ADULT BASIC EDUCATION
Volume 16, Number 2, Summer 2006, 99–117

OPTIMIZING COMPUTER TECHNOLOGY INTEGRATION

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ABSTRACT

The purpose of this study was to better understand what optimal computer technology integration looks like in adult basic skills education (ABSE). One question guided the research: How is computer technology integration best conceptualized and measured? The study used the Delphi method to map the construct of computer technology integration and required qualitative analysis of expert opinion, gathered in a variety of ways. Based on that analysis, we conclude that optimal computer technology integration: (a) allows for seamless movement between technology- and nontechnology-based instructional formats, (b) is appropriate for adult literacy learners, (c) is facilitated by instructors, and (d) empowers learners.

Society has placed a significant value on computer technology. Because of its pervasive impact, many adult literacy instructors are under substantial pressure to increase computer use in their classrooms. Consequently, educators who move slowly in adopting computers for instruction are sometimes labeled "resisters" or, even worse, "dinosaurs." Such misguided, more-is-better thinking can result in the wanton spread of computer use that may be inappropriate.

Yet, many educators agree that computers can make a substantial contribution to the information- and resource-poor environment of adult literacy education. Rivera (2003) reported that ESL students using computers showed improvements in seven areas: finding better jobs, attaining GED or high school diplomas, increasing community involvement, reinforcing lessons learned, practicing skills, self-directed learning, and self-monitoring of progress. Similarly, Rachal (1995), in a meta-analysis of 21 quasi-experimental studies, examined the effectiveness of computer-assisted instruction in adult education.

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He found that computers significantly improved certain aspects of instruction. These included improved learning time; student enjoyment of computer instruction, especially in terms of privacy and feedback; improved confidence levels; and reduced attrition levels.

Rationale and Purpose

Although these and other studies (Ginsburg & Creger, 2003; Imel, 2001; McKenzie, 2003; Selwynn, 2003; Stites, 2003; Wagner & Kozma, 2003) indicate that computers are beneficial, it is extremely difficult to put such research findings to work because of the considerable variability in what happens day-by-day and hour-by-hour in any given ABSE classroom. Clearly, there are activities for which computers are valuable additions to traditional instructional methods. However, there are other activities in which computers do not add to—and may even detract from—instructional effectiveness. Logically, computer use is relatively ineffective when it does not involve a variety of instructional techniques designed to address student and program outcomes. So how do teachers manage computer technology in a way that optimizes its instructional value?

This very problem became manifestly clear in the early stages of a related study in which we were engaged. We were attempting to understand the determinants of integrated computer use in adult literacy classrooms, and we set about to develop a self-completion questionnaire that would allow us to measure, quantitatively, the predictors of such use. By relying on the solid body of research on the diffusion and adoption of technological innovations (Rogers, 1995), we quickly came to terms with what our predictor variables should be and developed measures for each one.

To our surprise, however, we found ourselves with an amorphous and ill-considered outcome variable. Because the first author had spent hundreds of hours teaching literacy teachers about technology, and because she was quite familiar with the literature in this area, we had quickly settled on the name of the outcome variable: *computer technology integration*. We attempted a variety of ways to operationalize definitions for this variable, most of which centered on the percentage of time that learners used technology in the classroom. Ultimately, we decided that such definitions were unsatisfactory, primarily because a monolithic, simplistic measure simply could not capture either the complexity or the significance of optimal computer use.

Finally, we came to the conclusion that optimal computer technology integration simply cannot be considered as a function of time, nor is it reflected in the sheer quantity of technology use. Rather, there is a deeper, more complex logic at work that explains effective computer use. When we forced ourselves to articulate what effective computer use was, we concluded that computer technology integration was evidenced in a thoughtful blend of instructional modalities and thoughtful planning around student objectives and program outcomes. Computer technology integration was best defined by examining classroom practices that would serve as indicators of computer technology use in ABSE.

This ultimately led us to the present study, in which we decided that any definition of computer technology integration that was based purely on quantity of technology or quantity of use would be too simplistic. We also knew that any definition that we constructed out of our own subjectivity would be too arbitrary to be defended. Ultimately, we decided that we wanted to capture the best wisdom that would allow us to characterize a classroom that reflects highly effective use of computer technology.

