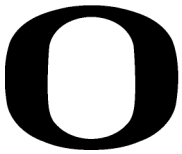

UNIVERSITY OF OREGON

APPLIED INFORMATION MANAGEMENT

Presented to the Interdisciplinary Studies Program:
Applied Information Management and the Graduate School of the University of Oregon
in partial fulfillment of the requirement for the degree of Master of Science

Computer Instruction and Andragogy: Best Methods to Teach the Elderly E-mail as a Communication Tool

CAPSTONE REPORT

J. Michael Cuciti
Owner/Systems Integrator
CBM Computer Solutions

University of Oregon
Applied Information Management Program

December 2005

722 SW Second Avenue
Suite 230
Portland, OR 97204
(800) 824-2714

Approved by

_____

Dr. Linda F. Ettinger
Academic Director, AIM Program

ABSTRACT

Computer Instruction and Andragogy: Best Methods to Teach the Elderly E-mail as a Communication Tool

Each year 351,000 people become senior citizens (U.S. Census Bureau, 2004). As families disperse geographically, there is a need for older adults to learn to use technology as a communication tool to remain connected to family. This study examines age-related barriers that hinder learning and identifies strategies and design considerations best suited to the elderly. Guidelines, grounded in andragogy (Knowles, in Bean, 2003) are provided to assist instructors who teach the elderly in face-to-face environments.

TABLE OF CONTENTS

ACKNOWLEDGEMENT

This paper began as an opportunity for this researcher to learn how to teach my elderly father to use the Internet and e-mail to communicate with family and friends. My father is the strongest, bravest, and smartest man I know; however, when he sits in front of a computer he shakes like a cold wet dog. I see that he has little idea what wonders computers can be. Due to short-term memory loss and other age-related barriers, I find that it takes a lot of patience and repetition for him to retain the ability to complete simplest computer activity, such as accessing the Internet or sending an e-mail. However, by using the methods recommended in this paper, I have seen improvement in his learning to use computer technology to communicate with others.

FIGURES AND TABLES

CHAPTER I – PURPOSE OF STUDY

BRIEF PURPOSE

The purpose of this study is to explore and describe the most effective methods for teaching the elderly (Becker and Coleman, 2005) to learn and understand the use of the Internet and e-mail as a viable tool for communication (Hudson, 1996). This study is based on writings from the field of andragogy, or the theory of teaching adults, as it applies to the elderly (Kearsley, n.d) on a one-to-one basis or teaching in a small-group classroom environment (Stuur, 2005). The intended audience is computer instructors who specifically train the elderly to learn to use the internet and e-mail as a communication tool (Lieb, 1991 and Hudson, 1996).

This is a literature review study (Leedy & Ormrod, 2001). Material is gathered from, but not limited to, previous research studies, journals, and articles pertaining to andragogy (Kearsley, n.d.) and studies of age-related barriers, particularly in the use of technology (Fainges, 1999). Literature published between 1994 and 2005 is collected and subjected to a content analysis (Leedy and Ormrod, 2005). The goal of the content analysis is to identify:

(1) Age-related barriers that hinder the elderly from learning to use e-mail (Clarkson and Bradford, 2001); and

(2) Strategies best suited to teaching the elderly that can address these age-related barriers (Wesselhoff, 2000).

The primary outcome of the study, based on the content analysis results, is formatted as a table (see Table 2: Preferred Strategies for Teaching the Elderly to use the Internet and E-mail) that presents a common set of teaching strategies (Becker and Coleman, 2005) and related recommendations designed to assist instructors who teach e-mail to the elderly (Lieb, 1991 and Hudson, 1996).

FULL PURPOSE

The US Census Bureau (2004) calculates there are upward of 36 million adults over the age of 65 and expects this number to grow to 86.7 million by the year 2050, a 147 percent growth. Approximately 351,000 people move to the category of senior citizens each year and account for 12 percent of the U.S. population. Nielsen (2002) states the elderly are living longer and are more active, and are very interested in the use of the Internet and e-mail as a communication tool to stay informed. While an aging population can be seen as a medical breakthrough, some view the elderly as a blight, as they believe the elderly are a burden to society and families, use too many social services, and have no interest in further educational opportunities (Lewin, 2001). Williamson, Bow, and Wale (1997) speculate our society does not value the knowledge our elderly have obtained, based on a belief that older adults are incapable of learning new technologies or seeking educational opportunities that are associated with youth.

When it comes to the use of computer technology, it is commonly believed that the elderly have a negative attitude that keeps them from using the Internet and e-mail which is based on a lack of understanding (Czaja and Sharit, 1998), mistrust of and/or

discomfort with technology (SeniorNet, 1998 and Christopher, 2000). However, it is important to remember that older adults have not had the benefit of computer technology, as most of their working lifetimes computer technology did not exist (Browne, 2000). Because seniors did not grow up in the Information Age, it may be too easy to assume that they have no interest in using technology. Springer (2000) believes that in general, the elderly are more at ease using the U.S. Postal Service to send a hand-written letter than using a computer to send electronic mail (e-mail). This belief is grounded on the notion that the elderly are set in their ways and are not easily swayed to try new or different ways of doing what they have done in the past (Christopher, 2000). Other beliefs assert that the elderly lack the mental capacity to learn new technology (Saunders, 2004). As a result, the elderly are often overlooked for training opportunities either at work, within the private sector, or in programs offered through public services, such as libraries or senior centers (Carroll, 1996 and Christopher, 2000).

However, research shows that the elderly are very capable of learning to utilize computers (Crowell, 1997 and Palm, 2000) and demonstrate a great interest in using technology as a communication tool to keep in contact with friends, children, and grandchildren (Czaja and Sharit, 1998, Holba-Puacz, 2000, and Saunders, 2004). SeniorNet (1998) is a non-profit organization whose mission is to "to provide older adults education for and access to computer technologies to enhance their lives and enable them to share their knowledge and wisdom." Studies by this organization dated back to 1998 show that 41 percent of older adults thought they had no need to learn about or use computers, 13 percent stated they were too old to learn, and 5 percent cited a lack of trust

in technology. But, a more current study by the SeniorJournal.com (2005) states that those seniors ages 65 – 74 make up 5.4 percent of Internet users, and of those 35.9 percent access the Internet on a regular basis. In a one-year period spanning October 2002 to October 2003 seniors increased their numbers in on-line access from 7.6 million to 9.6 million (25 percent increase) making them the fastest growing group using the Internet (Nielsen Ratings, 2004). However, this percentage leaves the majority of older adults in a group who do not access the Internet or use e-mail (Earthlink, 2005), providing a substantial opportunity for appropriately targeted education.

SIGNIFICANCE

Though older adults may no longer be as resistant to the idea of using computers as once thought (Alder, 1996), the educational problem still remains that computer training is most often designed in ways specific to younger learners and is not "age-appropriate" for the elderly (Bean, 2003 and Burch and McGrath, 2004). Kearsley (n.d.), posits that there is a difference in learning style that requires consideration when teaching older adults (known as andragogy) versus when teaching children (known as pedagogy). Based on the work of Malcolm Knowles, Kearsley (n.d) and Bean (2003) examine the concepts of andragogy as it applies to teaching older adults. Concepts include the following principles:

(1) Adults need to know why they need to learn something (self directed/motivated);

(2) Adults need to learn experientially (experienced-oriented);

(3) Adults approach learning as problem-solving (goal-oriented); and

(4) Adults learn best when the topic is of immediate value (relevancy)

(Bean, 2003 and Kearsley, n.d.).

These principles support the notion from Bean (2003) that in terms of learning to use the Internet and e-mail as communication tools, the elderly must want to learn for a specific purpose, and a newly acquired skill can be used immediately (Bean, 2003). However, instructional methods and settings designed for the young often prove to be problematic when teaching older adults (Bean and Laven, 2003). Seniors typically start using computers to send e-mail and move on to researching health concerns, financial issues, and recreation as they learn more about what is available on-line (Trogg, 2005), and as they become more familiar with the technology. Seniors are living longer, staying healthier (Manheimer, 2002), and have more leisure time (Microsoft, 2002). The elderly are seeking additional educational opportunities to enhance life-long learning and Manheimer (2002) suggests this is a continuing tend.

This study explores and describes the most effective methods and settings for teaching the elderly (Becker and Coleman, 2005) to learn and understand the use of the Internet and e-mail as a viable tool for communication (Hudson, 1996). This study also explores how instructors can adapt course materials to target the elderly learning styles (Fainges, 1999). In this study, the idea of "most effective" is determined with the set of andragogical teaching principles based on the ideas of Knowles (Kearsley, n.d.), provided above.

The intended audience of this study is computer instructors who specifically train the elderly to learn to use the internet and e-mail as a communication tool (Hudson,

1996). Computer instructors encounter unique challenges when teaching older adults the use of the Internet and e-mail, as they are using computer resources in greater numbers (Holba-Puacz, 2000 and Bean and Laven, 2003). An example is that younger instructors often do not have the patience to teach and re-teach material to the elderly, who may not comprehend information the first time around (Springer, 2000). This study may also be of interest to others who teach the elderly, directly or indirectly, including web designers, computer-based training (CBT) developers (Christopher, 2000), healthcare professionals (Stewart 1992 and Bedell, 1999), librarians (Bean and Laven, 2003 and Holba-Puacz, 2000), businesses interested in marketing to older adults (Flanigan, 2005) and family members (AARP, 2003). A 2003 study released by the American Association of Retired Persons (AARP) reveals that 78 percent of the elderly who own a computer in the home turn to their children or grandchildren first for technical assistance. However, Bean and Laven (2003) suggest family members may not have the proper skills to teach and many times confuse the elderly by moving too fast leaving them frustrated, as do younger instructors (Stephenson, 2002).

