¹				
Instructor Costs ¹				
Program Materials and Supplies				
Participant Replacement Costs				
Lost Production				
Facility Costs				
Facilities Rental				
Facilities Expense Allocation				
Catering				
Equipment				
General Overhead Allocation				
Miscellaneous				
Total		\$ ^e		\$ ^e
Evaluation				
Evaluation Team ¹				
Participant Costs ¹				
Office Supplies and Expense				
Printing and Reproduction				
Outside Services				
Equipment				
General Overhead Allocation				
Miscellaneous				
Total		\$ ⁱ		\$ ⁱ
Grand Total				
Fixed Costs for Training Session (a+c)	\$ ^f		\$ ^f	
Per Training Session Costs (d+g+i)		\$ ^o		\$ ^o
Anticipated Number of Training Sessions			^b	^b
Total Overall Costs for all Sessions (e x b)	\$ ^h		\$ ^h	
Total Overall Costs (f+h)	\$		\$	
¹ Personell Computation should include a minimum of the number of oarticipants x average salary x employee benefits factor x projected number of days on project x daily meal expense x average daily travel expense				

REFERENCES

- AbuSabha, R, ML Kiel, & C Achterberg. Evaluation of a Mixes-Model Teleconference Approach for Distance Education in Nutrition and Dietetics. *Topics in Clinical Nutrition*. 1997; 12(2):27-37.
- Aldrich-Markham, S, D Byrne, A Dailey, E Liss, B Rost, & T Welch. Communicate! Oregon State University Extension and Experiment Station Communications. Nov/Dec 2000; 179: 1-2. viewed 3/15/2007 <http://eesc.orst.edu/agcomwebfile/staff/Cate/Cate1100.pdf>.
- Bartley, SJ & JH Golek. Evaluating the Cost Effectiveness of Online and Face-to-Face Instruction. *Educational Technology & Society*. 2004; 7(4): 167-175. viewed 3/27/07 http://www.ifets.info/journals/7_4/16.pdf
- Bartolic-Zlomislic, Silvia & AW Bates. Investing in On-line Learning: Potential Benefits and Limitations. *Canadian Journal of Communication*. 1999; 24(3) viewed 3/26/07. <http://www.cjc-online.ca/viewissue.php?id=68>
- Belanger, F, and DH Jordan. Evaluation and Implementation of Distance Learning: Technologies, Tools and Techniques. Pennsylvania: Idea Group Publishing, 1999.
- Brent, BO. Is Distance Education a Cost-Effective Alternative to Traditional Classroom Instruction? *School Business Affairs*. Feb 2001: 33-39
- Byrne, D. A Study of Individual Learning Styles and Educational Multimedia Preferences: An experiment using self-directed online learning resources. School of Computer Applications, Dublin City University, Ireland. June 2002.
- Cogburn, JB. *Nutrition Training Project Final Report: Executive Summary*. Unpublished manuscript, Cogburn Consulting, 2000.
- Cragg, CE. Nurses' Experiences of a Distance Course by Correspondence and Audioteleconference. *Journal of Distance Education*. 1991; 6 (2): 39-57.
- Cragg, CE, MA Andrusyszyn, J Humbert. Experience with Technology and Preferences for Distance Education Delivery Methods in a Nurse Practitioner Program. *Journal of Distance Education*. 1999; 14(1): 1-13
- Drago, WA, & RJ Wagner. VARK Preferred Learning Styles and Online Education. *Management Research News*. 2004; 27(7): 1-13
- English, K, T Rojaske, & K Branham. Acquiring Counseling Skills in Mid-Career: Outcomes of a distance education course for practicing audiologists. *Journal of the American Academy of Audiology*. 2000; 11(2): 84-90.
- Fleischman, J. *Online Professional Development Part II: Webcasting & Videoconferencing*. Presented at the Commission on Adult Basic Education Conference, April 27, 2004. viewed 3/15/2007 [http://www.otan.dni.us/Presentations/OnlinePD\(COABE\)4-27-04.ppt](http://www.otan.dni.us/Presentations/OnlinePD(COABE)4-27-04.ppt).
- Hayes, D. *WIC Video-Teleconference, April 3, 2003: Evaluation*. Unpublished manuscript, Nutrition for the Future, Inc.: 2003.
- Jackson, B, R Larzelere, L St. Clair, M Corr, C Fichter, & H Egertson. The impact of *HeadsUp! Reading* on early childhood educators' literacy practices and preschool children's literacy skills. *Early Childhood Research Quarterly*. 2006; 21: 213-226.
- Jewett, F. The WESTNET Program—SUNY Brockport and the SUNY Campuses in Western New York State: A case study in the benefits and costs of an interactive television network. California State University: Seal Beach. [ED 420 301] viewed 3/29/07 <http://eric.ed.gov/>
- Johnson, JL. *Distance Education: the Complete Guide to Design, Delivery and Improvement*. New York: Teachers College Press, 2003.
- Jung, I. Cost-effectiveness of online teacher training. *Open Learning*. 2005; 20(2): 131-146.
- Kolasa, KM, NW Gaston, & ML Gallagher. The ABCs of the Dietary Guidelines for Americans, 2000: Experience With an Online Continuing Education Course - Nutrition Communications. *Nutrition Today*. Nov/Dec 2003; 38(6): 232-235.
- Kypreos, T. "Building a Business Case for E-Learning." 3 Oct 2002. *eLearn Magazine*. 2006. Association for Computing Machinery, Inc. viewed 3/28/07. http://www.elearnmag.org/subpage.cfm?section=case_studies&article=13-1