The purpose of this exploratory study was to develop a theoretical framework for examining—and ultimately improving—computer technology integration in adult literacy education. To accomplish this purpose, the study sought to collect, condense, and explicate expert opinion about computer technology integration through a structured data collection sequence consisting of interviews, e-mail communications, and questionnaires. The study was guided by a single research question: How is computer technology integration best conceptualized and measured in adult literacy classrooms?

Research Approach

This study was designed to build theory based on the consensus of expert opinion. The study employed a multistage approach called the Delphi method, first proposed by Helmer and Rescher (1956) as an alternative to scientific models of prediction. The approach allows for the exploration and explication of vague concepts through the systematic sharing, evaluation, and reevaluation of ideas among experts. The core notion of the Delphi method is that the knowledge of well-informed individuals can be combined to produce knowledge that is of equal or greater quality and utility than knowledge produced by more "objective" scientific methods. By placing high value on complex human judgment and reflection, the Delphi method represents an epistemological break from more positivistic approaches to knowledge creation.

A unique aspect of the Delphi method is how the input of each member of the expert panel remains anonymous. Members do not meet and do not have to reach complete agreement (Gordon, 1994; Linstone & Turoff, 2002). However, from a position of anonymity, members engage in collaborative problem solving (Ludwig, 1997; Turoff et al., 2004) through a series of questionnaires and opinion summaries, which lead to consensus as represented by the median score. Specifically, the Delphi method leads to a collation of individual opinion as opposed to the process formulation of group opinion because the group process can sometimes suspend any one individual's opinion. The Delphi method used in this study employed both qualitative and quantitative data in a six-stage process. This process is summarized in Table 1.

Concept Clarification

In the first stage of the Delphi method we clarified the target concept and described it in written form. We set boundaries on what was and was not relevant. Practices had to reflect the realistic environment of adult literacy classrooms, which often involve open enrollment, irregular attendance, and a broad spectrum of instructional methods, including small group instruction, as well as one-on-one tutorials. Practices also had to apply to a wide range of teaching methodologies ranging from instructivist approaches, such as stand-alone software and independent learning systems, to constructivist methodologies, such as project-based learning.

Through this process, we developed a broad, inclusive, preliminary understanding of our target concept. Ultimately, we were looking for essential characteristics or behaviors of integrated aspects of computer technology use in adult literacy classrooms.

Expert Panel

In the second stage, 12 national experts were selected to serve on the Delphi panel. These experts, who work at research universities and government institutes across the United States and North America, were selected on the basis of their proven expertise and leadership in the area of computer technology and all areas of adult literacy. They also are representative of a geographical span that is national in scope, and they are recognized for their work with ABSE providers. Eleven of the twelve agreed to participate in the study (Dillon-Marable, 2004). All 11 participated in all stages of the project. Delphi studies are typically plagued by mortality rates over time. This 100% retention rate can be attributed to the fact that we had a professional relationship with the experts, the study was of interest to them, and highly relevant to their work.

Letter of Intent

In the third stage, a letter of intent was sent to the panelists, inviting them to help us refine the construct of computer technology integration in its most ideal form and validate the measurement. We really believed that this approach would allow us to get the best wisdom from the field and then put it to work. The experts were interviewed about examples of excellent computer integration and classroom practices in computer use in ABSE.

Table 1
Stages of the Delphi Method

Stage	Activity
Stage 1	Concept Clarification
Stage 2	Expert Panel Selected
Stage 3	Letter of Intent (a) Mailed letter of intent (b) Conducted semistructured telephone interviews with experts (c) Analyzed taped interviews using constant comparative method (d) Wrote two-page concept paper
Stage 4	Summary of Preliminary Findings (a) E-mailed theoretical framework (b) Conducted follow-up semistructured telephone interviews to critique theoretical framework (c) Analyzed transcripts (d) Modified characteristics and indicators based on the opinion of the experts (e) Developed potential practices
Stage 5	Rating Characteristics and Practices (a) E-mailed correspondence on potential practices (b) Collected ratings of classroom practices (35 potential practices rated on Likert scale) (c) Developed means chart (d) Performed analysis of practices to identify those rated highly by 8 of 11 experts
Stage 6	Construct Validity (a) Conducted validity sort and frequency/means chart (b) Retained practices rated highly by 7 out of 10 reviewers (c) Refined practices based on reviewers' input