This study is designed as a literature review (Leedy & Ormrod, 2001) to identify characteristics on how older adults learn to use technology. The literature is collected from many different areas of study including education, healthcare, psychology, gerontology, and computer science, as it pertains specifically to the elderly learns. A literature review allows the researcher to collect and analyze selected data in a broad sense, then look for similarities within the data to explain how it fits the significance of this study (Overholtzer, 2004). The qualitative nature of this study also allows the

researcher to interpret data from published research; build upon theories that might lead to further insight and/or concepts (Leedy & Ormrod, 2001, p. 134 & 135).

This study uses a content analysis methodology employing conceptual analysis to examine the selected data (Palmquist et al, 2005). This allows identification of selected terms and phrases within the data to be used in this study and to identify terms and phrases which do not fit within the scope of this study. The goal of the content analysis is designed to identify:

(1) Age-related barriers that hinder the elderly from learning to use the Internet and e-mail (Clarkson and Bradford, 2001); and

(2) Strategies best suited to teaching the elderly that can lessen the effects of age-related barriers (Wesselhoff, 2000).

The first step in conceptual analysis is reading selected materials that identify instances of age-related barriers and how the authors recommend or have lessened the effects of those barriers through modifying the classroom environment. An example of classroom environment modification may include adjusting the room temperature (comfort), lessening the noise level (hearing), reducing class sizes (student/instructor interaction), and/or employing larger computer monitors (visual). The result of this first step is a list of age-related barriers and recommended changes to make the teaching environment more "age friendly" (see Figure 1: Age-Related Barriers and Figure 2: Related Classroom Environment Modifications).

The second step of the process is to identify instances of which teaching methods the authors have reported as successful when used to teach the elderly the use of the Internet and e-mail to communicate with friends and family. Examples of successful teaching methods include patience (Becker and Coleman, 2005), class sessions reduced to 45 – 50 minutes, and small class sizes (Stephenson, 2002). The result of this analysis is a list of teaching methods recommended when teaching the elderly student to use e-mail technology (see Figure 3: Recommended Teaching Methods).

The final outcome of this study is a table (see Table 2: Preferred Strategies for Teaching the Elderly to use the Internet and E-mail) that combines the two lists that result from the conceptual analysis: i.e. the list of age-related barriers and the list of recommended teaching methods. Table 2 is framed to assist the instructor to select teaching strategies and establish an age-appropriate teaching environment designed to address the unique challenges faced when instructing older adults to use the Internet and e-mail technologies.

LIMITATIONS

The following set of limitations frames choices made by the researcher in relation to both content and method, as they apply to this study.

Time frame: The first known study of any significance of older adults and the use of computer technology was written in 1973 (Shapiro, 1995) and extolled the benefits of technology to help older adults become more independent. However, the bulk of research

studies were written between 1994 and 2005 and thus are the focus of this study. Literature published prior to 1994, with few exceptions, does not reflect current data pertaining to the elderly and the use of computer technology (Shapiro, 1995) and much of the data prior to 1994 assumes the elderly have no interest in computers or are unable to learn to use computers, or there is not enough data available (Hudson, 1996).

Literature sources: This study is based on writings from the field of andragogy, as it applies to the elderly (Kearsley, n.d) on a one-to-one basis or taught in a classroom environment (Stuur, 2005). Books and articles pertaining to methods of teaching older adults are used as a platform to find additional resources for study. One specific book is used; Internet and E-mail for Seniors, by Addo Sturr (2005). This book is selected because it is a prime example of how to address common age-related barriers, such as using larger type print, colors better viewed with older eyes, many pictures, short lessons, and hands-on exercises.

Target population of study: According to Springer (2000), there are three types of learners:

- "The Traditional" remain in the same style of living as they have for the past X number of years. They drive the same car, live in the same neighborhood, and believe that "if it ain't broke, don't fix it." Chances are this group is not interested in using computers.

- "The Pseudo-Youth" update their lifestyle by changing clothing and hair to keep up with modern tastes. However, they are not likely to use computers as they may feel uncomfortable with technology that is new to them.
- "The Accepter" view new styles and technology and accept that that life changes and they readily make changes, letting go of the past and looking toward the future (Springer, 2000).

The target population for this study is The Accepter; older adults who have an interest in learning to access the internet and use e-mail (Holba-Puacz, 2000).

Target population descriptors: The term elderly refers to adults over the age of 65. The elderly reflects the age group that has most likely lived and worked in an environment without the benefit of computers or computer training (Browne, 2000). The term "elderly" also applies to additional descriptions such as older adults and seniors (Nielsen, 2002 and Campbell and Nolfi, 2005, and Sheridan, 2005)

Area of computer instruction: The study is limited to instruction in the use of the Internet and e-mail. This selection is made as a starting point to potential instruction in other areas of technology. Studies show older adults use e-mail to remain in contact with friends and family members (Czaja and Lee, 2001) and move to other applications when they become more familiar with computer technology (Flanigan, 2005).

Effective teaching methods: Effective methods of teaching the elderly, as addressed in this study, are determined in relation to the set of andragogical teaching principles based

on the ideas of Knowles (Bean, 2003) provided above. Selected effective methods are recommendations and opinions of the authors cited in this study, of which methods worked best for them when teaching older adults.

DEFINITIONS

Accessibility: Availability of computer technology in regards to income, education, and age-related barriers (Browne, 2000).

***Age-related Barriers*:** Those barriers such as sight and memory which may have an impact on their learning abilities as one grows older (Kunin, n.d. and Bean and Laven, 2003).

Ageism: A (generally) negative bias against older adults. Definition obtained from http://www.webster.edu/~woolflm/ageism.html.

***Andragogy*:** The theory of teaching adults based on four principles about adults learning versus the theory of how children learn (Kearsley, n.d.). The four principles are: 1. adults are self-directed; 2. adults learn by hands-on experimentation; 3. adults learn to problem-solve; and 4. adults learn best when the topic is currently relevant and can be utilized immediately (Bean, 2003).

Attitude: How older adults think about computer technology as compared with more experienced young adults (Czaja and Sharit, 1998).

Cognition: Processing speed, comprehension, memory, spatial acuity as it applies to older adults (Bean, 2003).

Computers: A programmable electronic device that can store, retrieve, and process data. Definition obtained from http://www.m-w.com/cgi-bin/dictionary

Digital Divide: Inequities of Internet access (Castells, 2001).

Elderly (also applies to *Senior citizens* and *Older adults*): Those adults over the age of 64 (Nielsen, 2002 and Campbell and Nolfi, 2005, and Sheridan, 2005).

E-mail (e-mail or Electronic Mail): **A** text-based (can contain graphics) mail message sent via a computer from one person to another (could also be one to many). Definition obtained from http://vygotsky.ced.appstate.edu.

Effective teaching method: The methods of teaching older adults which motivate and reinforce course material and help seniors retain and transfer the material for frequent use as a communication tool (Lieb, 1991).

Gerontogogy: The study of teaching older adults (Manheimer, 2002).

Gerontology: Study of old people (Lemieux, 2000).

Information Age**:** Techo-economic innovations started in the early twentieth century that moved society out of the Industrial Age (Webster, 2002).

Instructors: Those that teach adults to use the Internet and e-mail (Czaja and Lee, 2001 and Bean, 2003).

Internet**:** Refers to the global information system that –

> (i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons;
>
> (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and

(iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein" (Federal Networking Council, 1995).

A Department of Defense experiment in the 1980s to link computer systems together and enable communications between all attached points even when a link has been disconnected (Sturr, 2005 and Castells, 2001).

Learning: The act, process, or experience of gaining knowledge or skill. Definition obtained from http://education.yahoo.com/reference/dictionary/entry/learning

***Pedagogy*:** Theory and methods of teaching (Kearsley, n.d.).

Sticky Icon*:* A way to slow the mouse cursor for the elderly to better access and "click" on an icon (Lok, 2004).

***Third age*:** Those adults who have reached retirement age (65); as in youth, middle age, and third age (Flanigan, 2005).

PROBLEM AREA

Jaeger (2004) believes when it comes to the use of the computer technology, the elderly are further behind the majority of the population and less likely to use the Internet. Castells (1996) concludes ageism is a major factor that discourages the elderly from using computers. Ageism is discrimination against people who are considered "old" based on an arbitrary definition of chronological age, and excludes the elderly from policies and procedures pertaining to technology (Foskey, 2001). According to the US Census Bureau (2004), there are 36.5 million senior citizens in the United States, accounting for 12 percent of the overall population; this proportion is expected to reach

21 percent (or 86.7 million) by 2050 (US Census Bureau, 2004). This trajectory makes the elderly the fastest growing segment of the population (Nielsen, 2002). Adults who are now over the age of 65 did not have the benefit of receiving training to learn to use the Internet or e-mail (Browne, 2000). Springer, (2000) believes that in general, the elderly are more at ease using the U.S. Postal Service to send a hand-written letter than using a computer to send e-mail (Springer, 2000). However, the uses of computers are becoming more of a necessity in everyday life, (i.e. voting machines and automatic teller machines), and older adults who did not have the benefit of computer training have a steep learning curve. Bean (2003) believes that it may be easier for the elderly to ignore computer technologies altogether than it is to gain knowledge about them.

