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# Bridging the gap between asynchronous and traditional learning environments: Technology for adult learners

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BRIDGING THE GAP BETWEEN ASYNCHRONOUS AND TRADITIONAL  
LEARNING ENVIRONMENTS:  
TECHNOLOGY FOR ADULT LEARNERS

BY

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DISSERTATION

Submitted to the University of New Hampshire  
in Partial Fulfillment of  
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Doctor of Philosophy

in

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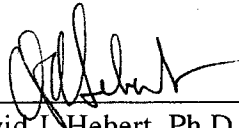
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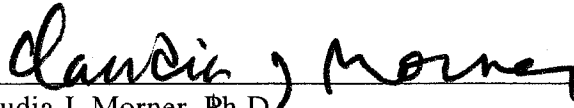
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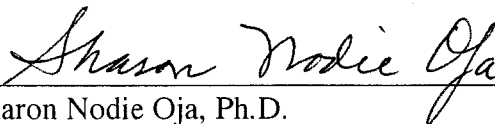
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## DEDICATION

To my extended family and friends who wondered when “the big paper” would be done  
and to my immediate family, Peter, Nick, and Haley, without whom I would be  
rudderless.



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## ABSTRACT

# BRIDGING THE GAP BETWEEN ASYNCHRONOUS AND TRADITIONAL LEARNING ENVIRONMENTS: TECHNOLOGY FOR ADULT LEARNERS

By

Jayne E. Pelletier

University of New Hampshire, September, 2005

The growth of new technologies has caused renewed interest in distance learning and has impacted the instructional delivery of courses. This interest ranges from nontraditional learners to businesses using distance education to meet the needs of employees working in multiple geographic sites. A review of the literature suggests that interaction is an important factor in learning and that improving interaction improves transformational learning and constructivism. Since asynchronous delivery tools can potentially marginalize social and cultural skills prevalent in a classroom setting, new technology may resolve these issues.

This study examines a web-based, VoIP platform (Interwise) as a means for instructional delivery adopted to meet the business training needs of a mid-sized multinational company. The study addresses the following questions:

- (1) Are the instructional components of Interwise consistent with adult learning principles?

- (2) How do students report their experience with Interwise in comparison to their experience in a traditional classroom?

The study involved a convenience sample of 233 adult men and women participating in online training within a corporate environment. The archival data provided information on distance education and the fit of the delivery system with adult learning principles. Individuals responded to an online survey, identifying their responses on a Likert scale. Descriptive statistics were used for all questions and, in addition, correlation and ANOVAs were conducted.

Findings support the use of Interwise as a delivery method for adults. The data indicates the perception of Interwise by students is positive and the platform appears suited to the learning needs of adults. It is convenient, easy to access, and the majority of students were willing to take another class. Instructor-centered factors influenced students' perception of their experience. The most significant limitation was in the area of student-to-student interaction, with fewer opportunities for quality interaction than in a traditional classroom. While not part of the original research, the data raised questions regarding differences by geography and further research is recommended.

## CHAPTER 1

### INTRODUCTION

Before the widespread adaptation of the classroom, people learned individually; an apprentice learning from a skilled master or a student learning from a tutor was the educational norm. As the amount of and demand for knowledge grew, the concept of universal access to education became more widely accepted. Most formal learning happened in the classroom; the larger scale of teaching many people at once was efficient and beneficial in many ways. The format for these classes ranged from the relatively small classes of the Colonial Dame schools to the large Lancastrian classrooms, to the current shopping mall high schools. The norm for centuries was a traditional classroom with a teacher directing the lesson within the proximity of time and space of students who, in turn, participate at the times and in the manner prescribed by the teacher. Learning took place face-to-face. Adults received their education within the same traditional classroom. Need and technology changed this delivery system.

As time went on, technological advances in communication began to provide new opportunities in education. One of the first technological advances that impacted education was the invention of the printing press which allowed for mass duplication of information in the form of books. Subsequent advances in communication technology such as the telegraph, telephone, radio, and film changed the education landscape even further. This accelerating pace of technological innovation paved the way for many new forms of learning to take place at a distance, a move away from the classroom in which

teacher and student had to be present at the same time and in the same place. However, as distance learning provided new opportunities, it came with a cost. The unique and somewhat intimate experience of learner and teacher together in time and space gave way to a redefined classroom that traded immediacy of contact for opportunity to learn while crossing the hurdle of distance. The spreading use of the personal computer led to individual learning opportunities but those often left the learner isolated and frustrated.

Distance education is not a new concept, yet the growth of new technologies has caused renewed interest in distance learning and has impacted the instructional delivery of courses. Mehrotra, Hollister, and McGaney (2001) define distance education as any formal approach to instruction in which the majority of the instruction occurs while educator and learner are not in each other's physical presence. The United States Distance Learning Association provides a definition of distance learning: "The acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance" (2004, p. 1). Keegan (1990) characterizes distance education as (1) the separation of instructor and student during most of the instructional process, (2) the influence of an educational organization, (3) provision of student assessment, (4) use of educational media to deliver course content, and (5) two-way communication between instructor and student. Related to a definition of distance education, the United States Distance Learning Association provides a definition of distance learning: "The acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance" (2004, p. 1).



Numerous forces are driving this newfound interest in distance learning, in particular the emerging needs of nontraditional learners has been particularly strong. With social and economic value being placed on lifelong learning, increasing numbers of people are seeking access to continued training and education. As the population in general ages and the frequency of adult career change continues to increase, a focus is developing around nontraditional learners who demand that relevance and application of ideas be matched with the experience and wisdom they have accumulated.

The rapid growth of the Internet has caught the interest of educators for its potential as a learning tool. Rivera and Rice (2002) note that web based course delivery “has become an attractive option for expanding educational opportunities” (p. 1). The Internet or World Wide Web now makes it possible to deliver educational opportunities into the homes and offices of learners. While such instructional delivery can be more convenient and adaptable than classroom teaching for the active adult, it is not without problems. For example, Mehrotra, Hollister, and McGaney (2001) argue that students still cited lack of immediate response as a disadvantage of distance learning. The problem identified by Mehrotra, Hollister, and McGaney (2001) is one of not enough interaction and discussion between students and instructor. On the reverse side of the interaction coin, Conrad (2002) asserts that participants in distance education do not have the luxury of remaining anonymous, as they often can in a traditional classroom; they are usually required to contribute to the discussion and to use good manners since the typed word remains visible once the discussion has ended. Yet, in spite of the challenges presented by distance education, Carnevale (cited in Rivera & Rice, 2002) found that distance education students want a knowledgeable instructor, the opportunity to interact with the

professor, and the opportunity to create a feeling of community within the classroom. These, Carnevale claims, are the same things students look for in traditional classes. The challenge is how to translate interaction and feelings of community in a delivery system bounded and defined by distance.

Computer technologies create extraordinary opportunities to bring a degree of interaction to the learning environment. Imel (1998) states that technology can enhance adult learning because it has the potential to increase flexibility, provide access to expertise, and facilitate discussion among learners who cannot meet face-to-face. She further writes that such interaction can reduce the feelings of isolation often experienced by nontraditional learners, can increase learner autonomy and both supports and promotes constructivist and collaborative learning.

#### **Statement of Purpose**

Distance education technologies are expanding at an “extremely rapid rate” (Sherry, 1996, p. 337). Adult distance learners are not confined to higher education. Business and the armed services also use distance education methods (California Distance Learning Project, 2004). The business community uses distance education as a means to meet the needs of its employees who may work in multiple sites and in multiple countries. This separation prompts the exploration of new methods for educating a dispersed work force that is effective and efficient.

With the advances in computer technology, opportunities for learning have evolved from television which provided one-way information and lacked interaction to computer-based training which was text-based and also lacked interaction, to synchronous, web-based tools which include real-time instruction and voice over internet

protocol (VoIP) capability allowing for interaction. However, the question remains whether these recent tools address the concerns that adult learners face and provide the opportunity for those learners to interact with each other and with their instructor as well as with the content.

Successful study for adults requires attention to the unique needs of adult learners. An instructional delivery model based on the learning needs of pre-adult learners is inadequate to the needs of adult learners. Verdium (1991) notes that the ability to be self-directed and internally motivated can affect an adult learner's satisfaction and likelihood of completing a program. Shrum (1998) and Palloff and Pratt (1999) suggest that specific student characteristics are an important factor in the achievement and satisfaction of a learner who is not in a face-to-face setting with the instructor. Research (Hunt, 1974; Palloff and Pratt, 1999) suggests that the structure of the classroom environment and the perception of teacher/student roles are paramount in providing successful learning experiences.

Online learning to date describes synchronous web-based learning as having live "chat rooms" which are primarily comprised of text-based, threaded discussions or e-mail correspondence. Other forms of interaction involve some face-to-face time in between web sessions or use of the telephone. Little research has been conducted on synchronous web-based classes using VoIP technology; the closest references to live interactive web-based classrooms are those using videoconferencing technologies, which do not separate video from any audio capability (Thomerson & Smith, 1996; Payne, 1997). Since asynchronous delivery tools as well as text-based synchronous tools can potentially marginalize social and cultural skills prevalent in a classroom setting, new technology

which includes the ability to speak with an instructor and with fellow students in real time may resolve these issues.

### **Research Questions**

This study examines a web-based, VoIP platform (Interwise) as a means for instructional delivery as an alternative to traditional classroom-based learning that was adopted to meet the business training needs of Enterasys, a mid-sized multinational company specializing in networking. The study is specific to the use of Interwise at this one private corporation and was selected as a convenience because recent and pertinent archival data was available. The study will address the following questions to examine the adult students' perceptions of their experience with Interwise as a synchronous, web-based learning environment:

1. Are the instructional components of Interwise consistent with adult learning principles?
2. How do students report their experience with Interwise in comparison to their experience in a traditional classroom?

### **Organization of the Study**

This study is organized into five chapters. The first chapter consists of an introduction to the research problem, the purpose of the research, the research questions and the significance of the study, the methodology, and a definition of terms. Chapter 2 is a review of the literature and how it relates to the purpose of this study. Chapter 3 describes the methodology used to gather and analyze data. Chapter 4 presents the data and results related to each of the research questions. Chapter 5 summarizes the findings

of this study and makes recommendations for future research. References and appendices conclude the study.

### **Definition of Terms**

The terms outlined below are presented here to ensure clarity for users of this research. These terms were adapted from the American Society for Training and Development (ASTD) for use with this study.

**Asynchronous learning:** Any learning event where interaction is delayed over time. This allows learners to participate according to their schedule, and be geographically separate from the instructor. Such learning could be in the form of a correspondence course or electronic learning.

**CBT (computer-based training):** An umbrella term for the use of computers in both instruction and management of the teaching and learning process. CAI (computer-assisted instruction) and CMI (computer-managed instruction) are included under the heading of CBT. Some people use the terms CBT and CAI interchangeably.

**Distance education:** An educational situation in which the instructor and students are separated by time, location, or both. Education or training courses are delivered to remote locations via synchronous or asynchronous means of instruction, including written correspondence, text, graphics, audio- and videotape, CD-ROM, online learning, audio- and videoconferencing, interactive TV, and FAX. Distance education does not preclude the use of the traditional classroom. The definition of distance education is broader than and entails the definition of e-learning.

**Distance learning:** The desired outcome of distance education. The two terms are often used interchangeably.

**E-learning (electronic learning):** A term covering a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, CD-ROM, and more.

**ILT (instructor-led training):** Usually refers to traditional classroom training, in which an instructor teaches a course to a room of learners. The term is used synonymously with on-site training and classroom training.

**Synchronous learning:** A real-time, instructor-led online learning event in which all participants are logged on at the same time and communicate directly with each other. In this virtual classroom setting, the instructor maintains control of the class, with the ability to "call on" participants. In most platforms, students and teachers can use a whiteboard to see work in progress and share knowledge. Interaction may also occur via audio- or videoconferencing, Internet telephony, or two-way live broadcasts.

**WBT (Web-based training):** Delivery of educational content via a Web browser over the public Internet, a private intranet, or an extranet. Web-based training often provides links to other learning resources such as references, email, bulletin boards, and discussion groups. WBT also may include a facilitator who can provide course guidelines, manage discussion boards, deliver lectures, and so forth. When used with a facilitator, WBT offers some advantages of instructor-led training while also retaining the advantages of computer-based training.

**Internet:** An international network first used to connect education and research networks, begun by the US government. The Internet now provides communication and

application services to an international base of businesses, consumers, educational institutions, governments, and research organizations.

**IP (Internet Protocol):** The international standard for addressing and sending data via the Internet.

**Learning platforms:** Internal or external sites often organized around tightly focused topics, which contain technologies (ranging from chat rooms to groupware) that enable users to submit and retrieve information.

**Virtual classroom:** The online learning space where students and instructors interact.

**VoIP (voice over IP):** Voice transmitted digitally using the Internet Protocol.

**WWW (World Wide Web):** A graphical hypertext-based Internet tool that provides access to WebPages created by individuals, businesses, and other organizations.

**Whiteboard:** An electronic version of a dry-erase board that enables learners in a virtual classroom to view what an instructor, presenter, or fellow learner writes or draws.

Other terms, such as interaction and interactivity require more in-depth definition and are found in the literature review.

### **Significance of the Study**

Research on distance learning is important because more and more organizations are deciding that it is more efficient to move the instruction to the student rather than moving the student to the instruction. The perceptions of adult students who use the latest technology for distance is important; they are the consumers of the education. The research questions focus on the adult learner's perceptions of the learning experience. Sherry (1996) writes, "although technology is an integral part of distance education, any

successful program must focus on the instructional needs of the student, rather than on the technology itself” (p. 342).

There are two audiences for this research. First, there are companies, which for various reasons use distance education as a means to meet their business needs in training staff. The study is focused on this audience specifically since the participants in the study use Interwise as part of their work-related duties; similar tools are being utilized at firms such as AT&T, Anderson Consulting, Dell Computer, General Motors, IBM, Lucent Technologies, and Merrill Lynch (Rosenberg, 2001).

The second audience is the growing number of adult learners seeking college degrees. In 1999, 5.8 million nontraditional college-age students (aged 25 or older) were enrolled in college, representing approximately 38 percent of all college students (US Census Bureau, 2001). Nontraditional students are typically part-time, employed, older than 25 (and increasingly older than forty), and are a mixture of people seeking credentials in the form of a degree, certification, or licensure. While many are enrolled in degree programs, others are interested in individual courses for career advancement or transition, as well as for the purpose of self-renewal or enrichment. For many people, college enrollment must be negotiated not only with respect to financial cost, but among many life-cycle factors, such as marriage, family, and career. Indeed, nontraditional college-age students were much more likely than their younger counterparts to attend college part-time (US Census Bureau, 2001).

In contrast to the traditional markets, programs for the nontraditional student have high growth potential (Katz, 1999). As more and more institutions seek new sources of revenue, programs involving nontraditional students are becoming increasingly more



important. It is critical that these institutions are successful in identifying and targeting the needs of nontraditional and corporate students. One way to respond to this growing need is to offer an alternative learning environment that can provide students with learning opportunities that meet their particular needs as adult or nontraditional learners. Consequently, studies of the fit between adult learning needs and new distance learning technologies, like VoIP, will provide business training leaders and officials in higher education with knowledge that may help to inform their decision making.