The interview was semistructured; however, it centered on three major questions: (a) Can you describe an adult literacy classroom in which you observed ideal (optimal) computer technology integration? (b) Given that description, how would you define ideal (optimal) computer technology integration? (c) Based on that definition, what are three characteristics or descriptors of ideal (optimal) computer technology integration?

Interviews were taped and transcribed and then subjected to constant comparative analysis to determine the essential characteristics and indicators of computer technology integration as defined by the experts. Once those were determined, we wrote a two-page concept paper in which we spelled out what computer technology integration was—and was not—as defined by the expert panel.

Summary of Preliminary Findings

In Stage 4, an e-mail summary of preliminary findings, in the form of a measurement framework, was shared with the panelists. They were then asked to provide criticisms, improvements, and elaborations in a follow-up telephone interview. Five questions guided the follow-up activity: (a) What do I have right? (b) What do I have wrong? (c) Do all the characteristics belong here? (d) Are there any characteristics missing? (e) Is my language precise and appropriate? All 11 experts provided suggestions at this point. Since their contributions were thoughtfully derived, comprehensive, and substantive, most of the panel preferred to provide input via telephone so they could engage in dialogue and discussion. The interviews were taped and then analyzed to modify the characteristics and indicators to reflect the criticisms of the panelists.

Rating Characteristics and Practices

In Stage 5, we asked the experts to rate 35 classroom practices based on their importance to computer technology integration. Frequency and means were charted and practices were ranked. Behaviors considered highly desirable by at least 8 of the 11 experts were retained as essential to our theoretical formulation. Through this process, it became apparent that there were really four distinct aspects of computer technology integration.

Construct Validity

In Stage 6, we created validity sort kits containing the following: (a) instructions; (b) five labeled envelopes, one for each of the four categories of computer technology integration and one for any practice that could not be classified; and (c) 35 strips of paper on which the practices were listed. Subsequently, 10 individuals familiar with survey development as well as adult education, literacy, and technology, gathered in a conference room and independently sorted each practice by characteristic. After the sort was completed, the group discussed their choices and gave suggestions on possible revisions to the wording of several characteristics and indicators. Frequencies were then charted. Each practice consistently identified under one characteristic of computer technology integration by 7 out of 10 individuals was retained as essential for measurement development. The logic underpinning this procedure is one designed to assess construct validity, not through observed covariation, as is the case with factor analysis, but rather through human judgment. We understood that not everyone would view each item in precisely the same way. However, if an item was to be considered a good indicator of a broader construct, we reasoned that a substantial majority of people should agree that it belonged there. Therefore, we set a criterion of 7 out of 10 before we would consider the item essential for measurement development.

We have discussed these concepts and practices with ABSE practitioners at conferences and in government-sponsored online discussion groups. The majority of practitioners found them to be useful for thinking through their practice and showed strong support for the resulting theoretical framework depicted in Table 2.

Findings

As can be seen from Table 2, our emergent themes ultimately took the form of classroom characteristics. Conceptually, a classroom that embodies these characteristics is a classroom with optimal levels of computer technology integration.

The first characteristic calls for a classroom in which computer use is *seamless*. Computer use is not an unusual event, nor is it something that learners engage in "every Tuesday and Thursday morning." Instead, computer technology is a taken-for-granted element of everyday instruction. There is an easy flow from computer to book to paper to discussion, and both learners and teacher benefit from using the best modality—alone or in combination—for accomplishing the learning task at hand.