Common belief proclaims that the elderly don't have the mental capacity to learn new technology (Saunders, 2004). However, research shows that the elderly are very capable of learning to use computers (Crowell, 1997 and Palm, 2000), and demonstrate a great interest in using the Internet and e-mail as a way to communicate with and remain in contact with friends, children, and grandchildren (Czaja and Sharit, 1998, Holba-Puacz, 2000 and Saunders, 2004).

Despite a history of misconceptions professing that older adults cannot learn computer technology; this thinking is changing (Lewin, 2001). However, as Bean (2003) discovered, even when older adults express an interest in learning to use the Internet and e-mail, there is little information pertaining to teaching methods targeted at seniors. Bean (2003) also states that many older adults are frustrated with instructors who may assume

they have a basic understanding of technology or who go through lessons too quickly. Younger instructors may also not understand that older adults are up to 2.5 times slower than younger students during training sessions and may require up to as much as 3 times the teaching assistance (Czaja and Lee, 2001).

Bean (2003) suggests the elderly do not use computers until such time there is a need for them to learn (Bean, 2003 and Kearsley, n.d.). However, when the need arises, older adults may be faced with difficulty due to the instructional methods used, which are often more specific to younger students (Bean and Laven, 2003). The elderly require instruction that is flexible (Fainges, 1999 and Czaja and Lee, 2001), targeted specifically at individuals who may have age-related barriers such as sight and memory losses which may have an impact on their learning abilities (Kunin, n.d. and Bean and Laven, 2003). It is a mistake to take no notice of the great potential that the elderly have for life-long learning (Williams and Williams, n.d.).

Manheimer (2002) suggests that the answer lies in the field of andragogy. The focus of this field of study is how adults learn. Research findings are applied to the design of teaching strategies best suited to teach the elderly the use of technology. Andragogy places emphasis on drawing from life experiences and prior training and is based on the studies of Malcolm Knowles (Kearsley, n.d.). Knowles' studies of andragogy makes four assertions about why and how adults learn:

- Adults are self-motivated and self-directed;
- Adults seek to learn what is relevant to satisfy an immediate problem;

- Adults need to learn from experiences; and
- Adults learn to resolve a problem

(Kearsley, n.d., Smith, 1999, and Bean, 2003).

Knowles believes older adults have a willingness to learn, and further recommends adult educational programs be targeted at "*life application categories"* (Smith, 1999). In other words; teach older adults something they can use immediately in their lives.

Drawn by the convenience, accessibility to vast amounts of information, and an inexpensive means of communicating with family and friends, greater numbers of older adults are accessing the Internet (Morgan, 1999). There is a need to help instructors, and others who teach the elderly, to incorporate the teaching strategies best suited for older adults. An understanding of andragogy (or genontagogy) would streamline the educational process for both the instructor and adult learner (Manheimer, 2002). Lewin (2001) suggests that a concerted focus on teaching older adults how to utilize the Internet and e-mail (or computer technology, in general) is lacking.

Computer instructors benefit by learning what methods best work for the elderly to lessen the levels of frustration and to enhance to teaching experience (Fainges, 1999). The elderly benefit by learning that computers are neither magical nor breakable (Fainges, 1999). The mental well-being of older adults also benefits from proper instruction in the use of the Internet and e-mail (i-newswire, 2005). Studies have shown the use of the Internet and e-mail lessens depression among seniors (i-newswire, 2005), gives them an opportunity to socialize with others lessening the feeling of isolation

(Palme, 2000 and Saunders, 2004), and gives them a renewed sense of worth (Shapiro, 1995, McCort, Telsavara, Scipio, and Stanton, 2001, and Saunders, 2004).

CHAPTER II – REVIEW OF REFERENCES

This chapter is a review of key references used to frame the Purpose, Problem Area, and Method of Study of this paper. Selected references are presented alphabetically as an annotated bibliography and provide a brief narrative of their contents.

Bean, C., (2003). Meeting the Challenge: Training an Aging Population to Use Computers. Southeastern Librarian 51(3).

Bean is a librarian with the North County Regional Library in Palm Beach, Florida, where the majority of the population is elderly. Bean discovered this portion of the population posed challenges when teaching computer technology; however she found little supporting documentation at the time she wrote her study. Instead, Bean discovered that older adults had difficulties with existing methods used to teach basic computer courses offered by the library system. Like Springer (2004), Bean believes the elderly are a portion of our society who have missed out on the Information Age but still have a need to learn and understand computer technology.

Bean found the elderly are using services provided by the local libraries to take classes to learn about the Internet. The instructors of these classes also discovered the age-related barriers faced by older adults, such as physical and cognitive barriers. Bean believes there is a need for training targeted specifically at older adults. Training methods and classes require special attention to age-related barriers and classroom environment.

Her experiences show that manipulation of training material and environment the elderly will improve their computer skills and retain more subject matter. Bean describes the types of age-related barriers often faced by the elderly and explains which teaching methods best apply to the elderly. Similar to Kearsley (n.d.), Bean bases her teaching philosophy on the work of Malcolm Knowles (see Kearsley below) and the four assumptions of older adult learning.

This reference is used heavily in the Significance portion of this paper to establish that the learning styles of the older adult are different than those of the younger student. This reference is used to describe the motivation for older adults to learn, presented in the Significance section of the Purpose chapter of this paper. Bean's article provides a definition of *cognition*. Bean is one of two authors selected to develop the definition of the terms *andragogy* and *instructor*, as used in this study. Bean's study is also used to frame of the Problem Area in this paper, to show there is a need for the elderly to learn computer technology.

Bean, C. and Laven, M., (2003). Adapting to Seniors: Computer Training for Older Adults. Retrieved September 16, 2005 from The University of Arizona, School of Resources and Library Science website at http://dlist.sir.arizona.edu/260/.

Bean and Laven are librarians with the North County Regional Library in Palm Beach, Florida, who conduct computer training for older adults. This paper is referenced in the Digital Library for Information Sciences and Technology (dLIST), School of Information Resources and Library Science and Learning Technology Center at the

University of Arizona. This reference builds upon Bean's earlier paper, Meeting the Challenge: Training an Aging Population to Use Computers. In this case as well, Bean's paper is pertinent to the purpose of this study. By demonstrating the special needs of older adults and suggesting ways to adapt to those needs, instructors can overcome some effects of age-related barriers by adapting teaching methods to. Bean and Laven suggest classes are routinely targeted at younger learners and are difficult for older adults. Based on previous research and experiences, Bean and Laven made changes to instruction targeted to older adults. Some of those changes are:

(1) Repetition, slower pace, and hands-on practice;

(2) When introducing new terms, use concepts associated with words familiar to the elderly. An example is associating the word "icon" to "picture";

(3) Use printed material that take in account for age-related barriers. An example is course material printed in larger font; and

(4) Patience.

Bean and Laven conclude this paper by suggesting techniques used to teach younger students are not age-appropriate for the elderly student and modifications are required for older adults to be successful.

The context of this reference is used to frame the Significance portion of this study. Bean and Laven point out a large number of older adults are using the public library system to take computer classes and face unique challenges which are not addressed by current training methods. Bean and Laven are one of two authors selected to

develop the definition of the term *age-related barriers*, as used in this study. Bean and Laven's study is also used to support the Problem Area in this paper, to show there is a need for the elderly to learn in an environment that is age-appropriate.

Fainges, K., (1999). How Older Learners Want to Learn Computer Applications? Retrieved September 15, 2005 from http://www.users.bigpond.com/sagatech/pr01.htm.

Fainges is a technology instructor at a technical institute and co-owns a computer tutoring business mainly targeted at the elderly. This paper is a pilot study designed to provide insight to private computer tutors on how to best teach the elderly the use of computer technology in contrast to the younger student. The author addresses several age-related problems facing the elderly, such as decline in sight and cognition. Fainges' research shows older adults are motivated to learn, but require step-by-step instruction as well as process training. While the author states that older adults may have a negative view of computer technology, she also feels this is due to a lack of understanding or training. She suggests the older adult learner becomes less anxious as they become more familiar with computer uses.

Fainges discusses barriers related to issues identified by instructors and elderly students. These issues are identified as:

(1) Use of unfamiliar computer jargon;

(2) Instruction moving at too fast of a pace;

(3) Lack of age-appropriate hardware, such as keyboards and mice;

(4) Misconception that older adult cannot learn new technology; and

(5) Fear of feeling "less-than-intelligent".

Fainges, like Bean (2003) and Springer (2004), draws on andragogy, the study of how adults learn, and bases her adult learning principles on the works of Knowles (1984). She suggests older adult learners must be actively involved in the training process and that repetition and hands-on exercises are the best activities for retaining course material. The author states that the instructor must demonstrate both a positive attitude and respect for the elder student when teaching the elderly.

Fainges concludes that the elderly are very motivated and, with the proper training, can become experts in the use of the Internet and e-mail as a communication tool. However, she warns the instructor must be aware of age-related barriers and be patient.

This reference is used in the Brief Purpose and Significance area of this study to point out a need for instructors to adapt course materials to target the elderly learning styles. It is also used in the Problem Area to suggest instructors require flexibility in teaching the elderly student to reduce frustration and to enhance the learning experience.