### **Limitations of the Study**

This research, as most does, has several limitations. It is important for the reader to understand the limitations of this study so as to appropriately assess the implications of the data. The limitations are as follows:

(1) **Reliability and Validity**

Reliability and validity are important research concepts. Reliability is concerned with the consistency of the instrument while validity is concerned with whether the instrument measures what it purports to measure. Validity regards the appropriateness, correctness, and usefulness of the data derived from the research instrument. While reliability and validity are important to the researcher, they are often of lesser interest to business that is interested in gathering information to assist with business decisions. The instrument was developed to meet the business training needs of a private corporation. As an internal document the rigors of reliability and validity testing were not considered necessary by management, and were not performed prior to the use of the instrument. Since this research uses

archival data from this instrument, the researcher took the instrument and its data as it was found. However, it is important for the reader to know this limitation.

(2) Respondents versus Non-Respondents

Because the data was archival, there was no efficient and effective way that the non-respondents could be studied to ascertain if there were significantly different from the respondents. The list of non-respondents was not available to the researcher at the time the research was conducted.

(3) Instructional Methods

A conceptual base discussing instructional methods was not developed in the literature review. The research does not gather data on how respondents learned or the specifics of instruction for each of the groups. It is quite possible that the style of teaching varied from group to group because the instructors varied and their teaching was non-standardized. The instrument did not gather data on the teaching ability or the teaching methods that were employed through the use of Interwise. While instructional methods are important, a section on methods was not developed for the original instrument. Consequently, instructional methods are beyond the purview of this research. Therefore, a review of various learning theories would be speculative since the researcher does not know what the actual instruction activities and approaches consisted of. The decision not to include this literature review was made for reasons of efficiency. It would have been interesting but its applicability to the specifics of instruction would be attenuated.

## CHAPTER 2

### REVIEW OF RELATED LITERATURE

#### Introduction

Corporations face many challenges as they try to educate an increasingly larger and more geographically dispersed workforce. The new realities of the business environment call for new approaches to old problems. Traditional classroom delivery does not always meet the needs of the changing structure of companies. Many of the themes that are key elements in training policies have been characteristics of distance training for decades (Keegan, 2000, p.20):

- lifelong learning,
- use of technology in training,
- cost-effective provision,
- the individualization of training provision,
- just-in-time training,
- the globalization of training.

As education becomes more accessible and technology advances allow for extending instruction beyond the classroom walls, the question remains as to whether distance learning formats meet the needs of adult learners who are most likely to be involved in distance learning. The “general learning processes and life conditions of adult distance learners are similar to those of adult classroom learners” (Burge, 1988, p. 5) and it is important to consider what learner characteristics, instructional elements, and approaches need to be considered in achieving positive outcomes for online students. As the World Wide Web and corporate intranets provide new learning opportunities, it has

become apparent that students, who most likely are already in front of a computer screen with web access, want to be trained on the web too (Keegan, 2000).

There has been “little significant discussion about the extent to which learning designs used in distance education are truly adult learner centered and based in adult learning literature” (Burge, 1988, p. 6). Distance education systems that are the most successful involve “interactivity between teacher and students, between students and the learning environment, and among students themselves, as well as active learning in the classroom” (Sherry, 1996, p. 343). The widening use of two-way communication technologies is helping distance educators develop their own kinds of interactive classrooms, thereby addressing a key element, interaction, which is complicated when using a distance-learning format. The need for interaction may be addressed in such new technology as the use of voice over Internet protocol (VoIP). Infonetics Research estimates “that VoIP services will amount to 20 billion dollars by 2009” (*Newsweek*, 2005, p. 16). In addition, it may be valuable for adult learners who have a unique set of characteristics and needs.

The literature review is organized into six sections and a summary. The elements of distance education and its supporting technology are discussed first. After exploring the delivery system, the review will describe the learner. Adult learning principles and the need for interaction and social context will be discussed. This provides a construct of the learner and the instructional environment. Next, how adults construct knowledge will be reviewed. The final literature to be reviewed combines the delivery system and the adult learner by analyzing selected research on distance learning and adult learners.

## Distance Education

In the East, some consider that educational writings can be traced back to the Indian Bhagavad-Gita and the sixth century B.C. writer Lao-Tse of China (Ulrich, 1954). Keegan (2000) traces the development of education back to the Confucian idea of education originating from a belief in the natural goodness of man. This idea became established in feudal society and individual achievements and personal advancement were subordinated to the good of society. Education, therefore, was based on the learning group and provided to groupings of students (Keegan, 2000).

In the West, educational historians trace the origins of organized teaching and learning back over 2000 years. Keegan (2000) argues that most commentators on the history of education believe the starting point in Ancient Greece with Socrates and Plato. Ulrich (1954) asserts that Plato's *Republic* was the "first coherent treatise on government and education" (p. 31). They describe a form of western education characterized by dialogue, the dialectic, and analysis (Keegan, 2000).

The medieval universities added the lecture, the seminar and the tutorial. Presently, education in schools, colleges and universities "include face-to-face education between teacher and learner in the learning group, based on interpersonal communication" (Keegan, 2000, p. 12).

Early distance education was provided using the postal system to make educational opportunities available to people who were not able to attend conventional schools. Verduin and Clark (1991) note that the first modern distance education program for working adults began in England in 1840 by Isaac Pitman. Private correspondence colleges in Europe followed around 1880. American involvement in distance education

began with The Society to Encourage Study at Home founded in 1873 by Anna Eliot Ticknor, originating the exchange of comments as well as grades with students. In 1878, John Vincent became interested in distance education as the founder of the Chautauqua Movement, a popular education society based on the idea of expanding access to education to all Americans (Verduin & Clark, 1991).

In 1891, Thomas J. Foster began teaching mining methods and safety by correspondence which eventually evolved into the popular International Correspondence Schools of Scranton, Pennsylvania. In 1919, University of Wisconsin professors started an amateur wireless station which became the first federally licensed radio station devoted to educational broadcasting. With the increased popularity and growth of distance learning, the National Home Study Council (NHSC) was created in 1926 as an accrediting body to address problems of quality (Verduin and Clark, 1991).

Early distance education was a new instructional delivery system distinct from the traditional classroom-based delivery system. What defines distance education is the separation of teacher from learner and of the learner from the learning group. “There is an underlying belief that teaching and learning are separate acts that can effectively be carried out by means of communications technology, even though teacher and learner are separated in space and time” (Keegan, 2000, p. 12).

Distance education is a form of education characterized by (Keegan, 2000, p. 36):

- The quasi-permanent separation of teacher and learner throughout the length of the learning process (this distinguishes it from conventional face-to-face education);
- The influence of an educational organization both in the planning and preparation of learning materials and in the provision of student support services (this distinguishes it from private study and teach-yourself programs);

- The use of technical media – print, audio, video or compute, or the World Wide Web, to unite teacher and learner and carry the content to the course;
- The provision of two-way communication so that the student may benefit from or even initiate dialogue (this distinguishes it from other uses of technology in education); and
- The quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals rather than in groups, with the possibility of meetings, either face-to-face or by electronic means, for both didactic and socialization purposes.  
(Keegan, 2000, p. 12)

Withrow (1997) states that distance education “is a natural extension of our inherent social need to deliver, ever more quickly and accurately, our experiences and knowledge” (p. 59). The widespread use of the printing press spurred a movement from the learning community of a small group gathered around a scholar or teacher to a classroom with books. Present advances in computer technology, which make learning at a distance possible, change the classroom configuration even further.

Recently, distance education programs “have assumed a major role in the delivery of adult education” (Rossman, 2000, p. 2). Giltrow (1989) attributes this growth to an increase in educational requirements at the same time that the telecommunications industry had more to offer. The field of distance education broadened as computers became widely available. Withrow (1997) claims “the computer, by eliminating the barriers of time and geography, neatly fits our democratic value of quality education for all” (p. 59).

Telecommunications technologies associated with the Electronics Revolution of the 1980s “made it possible to experience face-to-face learning at a distance” (Keegan, 2000, p. 12). Virtual or electronic classrooms enable a class of students to be divided between two geographic locations. An instructor can hear, and potentially see, students at other sites and, in turn, the students at all the locations can hear, and potentially see,

not only the instructor but fellow students in the class as well. “The interaction of face-to-face education has been recreated electronically; any student can question or interrupt the teacher or another student, just like in a conventional classroom” (Keegan, 2000, p. 12).

New technology has enhanced the ability to deliver instruction at a distance. The rise of computers and telecommunications has accelerated the expansion of distance learning. How that technology has developed will be discussed next.

### **Educational Technology**

Technology, as defined by Merriam-Webster’s dictionary, is characterized as the development and application of tools and processes that help solve human problems. Technology not only transforms society it transforms education as well. Sherry (1996) notes that the evolution of media from print to instructional television to current interactive technologies has been the subject of rich historical analysis. For example, prior to the advent of WWII, the need for consistency in training, speed of delivery, and geographically dispersed learners compelled the army to begin using film as an instructional technology. Soon, film was adopted into the curriculum in corporations and schools, along with the popularization of filmstrips (Saettler, 1990; Rosenberg, 2001).

Television was next to influence educational practices but was not as successful as educators had hoped. Money was placed into technology but not into programs or staff. Also, as Rosenberg (2001) asserts, educators began to realize that television “lacked an essential component of teaching – the ability to interact with learners, provide feedback, or alter a presentation to meet a learner’s needs” (p. 22). Instead, television



provided information rather than instruction. It is passive, similar to reading a book alone; it became just a different medium for essentially the same activity.

Computing technology was introduced into telecommunications in the 1960s with the first public, analogue software switchboards dating from the mid-1970s. Keegan (2000) notes these were digitalized almost immediately, and were followed by the development of Integrated Services Digitalized Networking (ISDN) in the 1980s. In the 1990s, seamless digitalized connections between fixed and air networks were achieved. In all these developments, the ever-increasing speed of chips was crucial (Keegan, 2000).

The development of broadband technology was of vital importance for distance training, because of the extensive bandwidth necessary for pictures, audio, video and virtual capabilities. Broadband is usually defined as rates of more than two megabytes per second over a public switched network. Interactive multimedia, image processing, data and video all require significant bandwidth (Keegan, 2000). The use of broadband expanded the medium of print to include a wider array of instructional possibilities.

The advent of the personal computer was a turning point; however, the differences in hardware, software, programming, and other technical barriers prevented widespread ease of use. Courseware was expensive to develop and rapid changes in technology led to obsolescence. Lack of authoring and development standards were also an impediment (Rosenberg, 2001).

Computer-based training (CBT) modules were fraught with other problems. Rosenberg (2001) explains that a rapidly changing knowledge base caused content to become outdated in a short period of time and that the high cost to update, added to the

usually large up-front investment, led to questionable cost effectiveness. More importantly, many CBT programs were perceived to be extremely dull. Instructional strategy was comprised of routine drill and practice. Most were text-based, surprisingly similar to textbooks, and were combined with slow computer speed and poor graphics (Rosenberg, 2001).

During the 1980s and early 1990s, satellite systems were developed for group-based distance training. Keegan (2000) notes that these systems did not develop to the same extent in Europe due to high costs and that distance training in Europe remained largely focused on the individual. During the early and mid-1990s, videoconferencing systems became popular for group-based distance training. The mid-to-late 1990s saw the development of training on the World Wide Web for individual-focused distance training in front of a computer (Keegan, 2000). The late 1990s and early 2000s heralded the introduction of mobile telephones and computers, the reduction of reliance on wiring, and, with the development of Bluetooth and other protocols, the growing empowerment of wireless (Keegan, 2000). The mid-2000s indicate the general availability of voice synthesis, voice recognition and voice input into telephones and computers; developments that are of clear relevance to distance students and the future of distance learning (Keegan, 2000).

These advances coincided with the growth of the Internet and its emerging capabilities such as real-time interaction with fellow students and the instructor. Synchronous learning typically describes a situation in which the learners and the instructor are not all at the same location, even though the session is scheduled during a common time period for all attendees. Generally, the geographic separation of learners is

overcome by audio or video conferencing. Chute, Sayers, and Gardner (1997) describe this scenario as growing from basic audio teleconferencing to include video and data conferencing. The signals “can be captured and then replayed on similar equipment at a later time and different place by the learner” (Chute, Sayers, & Gardner, 1997, p. 81).

The following chart (Mehrotra, Hollister, & McGaney , 2001, p. 89) outlines the strengths and weaknesses of selected synchronous delivery methods for distance education.

Table 1  
Strengths and Weaknesses of Selected Synchronous Delivery Methods  
for Distance Education

METHOD	STRENGTHS	WEAKNESSES
Interactive television (ITV)	Mimics sense of traditional class environment	Expensive hardware
Telephone: Conversation	Established technology Personalized attention possible	One-on-one nature limits number of contacts per instructor Conference calls limit personalized attention
Internet conferencing: Audio	May avoid long distance toll charges Multiple tools can be used concurrently	Sound may be of poorer quality than telephone
Internet conferencing: Video and audio	Less expensive than ITV Multiple tools can be used concurrently	Video files are large Current bandwidth inadequate Motion is not smooth Sound and motion not synchronized well
Internet conferencing: Chat	Rapid communication May involve many participants Sessions can be archived	Few
Internet conferencing: Whiteboard	Rapid sharing of graphical information Session can be archived	Few

Advances are not just taking place in the area of courseware, but also in building learning infrastructures and networks for corporations as well as educational organizations. Some tools allow for the creation of courses and programs directly on the web without investing in an organization's own tools or infrastructure. This has provided a broader access to educational technology without the previous costs and problems associated with prior versions of instructional technology (Rosenberg, 2001).

Early research focused on practical teaching with an emphasis on materials, devices, and comparison of instructional media with the assumption that learning would be enhanced. Curriculum reforms, which took place after the 1950s, began to link psychology and educational technology to examine human learning and performance to create effective principles of instructional design (Saettler, 1990).

Thomas J. Russell (1999) compiled a large number of comparative studies to discover that few found any measurable benefit to learning that was attributed solely to technology. He concluded that the vast majority showed no significant difference in learning outcomes. Technology neither harmed nor improved learning.

Clark (1994) felt strongly that it was instructional methodology, rather than technological delivery, that influenced learning. Tennyson (1996) agreed, placing importance on process rather than media when evaluating any potential effect on learning. Research conducted by McIsaac and Gunwardena (1996) support this contention; much traditional research in distance education has focused solely on issues of technology, particularly in the area of media comparison, resulting in no significant difference. The results of research conducted by Threlkeld and Brzoska (1994) also indicate that successful learning comes from other factors related to learners, support,

course design, motivation, and need. While technology may not be the sole factor to influence learning, emerging technologies potentially offer new, more flexible, learning opportunities and it is valuable to know which delivery platforms best suit an audience of adult learners.

In a world of rapidly changing technology, the impact on education, as an exchange of knowledge, seems inescapable. Technology is now available to address the individual educational needs of students regardless of age, location, and socioeconomic level. Withrow (1997) felt strongly that “if present trends continue, it seems not unreasonable to expect that digital technologies will have an impact on our classrooms proportionate to that of writing and the printing press” (p. 61).