The second characteristic calls for a classroom in which computer use is *appropriate*. Learners in adult literacy classes have special characteristics. They are more likely to have learning disabilities than other adults. They are more apt to be members of socially oppressed groups. They are more likely to have come from poor families and poor schools and thus have had limited access to computer technology. Also, by definition they have lower reading, writing, and math skills than other adults. The selection of both hardware and software must be made in light of these realities. However, as more than one of our experts has reminded us, a good teacher does not trap learners in their histories. Therefore, in the best classrooms, learners' technology expertise increases as their academic skills do, and the definition of "appropriate technology" is fluid.

Table 2
Four Characteristics of Computer Integration in ABSE

Characteristic 1: Computer Use Is Seamless.
Definition: There is seamless movement between computer-based instruction and other forms of instruction.
Practices:
(a) Learners access computers as easily as they access more traditional learning tools, such as paper and books.
(b) Computer use is routinely augmented by class discussions.
(c) Computers are used in combination with other learning formats, such as lectures and books.
(d) Computers are used to enhance other learning activities.

Characteristic 2: Computer Use Is Appropriate.
Definition: Learners are able to use the computer technology in the classroom.
Practices:
(a) The level of computer-accessed content matches learners' literacy skills.
(b) Accommodations are made for learners with different languages, cultures, and socioeconomic backgrounds.
(c) Accommodations are made for learners with special learning needs.
(d) The levels of technology match learners' technology skills.

Characteristic 3: Computer Use Is Facilitated.
Definition: Instructors facilitate learners' effective use of computer technology in the classroom.
Practices:
(a) Instructors actively assist learners in using computers to achieve individual learning goals.
(b) Instructors provide feedback to students on their computer-based learning.

Characteristic 4: Computer Use Is Empowering.
Definition: Learners are proactive in using computer technology for learning.
Practices:
(a) Computer use enhances learners' ability to work independently.
(b) Computer use enhances learners' ability to work collaboratively.
(c) Learners choose from a range of learning materials available through computer use.
(d) Learners make choices about learning activities available through computer use.
(e) Learners use computer technology to access materials that address their roles as family members, workers, or citizens.

The third characteristic calls for a classroom in which computer use is *facilitated*. The use of computers changes but does not diminish a teacher's instructional responsibility. In the best classrooms, teachers are actively engaged in planning and monitoring computer use. Although there are many instructional choices that can and should be made by the learners themselves, it is the teacher's job to ensure that the technology is up and running—and appropriate for the learning task at hand. Moreover, as with any learning modality, the teacher needs to provide the kind of guidance and feedback that will allow students to achieve their learning goals.

The fourth characteristic calls for a classroom in which computer use is *empowering*. The use of computers enhances students' opportunities to work independently as well as in groups. Students are able to make decisions about when and how to use computers and are able to use computers to choose from a broad range of materials that might not be available to them in programs with limited resources and funding. They are also able to use computers to engage in real-life problem-solving scenarios that are relevant to their personal and professional lives and their roles as citizens, family members, and workers.

Discussion

Seamlessness refers to easy movement between computer-based instruction and other forms of instruction. It involves open access to computer technology and promotes its use as a supplement to other instructional modalities. This aspect of integration is reflected in recent studies that suggest that the use of computer technology should be based on sound pedagogy and integrated into existing instruction for the purpose of enhancing content and the learning experience (Ginsburg, 1999; Imel, 2001; Phillips and Kelly, 2000; Stites, 2003; Wagner, 2001). These same studies emphasize that the focus of instruction should be on program goals and objectives rather than on the technology itself. McKenzie (2003), who studied the process of teachers adopting technology, uses the term *toolishness* to imply the foolishness of using technology for technology's sake alone.

Appropriate means that computer content should match learners' abilities from a technical, academic, and cultural perspective. It also implies that technology should address the needs of individuals with physical and learning disabilities. Stites (2003) identifies several barriers to technology integration. These barriers include the lack of online materials that meet the literacy levels of ABSE students and the lack of equitable, universal access. Imel (2001) notes that the design of technology itself has social, political, and cultural implications that impact the learning environment, creating a technology-driven pedagogy rather then a learner-driven one. Wagner (2001, p. 63) states that "Projects within the digital divide must first and foremost be about learning, and about culturally appropriate content." He stresses the need for content to address issues relevant to improving the lives of participants.