Hudson, B., (1996). Teaching Computers to Senior Citizens. Retrieved from http://www.seniorcomp.org/essay.html.

Hudson founded SeniorComp in 1995, an educational program that seeks to introduce senior citizens to the world of computers. SeniorComp is partnered with Alamo PC, a non-profit organization which trains and teaches older adults in the use of computer technology. Hudson started SeniorComp to fill a need for the elderly to have a place to learn computers in a non-threatening location in a peer environment. SeniorComp has been operating successfully for seven years in San Antonio, Texas and is the only organization that specifically teaches older adults in the area (Personal communication, Nov 7, 2005). Hudson states the aging population is healthier, living longer, and is more active then previous generations. He uses statistics provided by the U.S. Senate to relate that older adults are of increasing importance and very powerful financially which impacts society. Hudson further states studies show aging does not necessarily have negative effects on cognition or creativity, barring illnesses. Also, despite contrary expectations, the elderly have the ability to learn new technologies with little problem, except for those problems that are inherent with aging, such as decline in hearing and sight.

Hudson relates his teaching experiences with the elderly using computer technology and finds the benefits are great. He suggests many of the elderly are alone or unable to interact with others due to an age-related barrier. Hudson believes learning and using the Internet and e-mail as a communication tool allows the elderly to have a "virtual door" to the outside world to keep in contact with friends and family. He states

benefits to the elderly include a reduction to the feeling of isolation and an increase in mental stimulation.

Hudson's paper also posits some of the reason why older adults learn, based on Knowles' ideas (1984); including motivation when learning is relevant in their immediate lives. He relates there are age-related barriers the elderly face and gives some examples, such as the increase in the time required to teach the elderly and difficulty with loss of motor skills.

In conclusion, Hudson states that while the older adult learner is very motivated to learn, teaching programs for the elderly must be flexible, and the classroom environment must place the student at ease to enhance the learning experience.

Hudson's reference is used to frame the Brief Purpose to identify the target audience of this study. It is also used in the Significance and Limitation section to suggest there is little data pertaining to effectively teaching the elderly.

Kearsley, G., (n.d.). Explorations in Learning & Instruction: The Theory Into Practice Database, Tip: Learning Domains, Computers. Retrieved September 24, 2005 from http://tip.psychology.org/computer.html and

Kearsley, G., (n.d.). Explorations in Learning & Instruction: The Theory Into Practice Database, Tip: Learning Domains, Andragogy (M. Knowles). Retrieved September 24, 2005 from http://tip.psychology.org/knowles.html.

Kearsley has a Ph.D. in education and was instrumental in assisting with the creation of SeniorNet, an organization devoted to seniors and the use of computer technology. Kearsley bases his knowledge of teaching the elderly around the works of Malcolm Knowles, "the central figure in US adult education in the second half of the twentieth century" (Smith, 2002). Kearsley cites that andragogy makes four assumptions regarding the reasons why older adults want to learn:

(1) They are self directed;

(2) They learn through experience;

(3) They need to solve a problem; and

(4) They have an immediate need.

Kearsley suggests teaching materials must be designed specifically for and targeted to older adults, and should be appropriately configured to enhance the learning experience. He suggests age-appropriate course material is a motivator to learning.

This reference is used in the Brief Purpose portion of this paper to introduce how this study uses learning techniques targeted at older adults. In the Significance section, this reference is used to describe and examine the concepts of andragogy, as it applies to teaching older adults. Kearsley's document provided the definition of *pedagogy* and he is one of two authors selected to provide the definition of *andragogy*, as used in this study. In the Limitations portion of this paper, Kearsley's article points out literature used in this study are limited to those that reference teaching the elderly computer technology. In the

Problem Area section, Kearsley's article is used to explain the works of Malcolm Knowles and how it relates to teaching the elderly.

Krippendorff, K., (2004). Content Analysis: An Introduction to Its Methodology, California: Sage Publications.

This book is a guide to writing a content analysis study and its methodology. Krippendorff explains the history and purpose of content analysis. This reference is a step-by-step explanation of how to conduct a content analysis study. The book is divided into three parts; however, for the purposes of this study, only chapters 1 and 7 are used. Chapter 1 is a summary of the history of content analysis and explains how content analysis is used for quantitative newspaper analysis, propaganda analysis, and qualitative approaches to content analysis. In chapter 7, Krippendorff explains the functions of recording and coding data, what type of training coders require, and how to define the meaning of data through coding.

Content from chapters 1 and 7 of Krippendorff's book are used to guide the data collection process of this study, presented in Chapter III – Method of Study.

Leedy, P. and Ormrod, J., (2005). Practical Research, Planning and Design *(8th Ed.), Characteristics of a Proposal* (pp 142 -144). New Jersey: Prentice Hall.

This book is required reading for the Research Methods course offered through the University of Oregon for the Applied Information Management (AIM) Program. It is used as a roadmap to complete this study. Leedy and Ormrod explain, through written material and examples, how research is properly conducted. The book is divided into five parts, starting with the definition and purpose, then identifying and planning, to methodologies (qualitative or quantitative research), and finally preparing the research paper. This study uses the qualitative method for research.

Data is collected which pertain to research, determination of research method (qualitative or quantitative), and method of record keeping. Data used from this resource are included in the Purpose and Method of Study sections of this study as stated above.

Lewin, M., (2001). "Equal with Everyone": Computers in the Lives of Older People. Retrieved October 2, 2005 from http://www.Odeluce.stir.ac.uk/lewin/Disertation.htm.

Lewin conducted this study as a student completing her Master's program at the University of Sterling. She is employed as a Social Worker for the city of Edinburgh, Scotland, and is responsible to teach the elderly the use of computers. Although her study is based in Europe, it has global applications. Lewin's study pertains to whether or not the use of the Internet by the elderly will promote social inclusion. The author suggests the elderly are discriminated against and thought of a burden on social programs, however, she indicates this thinking is changing and the use of computer technology is becoming more prevalent in their lives.

Lewin's research shows that the industrial age has spread families to different geographical locations. The elderly are living longer and are healthier and do not want to be dependent on others. For this reason, Lewin suggests the use of the Internet and e-mail is used as a communication tool to keep family in contact.

Lewin's research focuses on several barriers which included age-related barriers, learning abilities, and ageism. She discovers there is nothing that can be done to reduce age-related barriers; however there are environmental changes that lessen the effects age-related barriers have when using computers. The learning abilities of the elderly in her study vary, but in most cases the students have positive attitudes and are able to learn the course material as long as accommodations are made to the methods of teaching, such as slower pace, patient instructors, and assurance that what is taught is understood before moving to the next subject.

Lewin's research not only discovers that using the Internet and e-mail to communicate is a benefit to the elderly, she also discovers other benefits as well which include giving the elderly a new sense of freedom, mental stimulation, and higher self-esteem.

This reference is used to frame the Purpose section of this study by suggesting although the elderly are living longer, and are more active, there are still perceptions by some that believe the elderly are a burden on society and use too many social services.

This reference is also used to frame the Problem Area section to suggest focus on teaching older adults the Internet and e-mail (or computer technology, in general) is lacking.

Palmquist, M., et al, (2005). Content Analysis. Writing@CSU. Colorado State University Department of English. Retrieved October 7, 2005 from http://writing.colostate.edu/references/research/content/.

This website is posted on the University of Oregon's Blackboard website and is recommended reading for the Applied Information Management (AIM) Master's Program Capstone course. It is an external link to Colorado State University's Writing Center. This website introduces the researcher to the history of content analysis and offers two methodologies to conducting content analysis; Conceptual and Relational. Palmquist divides the contents of this website into nine sections which include examples and a glossary of key terms. He also presents an annotated bibliography for those who wish more explanation of content analysis.

This website provides the means for the researcher to conduct the content analysis of this paper, using the conceptual analysis process. This website explains the 8 step process to coding selected material for this paper and it is detailed in Chapter III - Method of Analysis.

Saunders, E., (2004) Maximizing Computer Use Among the Elderly in Rural Senior Centers. Educational Gerontology, Vol 30, Issue 7, pgs 573 – 585.

Saunders is a professor of Social Work at the University of Iowa. This reference was published in the August 2004 issue of Educational Gerontology. Saunders' article references the elderly living in rural America and the consequences of excluding them from using computers to access the Internet and e-mail to communicate with friends and family. His focus is on the benefits of the elderly using technology as an empowerment tool. Saunders outlined several benefits, such as enhanced quality of life, fewer suicides, freedom from depending on others, improved psychological well-being, and increased self-confidence. His work cites children of the elderly want their parents to use e-mail as a way to keep in contact and many times provide a computer for them to use. However, Saunders suggests there is a lack of training and/or facilities that target the elderly.

Saunders' paper reveals four major areas of concern pertaining to the use and access to computer technology:

(1) Age-appropriate tutorials and lessons;

(2) Affordable computer systems;

(3) Age-appropriate classroom environment and adaptability; and

(4) Affordable repairs.

Saunders also points to five common reasons why older adults discontinue using computers:

(1) Age-related barriers;

(2) Physical environment barriers;

(3) Lack of facilities;

(4) Personal reasons; and

(5) Hardware/software limitations.

This reference is used to frame the Purpose section of this paper and as part of the Problem Area. Saunders dismisses the theory that the elderly do not have the mental capacity to learn new technology. Saunders further suggests the elderly have a great interest in using the Internet and e-mail as a communication tool with age-appropriate modification to current teaching methods.