Critical to the success of new distance learning environments is “the application of cost-effective technologies that distribute education and training electronically” (Chute, Sayers, and Gardner, 1997, p. 76). Networked learning environments “can make education and training more accessible, convenient, focused, effective, and cost-efficient for the learners and providers alike” (Chute, Sayers, & Gardner, 1997, p. 75). Entering the twenty-first century, there is great need not only for more training and education but also for more effective and more efficient training. Hart (1997) notes that the phenomenal rise of the Internet has presented education with a medium that is powerful and cost-effective, with programs attracting multi-state and international students. Learning can take place in a more global context with a broader perspective.

The present challenge is great, however, with a broad student base and improved technology. Distance education, which describes any situation in which learning and instruction are geographically separate, by its very nature can require higher costs than

conventional teaching due to the cost of media and time to produce for broad and diverse audience. Shifting into a technological teaching environment requires start-up investment. Providing the necessary technology also requires that appropriate student services be in place, something that is often overlooked. However, Withrow (1997) states that the ability of students and teachers to be on line for extended periods may mean that content will be covered more deeply and rapidly than before. This could reduce costs and allow students to guide their own educational agenda. In these new technology-mediated learning environments, learners can function in self-directed ways while still receiving the support of the community with which they interact.

Fidishun (2000) believes that “institutions are faced with the many instructional design issues that surround making the lessons succeed technologically” (p. 1). Faculty need to focus on learning theory in the design of instructional technology so that they can create lessons that are not only technology-effective but that are meaningful from the learner’s standpoint. When adult learning theory is an integral part of the design of technology-based learning environments, it is possible to “create lessons that not only serve the needs of students to use the latest technology but also focus on their requirements as an adult” (Fidishun, 2000, p. 1). However, distance education providers should make sure that the technologies they choose reflect learning outcomes since technology delivery might not be appropriate to all educational outcomes.

Determining the needs of distance learners and accommodating those needs is a challenge when creating networked learning environments (Chute, Sayers, & Gardner, 1997). Educational providers can then choose from an array of options to create the learning experience. Paramount for faculty is the concern for quality and academic

integrity and faculty may fear a lack of opportunity for personal interaction. Instructors find that direct interaction and student engagement is personally satisfying; “an important factor for successful distance learning is a caring, concerned teacher who maintains a high level of interactivity with the students” (Sherry, 1996, p. 340). Bower (1995) states that quality is measured by affective means such as student-to-student and student-to-faculty interaction and this emotional connection is an area in which distance education is vulnerable to criticism.

Interwise, as a new web-based synchronous system, may provide a positive environment in which adults can learn. The growing use of the Internet, increased access to personal computers, and reduced costs of necessary bandwidth set the stage for more favorable acceptance of a new technological learning environment. While synchronous learning environments require that students meet at the same time despite their geographic location, the opportunity to interact in real time with an instructor and with fellow students creates new opportunities for learning.

### **Adult Learning**

Distance education is a technique for overcoming the separation of teacher and learner in terms of space and time. While technology is an important factor in distance education,

any successful program must focus on the instructional needs of the students, rather than on the technology itself; it is essential to consider their ages, cultural and socioeconomic backgrounds, interests and experiences, educational levels, and familiarity with distance education methods (Sherry, 1996, p. 342).

Many important issues stem from the characteristics of distance learners, whose aims and goals may be quite different from those of traditional students. Adult learners have a wide variety of reasons for pursuing learning at a distance: constraints of time,

balancing family with employment, limited financial resources, the ability to hear from experts who might otherwise be unavailable, and the ability to come in contact with other students from different social, cultural, and economic backgrounds. As a result, students gain “not only new knowledge but also new social skills, including the ability to communicate and collaborate with widely dispersed colleagues and peers whom they may never have seen” (Sherry, 1996, p. 351).

Differences based on experience, motivations, voluntary learning status, and self-directedness are reflected in the attitudes and perceptions of adults. These qualities can make adults different from children and “recognizing these differences may be critical for educators to provide successful learning experiences to adults” (Verdium & Clark, 1991, p. 29). Burge (1988) asserts that adult learning theory could contribute to knowledge regarding the design and development of programs in distance education settings and technology-based instruction.

Adult learning theory helps faculty to understand their students and design more meaningful learning experiences for them. While there is not one adult learning theory that successfully applies to all adult learning environments, the following three theorists are especially relevant for the online learning environment: Knowles (1973, 1980), Cross (1981), and Mezirow (1991).

Arguably, the most influential researcher on adult learning was Malcolm Knowles. Knowles (1973) conceived of the term andragogy to define a set of core adult learning principles that apply to all adult learning situations. As opposed to pedagogy, which is the “art and science of teaching children,” andragogy is defined as the “art and science of helping adults learn” (Knowles, 1980, p. 43). This conceptual framework



describes the unique characteristics of adults as learners and how they differ from children in several critical ways. His theory provides the following six learner-centered guidelines for the education of adults:

1. Adults must recognize the necessity of learning something before undertaking to learn it.
2. Adults recognize they are responsible for their own lives. Adults are autonomous and self-directed; they are responsible for their own decisions and do not like others' imposing their will.
3. Adults enter an educational experience with more and different experience than youths. The quality and quantity of adult experience are critical to learning
4. Adults are more eager to learn things they must know and apply in order to cope effectively with their real-life situations.
5. Adults are life centered (or task centered or problem centered) in their orientation to learning.
6. While adults are responsive to some external motivators (i.e. better jobs, higher salaries, promotions), the most potent motivators are internal pressures (i.e.. the desire for increased job satisfaction, self-esteem, quality of life).

Rossmann (2000), building on Knowles work, presents andragogy as a framework for discussing distance education programs designed for the adult learner and applying andragogy to climate setting and learner involvement in distance education settings. Andragogy provides a structure "to build a climate conducive to adult learning and a process for more active involvement of the adult learner in the distance learning process" (Rossmann, 2000, p. 10).

Cross (1981) provides a framework for considering how adults learn through her Characteristics of the Adult Learners (CAL) model. The rationale of the CAL model is to clarify differences between adults and children as learners and ultimately to suggest how teaching adults should differ from teaching children; similar to the position of andragogy (p. 234). Her model identifies two classes of variables; personal characteristics and situational characteristics. Personal characteristics, those describing the learner, are expressed as growth continua along three dimensions; physical, psychological, and sociocultural. Situational characteristics, those describing the conditions under which learning takes place, include part-time versus full-time learning and voluntary versus compulsory learning.

Cross (1981) proposes that “some of the assumptions of andragogy such as readiness and self-concept can be readily incorporated into the CAL construct” (p. 238). Throughout their lives, adults have varying degrees of readiness and ability for learning and like andragogy, Cross’s model reflects the learners’ need for flexibility and control. Cross, however, suggests a framework for thinking about how adults learn rather than offering implications for practice, as Knowle’s andragogy does.

Jack Mezirow (1991) coined the term transformational learning to refer to learning that is based on reflection and on the interpretation of the experiences, ideas, and assumptions gained through prior learning. Transformational learning theory focuses on both the individual and social construction of meaning. For Mezirow, learning is a transformative process rather than an additive one involving an adult skill of reflecting on one’s thoughts and assumptions. He defines learning as an activity to construct meaning. “Learning is understood as the process of using a prior interpretation to construct a new

or revised interpretation of the meaning of one's experience in order to guide future action" (Mezirow, 1996, p. 162). Mezirow asserts that there is an opportunity for a change in one's perspective by examining life experiences. According to Mezirow (1997), the process of transformational learning involves three phases: "critical reflection on one's assumptions, discourse to validate the critically reflective insight, and action" (p. 60).

Transformative learning is rooted in the meaning-making process that is central to constructivism, which Palloff and Pratt (1999) establishes as a major feature of the online classroom. Constructivism and active learning suggest that learners actively create knowledge and meaning through experimentation, exploration, and the manipulation and testing of ideas in reality. "Interaction and feedback from others assist in determining the accuracy and application of ideas" (Palloff & Pratt, 1999, p. 16). Collaboration, shared goals, and teamwork are identified as powerful forces in the learning process. With the instructor in the role of facilitator, learners interact with the learning environment, and with each other. "This is the essence of self-directed learning, as it empowers learners to follow those interactions wherever they may lead and are not dependent on the instructor" (Palloff & Pratt, 1999, p. 16).

Palloff and Pratt (1999) have reviewed research on successful students in distance education programs and suggest that students who are attracted to this form of education share certain characteristics. They

- are voluntarily seeking further education,
- are motivated, have higher expectations, and are more self-disciplined,

- tend to be older than the average student, and
- tend to possess a more serious attitude toward their courses.

Mehrotra, Hollister, and McGaney (2001)) characterized community college distance learners as follows:

- Goal oriented – many want specific job-related courses and all expect to get their money’s worth from college.
- Highly motivated – they are self-directed learners with good reading and time management skills, and they are willing to work independently.
- Focused learners – they are learners who often enroll for the pure joy of learning
- Risk-takers – they are willing to try new ways of learning
- Thrive when guided and encouraged by their instructors – they do best when they are integrated into the institution’s social and support structures and given personal mentoring.

Such characteristics fit well with distance learning, which, “more than traditional instruction requires students to manage their own learning process, to be more assertive, and to participate actively in the instructional process” (Mehrotra, Hollister, and McGaney, 2001, p. 20).

### **Interaction and Social Context**

Most of the adult learning theories were “developed for traditional classroom education over twenty years ago, but the basic concepts effectively transfer to the online learning environment” (Frey, 2003, p. 11). Rossman (2000) suggests “adult learning theories provide a framework to build a climate conducive to adult learning and a process for more actively involving the adult learner in the distance learning process” (pp. 6-7).

Burge (1988) argues that adult learning theory would contribute to knowledge concerning the design and development of programs in distance education environments. Fidishun (2000) asserts that “when theory is integrated into the design of technology-based learning environments it is possible to create lessons that not only serve the needs of students to use the latest technology but also focus on their requirements as an adult” (p. 1).

Adult learning theories offer a great deal of advice to adult educators about an adult learner’s need to share experiences, receive feedback, and be an active participant in learning; all elements requiring satisfactory interaction. To sufficiently meet the needs of adult learners, the learning environment should be interactive, learner-centered, and facilitate self-direction in learners (Fidishun, 2000). “The interaction between the students and instructor, and the interaction among students are vital components of a successful adult learning experience” (Frey, 2003, p. 9) and are an aspect of technological delivery and course design that must be considered early in the planning stage.

Interaction is an important construct in education (Moore, 1989; Bannan-Ritland, 2002, Merriam & Caffarella, 1999; Dewey, 1938). The importance of interaction is enhanced in distance education where instructors and students are geographically separated from one another. However, multiple definitions of interactivity are problematic as many terms are used interchangeably. Bannan-Ritland (2002) noted the contradictory definitions of the construct of interactivity and established categories to define interactivity in a similar way. Her review “examines literature related to computer mediated communication and interactivity to promote better understanding of the operational definition of interactivity across multiple research studies, determine the

types of interactivity present in those studies, and synthesize the research outcomes to facilitate the transfer of research into effective practice” (p. 173). This review comes in response to the need for the fields of educational technology and distance education to identify and better define the various forms of interaction possible in an online learning environment.

Bannan-Ritland (2002) assert that “interactivity is a construct with multiple definitions and interpretations” (p. 167). Some commonalities emerge as interaction can be viewed as a function of:

- (a) Learners participation or active involvement,
- (b) Specific patterns and amounts of communication,
- (c) Instructor activities and feedback,
- (d) Social exchange or collaboration, or
- (e) Instructional activities and affordances of the technology.

Dickinson (1995) advises that interaction is a key element of a positive, nurturing, and stimulating learning environment. Chute, Sayers, and Gardner (1997) contend that interaction is the most powerful way to engage learners. O’Donoghue (2001) notes that group and social interaction is “an important facet of educational process and however ‘virtual’ the future learning establishments are, such communication must be retained, technologically established, and enabled and transparent interfaces provided for the non computer expert” (p. 517).

For those who are critical of distance education, interactivity is “frequently noted as the missing ingredient when comparing distance-learning experiences with traditional face-to-face learning experiences” (Wagner, 1997, p. 10). For those who favor distance

education, interactivity “offers the evidence on which to build a case that a distance learning experience is just as good, if not better than, a traditional face-to-face learning experience” (Wagner, 1997, p. 19).

Interaction can be an important outcome of “clearly conceptualized, well-designed, and well-developed instruction and training” (Wagner, 1997, p. 25). In distance learning, interaction and interactivity are terms that are often used interchangeably, however Wagner (1997) suggests several distinctions worth noting. Wagner (1997) defines interactions as reciprocal events requiring two objects and two actions. Interactions are suggested to occur when objects and events mutually influence one another. Interactivity, on the other hand, appears to emerge from descriptions of technological capability for establishing connections from point to point (or from point to multiple points) in real time. In Wagner’s discussion, interactivity tends to focus on the attributes of the technology systems employed in distance learning enterprises. Conversely, interactions typically involve behaviors where individual and groups directly influence one another.

Interactions enable active participation and allow learners to customize learning experiences to meet their specific needs or abilities. Interactions also “enable clarification and transfer of new ideas to already held concept frameworks and promote intrinsic motivation on the part of a learner by highlighting the relevancy that new information may have under specific circumstances” (Wagner, 1997, p. 22).

There are many reasons to build interaction into learning. Wagner (1997) asserts that among the most relevant are:

- (1) Interaction to increase participation. Learning is a natural process of pursuing meaningful goals and learning depends on an individual's willingness to engage in the learning process. The learning environment needs to include a means of engagement and a means for establishing relationships.
- (2) Interaction to develop communication including examples such as articulating expectations, sharing information and opinions.
- (3) Interaction to receive feedback (any information that allows learners to judge the quality of their performance). Feedback provides reinforcement to correct and direct performance. Such feedback also provides learners with information about the correctness of a response or allows learners to correct a response for long-term retention of correct information.
- (4) Interaction to enhance elaboration and retention. Modifying and expanding on information assists in making new information more meaningful for learners. The "extra cognitive 'practice' that results from generating alternative interpretations makes it easier for learners to integrate new information into their existing cognitive framework for enhanced long-term retention and recall" (Wagner, 1997, p. 23).
- (5) Interaction to support learner control/self-regulation. This is particularly important in preparing individuals to be lifelong learners, since it addresses the ability of a learner to stay on task, to qualify the need for additional information to complete one's understanding, and to recognize when the task has been completed.



- (6) Interaction to increase motivation. Humans are naturally curious and enjoy learning. To avoid discouragement, interaction provides opportunities for asking questions, clarifying statements, reviewing guidelines and so forth.

Attempting to bring a measure of order to discussions of interaction, Michael Moore (1989) offers a schema in which he identifies four types of instructional interactions. Moore's interaction schema implies purpose, intent, and/or intended outcome of an interaction by virtue of indicating whom or what is to be involved in a transaction – it identifies the agents involved in or affected by a given interaction.

Moore (1989) draws distinctions for distance educations between three types of interaction, which he has labeled learner-content interaction, learner-instructor interaction, and learner-learner interaction. Moore describes the first type of interaction as that between a learner and the content, which is the subject under study. This is a fundamental part of the educational process as learners engage intellectually resulting in changes in the learner's understanding of the material. Distance learning programs which are only content interactive in nature are one-way communications between the subject matter expert and the learner. Since there no other educational professional involved, learning is largely self-directed.