Empowering means the learner is proactive in the use of technology for goal achievement. Proactive involvement suggests the learners' ability to work independently as well as collaboratively. It also indicates that the learner should be able to choose from a wide range of learning materials available through computer technology. This aspect of computer technology integration is echoed in the work of researchers and practitioners who stress the need for proactive participation of the learner in technology-related activities (Cowles, 1997; Imel, 1998; Stites, 2003; Wagner & Kozma, 2003). These studies also stress the importance of computer technology use that supports both independent and interdependent learning environments.

The notion of technology being facilitated recognizes the responsibility of instructors to guide the learners' effective use of computer technology and to provide them with feedback regarding progress toward their learning goals. The role of the instructor is emphasized in a recent participatory research study that examined the connection between learning and technology (Daley et al. 2001). This study found that variations in learning with technology were largely attributed to the learners' attitudes and perceptions of the technology itself. Findings suggest that instructors need to structure technology-enhanced learning environments with careful attention to the development of learning tasks that foster positive attitudes among learners. Similarly, Imel (1998) emphasizes that the use of technology requires a learning environment that assures the attainment of instructional and learner goals and that the responsibility for effective use of technology rests primarily on the instructor. Stites (2003) records the need for frequent interaction and feedback between teachers and learners, and McKenzie (2003) suggests that it is essential for teachers to manage their myriad of learning activities inherent in technology-enriched environments.

Implications for Practice, Policy, and Research

Implications for Practice

This study developed a framework that can guide the design of instruction and the design of evaluation for optimal computer technology integration. The framework identifies four characteristics to look for: seamlessness, appropriateness, facilitation, and empowerment. Using these as a guide, a classroom can be evaluated to determine if computer technology is being integrated in an optimal manner. The four characteristics provide a framework for evaluation that is superior to more simplistic measurements, such as the amount of equipment in the classroom, or the percentage of time computers are used.

Two of the four characteristics lend themselves to planning for and placing computers and peripheral devices in ABSE classrooms. Seamlessness suggests that the placement of computers and peripherals be such that students and teachers have as-needed access to them. They should not have to wait to go to a lab setting or to use limited computer resources within the classroom. Also, the placement of equipment should be such that students can comfortably interact for curriculum objectives that are group oriented or project based.

Appropriateness suggests that the software and computer programs purchased be suited to the background and experience of the learner. This would involve a clear assessment of learner needs and abilities by knowledgeable experts. It would also involve expertise for the purchase of assistive technologies appropriate for students with both physical and learning disabilities.

Two of the characteristics lend themselves to the planning of staff development for instructors who will use the technology. Facilitation requires training that focuses on guiding students in the use of technology that is expressly directed toward the achievement of learner and program outcomes. It also requires training in how to provide timely feedback to students using computer technology.

Empowerment involves training teachers how to encourage learners to be proactive in using computer technology for learning. This means equipping students to use the rich resources available through computer technology and involving them in both collaborative and independent learning modalities.

Implications for Policy

This study has implications for policy on the local, state, and national levels. Efforts to optimize the use of computer technology rest largely on the shoulders of local practitioners, whose instructional choices will determine the extent of computer technology use. Logically, instructors will only make that choice if they believe that computers prove more effective than current instructional methods. This study lays out the conditions under which experts believe that computers enhance traditional learning activities and provides a foundation for local practitioners to advocate for educational environments that allow learners to have seamless, appropriate access to computer technology that is instructor-facilitated and learner-empowering.

State organizations can support literacy programs and practitioners at the local and regional levels by rewarding those who incorporate the characteristics of optimal computer technology integration in their classrooms. They can also provide incentives to assist them in designing new initiatives that:

1. Promote the seamless integration of computer technology.
2. Encourage learners to proactively use computers to access learning materials.
3. Engage learners in independent and collaborative learning and address their roles as family members, workers, or citizens.