Springer, S., (2004). Inclusion of Older Adults in Higher Education…The Last Frontier. Retrieved May 17, 2005 from http://www.celt.lsu.edu/CFD/E-proceedings04/Springer.pdf.

Springer is a professor of Occupational Education at Texas State University at San Marcos. His work addresses the difficulty the elderly face in moving from a less technical communications environment (telephone or U.S. Postal Service) to an environment that is dependent on electronic technology (Internet and e-mail). Springer suggests that the rapid change in technology offers an opportunity for the elderly to learn and exchange information. This article also addresses age-related barriers faced by older adults, such as diminished manual dexterity or cognition. Springer suggests age-related

barriers are the cause for older adults to be excluded from communications available through computer technology.

Springer addresses three groups of older adults in relation to technology use: The Traditional Type, who never use computers; the Pseudo-Youth Type, who update their lifestyle, but are not likely to use computer technology; and the Accepter Type, who accept the change in lifestyle and are interested in using computers.

Springer concludes his article with a recommendation of seven steps to assist instructors in teaching the elderly the Internet and e-mail (or computer technology in general). They are:

(1) Instill confidence;

(2) Keep teaching sessions short;

(3) Ensure computer monitors are "age-appropriate", by employing large fonts and adjustable volume settings;

(4) Teach, review, and repeat lessons often;

(5) Ensure older adults understand that by learning the use the Internet and e-mail, their quality of life may be enhanced;

(6) Ensure computer programs are "age-appropriate", such as by slowing the mouse click and movement and using sticky icons; and

(7) Consider incorporating small children in the learning process, as children and older adults have common learning capabilities.

Information from this resource is used to frame the Purpose and Problem Area portions of this study. In these two sections, Springer believes it is easy to assume older adult prefer using methods of communication they are comfortable with, for instance: the U.S. Postal Service versus e-mail. The Significance section of this paper draws on Springer's suggestion that today's instructors do not have the patience to teach and re-teach course material to older adult who have trouble with short-term memory. Information from this reference is also used in the Limitation portion to narrow the scope and target to a specific group of older adults (The "Accepter").

CHAPTER 3 – METHOD OF STUDY

LARGER METHOD OF STUDY

This study is designed as a literature review (Leedy and Ormrod, 2001). The main objective of this study is to collect and analyze selected books, articles, and previously published research pertaining to the topic (Leedy, 2001 p 64) of how best to teach the elderly to use the Internet and e-mail as a communication tool. This study uses a content analysis methodology (Leedy and Ormrod, 2001 p108). The specific strategy selected is conceptual analysis (Palmquist, M. et. al., 2005). According to information from the Palmquist and the Colorado State University Writing Lab, this type of content analysis strategy allows the researcher to create a knowledgebase of known patterns of behavior and infers possible patterns of behavior from the selected material. Conceptual analysis is used in this study to answer the following questions:

- What age-related barriers are faced by the elderly when attempting to learn to use the Internet and e-mail as a communication tool?
- In what environment do seniors best learn?
- What methods currently in use are best to teach older adults the use of the Internet and e-mail as a communication tool?

DATA COLLECTION

Data is collected and prepared in two stages. In the first stage, literature is collected to answer questions regarding age-related barriers faced by the elderly and classroom environments that enhance the learning experience. In the second stage,

literature is collected pertaining to how to best teach the elderly to use the Internet and e-mail technology as a communication tool.

Literature in both stages is collected from books, articles, and previously published research. Literature collected during the second stage is specifically focused on the primary question of this study: how best to teach the elderly to use the Internet and e-mail as a communication tool. A report of the detailed search strategy follows.

Primary Internet search engines:

Google.com	Dogpile.com
Google Scholar	MSN.com

Although all these Internet search engines produced several references used in this literature review, Dogpile.com and Google performed best and retrieved the most relevant data for analysis.

Databases:

Business Source Premier	*Science*
Academic Search Premier	*ArticleFirst*
Psychology and Behavioral	*Newspaper Source*

All databases performed well and returned relevant data for this literature review, *Academic Search Premier* and *Psychology and Behavioral* performed best.

Keywords:

Accessibility	Computers
Adult	Digital Divide
Cognition	Education
Electronic mail	Microsoft
Elderly	Older people
E-mail (e-mail)	Psychological
Gerontology	Senior Citizen
Internet	Services
Messaging	Training

For Phase 1, the following words, their variations, and/or a combination thereof, were most productive, yielding approximately 32 relevant sources:

Accessibility	Mental Health
Capabilities	Older adults
Computers	Seniors
Education	Teaching
Elderly	Technology
Learning	Usability

For Phase 2, the following words, their variations, and/or a combination thereof were most were most productive, yielding approximately 37 relevant sources:

Andragogy	Education

Elderly	Pedagogy
Electronic mail (e-mail)	Seniors
Gerontology	Teaching
Internet	Training
Learning	Technology
Older Adults	Usability

An initial search of web search engines using just keywords yielded too great a selection of material. Using combinations, such as "older+adults" also yielded too great a selection (Google return 37,000,000). Combining keywords and looking for specific content, the choices are more manageable (i.e. older adults+computers+attitude+learning returned 44 sources). Selected literature retrieved from library databases used the same keywords as noted above, and bibliographies from previously published research are used as additional resources (Leedy and Ormod, 2001).

Collected resources are deemed relevant for use in this study only if they pertain to the following criteria:

Phase 1:

Age-related barriers to learning

Learning abilities of the elderly

Classroom environment targeting older adults

Phase 2:

Adult/Older Adult education

Teaching methods targeted towards older adults

Andragogy, as it pertains to older adults

Specific references to the Internet, e-mail, and the elderly

Data Analysis

Below is an outline of the conceptual analysis plan used to code and analyze the approximately 70 sources selected for data analysis in this study, following the eight steps recommended on the CSU Writing Lab website (2005). There are two phases to the conceptual analysis process in this study. Phase 1 is designed to identify instances of age-related barriers faced by the elderly when attempting to learn to use technology. In addition, ways to lessen the effects of those barriers through changing the classroom environment are also noted. Phase 2 is designed to identify instances of teaching methods and strategies reported to be successful when used to teach the elderly the use of the Internet and e-mail to communicate with family and friends. Detailed information related to each phase in the data analysis plan is provided in each step below.

Step 1: Level of Analysis – Data in Phase 1 and Phase 2 are analyzed according to text related to the topic. Coding is accomplished at its lowest level, usually sentence level. However, if the meaning is not clear to the researcher, paragraph level or more are used to maintain the reliability of the context.

Step 2: Pre-defined or Interactive Categories – The terms used to search for selected material are pre-defined for categories to represent the best methods of teaching older

adults. Using available standardized search terms and phrases, categories are defined as follows:

Phase 1

Age-Related Barriers

Related Classroom Environment Modifications

Phase 2

Teaching Methods / Teaching Strategies

An interactive method allows for data other than that specifically related to these terms to be noted, for additional data to be considered (Krippendorff, 2004, p. 10).

Step 3: Existence or Frequency Coding – Analysis is accomplished by coding for existence of age-related barriers and classroom environments (for Phase 1), and methods and strategies of teaching the elderly (for Phase 2). Frequency of teaching methods is also noted as a way to determine "best" methods, based on the authors of selected material (Phase 2).

Step 4: Level of Generalization – Coding is conducted using the specific terms listed above in Step 2, as well as generalized meanings of these terms, as they appear throughout the analysis of selected literature. Examples of the phrase "age-related barriers" might also refer to "limitations" or "physical handicaps" or impairments". "Teaching methods" is generalized to include such terms as "teaching strategies" and "teaching approaches".

Step 5: Rules for Coding – In both Phase 1 and Phase 2, coding is mutually exclusive and data can only fit in to one category (Krippendorff, 2004 p. 132). If there is a possibility that a term might fit into more than one category, the researcher determines in which category it belongs, based on the context of the selected literature (Krippendorff, 2004, p. 151).

Step 6: Handling of "Irrelevant" Information – Any data which do not apply directly to the topic, or can not be used to infer application to the topic, are ignored. This applies to both Phase 1 and Phase 2.

Step 7: Coding the Texts – According to Krippendorff (2004), the researcher must construct a set of rules for the selected research material to make sense. The material must be read and understood for the researcher to code to appropriately. The coding of selected material is done manually (Palmquist, 2005). For Phase 1, record keeping and organization are accomplished by use of an electronic spreadsheet to tabulate the instances of occurrences (Leedy and Ormrod, 2001, p.143). For Phase 2, record keeping and organization are accomplished by the use of an electronic spreadsheet to tabulate both the instances and frequencies of occurrences.

Step 8: Analyzing the Results – Once the data from the selected material are analyzed, results of the conceptual analysis process are presented in a set of tables.

At the conclusion of the conceptual analysis process in Phase 1, identified age-related barriers are presented in Figure 1: Age-Related Barriers, which includes a description of the barriers and how to overcome them to enhance the teaching experience by the instructor. Figure 2: Related Classroom Environment Modifications presents identification of age-friendly classroom environments.

At the conclusion of the conceptual analysis process in Phase 2, results are presented in Figure 3: Recommended Teaching Methods, which is designed to identify best methods of instruction for teaching the Internet and e-mail to the elderly.