The second type of interaction, learner-instructor, is often regarded as essential to the educational process and desirable by many learners (Moore, 1989). Such interaction places the subject matter expert in a position to stimulate and motivate learners as well as enhance and maintain a learner's interest. Instructors present content, organize students' application, and arrange for evaluation to determine if the learner is making progress. Instructors also provide support and encouragement throughout the learning process.

Moore contends that when there is interaction between learner and teacher, learners are able to draw on the experience of that educator/subject matter expert to interact with the content in the most effective manner. He notes that instructors are particularly valuable in responding to the learners' application of new knowledge and can provide feedback and validation at the point of application. Distance learners, by definition, are not in the immediate presence of their instructors, so essential interactions between teachers and students that help clarify information are crucial.

The third form of interaction, which Moore (1989) cites as a challenge to meet in distance learning, is learner-learner interaction. He asserts that inter-learner interaction is an extremely valuable resource for learning. Peer discussion and analysis acknowledges and encourages the development of their expertise.

Hillman, Willis, and Gunawardena (1994) felt that Moore's distinctions for interactivity in distance education did not include interaction that occurs when a learner must use these intervening technologies to communicate with the content, negotiate meaning, and validate knowledge with the instructor and other learners. They proposed adding a fourth type of interaction: learner-interface interaction. This additional concept suggests that the learner must interact with the technology before being able to interact with the content, instructor, or other learners. Inability to interact successfully with the technology, say Hillman, Willis, and Gunawardena (1994), will inhibit an individual's active involvement in the educational transaction.

Bonk (2000) asserts that the learning that results from real-time social interaction and negotiation with peers, experts, and instructors in the context of an activity is highly desirable and that a social situation may be an important ingredient in gaining deeper

learning. Unlike the delayed exchange of a text-based, asynchronous learning tool, synchronous tools provide an immediate interchange of ideas. Such an interactive environment can benefit collaborative learning in a web-based environment.

Cooney (1998) asserts that computer networks coupled with appropriate software can support and enhance collaborative learning. Many of the principles of collaborative learning such as co-constructing of knowledge, participation by all learners, and shared authority in a community of learners, fit well with the elements of networked computer-mediated tools. She notes that when multiple collaborators can simultaneously view and change a shared document on connected computer monitors, the text truly becomes a shared experience.

Interwise, as a synchronous delivery tool, may provide the opportunity for adults to have an interactive environment in which to learn. Moore's (1989) three forms of interaction, Hillman, Willis, and Gunawardena (1994) fourth interaction, learner-interface may well be served by the synchronicity of Interwise. Interwise may also adequately address Bonk's (2000) concern for real-time interaction and negotiation and Cooney's (1998) concern for multiple collaborators.

In addition, the essential elements of adult learning encompass the learner's need for control and flexibility. The need for control can be expressed in terms of self-directedness, the desire to be responsible for one's own learning, the desire for learning to be problem-centered, and the desire to share knowledge and experience. In order to meet this need, particularly sharing knowledge and experience that adults bring to the classroom, learners anticipate the opportunity to interact with the instructor and with each

other. The need for flexibility can be expressed in terms of convenience with respect to learning opportunities and the ease with which such opportunities may be accessed.

### **Constructivist Theory**

Collaborative learning is based upon the theoretical foundation of social constructivist thought. Rather than knowledge as an object to be given by an expert and memorized as truth by students, knowledge becomes something that is continually made and remade, shaped and formed through interactive discourse.

The social constructivist view contends that knowledge is constructed when individuals engage socially in talk and activity about shared problems or tasks. Making meaning from information is a process that involves dialogue, as individuals may be able to add to or change the general pool of knowledge. Teaching and learning, especially for adults, is a process of negotiation, involving the construction and exchange of personally relevant and viable meanings.

Huang (2002) argues that “for social constructivists, learning should involve interaction with other people or environments, which foster potential development through instructors’ guidance or in collaboration with more capable peers” (p. 33). Teaching often involves collaborative learning in the classroom to improve the interpersonal skills of students. Advanced technologies might “overcome some of the barriers to learners’ interaction and support collaborative work to synthesize shared knowledge” (Huang, 2002, p. 33). Online educators should be encouraged to find ways to promote collaborative learning through reflection and social negotiation.

A constructivist perspective is congruent with much of adult learning theory. Candy (1991) points out that the constructivist view of learning is particularly compatible

with the notion of self-direction, since it emphasizes the combined characteristics of active inquiry, independence, and individuality in a learning task. Huang's (2002) research develops a connection between constructivism and adult learning theory. In addition, she proposes instructional guidelines using the constructivist approach in online learning for adults.

Distance education has different settings from the conventional classroom due not only to the physical distance between an instructor and learners but also to the difference in designs of instruction in distance learning (Moore, 1989). Since distance education cannot offer face-to-face instruction in the same fashion as the traditional classroom does, interaction becomes a focus of interest. Moore (1989) also noted that the interaction of the individual or group is determined by the educational philosophy in distance learning. Constructivists, such as Dewey (1916) Vygotsky (1978) and Bruner (1996) view knowledge as constructed by learners through social interaction with others. Each proposed that learners could learn actively and construct new knowledge based on their prior knowledge.

Recently, Jonassen (1994) and Petraglia (1998) proposed that constructivism should be applied in distance education and educational technology, Petraglia (1998) argued that distance educators should attempt to make learning materials and environments correspond to the real world prior to the learner's interaction with them.

Palloff and Pratt (1999) examined a number of studies in the area of community and connectedness and focused on defining and redefining community. They assert that the facilitation of learning environments which foster personal meaning making, as well as the social construction of knowledge and meaning through interactions with

communities of learners, is preferred to instructor interventions that control the sequence and content of instruction.

Social learning theory combines elements from both behaviorist and cognitive orientations and suggests that people learn from observing others focusing on the social setting in which learning occurs. Central to Bandura's (1986) theory is the separation of observation from the act of imitation, maintaining that individuals can learn from observation without having to imitate what was observed.

Set within a social context, Bandura's theory has particular relevance to adult learning in that it accounts for both the learner and the learning environment. In Bandura's interactive model, individuals influence their environment, which, in turn, influences the way they behave. Social learning theories contribute to adult learning by highlighting the importance of social context as well as the processes of modeling and mentoring.

Vygotsky (1978) questioned the relationship between human beings and their environment, both physical and social. He viewed learning as a profoundly social process and emphasized dialogue and the varied roles that language played in instruction and in mediated cognitive growth. The mere exposure of students to new materials through oral lectures neither allows for adult guidance nor for collaboration with peers. Instead, he contends that human learning presupposes a specific social nature encompassing a process of internalization consisting of a series of transformations:

- (a) An operation that initially represents an external activity is reconstructed and begins to occur internally.
- (b) An interpersonal process is transformed into an intrapersonal one.

- (c) The transformation of an interpersonal process into an intrapersonal one is the result of a long series of developmental events.

Since Vygotsky emphasized the critical importance of interaction with people, including other learners and teachers, in cognitive development, his theory is called “social constructivism.”

The lack of recognition among educators of this social process and of the many ways in which an experienced learner can share his knowledge with a less advanced learner, limits the intellectual development of many students; their capabilities are viewed as biologically determined rather than socially facilitated and culturally transmitted (Vygotsky, 1978, p. 125-126).

Huang (2002) describes several issues of constructivism for online educators.

The first involves the issue of a learner’s isolation since individual learning at a distance is a basic element of learning online. She urges distance educators need to recognize that technology and social context are equally important for distance learning. Another issue she describes is that distance learners should determine the value and legitimacy of their learning. Adult learners, with a strong self-direction in learning, actively participate in their learning experiences. The third issue is the role of the instructor in distance learning. The instructor’s role is that of facilitator, a role she acknowledges involves the time-consuming task of evaluating learners’ achievement.

A fourth issue she describes is the importance of connecting learning to real-world experience since constructivism emphasizes that teaching and learning should be learner-centered. Additionally, while collaborative learning is in conflict with individual differences, social constructivism contends that social interaction and collaborative learning construct knowledge and that interactivity provides a way to motivate and stimulate learners (Huang, 2002).

“Advanced online technologies are gradually decreasing the barriers of traditional distance education with respect to interactive or communication problems” (Huang, 2002, p. 34). Applying constructivist principles to learning in an online setting can inform and support instructors in creating learner-centered and collaborative environments. Huang (2002) maintains that “sound distance education is the result of effective communication and instruction; therefore, instructional strategies, subject matter, and instructional theories are other relevant variables for creating a better learning environment for online learners” (p. 35).

### **Selected Research: Interaction and Comparison**

Various studies were examined and incorporated throughout this text. While not intended to be exhaustive, additional research studies are included and are generally categorized in two critical areas; the concept of interaction, and a comparison of online learning with a traditional classroom environment.

#### Interaction

Northrup (2002) researched the types of interactions that students perceived as important for learning online. Content interaction, conversation and collaboration, interpersonal/metacognitive skills, and the need for support were examined through data collected from a survey entitled the “Online Learning Interaction Inventory.” Questions from the study (N = 52) include why students learn online and what interaction attributes students perceive as important for online learning. Results indicate that the primary reason students take a course online is flexibility and convenience and that having timely feedback from the instructor was valued by participants.



Northrup (2002) concluded that interaction should be designed into online instruction and that the foundation of online learning “included the notion of solid student support and self-directedness” (p. 225). She found that while student reported being comfortable simulating a campus-based course online, they gave favorable ratings to innovative strategies in the online learning environment. Most compelling, she noted, was that “participants strongly stated that the need for timely responses from peers and from their instructor was of utmost importance” (Northrup, 2002, p. 225).

Kelsey and D’souza (2004) evaluated the importance of interaction on the efficacy of distance learning. The researchers questioned whether student-content, student-interface, and learner-learner interactions motivate learners to favorable learning outcomes. Their case study (N = 88) utilized the university student information system as well as data from a survey designed by the researchers. The research shows that faculty were consistent when communicating with students and that “faculty members and students had individual preferences regarding mode and frequency of communications” (p. 8). Their research also showed that the particular video conferencing technology used in the study caused a voice delay resulting in a loss of student involvement.

Lindner, Dooley, and Kelsey (2002) examined student relationships with faculty and student relationships with cohort groups in what they refer to as “Doc-at-a-Distance” program. A course early in the program was conducted synchronously using a videoconferencing network which joined eleven sites. Subsequent courses were delivered synchronously and asynchronously. The data included telephone interviews

with all students who had completed the first year of the program (N=18) as well as an analysis of historical documents created during the program's initial planning stages.

All students reported positive relationships with their faculty and with each other but suggested "increasing response time to communications and increasing time for non-structured interactions with professors, perhaps at the end of interactive video conferencing sessions" (Lindner, Dooley, & Kelsey, 2002, p. 7). All eighteen students reported "feeling that their life stage – nontraditional students, married, children, and working professionals" drew them together as a group (Lindner, Dooley, & Kelsey, 2002, p. 7).

Bernard, Abrami, Lou, Borokhovski, Wade, Wozney, Wallet, Fiset, and Huang (2004) conducted a meta-analysis of the comparative distance education literature between 1985 and 2002. They sought to provide an exhaustive quantitative synthesis of the comparative research to answer a series of question which included the effect of interactivity on student achievement, attitudes, and retention in comparison with classroom-based environments. They conclude that "opportunities for communication, both face to face and through mediation appear to benefit students in synchronous and asynchronous distance education" (p. 411). They also suggest that "interactivity among learners occurs when technology is used as a communication device and learners are provided with appropriate collaborative activities and strategies for learning together" (p. 413). Bernard et al. (2004) note that "the keys to pedagogical effectiveness in distance education center on the appropriate and strategic use of interactivity among learners, with the material leading to learner engagement, deep processing, and understanding" (p. 413).

### Comparison of Online Learning and Traditional Classroom

Other studies included focused on the comparison between learning online and a traditional classroom environment. Russell (1999) examined 355 comparative studies conducted between 1928 and 1998 and considered strategic parts of their conclusions to assert that there was no significant differences in learning attributed to technology. He contends that while the studies show “there is nothing inherent in the technologies that elicits improvements in learning” (p. xii) that “...differences in outcomes can be made more positive by adapting the content to the technology” (p. xii). Russell suggests that it is through the process by which courses are adapted to technology that learning may be improved.

Halsne and Gatta (2002) conducted a descriptive study of learner characteristics in an online environment. The study compared characteristics of these learners with characteristics of learners in a traditional classroom setting. The characteristics included learning styles, demographics (such as gender, age, children, marital status, race, and family income), employment or occupational status, education, and time spent on class work. Participants were randomly chosen from online courses in a community college and were compared to students who were taking the same courses on campus. The researchers concluded that there were several distinctive characteristics that online learners possessed. The results indicated that online learners were generally Caucasian, 26 to 55 years of age, working full-time with an average family income of over \$40,000.00 per year, and had more education than their traditional counterparts.

Tesone, Alexakis, and Platt (2003) present a comparison of online and traditional classroom instructional techniques and focus on the differences between face-to-face and

computer-mediated communication. The researchers compared a group of online students with a traditional classroom setting (N = 70) and designed the study to compare learning outcomes (student success) with perception of the learning process (satisfaction). Participants were given content-driven pretests and posttests and completed a Student Interaction Satisfaction Questionnaire Summary designed by the researchers. While the researchers note that the empirical case described in their article may only be relevant to that particular course, they observed that “an instructor may positively influence student satisfaction levels by maintaining a ‘teacher oriented’ approach in the classroom and shifting to a ‘learner centered’ methodology with those students in the online environment” (Tesone, Alexakis, & Platt, 2003, p. 7).

While there is still much to learn, these studies suggest a number of factors. They indicated that participants choose to learn online for the flexibility and convenience afforded them. These studies also illustrate the importance of feedback from peers and from the instructor and that communication through synchronous learning can benefit students. Comparison studies suggest that with proper consideration for communication and content, there can be little difference between online environments and other more traditional environments with respect to outcomes. Demographics indicate that the typical online student is a working adult and, as such, can prosper in an online environment which tends to favor a learner-centered approach.

### **Summary**

Distance education technologies are continuing to evolve and, according to Jeanne Meister (1998), will continue to grow in importance during the coming decade. Institutions view learning technology as a new way to deliver instruction, broaden

training opportunities, reduce costs, improve motivation, and implement strategic initiatives.

The Electronics Revolution of the 1980s changed the nature of distance education, making it possible to teach face-to-face at a distance, and to teach groups as well as individuals at a distance. The Mobile Revolution of the late 1990s has changed the distance student from an individual who chooses not to go to college, to a person who not only chooses not to go to college, but is moving at a distance from the college or learning institution (Keegan, 2000).

“Successful distance education systems involve interactivity between teacher and students, between students and the learning environment, and among students themselves, as well as active learning in the classroom” (Sherry, 1996, p. 343). Distance education increasingly uses combinations of different communications technologies to enhance the abilities of teachers and students to communicate with each other, even in rural and isolated communities separated by perhaps thousands of miles. The Office of Technology Assessment stresses the importance of interactivity: distance learning allows students to hear and perhaps see teachers, as well as allowing teachers to react to their students’ comments and questions (US Congress, 1988). Moreover, virtual learning communities can be formed, in which students and researchers throughout the world who are part of the same class or study group can contact one another at any time of the day or night to share observations, information, and expertise with one another (Palloff & Pratt, 1999).