4. Provide instructor support.
5. Promote appropriate use of computer technology in ABSE learning environments.

On a national level, funding sources can encourage or require professional development opportunities that assist literacy programs and providers to develop best practices that reflect and build on the characteristics of optimal computer technology integration and ensure that computer technology is used effectively for learners in ABSE environments.

Implications for Research

This study has several implications for research. Since the four characteristics of computer technology integration and the associated practices identified in this study were derived from a panel of experts, they have not been studied in depth in actual ABSE classrooms. It would be valuable to understand the relationships between the four characteristics and various methodological preferences. For example, how do the four characteristics correlate with one-on-one instruction as opposed to group instruction? How do the characteristics correlate with instruction that involves constructivist (project-based) learning as opposed to those using instructivist (skills-based) learning? Are the characteristics more prevalent in ABE classrooms, in GED classrooms, or in ESL classrooms? What will these correlations imply?

It would also be interesting to examine whether the characteristics of computer technology integration are more likely to exist independently of each other or if they tend to coexist. If they exist separately, which characteristic is most likely to be found, under what circumstances, and why? If they are more likely to coexist, is one characteristic present to a greater extent than others, in what environments, and with what outcome?

Here is another question for future research: Are classrooms that exhibit these four characteristics more effective in reaching participants' goals and program outcomes than classrooms that do not? This framework could advance both quantitative and qualitative research designed to answer these questions. We have already put this framework to use in the development of an instrument for a quantitative study of computer technology integration (Dillon-Marable, 2004). Researchers who prefer qualitative methods can also use these four characteristics as a conceptual guide.

The framework also has implications for program evaluation. Presently, the evaluation of computer technology integration is undertheorized. Current evaluation methods typically consist of an assessment of hardware and software along with apparent levels of satisfaction. Using the framework developed in this study, evaluators can build on the collective knowledge of the national experts. The four distinct characteristics described in the framework can be used to develop a useful evaluation tool for the assessment of computer technology integration in adult education programs.

Since, conceptually, a classroom that embodies these characteristics is a classroom with optimal levels of computer technology integration, this framework can also be used in the design of educational programs. The identified classroom practices can easily serve as the foundation for the development of questionnaire and interview schedules.

The behaviors and best practices identified through this study also contain substantive implications for staff development in ABSE. On the most fundamental level, training should emphasize the concept that computer technology is only one of many tools, and, as such, is most effective when used in combination with other instructional modalities. In addition, training should reduce the tendency for teachers to use computers as an easy replacement for textbook-driven instruction. This can be accomplished by modeling the use of computers as a rich, diversified, easily accessed resource for personal inquiry, project-based learning, and problem solving. Most importantly, teacher training should provide a needs-based approach to the use of computer technology. This requires the establishment of clear connections between the use of computer technology and the attainment of measurable program goals and objectives. Only then will teachers view it as a viable tool that supports and enhances instruction.

References

Cowles, S. K. (1997) Technology melts classroom walls. *Focus on Basics, 1*(C), 11–13. Retrieved October 25, 2004, from http://gseweb.harvard.edu/~ncsall/fob/1997/cowles.htm

Daley, B., Watkins, K., Williams, S., Courtenay, B., Davis, M., & Dynmock, D. (2001). Exploring learning in a technology-enhanced environment. *Educational Technology and Society, 4*(3). Retrieved October 25, 2004, from http://ifets.ieee.org/periodical/vol_3_2001/daley.html

Dillon-Marable, E. (2004). *Conceptualization, measurement, and prediction of computer technology in adult basic skills education*. [Electronic version]. Doctoral dissertation archived on University of Georgia Web site: http://graduate.gradsch.uga.edu/etdarchive/spring2004/dillon-marable_elizabeth_200405_phd.pdf

Ginsburg, L. (1999). Educational technology: Searching for the value added. *Adult Learning, 10*(4), 12–15.

Ginsburg, L., & Creger, J. (2003) *Adult literacy and the Internet: An exploratory conversation*. Retrieved May 29, 2005, from University of Pennsylvania, National Center on Adult Literacy Web site: http://www.literacy.org/products/t21_ALL_NET_jcs26.pdf

Gordon, T. J. (1994). The Delphi method. American Council for the United Nations University. Millennium Project, Futures Research Methodology. Internal papers of the Futures Group. Retrieved June 14, 2005, from http://www.futurovenezuela.org/_curso/5-delphi.pdf

Helmer, O., & Rescher, N. (1956). On the epistemology of inexact sciences. *Management Science, 5*(8), 25–53.