Data Presentation

The primary outcome of this study is Table 2: Preferred Strategies for Teaching the Elderly to use the Internet and E-mail, which combines information presented in the set of figures resulting from the conceptual analysis process in Phases 1 and 2, Table 2 identifies age-related barriers that affect teaching and recommends teaching strategies and classroom/instructional modifications that assist instructors to teach older adults to use the Internet and e-mail as a communication tools. A template of the anticipated design of Table 2 is presented below (see Table 1).

Teaching Strategies	**Age-Related Barriers**	**Classroom Environments**
Strategy 1	Description of barrier	Description of Modification
Strategy 2		
Strategy 3		

Table 1: Template - Preferred Strategies for Teaching the Elderly to use the Internet and E-mail

Chapter IV - Analysis of Data

This chapter presents a description of the content analysis of selected literature conducted to answer Stage 1 and Stage 2 questions in preparation for development of the final outcome of this literature review.

Stage 1 data analysis answers the questions:

- What age-related barriers are faced by the elderly when attempting to use the Internet and e-mail as a communication tool?
- In what classroom environments do seniors best learn?

Stage 2 data analysis answers the question:

- What methods currently in use are best to teach older adults the use of the Internet and e-mail as a communication tool?

Stage 1 of the content analysis centers on identifying the most prevalent age-related barriers the elderly face which hinder their ability to learn and further on classroom modifications that enhance the learning experience. Stage 1 results are presented in Figure 1: Age-Related Barriers and Figure 2: Related Classroom Environment Modifications. These figures identify age-related barriers and classroom modifications the authors of selected research materials recommend as the most effective in enhancing the learning experiences of older adults. Of the approximately 70 sources selected for use in this literature review, 27 are used to form the data set for Phase 1 and

Phase 2 coding, as described in Chapter III – Methods of Analysis**.** The set of 27 references is located in Appendix A: Stage 1 and Stage 2 Coding Set.

Phase I Category 1 – Age-Related Barriers		
Barrier	**Explanation**	**No. Instances**
Visual abilities	The general decline in visual acuity as one ages.	12
Hearing	The loss of hearing as one ages.	9
*Cognitive abilities	The deficit of cognitive skill, such as awareness, perception, reasoning, and judgment when older adults attempt to perform complex computing tasks.	9
Memory	The loss of primary and/or short-term.	8
Manual Dexterity	The loss of grasp or movement due to deterioration of fine motor control. This barrier can be caused from chronic conditions such as arthritis.	7
Mobility	Decreased gross motor skill, such as moving (walking) on one's own power.	6
General decline in health	The axiomatic decline in general health of adults over the age 65.	1

Figure 1: Age-Related Barriers

Figure 1: Age-Related Barriers presents seven sub-categories, listed in order of the number of instances of terms and/or phases identified in the literature, from highest to lowest. An explication of each sub-category follows, cited to the source material.

Visual Barriers: Natural deterioration of sight is what most authors of the selected study material believe is the most common age-related barrier the elderly faces (Bedell, 1999 and Christopher, 2000). Several of the authors agree that as one ages, visual acuity diminishes from diseases such as macular degeneration, cataracts or glaucoma (Lewin, 2001 and Saunders, 2004). Older adults may not be able to properly focus on small areas due to visual problems. As the width of their visual field is reduced the ability to see fine

detail is impacted (Browne. 2000 and Springer, 2004). Changes in older eyes also affect how the eye reacts to light and color quality. Distinguishing between certain colors can be more difficult. For example purple and blue may look the same and cataracts will make white appear yellow (Christopher, 2000 and Bean, 2003).

Hearing Barriers: Changes to older ears often make it difficult to process what is heard. Higher pitched sound is frequently the first which negatively affects the elderly (Browne, 2000 and Bean, 2003). The pitch of male instructors is ideal for older ears; however a female instructor whose voice is of low pitch is acceptable (Bean, 2003).

***Cognitive Barriers:** These barriers are defined as spatial visualization and processing speed (Bean, 203). A spatial visualization barrier is the inability to connect two related tasks together; for instance, the movement of the mouse related to its movement on a computer monitor (Bean, 2003). Processing skills refer to how older adults process information presented to them. For example, if the task is a new concept, as in "icon" verses "picture", it will take longer for the older adult to process its meaning (McCort, et al., 2000).

Memory Barriers: Generally, short term recall diminishes with age (Hudson, 1996 and McCort, et al., 2000). Memory is affected more in recall and less in recognition, which means the older adult is apt to remember through visual cues more easily than from recalling instructions or directions (McCort, et al., 2000).

Manual Dexterity Barriers: The loss of fine motor skills can occur as a result from afflictions such as tremors and arthritis, making it difficult for the elderly to use some computer peripherals, such as a mouse or keyboard (Fainges, 1999 and Bean, 2003).

Mobility Barriers: Compared to younger people, a larger portion of older adults have limited mobility due to disabilities (Hudson, 1996). Physical ailments, such as a bad back or hip mean shorter periods of time the elderly can remain comfortably in a sitting position (Fainges, 1999).

General Decline in Health: This barrier is referenced once, but it is important to be aware that due to the above barriers, the general health of older adults also declines with age and may include a chronic illness (Campbell, 2005).

*Note: For the purpose of this study, Memory has been selected as a separate point.

Phase I Category 2 – Classroom Environment Modifications		
Modification	**Explanation**	**No. Instances**
Comfort	Have proper environmental controls, such as heating/ cooling, appropriate lighting, seating, and accessibility.	8
Socialization	Have a place set aside for coffee or tea, to allow students to interact and share experiences with others during breaks.	3
Location	Make classroom locations easy in locations where seniors frequent.	2
Class size	Conduct instruction with a small number of students to allow instructors to spend additional time for one-on-one instruction.	2
Equipment	Have enough computers for student use and that it is similar to what the student normally accesses.	1

Figure 2: Related Classroom Environment Modifications

Figure 2: Related Classroom Environment Modifications presents five sub-categories, listed in order of the number of instances of terms and/or phases identified in the literature, from highest to lowest. An explication of each sub-category follows, cited to the source material.

Comfort: This modification was highest on the recommendation list of selected study material. Shapiro (1995) suggests that if material is introduced in a comfortable environment the elderly are more inclined to learn to use computer technology. Instructors need to remember the physical barrier of mobility and ensure arrangements are comfortable for older adults to remain in a seated position for the duration of classes (Saunders, 2004). Bean (2003) recommends the instructor be aware of temperature control as older adults are more susceptible to thinning skin and poor circulation. What is uncomfortable for the instructor may be perfect for the elderly. Limit noisy distractions during class periods as to not disturb the learning process (Becker and Coleman, 2005). Also, older adult students feel more comfortable with their peers. This lessens anxiety for a better learning environment (Hudson, 1996 and Holba-Puacz, 2000).

Socialization: Older adults need time to meet the other students and make new friends (Cromwell, 1997 and Lieb, 1991). Williams and Williams (n.d.) suggests arranging seating in a circle, horseshoe, or round table to allow for social interaction between the elderly students as well as the instructor. This creates an environment that is non-threatening and informal. Stephenson (2002) suggests having a break area set aside for older adult to exchange experiences and make friends.

Location: The location of classes is also important. Classrooms need to be accessible by older adults, and Conover (1997) suggests they be located in areas where older adults frequent. These locations can be libraries, senior centers, or malls (as in mall walking) and can be considered non-threatening and "non-computer" locations (Holba-Puacz, 2000). Classrooms need to be accessible for those who have a disability and allow for space to accommodate wheelchairs or other mobility aids (Browne, 2000).

Class Size: Stephenson (2202) recommends that class sizes remain small to enable one-on-one instruction. Due to memory and cognitive barriers, older adults can take up to 2.5 times longer to understand a task and thus require additional instructor attention (Czaja and Lee, 2001). If needed, have additional volunteer instructors on hand to allow for better student-to-instructor ratio (Hudson, 1996 and Becker and Coleman, 2005).

Equipment: Equipment used to teach needs to be as close to what the older adult student normally uses (Bean, 2003 and Stephenson, 2002). Ensure items such as pencil and paper are available to take notes (Holba-Puacz, 2000). Monitors require the ability to change resolution, colors, and fonts to accommodate older eyes (Bean, 2003 and Springer, 2004). Springer (2004) and Bean (2003) suggest using a mouse with the ability to slow the rate of speed for those older adults with limited manual dexterity. Instructors must ensure there are enough computers for each student. The instructor can also pair students, to enhance socialization and assist each other with problems (Becker and Coleman, 2005).

Stage 2 of the content analysis centers on identifying instances of which methods currently in use are reported as best to instruct older adults the use of the Internet and e-mail as a communication tool. Results are presented in Figure 3: Recommended Teaching Methods. This stage of the content analysis takes a second look at the selected material from Stage 1 to identify instances of pertinent data as described in Chapter III – Methods of Analysis. Coding of terms is accomplished at its lowest level, usually sentence level.