Garrison (1990) argued that the quality and integrity of the educational process depends upon sustained, two-way communication. “Without connectivity, distance

learning denigrates into the old correspondence course model of independent study in which the student become autonomous and isolated” (Sherry, 1996, p. 342). Hence, “the challenge of creating distance learning environments is to determine what learners truly need and how to reasonably accommodate their needs” (Chute, Sayers, & Gardner, 1997, p. 82).

## CHAPTER 3

### METHODOLOGY

#### **Introduction**

Training at Enterasys Networks has been delivered using Interwise, a technologically mediated, voice over internet protocol (VoIP) virtual classroom communication tool. Participants need access to the Internet and join the session using their computer browser. All participants, students and instructor, must be present at the same time although not necessarily at the same location. Interaction takes place in real time through voice/audio, text boxes (similar to Instant Messenger), whiteboards, application sharing, and occasionally small group breakout sessions. This learning technology can support two-way video with up to five web cameras but the video option was not used by Enterasys due to the nature of the training content and concerns over bandwidth in particular geographic areas.

Interwise provides a synchronous learning environment with the addition of voice and video, although video was not used by Enterasys in this study. This virtual classroom may provide the bridge to lessen the distance between students and instructor that Arbaugh (2001) concludes is important to student satisfaction. The addition of voice to distance education transforms the traditional text-only online learning environment. This change may address a concern of Brooks (2003). Brooks asserts that the distance between student and instructor can be lessened through communication. And, the communication that matters most is that which creates an online presence that assures the

student that the instructor is “out there.” Similarly, Frederickson, Pickett, Shea, Pelz, and Swan (2000) found in their study of college student satisfaction with online learning that interaction with the teacher is the most significant contribution to learning.

### **Role of the Researcher**

Interwise, one of many training tools used by Enterasys, was purchased with a yearly, renewable contract. Data was collected for the purpose of evaluating the tool for continued use. The role of the researcher was to examine Interwise for continual use in the company by determining the value of the instructional delivery system and the suitability of such a system for use with adults. The researcher developed the survey instrument to assess the participant’s use of Interwise. The researcher had no stake in the outcome of the evaluation of Interwise as a platform for global instructional delivery. She was not involved with the decision to use Interwise and had no financial or business stake in the decision to either keep Interwise or exchange it for another platform. By the time the majority of the analysis was conducted the researcher was no longer employed by Enterasys. The researcher’s sole activity was to monitor the implementation of the program. Consequently, the researcher was able to maintain an objective view of the data. Therefore, any potential threat to data collector bias was reduced.

The researcher was tasked with the development of the survey instrument because of her responsibilities for staff development. Her knowledge of the importance of adult development was central in the development of the survey instrument. The instrument was approved by the chain of command as meeting the needs of the organization and the researcher was directed to implement the survey and compile the data responses. Minimal descriptives were used by the company in its analysis of Interwise.



After the survey was sent, received, and tabulated, the researcher considered the data important to the understanding of the role of adult development in the next generation of the distance learning. She received permission from the her superiors to use the data for research purposes including more sophisticated data analysis than originally intended for the data. The researcher gave assurances to her superiors that the identities of the participants would be kept confidential. In fact, the researcher never had access to the names of the respondents. The company was satisfied with the assurances and granted her access and use of the data.

The researcher next developed a proposal for her Doctoral Dissertation Committee. The archival data was central to the research. The Committee reviewed the proposal and approved the use of the archival data.

While in some respects the researcher was a participant-observer, she had no access to the identity of the respondents and no influence on them. In addition, the researcher did not have a stake in the outcome of the data. At all times the researcher was mindful of the possibility of data contamination through preconceived preferred outcomes and took steps to minimize such minimal possibility given the distance the researcher had from the importance of the outcome.

### **Sampling**

This study involved a convenience sample of 233 adult men and women participating in online sales and technical training classes within a corporate training environment. Surveys were sent to 467 people who received training via Interwise either as employees of Enterasys or as members of the extended partner community involved in the sale or use of company products. Most training was not compulsory and participants

received training in a variety of content areas such as management, sales, and networking. Similar content sessions were given in all geographies. Instructors were from all four geographic regions. Participants received the survey with the following introductory statement:

Thank you for attending an Interwise session. You have been selected to participate in a brief survey that will assist the training organization in evaluating Interwise, our virtual classroom tool. Please be assured that your responses will be kept confidential but may be used for research purposes to study the effectiveness of Interwise and distance computer-assisted instruction. Thank you in advance for your time.

Students were given four weeks to complete the survey and reminders were not sent.

Data was provided to the researcher at the end of the four week period.

### **Instrument**

Data for this study is archival data obtained from an instrument developed by the researcher based upon information gained through a literature review of adult learning, distance learning environments, interaction in education, and educational technology. The instrument was designed as an evaluation tool for Enterasys approximately one year after Interwise was introduced as a virtual classroom environment. However its dual nature allows Enterasys to gather the information that it needs on the efficacy of its instructional delivery system, and it provides data on distance education and the fit of the delivery system with adult learning principles.

The data was examined for internal consistency using Cronbach's alpha. This test of reliability yielded a score of .7677, which indicates some reliability. This analysis demonstrates that the instrument had internal consistency.

The American Educational Research Association et al. (1985) suggests that "Reliability is a necessary but not sufficient condition for validity." Initially, the survey

was developed with minimal surface face validity; no content, criterion, or construct validity studies were done prior to development. However, an evaluation was conducted on the responses and showed a confidence level of 95% (margin of error 5%). This confidence level required a response rate of 212 respondents and since the response rate was 233, one can conclude that the responses validly represent the population under study. Therefore, there is confidence that the data from the respondents can be generalized at least to the original population of Enterasys employees who participated in Interwise training sessions.

Furthermore, an analysis of group participation during the Interwise training shows that none of the participants left the training sessions without completing the full training regimen, thus one of the threats to validity was eliminated. Nonetheless, since Enterasys did not require reliability or validity procedures be conducted on the instrument, the reader is cautioned about this potential limitation to the study.

The instrument was designed from the viewpoint of adult learning theory to ascertain whether Interwise, as a delivery platform, attended to the needs of adults. This study looked across the field of adult development and examined general, common principles of adult learning that spanned several theorists whose constructs were most closely aligned with an online environment. The goal was not to develop a new theoretical base, nor was the study intended to validate a particular theorist but instead was intended to examine applicable broad principles. While the survey represents an amalgamation of the work of several theorists, the questions were designed to reflect the views of Knowles (1973, 1980), Cross (1981), and Mezirow (1991, 1996, 1997). Specifically, items which inquire about the ability to be self-directed and responsible for

one's own learning are indicative of the work of Knowles (1973, 1980) and Mezirow (1991, 1996, 1997) and also connect to the concept of constructivism. Items inquiring about the ability to share job knowledge and whether sessions were problem-centered correspond with Knowles (1973, 1980) and Cross (1981) as learners desire experiences which have meaning and are relative to their lives. Both Knowles (1973, 1980) and Cross (1981) note that convenience and ease of use are important considerations for adults in their need for flexibility and control of their learning environment and, therefore, items of this type were included.

Surveys were sent online using SurveyShare.com, a web-based survey tool designed by faculty at Indiana State University. Learners were surveyed to determine their perception of the opportunity to interact with their colleagues and their instructor as well as the quality of such interaction. Participants were also surveyed regarding the convenience and ease of use of the online tool, relativity of sessions to their work, and whether they would participant in another online session. Individuals were asked to identify their responses on a Likert scale which included (1) Strongly Disagree, (2) Disagree, (3) Undecided, (4) Agree, (5) Strongly Agree.

The following survey items address Question 1: Are the instructional components of Interwise consistent with adult learning principles?

7. Interwise is more convenient for me than attending a traditional classroom.
8. This instructional delivery method allows me to be self-directed and responsible for my own learning.
9. Interwise allows me to share my job knowledge and experience.

10. Interwise sessions have been problem-centered and appropriate to my job.
11. The Interwise tool is easy to use.

First, an analysis was conducted of Interwise instructional techniques for consistency with adult learning principles by conducting a task analysis of Interwise using the six elements of adult learning as an instructional delivery system. Second, whether participants perceive this delivery technology to be effective was examined.

The following survey items address Question 2: How do students report their experience with Interwise in comparison to their experience in a traditional classroom?

1. I believe the opportunity to interact with my instructor in an Interwise course to be as satisfying as that of a traditional classroom.
  2. I believe the opportunity to interact with students in an Interwise course to be as satisfying as in a traditional classroom setting.
  3. I believe the feedback from the instructor on instructional questions to be as satisfying in comparison with a traditional classroom setting.
  4. I believe the quality of the interaction with the instructor in an Interwise course to be as satisfying as that of a traditional classroom setting.
  5. I believe the quality of the interaction with the students in an Interwise course to be as satisfying as that of a traditional classroom setting.
  6. I would have preferred to have taken my classes in a traditional classroom setting rather than through this web-based format.
12. I would take another class using Interwise.

In addition to survey items aimed at answering the two research questions demographic data was sought. Questions regarding gender, the number of Interwise sessions attended, and the connection option to the Interwise sessions were included. Another demographic important to Enterasys was the geographic location of the participant. This question was important to Enterasys because of the multinational aspect

of the company. Consequently, the variable of geography was added as a post hoc analysis.

A variety of statistical analyses were used in the study. Descriptive statistics were used for all questions. In addition, correlation and ANOVAs were conducted.

### **Limitations of Interwise**

As previously noted, Interwise does have the capability to use live (streaming) video. However, such capability was not included in this study due to the lack of use within the training group at Enterasys as bandwidth in some countries was restricted. Thus, any impact of visual clues was not studied and could be suggested as an area of further study. Also, the study was limited to a training environment and further study within an academic environment is warranted.

## CHAPTER 4

### ANALYSIS OF DATA

In an effort to increase learning opportunities, Enterasys began a series of training classes delivered using Interwise, a technology mediated, voice over internet protocol (VoIP) virtual classroom tool. In order to evaluate Interwise as a delivery tool, surveys were sent to 467 sales and technical employees and partners worldwide who participated in training sessions using this technology. Of the participants surveyed, 233 individuals responded for a response rate of fifty percent. The study consisted of a selected finite population with limited access to information regarding non-respondents. Therefore, no analysis of non-respondent data was included and the study assumes there were no differences.

The survey used in the study was designed to examine two areas; consistency with adult learning, and the perception of Interwise in comparison with a traditional classroom setting. The data analysis was conducted within the framework of these two areas, resulting in the following research questions:

- Question 1: Are the instructional components of Interwise perceived as consistent with adult learning principles?
- Question 2: How do students report their experience with Interwise in comparison to their experience in a traditional classroom?

This study used Enterasys archival data obtained from an instrument developed by the researcher based upon information gained through a literature review of adult

learning, distance learning environments, interaction in education, and educational technology. Surveys were sent online using SurveyShare.com, a web-based survey tool designed by faculty at Indiana State University. The instrument was designed as an evaluation tool for the company, however its dual nature allowed the company to gather the information that it needed on the efficacy of its instructional delivery system, and it provided data on research questions focusing on distance learning and adult online learning.

Learners were surveyed to determine their perception of the opportunity to interact with their colleagues and their instructor as well as the quality of such interaction. Participants were also surveyed regarding the convenience and ease of use of the online tool, relativity of sessions to their work, and whether they would participate in another online session. Individuals were asked to identify their responses to 16 items on a Likert scale which included (1) Strongly Disagree, (2) Disagree (3) Undecided (4) Agree (5) Strongly Agree. The complete list of questions is found in Table 2. The discussion of the research questions follows.

The data analysis process addressed the question of students' satisfaction with Interwise as a learning environment and its ability to meet the needs of students as adult learners. The researcher sought to discover: (a) if the instructional components of Interwise were perceived as consistent with adult learning principles and (b) how students report their experience with Interwise in comparison to their experience in a traditional classroom. To address these research questions, means and standard deviations, analysis of variance, and Pearson Correlations were calculated.



Table 2

## Mean and Frequency Results for Participant Responses

Questions	Mean (s.d.)	1 strongly disagree	2 disagree	3 undecided	4 agree	5 strongly agree
1. I believe the opportunity to interact with my instructor in an Interwise course to be as satisfying as that of a traditional classroom.	3.40 (1.044)	12 5.2%	46 19.8%	27 11.6%	131 56.5%	16 6.9%
2. I believe the opportunity to interact with students in an Interwise course to be as satisfying as in a traditional classroom setting.	3.16 (1.093)	17 7.3%	58 24.9%	43 18.5%	101 43.3%	14 6.0%
3. I believe the feedback from the instructor on instructional questions to be as satisfying in comparison with a traditional classroom setting.	3.63 (.884)	5 2.2%	28 12.1%	34 14.7%	144 62.3%	20 8.7%
4. I believe the quality of the interaction with the instructor in an Interwise course to be as satisfying as that of a traditional classroom setting.	3.23 (1.021)	9 3.9%	60 26.3%	39 17.1%	109 47.8%	11 4.8%
5. I believe the quality of the interaction with the students in an Interwise course to be as satisfying as that of a traditional classroom setting.	3.00 (1.051)	15 6.5%	74 31.9%	46 19.8%	89 38.4%	8 3.4%
6. I would have preferred to have taken my classes in a traditional classroom setting rather than through this web-based format.	2.91 (1.123)	18 7.8%	81 34.9%	59 25.4%	52 22.4%	22 9.5%
7. Interwise is more convenient for me than attending a traditional classroom.	4.04 (.909)	5 2.1%	12 5.2%	25 10.7%	117 50.2%	74 31.8%

Table 2 (continued)

8. This instructional delivery method allows me to be self-directed and responsible for my own learning.	3.92 (.822)	5 2.2%	11 4.8%	25 10.8%	147 63.6%	43 18.6%
9. Interwise allows me to share my job knowledge and experience.	3.27 (.979)	7 3.0%	49 21.3%	66 28.7%	91 39.6%	17 7.4%
10. Interwise sessions have been problem-centered and appropriate to my job.	3.57 (.796)	4 1.7%	20 8.6%	61 26.2%	135 57.9%	13 5.6%
11. The Interwise tool is easy to use.	4.25 (.669)	1 .4%	6 2.6%	6 2.6%	140 60.3%	79 34.1%
12. I would take another class using Interwise.	4.21 (.765)	2 .9%	6 2.6%	18 7.8%	120 51.9%	85 36.8%

### Demographic Characteristics of the Survey Respondents

Respondents were placed in four geographic locations, North America (NA), Latin America (LA), Europe, Middle East, Africa (EMEA), and Asia/Pacific (AP). The largest representation, 56.5 percent, was from North America, which is understandable given the location of the company's headquarters. This was followed by equal representation from Latin America and Asia Pacific (18.5 % each). Europe, Middle East, Africa consisted of 12.5percent of survey respondents.

Respondents were asked to identify the number of Interwise sessions they have attended. The majority of students who responded to the survey (35.1%) had attended more than ten sessions followed by the second largest group (29.4%) who attended four to seven sessions. Therefore, over two thirds of the students had attended more than four sessions at the time they answered the survey questions.