- Lee, D. & T Chamers. *Web-based Training and Corporate America*. Presented at the 24th National Convention of the Association for Educational Communications and Technology. Atlanta, GA: November 8-12, 2001. [ED 470 195] viewed 3/28/07 <http://www.eric.ed.gov/>
- Matsumura, LC & CK Boscardin. *The Implementation and Effects of Early Steps to Reading Success: Evaluation Year 2002-2003*. Unpublished manuscript, Center for the Study of Evaluation, University of California, Los Angeles, CA: 2004.
- Michigan Public Health Institute. WIC Income Eligibility Determination Training: 1, 2, 3 WIC Income Eligibility Evaluation: Unpublished raw data. 2006.
- Milam, JH. *Cost Analysis of Online Courses. AIR 2000 Annual Forum Paper. Presented at the Annual Forum of the Association for Institutional Research*. Andrew W. Mellon Foundation: New York, NY. 2000. [ED 445 649] viewed 3/27/07 <http://www.eric.ed.gov/>
- National Head Start Association. *The Early Years of HeadsUp! Reading: A Report from the National Head Start Association*. Alexandria, VA: National Head Start Association, 2002. viewed 3/15/2007. www.huronline.org
- Neal, L. "Q&A with Saul Carliner." 19 Nov 2004. *eLearn Magazine*. 2006. Association for Computing Machinery, Inc. viewed 3/28/07. <http://www.elearnmag.org/>
- Oregon State University. *Synergies Newsletter: 2004 Annual Report*. Winter 2005. viewed 3/15/2007. <http://www.hhs.oregonstate.edu/about/Synergies/W05/fcd.html>
- Phelps, RH, RA Wells, RL Ashworth, & HA Hahn. Effectiveness and Costs of Distance Education Using Computer-Mediated Communication. *The American Journal of Distance Education*. 1991; 5(3): 7-19.
- Ross, JL, & RA Schulz. Using the World Wide Web to Accommodate Diverse Learning Styles. *College Teaching*. 1999; 47 (4): 123-129
- Rumble, G. Cost Analysis of Distance Learning. *Performance Improvement Quarterly*. 1999; 12(2): 122-137.
- Schmeeckle, JM. Online Training: An Evaluation of the Effectiveness and Efficiency of Training Law Enforcement Personnel over the Internet. *Journal of Science Education and Technology*. 2003; 12(3): 205-261.
- Schuster, E, H Berry, R Carr, S Cartwright, S Dodrill, M Engle, B Rost, & J Smiley. *Developing a Multimedia CD: Lessons Learned and How Users Responded to the New Learning Approach*. Presented at the Food and Nutrition Service National Nutrition Education Conference, 2/25/2003. viewed 2/27/2007. <http://www.fns.usda.gov/oane/menu/NNEC/Files/2003/NutEdStrategies.pdf>
- Shafer, MS, R Rhode, & J Chong. Using distance education to promote the transfer of motivational interviewing skills among behavioral health professionals. *Journal of Substance Abuse Treatment*. 2004; 26: 141-148.
- Shearer, ES. Evaluation of a Continuing and Distance Education and Training Teleconference for Pennsylvania Nutritionists. Thesis (MS). Pennsylvania State University, 1995.
- Sherry, L. Issues in Distance Learning. *International Journal of Educational Telecommunications*. 1996; 1(4): 337-365.
- Sigman-Grant, M, D Loesch-Griffin, A Rye & D Mitchell. *2001 Video-Teleconference: WIC Nutrition Education: On the Road to Excellence, Evaluation Executive Summary*. Unpublished manuscript, University of Nevada, Reno: 2002.
- Wentling, TL & JH Park. *Cost Analysis of E-learning: A case study of a University Program*. Unpublished manuscript. University of Illinois at Urbana-Champaign. 2002. viewed 3/27/07 http://learning.ncsa.uiuc.edu/papers/AHRD2002_wentling-park.pdf
- Whalen, T & D Wright. Methodology for Cost-Benefit Analysis of Web-based Tele-learning: Case study of the Bell Online Institute. *The American Journal of Distance Education*. 1999; 13(1): 25-43.
- "WIC Client Centered Counseling Training." Michigan Department of Public Health, Western Michigan University. viewed 2/12/2007 www.wichealthmn.org.
- Willis, B. Distance Education at a Glance. University of Idaho Engineering Outreach. viewed 2/15/2007. <http://www.uidaho.edu/eo/distgfan.html>.
- University of Missouri, St. Louis. *Destination Roadmap and Descriptions, Destination 6: Distance education technologies*. viewed 3/19/2007 <http://www.umsl.edu/technology/frc/DEID/destination6technology/6aindex.html>
- Zhang, Y. Distance Learning Receptivity: Are they ready yet? *The Quarterly Review of Distance Education*. 2005; 6(1): 45-



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