Imel, S. (1998). Technology and adult learning: Current perspectives. ERIC Digest No. 197, pp. 1–4. Retrieved October 25, 2004, from http://adulted.about.com/gi/dynamic/offsite.htm?site=http%3A%2F%2Fericacve.org%2Fdocgen.asp%3Ftbl%3Ddigests%26ID%3D50

Imel, S. (2001). *Learning technologies in adult education*. Retrieved October 25, 2004, from Ohio State University, Center on Education and Training for Employment Web site: http://www.cete.org/acve/docs/mr00012.pdf

Linstone, H. A., & Turoff, M. (Eds.). (2002). The Delphi method: Techniques and applications. Retrieved June 13, 2005, from New Jersey Institute of Technology, College of Computer Sciences Web site: http://www.is.njit.edu/pubs/delphibook/

Ludwig, B. (1997). Predicting the future: Have you considered using the Delphi methodology? *Journal of Extension, 35*(5). Retrieved June 13, 2005, from http://www.joe.org/joe/1997october/tt2.html

McKenzie, J. (2003). Stories of adult learning. *The Educational Technology Journal, 12*(11), 1–8. Retrieved October 25, 2004, from http://www.literacyonline.org/ICTconf/PhilaRT_wagner_kozma_final.pdf

Phillips, M., & Kelly, P. (2000). Learning technologies for learner services. In E. J. Burge (Ed.), The strategic use of learning technologies. *New Directions for Adult and Continuing Education, 88,* 17–26.

Rachal, J. R. (1995). Adult reading achievement comparing computer-assisted instruction and traditional approaches. *Reading Research and Instruction, 34,* 239–367.

Rivera, N. V. (2003). *A study of the effectiveness of LAUSD's Adult ESL/CBET Program.* Retrieved May 29, 2005, from Los Angeles Unified School District, Program Evaluation and Research Branch Web site: http://notebook.lausd.net/pls/ptl/docs/PAGE/CA_LAUSD/FLDR_ORGANIZATIONS/FLDR_PLCY_RES_DEV/PAR_DIVISION_MAIN/PERB/PUBLICATIONS/REPORTS/RPT%20ESLCBET%20EFFECT.PDF

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.

Turoff, M., Hiltz, S. R., Li, Z., Wang, Y., Cho, H., & Yao, X. (2004). *Online collaborative learning—Enhancement through the Delphi method.* Proceedings of the OZCHI 2004 Conference, November 22–24, University of Wollongong, Australia. Retrieved June 13, 2005, from http://eies.njit.edu/~turoff/Papers/ozchi2004.htm

Selwynn, N. (2003). *ICT in non-formal youth and adult education: Defining the territory.* School of Social Sciences, University of Cardiff. Paper prepared for the International Roundtable, November 12–14, Philadelphia, PA.

Stites, R. (2003). Implications of new learning technologies for adult literacy and learning. In J. Comings, B. Garner, & C. Smith (Eds.), *Annual review of adult learning and literacy* (Vol. 4). Mahwah, NJ: Erlbaum. Retrieved October 5, 2004, from http://gseweb.harvard.edu/~ncsall/ann_rev/v4_c4.html

Wagner, D. A. (2001). IT and education for the poorest of the poor: Constraints, possibilities, and principles. *TechKnowLogia: International Journal for the Advancement of Knowledge and Learning,* July/August. Retrieved October 25, 2004, from http://www.literacy.org/products/WagnerTechKnowLogiaArticle.pdf

Wagner, D. A., & Kozma, R. (2003). *New technologies for literacy and adult education: A global perspective.* Retrieved October 25, 2004, from University of Pennsylvania, National Center on Adult Literacy Web site: http://www.literacyonline.org/ICTconf/PhilaRT_wagner_kozma_final.pdf