In an attempt to determine if there were differences in the communication experience for men and women, respondents were asked to indicate their gender. There

were fewer women than men who responded to the survey which is reflective of the male/female ratio in the company as well as the extended partner community. Women comprised 16 percent of respondents, whereas men represented 84 percent of respondents.

Students were able to connect to Interwise sessions in a variety of ways depending upon their access to the Internet. Therefore, respondents were asked to identify the way in which they connected to the session to determine if this factor influenced their perception of the delivery tool. The majority of students (57.5%) connected through the office network which consisted of a high-speed internet connection. The second largest group (28.3%) connected using Broadband at an off-site location.

### **Interwise and Adult Learning**

The survey included items that reflect adult learning theory as discussed in the literature relating to adult learning principles (Knowles, 1973, 1980; Cross, 1981; Mezrow, 1991, 1996, 1997; Palloff & Pratt, 1999; Rossman, 2000; Mehrotra, Hollister, & McGaney, 2001; Huang, 2002) which examine the learners' desire for control and flexibility. These items consider convenience, the opportunity to be self-directed and responsible for one's own learning, the opportunity to share job knowledge and experience, whether sessions have been problem-centered and job appropriate, and the ease of use regarding the delivery tool.

Table 3

Interwise Participants' Report of System's Consistency with Adult Learning Principles

Question	1 strongly disagree	2 disagree	3 undecided	4 agree	5 strongly agree
This instructional delivery method allows me to be self-directed and responsible for my own learning.	5 2.2%	11 4.8%	25 10.8%	147 63.6%	43 18.6%
Interwise sessions have been problem-centered and appropriate to my job.	4 1.7%	20 8.6%	61 26.2%	135 57.9%	13 5.6%
Interwise allows me to share my job knowledge and experience.	7 3.0	49 21.3%	66 28.7%	91 39.6%	17 7.4%
Interwise is more convenient for me than attending a traditional classroom.	5 2.1%	12 5.2%	25 10.7%	117 50.2%	74 31.8%
The Interwise tool is easy to use.	1 .4%	6 2.6%	6 2.6%	140 60.3%	79 34.1%

A majority of participants expressed favor for Interwise as a delivery system; 82% noted that Interwise was more convenient than attending a traditional classroom and 94.4% felt the Interwise tool was easy to use. Participants noted (Table 3) that Interwise allowed them to be self-directed (82%) and that the sessions were problem-centered (63.5%), however, fewer than half (47%) felt that Interwise allowed them to share their job knowledge and experience. This was the only adult learning principle for which respondents perceptions differed. In fact, Table 3 illustrates that 28.7 percent were undecided when asked about sharing job knowledge and experience and 24.3 percent either disagreed or strongly disagreed.

Correlations were conducted on the adult learning principles used in the study to discover how these principles were related to one another. Relationships of .10 - .20

indicated a weak relationship, .20 - .50 indicated a moderate relationship, and above .50 indicated a strong relationship (Urdan, 2001). Table 4 illustrates that many of the adult learning principles in the study were associated.

Table 4  
Correlation of Adult Learning Principles

	Ability to be Self-Directed	Allows Sharing Job Knowledge/Experience	Convenience of Interwise	Sessions are Problem-Centered	Ease of Use
Ability to be Self-Directed		.399	.424	.376	.409
Allows Sharing of Job Knowledge/Experience	.399		.263	.271	.132
Convenience of Interwise	.424	.263		.270	.201
Sessions are Problem-Centered	.376	.271	.270		.243
Ease of Use	.409	.132	.201	.243	

.10-.20 weak  
.20-.50 moderate  
above .50 strong

There was a weak correlation between the perception of ease of use and the number of sessions, suggesting that individuals became more comfortable with the technology with each session. However, there appeared to be no correlation between students' perception of ease of use and the manner in which they connected to the Interwise session.

Further examination of the means of items related to adult learning were conducted to determine whether differences existed by gender or region. One-Sample T-Test procedures did not reveal any significant differences in reporting of any adult

learning items by gender. However, an analysis of variance conducted on items related to adult learning by geography revealed significant differences in reporting by region.

Tukey post hoc tests were conducted in order to determine the nature of the effects. A pattern emerged in which North America differed significantly from other regions in these areas.

Table 5

Interwise Participants' Perception of Adult Learning Principles by Geography  
Ability to be Self-Directed

Geography	Mean	Std. Deviation	N
North America	3.72	.929	116
Latin America	4.31	.517	42
EMEA	4.00	.756	29
Asia Pacific	4.00	.655	43
Total	3.92	.824	230

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.59*	-.28	-.28
Latin America	.59*	0	.31	.31
EMEA	.28	-.31	0	.00
Asia Pacific	.28	-.31	.00	0

\*The mean difference is significant at the .05 level.

Allows Sharing of Job Knowledge/Experience

Geography	Mean	Std. Deviation	N
North America	3.01	.880	116
Latin America	3.52	1.131	42
EMEA	3.50	.962	28
Asia Pacific	3.56	.934	43
Total	3.27	.980	229

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.52*	-.49	-.55*
Latin America	.52*	0	.02	-.03
EMEA	.49	-.02	0	-.06
Asia Pacific	.55*	.03	.06	0

\*The mean difference is significant at the .05 level.

Table 5 (continued)

Sessions are Problem-Centered

Geography	Mean	Std. Deviation	N
North America	3.44	.865	117
Latin America	3.88	.586	43
EMEA	3.55	.827	29
Asia Pacific	3.60	.695	43
Total	3.57	.797	232

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.44*	-.11	-.16
Latin America	.44*	0	.33	.28
EMEA	.11	-.33	0	-.05
Asia Pacific	.16	-.28	.05	0

\*The mean difference is significant at the .05 level.

Ease of Use

Geography	Mean	Std. Deviation	N
North America	4.09	.734	116
Latin America	4.53	.505	43
EMEA	4.34	.553	29
Asia Pacific	4.33	.606	43
Total	4.25	.671	231

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.44*	-.25	-.23
Latin America	.44*	0	.19	.21
EMEA	.25	-.19	0	.02
Asia Pacific	.23	-.21	-.02	0

\*The mean difference is significant at the .05 level.

Table 5 illustrates that students in North America were less likely to report that Interwise allowed them to be self-directed than students in Latin America. Students in North America were also less likely to report that Interwise allowed them to share job knowledge and experience than students in Latin America and Asia/Pacific. Students in North America were less likely to find Interwise sessions to be problem-centered and

appropriate to their jobs and less likely to report that Interwise was easy to use than students in Latin America.

### **Interwise and a Traditional Classroom Setting**

The survey included seven items that examined the opportunity for and quality of interaction between the instructor and students, feedback from the instructor, the opportunity for and quality of interaction among students, preference for classes in a traditional setting, and willingness to take another Interwise class.

Students generally had a favorable perception of instructor factors. Table 6 indicates 63.4 percent agreed or strongly agreed that the opportunity to interact with the instructor was as satisfying as that of a traditional classroom, and 52.6 percent agreed or strongly agreed that it was of the same quality (Table 6). In addition, 71 percent agreed or strongly agreed that the feedback from the instructor was as satisfying in comparison to a traditional classroom (Table 6). However, while students felt they had the opportunity to interact and receive satisfactory feedback, and a majority felt the quality was as satisfactory, it is worthwhile to note that 17 percent were undecided when asked if the quality was as satisfactory and 30.2 percent disagreed or strongly disagreed that it was as satisfactory as that of a traditional classroom (Table 6).



Table 6

## Interwise Participants' Report of the Delivery System in Comparison with a Traditional Classroom Setting

Question	1 strongly disagree	2 disagree	3 undecided	4 agree	5 strongly agree
I believe the opportunity to interact with my instructor in an Interwise course to be as satisfying as that of a traditional classroom.	12 5.2%	46 19.8%	27 11.6%	131 56.5%	16 6.9%
I believe the quality of the interaction with the instructor in an Interwise course to be as satisfying as that of a traditional classroom setting.	9 3.9%	60 26.3%	39 17.1%	109 47.8%	11 4.8%
I believe the feedback from the instructor on instructional questions to be as satisfying in comparison with a traditional classroom.	5 2.2%	28 12.1%	34 14.7%	144 62.3%	20 8.7%
I believe the opportunity to interact with students in an Interwise course to be as satisfying as in a traditional classroom setting.	17 7.3%	58 24.9%	43 18.5%	101 43.3%	14 6.0%
I believe the quality of the interaction with the students in an Interwise course to be as satisfying as that of a traditional classroom setting.	15 6.5%	74 31.9%	46 19.8%	89 38.4%	8 3.4%
I would have preferred to have taken my classes in a traditional classroom setting rather than through this web-based format.	18 7.8%	81 34.9%	59 25.4%	52 22.4%	22 9.5%

In addition to being asked questions about their interaction with and feedback from the instructor, students were also asked about their interaction with each other. Nearly half (49.3%) agreed or strongly agreed that the opportunity to interact with

students was as satisfying as in a traditional classroom setting but, reactions to quality were mixed. While 41.8 percent either agreed or strongly agreed that the quality of the interaction with students was as satisfying, nearly 20 percent (19.8%) were undecided and 38.4 percent either disagreed or strongly disagreed (Table 6). This suggests that students are being given opportunities to interact but, when compared with the traditional classroom experience, students perceive such interaction as less satisfactory than in a traditional setting. Responses were mixed when students were asked about their preference for a learning environment. The data suggests that students are ambivalent about their Interwise experience when it involves student-to-student rather than student-to-instructor interaction.

While 42.7 percent disagreed or strongly disagreed when asked if they would prefer to take classes in a traditional setting, 25.4 percent were undecided and 31.9 percent preferred a traditional classroom setting (Table 6). Although slightly more students, 42.7 percent, indicated that they prefer the web-based format, there was no majority. There was no clear or convincing evidence that, despite some satisfaction with the delivery method, students preferred the web-based format over a traditional classroom setting.

Survey questions which addressed instructor-centered factors such as the opportunity to interact with the instructor, the quality of interaction with the instructor, and the feedback from the instructor indicated that these factors had a slight effect on students' willingness to take another class. Table 7 shows there was a weak correlation between these instructor-centered factors (interaction with the instructor, feedback from the instructor, quality of the interaction with the instructor) and willingness to take

another Interwise class. There was a moderate correlation between instructor-centered factors and the preference for traditional classes as displayed in Table 7. Students who perceived instructor-centered factors to be satisfactory were less likely to prefer classes in a traditional setting. The more satisfied students were with the three instructor factors, the less willing they were to choose a traditional setting in which to learn.

Table 7

Correlation of Instructor Factors, Preference for Traditional Setting, and Willingness to Take Another Class

	Interaction with Instructor	Feedback from Instructor	Quality of Interaction with Instructor	Prefer Classes in Traditional Setting	Willingness to take another Interwise Class
Interaction with Instructor		.663	.679	-.434	.192
Feedback from Instructor	.663		.619	-.410	.262
Quality of Interaction with Instructor	.679	.619		-.453	.212
Prefer Classes in Traditional Setting	-.434	-.410	-.453		-.310
Willingness to take another Interwise Class	.192	.262	.212	-.310	

.10-.20 weak  
 .20-.50 moderate  
 above .50 strong

Further examination of the means of items related to how students perceive Interwise as a delivery method in comparison with a traditional classroom environment were conducted to determine whether differences existed by gender or region. One-Sample T-Test procedures conducted by the researcher did not reveal any significant differences in reporting by gender. However, as in the previous set of items, an analysis of variance conducted on items related to perception of the learning environment by geography revealed significant differences in reporting by geographic region. Tukey post hoc tests were conducted in order to determine the nature of the differences. Again, a pattern was detected in which North America differed significantly from the other regions in their responses.

Table 8

Interwise Participants' Perception of the Learning Environment Compared to a Traditional Classroom by Geography

Interaction with Students

Geography	Mean	Std. Deviation	N
North America	2.81	1.082	117
Latin America	3.44	1.053	43
EMEA	3.45	.985	29
Asia Pacific	3.60	.955	43
Total	3.16	1.094	232

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.63*	-.64*	-.79*
Latin America	.63*	0	-.01	-.16
EMEA	.64*	.01	0	-.16
Asia Pacific	.79*	.16	.16	0

\*The mean difference is significant at the .05 level.

Table 8 (continued)

Interaction with Instructor

Geography	Mean	Std. Deviation	N
North America	3.13	1.082	116
Latin America	3.74	1.053	43
EMEA	3.62	.985	29
Asia Pacific	3.63	.955	43
Total	3.40	1.094	231

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.61*	-.49	-.50*
Latin America	.61*	0	.12	.12
EMEA	.49	-.12	0	-.01
Asia Pacific	.50*	-.12	.01	0

\*The mean difference is significant at the .05 level.

Feedback from Instructor

Geography	Mean	Std. Deviation	N
North America	3.43	.953	116
Latin America	3.86	.872	42
EMEA	3.76	.830	29
Asia Pacific	3.86	.601	43
Total	3.63	.886	230

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.43*	-.33	-.43*
Latin America	.43*	0	.10	.00
EMEA	.33	-.10	0	-.10
Asia Pacific	.43*	.00	.10	0

\*The mean difference is significant at the .05 level.

Quality of Interaction with Students

Geography	Mean	Std. Deviation	N
North America	2.70	1.015	116
Latin America	3.26	1.071	43
EMEA	2.97	.865	29
Asia Pacific	3.58	.957	43
Total	3.00	1.051	231

Table 8 (continued)

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.56*	-.27	-.88*
Latin America	.56*	0	.29	-.33
EMEA	-.27	-.29	0	-.62
Asia Pacific	.88*	.33	.62	0

\*The mean difference is significant at the .05 level.

Willingness to take another Interwise Class

Geography	Mean	Std. Deviation	N
North America	4.20	.783	116
Latin America	4.60	.495	43
EMEA	4.00	.667	28
Asia Pacific	4.00	.873	43
Total	4.21	.767	230

	North America	Latin America	EMEA	Asia Pacific
North America	0	-.41*	.20	.20
Latin America	.41*	0	.60*	.60*
EMEA	-.20	-.60*	0	.00
Asia Pacific	-.20	-.60*	.00	0

\*The mean difference is significant at the .05 level.

Table 8 suggests that students in Latin America and Asia/Pacific were more likely to have a positive perception of the opportunity to interact with the instructor and reported a more positive perception regarding feedback than students in North America. Latin America and Asia/Pacific were also more likely to have a positive perception of the opportunity to interact with other students than participants in North America.

While there were no differences in the reporting of perception of quality of interaction with the instructor, students in Latin America and the Asia/Pacific regions were more likely to report that the quality of interaction with students was as satisfying as a traditional classroom than students in North America.

There were no differences reported by region regarding preference for a traditional classroom over Interwise, however, students in North America ( $M = 4.20$ ) were less willing to take another Interwise class than students in Latin America ( $M = 4.60$ ) ( $p = .013$ ) and students in Latin America were more willing than students in the other three regions to take another class using Interwise. The number of sessions did not appear to influence students' satisfaction with Interwise as a delivery tool.

### **Bridging**

Data from the study indicated that students were ambivalent in two areas; the ability to share job knowledge and experience and student-to-student interaction. Correlation analyses suggest that the two areas are related. In research question one, students were asked if Interwise allowed them to share their job knowledge and experience, an important factor in adult learning. The responses were mixed; 47 percent either agreed or strongly agreed, 28.7 percent were undecided and 24.3 percent either disagreed or strongly disagreed.