Phase 2 Recommended Teaching Methods		
Method	**Explanation**	**No. Instances**
Patience and Repetition	Provide more than one explanation of material to accommodate slower processing speeds of the elderly. It may take up to 2.5 times longer to teach them than younger students.	14
Jargon or Language	Do not use unfamiliar terms that may not be understood by the student. Words such as "icon" instead of "picture". This can be from both the computer and/or the instructor.	8
Course Material	Ensure the course and material is structured in a step-by-step method; written content is relevant and age-appropriate.	5
Hands-on Training	Ensure there is ample time for students to "play" and assimilate what has been taught.	4
Small Blocks of Instruction	Teach in 30 to 60 minute blocks of time.	4
Encourage Questions and Answers	Make the student understand there are no "stupid questions" - only opportunities.	3
Flexibility	Adapt curriculum to the needs and styles of the students and teach to the student's interest and abilities.	3
Speak Slowly and Clearly	Speak slowly and clearly with a soft, but active voice and pause often.	3
Place Student at Ease	Explain the course and reassure the students that learning will be worth the effort.	2
Skill Level	Place students in the proper skill level of learning, such as basic, intermediate, or advanced courses.	2
Teach One Topic at a Time	Only teach one concept per block of instruction.	1

Figure 3: Recommended Teaching Methods

Figure 3 identifies best recommended approaches to teaching the elderly, presented as eleven sub-categories, listed in order of the number of instances of terms and/or phases identified in the literature, from highest to lowest. An explication of each sub-category follows, cited to the source material.

Patience and Repetition: Patience is not only a virtue, but is the most highly recommended teaching method by authors of selected research literature. Instructors need to be aware that older adults have slower cognitive processing and must allow sufficient time for course material to be assimilated (McCort et al., 2000 and Becker and Coleman, 2005). Bean and Laven (2003) suggest that the elderly process slower than younger students and instructors need to allot time for repetition of instruction. Springer (2004) recommends to review and repeat often by using the "tell them what you're going to tell them, tell them, and then tell them what you told them" protocol. Fainges (1999) asserts that many older adults feel instructors jump ahead too quickly and do not allow students to finish assigned tasks.

Jargon/Language: It is important for instructors to remember that older adults may not have had the benefit of using computer technology, as during most of their working life computer technology did not exist (Browne, 2000). Instructors need to avoid using terms such as megabytes, motherboard, or PCI card; use terms the student is familiar with such as "picture" instead of "icon".

Course Material: Due to age-related barriers, course material needs to be "senior-friendly" (Bean and Laven, 2003). Nielsen (2002) and Browne (2000) recommend written material, targeted at older eyes, should use larger fonts and be at least 12 point type. Browne (2000) also suggests using written material that has more than one visual cue, such as combining color with large text, or large text and graphics, for better readability. Avoid the use of bold, unless used for emphasis, or all capital letters, as this decreases readability (Christopher, 2000).

Hands-On Training: As older adults need more time to learn tasks., allot time for them to practice what has been instructed (Hudson, 1996). As Hudson (1996) suggests, retention of course material is improved when an opportunity for hands-on practice is given immediately after instruction. Also, studies show the elderly, like younger students, enjoy the opportunity to "play" after instruction, but need to be allowed to work at their own pace (Clarkson and Bradford, 2001 and Stephenson, 2002). This method is useful for learning in all ages to better understand and retain course material.

Small Blocks of Instruction: Springer (2004) recommends older adults be taught in small blocks of time as it may be difficult for them to stay on task due to an inability to remain seated for long periods of time or due to other physical barriers.

Encourage Questions and Answers: Instructors need to encourage questions throughout training and listen to the entire question before answering (Becker and Coleman, 2005). Becker and Coleman (2005) also suggest instructors to use open-ended questions to

solicit answers from students. Older adults are more apt to answer questions when classes consist of peers. When all else fails, Holba-Puacz (2000) recommends to bribe students to solicit questions and answers!

Flexibility: Fainges (1999) and Bean (2003) recommend that instructors remain flexible enough in their instruction to change on the fly. For example, if a student is having difficulty with mouse control, change the instruction to use alternative means of accomplishing the task. This requires instructors be prepared to teach to the needs, interests, and abilities of individual learning styles of each class student to limit frustration (Becker and Coleman, 2005).

Speak Slowly and Clearly: As noted in Figure 1: Age-Related Barriers, instructors need to speak slowly due to deterioration of the ability to hear and understand high pitched sounds (Bean, 2003). Bean (2003) and Becker and Coleman (2005) recommend instructors speak clearly and pause often to allow the older adult students to process and digest what has been said.

Place Students at Ease: Although placing the elderly student at ease is not mentioned in general by many of the selected resources, Wesselhoff (2000), Springer (2004) and Saunders (2004) feel it important that the elderly know that computers and programs are hardy and difficult to break. The use of appropriate humor will lighten the atmosphere and the mood of older adults may as they may be anxious about learning computer technology (Holba-Puacz, 2000).

Teach one Topic at a Time: When using small blocks of instruction, Becker and Coleman (2005) recommend teaching one topic at a time. For instance, if the lesson is word processing, a 30 or 60 minute instructional block might consist of the different options to select text to be changed, moved, or copied.

CHAPTER V – CONCLUSION

Studies have shown older adults can gain many benefits from learning the use the Internet and E-mail as a communication tool. Some of those reported benefits are:

(1) Enhanced mental health (i-newswire, 2005);

(2) Enhanced mental abilities and protection against memory loss (Hotz, 2005);

(3) Reduced loneliness (SeniorNet, 2000);

(4) Reduced rate of suicide due to loneliness (Saunders (2004);

(5) Improved autonomy and quality of life (SeniorNet, 2000); and

(6) Improved ability to socialize with others via e-mail or Internet chat rooms (Browne, 2000).

Contrary to popular belief, older adults can not only learn new "tricks", but can become just as good at using the computer for e-mail communication as younger users (Fainges, 1999 and Christopher, 2000). However, there are specific age-barriers among older students that must be addressed in the face-to-face classroom for successful learning to occur (McCort et al, 2000).

The final outcome of this study, Table 2: Preferred Strategies for Teaching the Elderly to Use the Internet and E-mail, presents some of the more prevalent barriers faced by the elderly and how recommended teaching strategies may mitigate their effects on learning. These recommendations are not all-inclusive nor do they work for all people over the age 65 – teachers and staff must analyze each group of students based on their abilities, interests and merits. Teachers should assume that older adults can be taught new

concepts and that they have the same potential as any other individual who is seeking to learn (Williams and Williams, n.d.). However, teaching strategies and teaching environments should be framed within the concepts of andragogy, for maximum learning outcomes.

Table 2: Preferred Strategies for Teaching the Elderly to Use the Internet and E-mail, is formed by combining information presented in Figure 1, Category 1: Age-Related Barriers and Figure 2, Category 2: Classroom Environment Modifications in Phase 1 and Figure 3: Recommended Teaching Methods in Phase 2. The combined information presents eleven sub-categories, listed in order from Figure 3. It is designed to assist instructors to teach older adults the use of the Internet and e-mail as a communication tool. An explication of each of eleven final recommended teaching strategies, along with a listing of pertinent age-related barriers and relevant classroom environment conditions, follows the presentation of the table below. This researcher notes that many of the recommended teaching strategies overlap, such as "Patience and Repetition" and "Encourage Questions and Answers", which may also relate to "Comfort". Teachers may benefit most by working with this set of recommendations as a whole.

Teaching Strategies	Age-Related Barriers	Classroom Environments
Patience and Repetition	Cognitive abilities Memory	Class size
Jargon or Language	Cognitive abilities	Comfort

	Memory	Environment
Course Material	Visual abilities	Equipment
Hands-on Training	Cognitive abilities Memory Manual Dexterity	Socialization Class size
Small Blocks of Instruction	Cognitive abilities Memory Mobility General decline in health	Comfort Class size Socialization
Encourage Questions and Answers	Memory	Comfort Socialization
Flexibility	Visual abilities Hearing Mobility General decline in health	Comfort Socialization Location Class size Equipment
Speak Slowly and Clearly	Hearing Memory	Comfort
Place Student at Ease	Cognitive abilities Memory Mobility General decline in health	Comfort Socialization Location Class size
Skill Level	Cognitive abilities	Comfort

		Socialization
Teach One Topic at a Time	Cognitive abilities Memory	Comfort Class size

Table 2: Preferred Strategies for Teaching the Elderly to Use the Internet and E-mail

Patience and Repetition: This strategy helps to mitigate reduction of cognitive abilities and short-term memory barriers due to lack of experience with computers (Fainges, 1999 and Bean and Laven, 2003). By working within a small class, the instructor can spend more time with students having difficulties (Becker and Coleman, 2005). Instructors should allow more time for the older adult students to complete tasks as it may take up to 2.5 times longer than younger students (Czaja and Lee, 2001). Giving the students additional time to process information assists with retention of material and places the student at ease making a better learning environment.

Jargon or Language: The use of jargon or "computerese" is likely to confuse the older adult with little or no computer experience (Wesslelhoff, 2000). Zhao (2001) suggests older adults may speak less fluently regarding technology than younger students. When explaining concepts, teachers should try to associate words that have meanings which are familiar to the student's generation. This will minimize erroneous connotations and inferences (Becker and Coleman, 2005). For instance the word "picture" is more easily understood than "icon", which in another context has a religious connotation. By minimizing jargon and using the proper language association, teachers may be able to raise the comfort level and lower the frustration level among students (Bean, 2003).

Course Material: Materials used for older adults should be organized and specific to the audience (Zhao, 2001). Poor design makes it more difficult for the students to learn and retain information (Neilson, 2002). One useful organizational scheme is a step-by-step format (Sturr, 2005). Course material needs to be written in clear, simple language that contains wording and language familiar to the students (McCort et al, 2000). Written material should minimize the amount of reading (Czaja and Lee, 2001) and provide information with graphical explanation wherever possible. The use of screenshots and projectors to enhance visuals are highly recommended (Becker and Coleman, 2005). If course material is on-line, use websites with high contrast and stay away from "busy" sites that use too many colors or those with small print (Bean, 2003). Ensure computer monitors are positioned comfortably for older eyes (Hudson, 1996).