In research question two, students were asked two questions regarding their interaction with fellow students. They were asked if they had the opportunity to interact with other students and, if so, did they believe that the quality of that interaction was as satisfying as that of a traditional classroom. Fewer than half (49.3%) of respondents believed the opportunity to interact with students was as satisfying as in a traditional classroom setting and reactions to quality were mixed. Only 41.8 percent of participants either agreed or strongly agreed that the quality of interaction with other students in an Interwise session was as satisfying as that of a traditional classroom.

Student responses on items relating to student-to-student interaction were then examined with respect to the sharing of job knowledge and experience with the assumption that better sharing would occur if more interaction took place and if the quality of that interaction was satisfying.

Table 9 shows a moderate correlation between the opportunity to interact with other students and the sharing of job knowledge and experience, suggesting that perhaps the lack of opportunity to interact may inhibit the ability and occasion to share experiences. Additionally, there was a moderate correlation between the quality of interaction with other students and the sharing of job knowledge and experience shown in Table 9. This suggests that a perceived lack of quality in those opportunities that do exist may further compromise the sharing of knowledge and experience.

Table 9

Correlation of Student Interaction with the Sharing of Job Knowledge/Experience

	Interaction with Students	Quality of Interaction with Students	Allows Sharing of Job Knowledge/Experience
Interaction with Students		.738	.377
Quality of Interaction with Students	.738		.337
Allows Sharing of Job Knowledge/Experience	.377	.337	

.10-.20 weak  
 .20-.50 moderate  
 above .50 strong

### Summary

This research suggests that Interwise is consistent with most of the adult learning principles described in the literature review. However, when asked if that the delivery method allowed them to share job knowledge, reactions were mixed. This concept was



closely correlated with the opportunity to interact with others and the quality of such interaction. Lack of opportunity to interact with fellow students or compromised quality of interaction may have influenced the perception of respondents. While no significant differences were noted by gender, significant differences existed by geographic region. Respondents in North America differed from other regions in all but one item related to adult learning.

Instructor-centered factors (opportunity to interact, quality of interaction, and feedback) were closely tied together and influenced student perception. The more satisfied students were with these factors, the more willing they were to choose a web-based format. Again, while differences did not exist by gender, a trend was noted in which North America differed significantly from other regions in five of the seven areas that were examined.

## CHAPTER 5

### FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### **Introduction**

As more adults seek learning opportunities for job advancement or personal enrichment, new methods of delivering such opportunities are important to develop. Technological advances have made it possible to explore new learning environments for adults outside of the traditional classroom. Research (Knowles, 1980; Cross, 1981; Mezrow, 1990; Palloff & Pratt, 1999; Rossman, 2000; Mehrotra, Hollister, & McGaney, 2001; Huang, 2002) suggests that adults possess different learning needs; consequently, as new environments are explored, these unique needs are critical to consider. Another critical element to consider is the role of interaction/interactivity in the online environment. Interaction is an important construct in education (Moore, 1989; Belanger & Jordan, 2000; Bannan-Ritland, 2002; Merriam & Caffarella, 1999; Dewey, 1938) and is particularly important in an environment where learners are geographically separated. Early online learning did not allow learners to interact with their instructor and with fellow students in real time and while these early experiences were sometimes more convenient for adults, students still cited lack of immediate response as a disadvantage (Mehrotra, Hollister, & McGaney, 2001). The evolution of computer technology, along with enhanced affordability, is providing new experiences in a variety of environments, in particular a new VoIP delivery method, Interwise. Does this new delivery method

meet the needs of adults and how do students perceive this environment in comparison to a traditional classroom?

## **Findings**

### Interwise and Adult Learning

Findings from this study indicate that the response to Interwise was generally positive. The first research question addressed the instructional components and consistency with adult learning principles. The adult learning principles that were examined included the ability to be self-directed and responsible for one's own learning and exposure to educational experiences that were problem-centered and relevant. Other principles included having the opportunity to share job knowledge and experience, ease in access, and convenience.

Responses revealed that a majority of students perceived that Interwise allowed them to be self-directed and the sessions they attended were problem-centered. Students also noted that Interwise was more convenient than attending a traditional classroom and a majority felt the Interwise tool was easy to use regardless of how they connected to sessions or how many sessions they attended.

There appeared to be no correlation between students' perception of ease of use and the manner in which they connected to the Interwise session. This was surprising since individuals could conceivably become frustrated with the learning experience if they experience difficulty accessing the technology.

The only area of adult learning in which students' perceptions differed was in the ability to share job knowledge and experience. When responses for this question were correlated with the opportunity to interact with fellow students, there was a moderate

correlation suggesting that students may not have had the opportunity to share. Many students were facing and solving common problems such as penetrating new markets or overcoming customer objections and were eager to share their solution with their fellow classmates. However, in order for this to happen, students need to be given an opportunity to share these common experiences. The responses from this question were also correlated with the quality of interaction that students experienced while engaged in the class. A moderate correlation was noted suggesting that what interaction students did have was not as satisfying as in a traditional classroom, again impacting their ability to share their knowledge and experience. This suggests that a perceived lack of quality in those opportunities that do exist may further compromise the sharing of knowledge and experience.

This varied response is important to recognize as Moore (1989) asserts that learner-learner interaction is an extremely valuable resource for learning and that peer discussion and analysis acknowledges and encourages the development of expertise. Since adult learners enter learning opportunities with more and different experiences than youths, they are eager to share their knowledge and apply their learning to real-life situations they have faced. Learner-learner interaction is a challenge to meet in distance education and these results underscore the need to create opportunities for adults to share their information and opinions.

There were no significant differences noted from examining the means of items related to adult learning and gender. However, there were significant differences in four of the items related to adult learning when examined by geography. A pattern emerged in

which North America differed significantly from other regions, particularly with Latin America.

While the reason for these regional differences, particularly the trend for North America to differ significantly from other areas, is unknown, such differences could be attributed to the fact that many of the regions consist of geographically dispersed areas where travel to classrooms may be time-consuming and costly. The result could be fewer learning prospects for individuals resulting in a more positive view of any learning opportunity which presents itself. Also, respondents in North America, particularly among a sales audience, may view training events as social opportunities in addition to educational experiences. While not part of the original research questions, the data raises some interesting issues and a post-hoc analysis is included later in this chapter. Further research on cultural differences is recommended.

#### Interwise and a Traditional Classroom Setting

Seven items were examined to determine students' perception of Interwise in comparison to a traditional classroom setting; the opportunity for and quality of interaction between the instructor and students, feedback from the instructor, the opportunity for and quality of interaction among students, preference for classes in a traditional setting, and willingness to take another Interwise class. Student responses were favorable when asked to compare their experience with Interwise to a traditional classroom setting. Instructor centered factors, which included the opportunity for and quality of interaction between a student and the instructor as well as feedback from the instructor, were strongly linked together and affected student perception of their experience. A majority of students felt that the opportunity to interact with the instructor

was as satisfying as that of a traditional classroom, that the interaction was of the same quality, and that the feedback from the instructor was as satisfying.

There was a moderate correlation between instructor-centered factors and the preference for traditional classes. Students who perceived instructor-centered factors to be satisfactory were less likely to prefer classes in a traditional setting. The more satisfied students were with the three instructor factors, the less willing they were to choose a traditional setting in which to learn.

These findings are particularly important since interaction/interactivity is often noted as the missing ingredient when comparing online environments with traditional classroom environments. It is important to note the favorable response for instructor factors as these factors are often regarded as essential to the educational process and desirable by learners. Students can be stimulated and motivated by such instructor interaction and feedback and instructors can provide support and encouragement throughout the learning process. Such interaction is particularly critical since learners are separated from the instructor by distance.

Responses to student interaction did not fare as well. Students were uncertain about their experiences when they involved student-to-student rather than student-to-instructor interaction. Fewer than half felt the opportunity to interact with fellow students was as satisfying and perception of quality was mixed. There was no clear majority; 41.8 percent agreed or strongly agree that the quality of interaction was as satisfying, 19.8 percent were undecided, and 38.4 either disagreed or strongly disagreed. Therefore, while some opportunity for interaction did exist, the quality could be improved. Improving the quality of student-to-student interaction can promote collaborative

learning, a concept which Palloff and Pratt (1999) asserts is central to the social construction of knowledge in an online learning environment. Huang (2002) maintains that constructivism in online environments depends on social interaction and collaboration to construct knowledge. Also, improving the quality and quantity of student-to-student interaction could lead to an improvement in transformational learning, focusing on the individual and social construction of meaning, which is of particular importance to adults (Mezirow, 1991). Therefore, improvement in the area of student interaction would, in general, lead to more successful learning experiences for adults.

The means of items related to how students perceived Interwise as a delivery method in comparison with a traditional classroom environment were examined to determine whether differences existed by gender or by region. While no significant differences were noted by gender, differences did exist by geography. Again, a pattern was noted in which North America differed significantly from the other regions in their responses. Students in Latin America and Asia Pacific generally felt more favorable than their fellow students in North America when asked about instructor-centered factors as well as student to student interaction. While there were no differences reported regarding preference for a traditional classroom over Interwise, students in North America were less willing to take another Interwise class than students in Latin America and students in Latin America were more willing than students in the other three regions to take another class using Interwise. More research is needed to determine any underlying cultural reasons for this phenomenon.

## Geography: An Exploratory Post-Hoc Analysis

While not part of the original research questions, the data raises questions surrounding the differences by geographic location. Literature on cross-cultural adult learning is somewhat meager in examining the different dimensions of culture of both learners and instructors. However, the issue of culture in increasingly diverse learning groups is a topic of interest in educational environments. Kennedy (2002) defines culture as “not just a matter of overt behavior, it is also the (social) rules, beliefs, attitudes and values that govern how people act and how they define themselves” (p. 430). He identifies three cultural layers: “the basic norms and values shared by all human beings; the collective beliefs and values shared by particular groups of people; and an individual’s unique experience of people and things” (Kennedy, 2002, p. 430). Nieto (2000) describes culture as “the ever-changing values, tradition, social and political relationships and worldview created and shared by a group of people bound together by a combination of factors that can include a common history, geographic location, language, social class, and/or religion, and how these are transformed by those who share them (p. 138). Cultural forms of learning are “the set of social processes of introspection, social interaction, and the formation of relations” (Sparks, 2001, p. 24). Sparks (2001) asserts that cultural influences will impact adult learning and that “differing communication styles and learning styles, differing perceptions of involvement, as well as the ideology of adult education all have the potential to produce cultural conflict or tension” (p. 25), reinforcing inequalities that may already exist in the classroom.



Ziegahn (2001) identifies key issues of cultural differences which could influence learning; the most relevant for this study are individualism and collectivism, egalitarianism versus hierarchy, and action versus “being” orientation.

Ziegahn (2001) asserts that it is important to recognize the need for balance, particularly in western corporate culture, between rewarding the efforts of individuals with fostering team work and collaborative efforts. “Individualistic cultures generally value the self-reliance, equality, and autonomy of the individual, whereas collectivist cultures tend to value group effort and harmony and knowing one’s place within society” (Ziegahn, 2001, p. 1). “For example, more individualistic cultures, such as those found in North America, tend to reward teachers and learners for class activities that stress individual initiative and expression, whereas more collectivist cultures tend to value those collectivist efforts which reinforce social connections and norms” (Ziegahn, 2001, p. 1).

The next key area of cultural difference Ziegahn identifies is the issue of egalitarianism versus hierarchy. The concept of equal opportunity for all is a critical value in individualistic cultures which associate hierarchy with inflexibility. However, in collectivist cultures, hierarchy may be valued and becomes a means of “facilitating communication through the recognition of various social levels through titles and roles” (Ziegahn, 2001, p. 1). This is particularly important with respect to communication within a learning environment. Communication patterns, Ziegahn (2001) suggests, may differ depending on cultural variables as “individuals may have a preference for both sending and receiving messages in styles that are linear or circular, direct or indirect, attached or detached, procedural or personal, and more confrontational in either intellectual or relational terms” (p.1). Chinese students, for example, view learner and

instructor classroom roles as status dependent and may perceive questioning an instructor as questioning his or her competency as a faculty member.

A third area is action versus “being” orientation. Individualist cultures, such as the United States, value action and efficiency in accomplishing tasks and may downplay social interaction in reaching particular goals. In other, more “holistic” cultural orientations, value is placed on discussion of issues prior to taking any immediate action.

The construct of self-directedness is an important facet of adult learning and gaining autonomy during and after the learning process is desirable. However, not every culture places value on independence and autonomy. For example, in Korea, collectivism and collaboration are taught from an early age; being independent without being interdependent is considered to be a sign of immaturity or self-centeredness (Nah, 1999). Her research on Korean women in male-dominated occupations suggests that self-directed learning processes did not lead these women to become independent of their mentors but instead fostered interdependence. She found that “the virtue of interdependence and the virtue of independence and autonomy were not mutually exclusive within a self-directed learner” (Nah, 1999, p. 19). She encourages educators to recognize cultural differences among learners and, in practicing self-directed learning processes, foster both independence and interdependence within their adult population.

Enterasys was divided into geographical areas that spanned continents rather than cultural areas. No hypothesis was developed on culture because the regions identified and studied by Enterasys were cross-cultural. Given this restriction, the following post hoc hypothesis was developed: There would be a difference between the geographical regions. This hypothesis developed because it was believed by the researcher that

geographic areas outside of North America would be more receptive to Interwise due to a lack of access to opportunities for learning. The data showed that this hypothesis of difference between geographic regions was supported. However, it was surprising to learn that North America differed significantly from the other regions. It is unknown whether access or cultural differences account for this trend. It is recommended that further research be done to examine areas within regions that could explain these differences.

### **Conclusions**

This study indicates that the perception of Interwise by students is generally positive and the delivery platform appears suited to the learning needs of adults. It is convenient, easy to access, and the majority of students were willing to take another class in this environment. Instructor-centered factors were of significant importance and influenced students' perception of their distance learning experience. The most significant limitation appeared to be in the area of student-to-student interaction; students indicated that they had fewer opportunities to share their knowledge and that such opportunities were lacking the quality of interaction that exists in a traditional classroom setting.

Findings from this study support the continued use of Interwise as a delivery method for adults. It is imperative, however, that opportunities for students to interact with one another be built into the course objectives and that expanded use of collaborative tools within Interwise be promoted. As in a traditional classroom, instructors should be encouraged to use different techniques to engage students, particularly since the results of the study indicated that instructor factors were vital to

students' positive perception of the learning environment. Appropriate training for instructors is critical in this regard.

Institutions are faced with the many instructional design issues that surround making lessons succeed technologically. Instructional strategies, subject matter, and instructional theories are relevant variables for creating a better learning environment for online learners. Focusing on learning theory in the design of instructional technology creates lessons that are not only technology-effective but are meaningful from the learner's standpoint. This can be accomplished by integrating adult learning theory into the design of technology-based courses. Additionally, distance education providers should make sure that the technologies they choose reflect learning outcomes since technology delivery might not be appropriate to all educational outcomes. Focus should be placed on instructional methodology rather than exclusively on technological delivery to maintain quality and uphold academic integrity.

### **Recommendations for Further Research**

This research study was conducted within the training group of a large company using technical content. Did the content affect the quality or quantity of interaction? Would other topics have been more effective in engaging students in discussion and collaboration?

What other factors contribute to a student's perception of a satisfactory learning environment? Further study is warranted to determine whether the use of video capabilities would enhance the perception of interactivity since this study focused solely on the use of audio capabilities within Interwise. It would be interesting to know whether

visual clues would increase student satisfaction with a distance delivery method such as Interwise.

Further research may include comparison studies of online and traditional environments. Are students expecting all learning environments to resemble traditional classrooms in every way? Do students have the notion that distance learning should replicate the traditional classroom environment and, therefore, has this presumption affected the perception of their online experience?

A review of the literature suggests that interaction is an important factor in successful learning experiences and that improving interaction can lead to an improvement in transformational learning and constructivism. How might such interactions be improved? Can improvement in instructional design techniques promote a more positive perception of this distance learning environment? Since this study focused on delivery rather than instructional methodology, how would instructional design principles affect students' experience with a synchronous online environment?

For many people, college enrollment must be negotiated not only with respect to financial cost, but among many life-cycle factors, such as marriage, family, and career. Programs for nontraditional students have high growth potential and it is critical that institutions are successful in identifying and targeting the needs of these students. One way to respond to this growing population is to offer alternative learning environments in which students can function in self-directed ways while still receiving the support of the educational community with which they interact. Online learning environments can make education more accessible, convenient, focused, effective, and cost-efficient for the learners and providers alike and continue examination of related issues is beneficial.

Increased bandwidth and decreasing technology costs make the exploration of emerging technologies worthwhile. Such technologies include synchronous environments, such as Interwise, which offer the opportunity to collaborate by providing real-time interaction with faculty and fellow students. While there are advantages and challenges to all learning environments whether traditional classroom settings or online environments, the key is to provide a balance by offering a variety of learning environments in which students may flourish.

## REFERENCES

Abbey, B. (2000). *Instructional and cognitive impacts of web-based education*. Hershey, PA: Idea Group Publishing.

Aggarwal, A. (2000). *Web-based learning and teaching technologies: Opportunities and challenges*. Hershey, PA: Idea Group Publishing.

Alessi, S. M., & Trollip, S. R. (2001). *Multimedia for learning: Methods and development*. Boston: Allyn and Bacon.

Association, & National Council on Measurement in Education. (1985). *Standards for educational and psychological testing*. Washington, DC: Authors.

Arbaugh, J. B. (2001). How instructor immediacy behaviors affect student satisfaction and learning in web-based courses. *Business Communication Quarterly*, 64, 42-54.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bannan-Ritland, B. (2002). Computer-mediated Communication, ELearning, and interactivity: A review of the research. *The Quarterly Review of Distance Education*, 3(2), 161-179.

Bernard, R.M., Abrami, P.C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., Wallet, P.A., Fiset, M., & Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research*, 74(3), 370-439.

Bonk, C. J., & Cunningham, D. J. (1998). Searching for learner-centered, constructivist, and sociocultural components of collaborative educational learning tools. In C. J. Bonk & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse* (pp. 25-50). Mahwah, NJ: Lawrence Erlbaum Associates.

Bonk, C. J., & King, K. S. (Eds.). (1998). *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse*. Mahwah, NJ: Lawrence Erlbaum Associates.

Bower, B. (1995). Top five reasons why faculty resist distance education. Paper presented at the Association for Continuing Higher Education (ACHE).

Brewer, E., DeJonge, J. O., & Stout, V. J. (2001). *Moving to online: Making the transition from traditional instruction and communication strategies*. Thousand Oaks, CA: Corwin Press, Inc.

Brooks, L. How the attitudes of instructors, students, course administrators, and course designers affects the quality of an online learning environment. *Online Journal of Distance Learning Administration*, 4, site visited 12-8-04, <http://www.westga.edu/~distance/ojdla/winter64/brooks64.htm>

Bruner, J. (1996). *The culture of education*. Cambridge, MA: Harvard University Press.

Burge, L. (1988). Beyond Andragogy: Some Explorations for Distance Learning Design. *Journal of Distance Education* 3 (1). 5-23

California Distance Learning Project (2004). What is distance learning? Site visited 12-8-04, <http://www.cdlonline.org/index.cfm?fuseaction=whatis&pg=4>.

Candy, P.C. (1991). *Self-direction for lifelong learning*. San Francisco: Jossey-Bass.

Chute, A. G., Sayers, P. K., & Gardner, R. P. (1997). Networked Learning Environments. *New Directions for Teaching and Learning*, 71. 75-83.

Clark, R. E. (1994). Media will never influence learning. *Educational Technology Research and Development*, 42(2), 21-29.

Conrad, D. (2002). Deep in the hearts of learners: Insights into the nature of online community. *Journal of Distance Education*, 17, 1-19.

Cooney, D. H. (1998). Sharing aspects within aspects: Real-time collaboration in the high school English classrooms. In C. J. Bonk & K. S. King (Eds.), *Electronic Collaborators: Learner-Centered Technologies for Literacy, Apprenticeship, and Discourse* (pp. 263-287). Mahwah, NJ: Lawrence Erlbaum Associates.

Cranton, P. (1994). Self-directed and transformative instructional development. *Journal of Higher Education*, 65(6), 726-744.

Cross, K.P. (1981). *Adults as learners: Increasing participation and facilitating learning*. San Francisco: Jossey-Bass.

Dewey, J. (1938). *Experience and education*. New York: Collier Books.



Dickinson, D. (1995). Multiple technologies for multiple intelligences. In R. Fogarty & J. Bellanca (Eds.), *Multiple intelligences: A collection*. Arlington Heights: IRI/Skylight Training and Publishing, Inc.

Eastmond, D. V. (1998). Adult learners and internet-based distance education. *New Directions for Adult and Continuing Education*, 78, 33-41.

Egan, M. W., & Gibb, G. S. (1997). Student-centered instruction for the design of telecourses. *New Directions for Teaching and Learning*, 71, 33-39.

Frederickson, E., Pickett, A., Shea, P., Pelz, W., & Swan, K. (2000). Student satisfaction and perceived learning with on-line courses: Principles and examples from the SUNY Learning Network. *Journal of Asynchronous Learning Networks*, 4, site visited 12/3/04, [http://www.sloan-c.org/publications/jaln/v4n2\\_frederickson.asp](http://www.sloan-c.org/publications/jaln/v4n2_frederickson.asp).

Frey, B. A. (2003). Applying adult learning theory to the online classroom. *New Horizons in Adult Education*, 17(1).

Fidishun, D. (2000). Andragogy and technology: Integrating adult learning theory as we teach with technology. Penn State Great Valley School of Graduate Professional Studies – IT Conference Proceedings.

Garrison, D. R. (1990). An analysis and evaluation of audio teleconferencing to facilitate education at a distance. *The American Journal of Distance Education*, 4(3), 16-23.

Giltrow, D. (1989). *Distance Education*. Washington, DC: Association for Educational Communications and Technology. ERIC Document Reproduction Service No. ED 310 753.

Halsne, A.M., & Gatta, L. A. (2002). Online versus traditionally-delivered instruction: A descriptive study of learner characteristics in a community college setting. *Online Journal of Distance Learning Administration*, 5(1), 1-9.

Hara, N., Bonk, C. J., & Angeli, C. (2000). Content analysis of online discussion in an applied educational psychology course. *Instructional Science*, 28(2), 115-152.

Hardy, D. W., & Boaz, M. H. (1997). Learner development: Beyond the technology. *New Directions for Teaching and Learning*, 71, 41-48.

Hart, J. (1997). Best practices in the implementation of advanced educational technologies. *Education at a Distance*, 11(1), J4-J7.

Hillman, D. C. A., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *The American Journal of Distance Education*, 8(2), 30-42.

Huang, H. (2002). Toward constructivism for adult learners in online learning environments. *British Journal of Educational Technology*, 33(1), 27-37.

Imel, S. (1998). Technology and adult learning: Current perspectives (ERIC Digest No. 197 EDD000036). Washington, DC: Office of Educational Research and Improvement.

Johnson, D. W., & Johnson, R. T. (1996). Cooperation and the use of technology. In D. H. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology*. Mahwah, NJ: Lawrence Erlbaum Associates.

Jonassen, D.H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology*, 34(4), 34-37.

Jung, I. (2001). Building a theoretical framework of web-based instruction in the context of distance education. *British Journal of Educational Technology*, 32(5), 525-534.

Katz, R. N. (1999). *Dancing with the devil*. San Francisco: Jossey-Bass Publishers.

Keegan, D. (1990). *Foundations of distance education*. London: Routledge

Keegan, D. (2000). *Distance training: Taking stock at a time of change*. London: Rutledge Falmer.

Kelsey, K.D., & D'souza, A. (2004). Student motivation for learning at a distance: Does interaction matter? *Online Journal of Distance Learning Administration*, 7(2), Summer, 1-10.

Kennedy, P. (2002). Learning cultures and learning styles: myth-understandings about adult (Hong Kong) Chinese learners. *International Journal of Lifelong Education*, 21(5), 430-445.

Knowles, M.S. (1973). The adult learner: A neglected species. Houston: Gulf.

Knowles, M.S. (1980) *The modern practice of adult education: From pedagogy to andragogy*. New York: Cambridge Books.

Lindner, J.R., Dooley, K.E., & Kelsey, K.D. (2002). All for one and one for all: Relationships in a distance education program. *Online Journal of Distance Learning Administration*, 5(1), p. 1-9.

McIsaac, M. S., & Gunawardena, C. N. (1996). Handbook of research for educational communications and technology. In D. H. Jonassen (Ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Mehrotra, C. M., Hollister, C. D., & McGahey, L. (2001). *Distance learning: Principles for effective design, delivery, and evaluation*. Thousand Oaks, CA: Sage Publications, Inc.

Meister, J. C. (1998). *Corporate universities: Lessons in building a world-class work force*. NY: McGraw-Hill.

Merriam, S. B., & Caffarella, R. S. (1999). *Learning in adulthood*. San Francisco: Jossey-Bass Publishers.

Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Francisco: Jossey-Bass Publishers.

Mezirow, J. (1996). Contemporary paradigms of learning. *Adult Education Quarterly*, 46(3), 158-172.

Mezirow, J. (1997). Transformative theory out of context. *Adult Education Quarterly*, 48(1), 60-62.

Moore, M. G. (1989). Editorial: Three types of interaction. *The American Journal of Distance Education*, 3(2), 1-6.

Moore, M. G. (1989). *Effects of distance learning: A summary of the literature*. Congress of the United States Office of Technology Assessment.

Morrison, G. R., Lowther, D. L., & DeMeulle, L. (1999). *Integrating computer technology into the classroom*. Upper Saddle River, NJ: Prentice-Hall, Inc.

Muirhead, B. (2000). Enhancing social interaction in computer-mediated distance education. *Educational Technology & Society*, 3(4).

Nah, Y. (1999). Can a self-directed learner be independent, autonomous and interdependent: Implications for practice. *Adult Learning*, 11(1), 18-25.

Newsweek (2005). The technologist. *Newsweek*, CXLV(20), May 16, 2005, 16.

Nieto, S. (2000). *Affirming diversity: The sociopolitical context of multicultural education*. New York: Longman.

Northrup, P. T. (2002). Online learners' preferences for interaction. *The Quarterly Review of Distance Education*, 3(2), 219-226.

O'Donoghue, J., Singh, G., & Dorward, L. (2001). Virtual education in universities: a technological imperative. *British Journal of Educational Technology*, 32(5), 511-523.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace*. San Francisco: Jossey-Bass Publishers.

Payne, H. E. (1997). A Review of the literature: Interactive video in distance learning courses. *Education Journal*, 11(10), 1-16.

Pena-Shaff, J. Martin, W., & Gay, G. (2001). An epistemological framework for analyzing student interactions in computer-mediated communication environments. *Journal of Interactive Learning Research*, 12(1), 41-68.

Petraglia, J. (1998). The real world on a short leash: the (mis)application of constructivism to the design of educational technology. *Educational Technology Research and Development*, 46(3), 53-65.

Rivera, J. C., & Rice, M L. (2002). A comparison of student outcomes and satisfaction between traditional and web based course offerings. *Online Journal of Distance Learning Administration*. Site visited 12-8-04, <http://www.westga.edu/%7edistance/ojdl/fall53/rivera53.html>

Rosenberg, M. J. (2001). *E-Learning: Strategies for delivering knowledge in the digital age*. New York: McGraw-Hill.

Rossmann, M. H. (2000). Andragogy and distance education: Together in the new millennium. *New Horizons in Adult Education*, 14(1).

Russell, T. L. (1999). *The no significant difference phenomenon*. Raleigh: North Carolina State University.

Saettler, P. (1990). *The evolution of American educational technology*. Englewood, CO: Libraries Unlimited, Inc.

Schamber, L. (1988). Delivery systems for distance education. (ERIC Document Reproduction Service No. ED 304 111).

Sherry, L. (1996). Issues in distance learning. *International Journal of Educational Telecommunications*, 1, 337-365.

Shrum, L. (1999). On-Line education: A study of emerging pedagogy. *New Directions for Adult and Continuing Education*, 78, 53-61.

Sparks, B. (2001). A Sociocultural approach to planning programs for immigrant learners. *Adult Learning*, 12(4), 22-25.

Tennyson, R. D. (1996). Soft technologies: Instructional and informational design research. In D. H. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology*. Mahwah, NJ: Lawrence Erlbaum Associates.

Tesone, D.V., Alexakis, G., & Platt, A. (2003). Distance learning programs for non-traditional and traditional students in the business disciplines. *Online Journal of Distance Learning Administration*, 4(4), Winter, 1-10.

Threlkeld, R., & Brzoska, K. (1994). Research in distance education. In B. Willis (Ed.), *Distance education: Strategies and tools* (pp. 41-66): Educational Technology Publications.

Tomerson, J.D. (1996). Student perceptions of the affective experiences encountered in distance learning courses. *The American Journal of Distance Education*, 10(3), 37-58.

Ulrich, R. (Ed.) (1954). *Three thousand years of educational wisdom: Selections from great documents*. Cambridge, MA: Harvard University Press.

Urduan, T. (2001). *Statistics in plain English*. Mahwah, NH: Laurence Erlbaum Association.

U.S. Congress, Office of Technology Assessment. (1988). Power on! New tools for teaching and learning. OTA-SET-379. Washington, DC: US. Government Printing Office.

United States Distance Learning Association (2004). About us. Site visited 12-9-04, <http://www.usdla.org>

Verduin, J. J. R., & Clark, T. A. (1991). *Distance education: The foundations of effective practice*. San Francisco, CA: Jossey-Bass, Inc.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wagner, E. D. (1997). Interactivity: From agents to outcomes. *New Directions for Teaching and Learning*, 71, 19-26.

Withrow, F. (1997). Technology in education and the next twenty-five Years. *Technological Horizons in Education (THE) Journal*, 24(11), 59-61.

Ziegahn, L. (2001). Considering culture in the selection of teaching approaches for adults. Center of Education and Training for Employment, *Eric Digest*, EDO-CE-01-231, no. 231, 1-2.