Hands-on Training: Immediate hands-on practicing of blocks of instruction helps older adults retain course material (Hudson, 1996) and improve memory (Hotz, 2005). Teachers should always allow ample time for practice and ask questions to ensure that students understand what has been taught. If the student does not understand, refer back to the teaching strategy of patience and repetition. Instructors should never fix problems for the student. Rather, verbally explain how the process works and let the student do the keyboarding, as this process helps retention of material and enhances the learning experience (Stephenson, 2002 and Becker and Coleman, 2005).

Small Blocks of Instruction: Due to some physical barriers, seniors may get tired of sitting for long periods of time. Allow a "break" period during instruction and encourage

students to stand up and stretch to relieve physical discomfort (Cottonwood Press, 2000). A short break also enhances an opportunity to socialize. Small blocks of instruction keep the students from becoming bored, which in turn helps them to retain information for hands-on training. Small class size also gives the instructor the ability to allow for more time for instructor-to-student interaction (Hudson, 1996).

Encourage Questions and Answers: Older adults appear to be more comfortable in an environment with other older adults when it comes to asking questions (Holba-Puacz, 2000). When students ask questions, the instructor should listen to the entire question before starting to answer. Then, it is often helpful to repeat the question to ensure that it is understood. Remember to thank the student for participation (Becker and Coleman, 2005). When answering questions, keep the answers short and reasonable, i.e., do not turn answers into a dissertation (Helpguide.org, 2004). When the instructor asks questions, he/she should use open-ended questions to allow for thought provoking answers instead of "yes" or "no" answers. Set aside time for questions and answers after class time, if necessary (Becker and Coleman, 2005).

Flexibility: Teachers should be sure to teach to the abilities and interests of the students in each class, not to the agenda of the instructor (Hudson, 1996 and Becker and Coleman, 2005). Look for ways to use alternatives, such as the keyboard versus the mouse if the student has difficulty with manual dexterity (Czaja and Lee, 2001) or use websites with high contrast for students with visual barriers (Bean, 2003). Classrooms should be

configured to allow for movement of those who may have walkers or wheelchairs (Bean and Laven, 2003).

Speak Slowly and Clearly: Speak loudly enough for all to hear (Hudson, 1996). Speaking slowly lowers the pitch of the instructor's voice, which enhances listening for the student, as high pitch hearing diminishes with age (Browne, 2000 and Bean, 2003). Pause frequently for the student to process what has been said and to take notes (Becker and Coleman, 2005).

Place Student at Ease: Set aside time for introductions at the beginning of a new class. Give students and instructors few minutes to "break the ice" and introduce themselves to enhance the comfort level of the classroom environment and foster socialization and interaction of students during break time (Hudson, 1996). Instructors can often place students more at ease by introducing computer learning within a simple historical context. Students may like to hear affirmation to the notion that they have lived through an amazing technological era in their lifetimes and have adapted to many new methods (Springer, 2004). When a student makes a mistake or starts to blame themselves for inadequacies, redirect the blame to the computer (Becker and Coleman, 2005). The use of appropriate humor reduces stress and improves the ability to learn. Laughter stimulates the brain which eases muscle and psychological tension. This allows for better retention of information (Helpguide.org, 2004).

Skill Level: Instructors should screen students to identify their computer knowledge and place them in a class of "knowledge peers" (Bean and Laven, 2003) as a way to set the

appropriate level of curriculum difficulty (Lieb, 1991). Students may assume that everyone but them uses and understands computers. Grouping students with peers of similar abilities and knowledge places them at ease, fosters socialization and enhances the learning environment of the classroom (Stephenson, 2002).

Teach One Topic at a Time: Instructors should realize age affects processing speed and cognitive processes (Bean, 2003). Teach to a specific goal of one topic at-a-time, and break it into the lowest unit. For example, instead of teaching all about word processing show the student how to format a document, such as fonts, page layout, paragraphs, etc (Becker and Coleman, 2005). Once a unit of instruction is taught, ensure that students have ample time for questions and answers and time for hands-on practice (Hudson, 1996).

REFERENCES

AARP, (2003). Wired Generations. Retrieved September 17, 2005 from http://assets.aarp.org/www.aarp.org_/articles/research/oww/wiredgenerations.pdf.

Bean, C., (2003). Meeting the Challenge: Training an Aging Population to Use Computers. Southeastern Librarian 51(3).

Bean, C. and Laven, M., (2003). Adapting to Seniors: Computer Training for Older Adults. Retrieved September 16, 2005 from The University of Arizona, School of Resources and Library Science website at http://dlist.sir.arizona.edu/260/.

Becker, K. and Coleman, J. (2005) Instruction for Older Adults, TriCon 2005. Retrieved September 20, 2005 from http://skyways.lib.ks.us/tricon/2005/handouts/tips_for_teaching.pdf.

Bedell, D., (1999). Seniors Proving You're Never Too Old to Surf Internet. Retrieved September 19, 2005 from http://www.dougbedell.com/seniors.htm.

Browne, H., (2000). Accessibility and Usability of *Information Technology by the Elderly*. Retrieved May 17, 2005 from the University of Maryland, Department of Computer Science website at http://www.otal.umd.edu/UUGuide/ hbrowne.

Campbell, R. and Nolfi, D., (2005). Teaching Elderly Adults to Use Internet to Access Healthcare Information: Before and After Study. Retrieved September 8, 2005 from http://www.jmir.org/2005/2/e19/.

Carroll, M., (1996). Never Too Old to Net-Surf. Electronic Engineering Times, Issue 904, p62.

Castells, M., (2001). The Internet Galaxy, Reflections on the Internet, Business, and Society (pg 248). Oxford University Press: Great Britain.

Christopher, P., (2000). Older Adults – Special Considerations for Special People. Retrieved on May 17, 2005 from Georgia State University, Stephen W. Harom website at http://www2.gsu.edu/~mstswh/courses/ it7000/papers/newpage31.htm.

Clarkson, T. and Bradford, S., (2001). It's never too late to learn how to surf the net. Retrieved September 17, 2005 from The Library Association at http://www.la-hq.org.uk/directory/record/r200102/.

Conover, K., (1997). The New Generation of Net Surfers: Seniors. Christian Science Monitor, V90 Issue 1, p8.

Cottonwood Press, (2000). Tips for Teaching Senior Adults. Retrieved September 20, 2005 from http://seniors.cottonwoodpress.com/tips/teaching.htm.

Crowell, A., (1997). Age Brings Capabilities, Not Limitations. Retrieved May 17, 2005 from http://gtresearchnews.gatech.edu/reshor/rh-win97/aging.htm.

Czaja, S. J. & Lee, C., (2001). The Internet and Older Adults: Design Challenges and Opportunities. Communication, Technology and Aging: Opportunities and Challenges for the Future (pp. 60 –81). New York: Springer Publishing Co.

Czaja, S. J. & Sharit, J. (1998). Age differences in attitudes towards computers. The Journals of Gerontology: Psychological Sciences and Social Sciences 53B, 329-340.

Earthlink.Net, (2005). GenerationLink: Internet Usage Statistics. Retrieved September 29, 2005 from http://www.earthlink.net/about/generationlink/stats/.

Fainges, K., (1999). How Older Learners Want to Learn Computer Applications? Retrieved September 15, 2005 from http://www.users.bigpond.com/sagatech/pr01.htm.

Federal Network Council, (1995). FNC Resolution: Definition of "Internet". Retrieved October 3, 2005 from http://www.nitrd.gov/fnc/Internet_res.html.

Flanigan, J., (2005).Vigor of the Elderly is Key to Economy's Well-Being. Retrieved September 29, 2005 from http://www.latimes.com/business/investing/la-retire101-story3,1,4259035.story?ctrack=1&cset=true.

Foskey, R., (2001). Technology and Older People: Overcoming the Great Divide. Retrieved September 8, 2005 from http://www.dcita.gov.au/crf/papers2001/foskey.pdf.

HelpGuide.Org, (2004). Teaching Older Adults to Become Computer Literate. Retrieved November 20, 2005 from http://www.helpguide.org/life/teaching_older_adults_computer.htm.

Holba-Puacz, J. (2000). Surf's Up for Seniors. Computers in Libraries, September 1, 2000, Vol 20, Issue 8.

Hotz, R., (2005) Higher Education May Benefit Brains of Elderly, Study Finds. Retrieved September 9, 2005 from http://www.post-gazette.com /pg/pp/05073/470997.stm.

Hudson, B., (1996). Teaching Computers to Senior Citizens. Retrieved from http://www.seniorcomp.org/essay.html.

I-Wire.com, (2005). Computer Use by Seniors May Help Their Mental Health. Retrieved September 29, 2005 from http://i-newswire.com/goprint44234.html.

Kearsley, G., (n.d.). Explorations in Learning & Instruction: The Theory Into Practice Database, Tip: Learning Domains, Andragogy (M. Knowles). Retrieved September 24, 2005 from http://tip.psychology.org/knowles.html.

Kearsley, G., (n.d.). Explorations in Learning & Instruction: The Theory Into Practice Database, Tip: Learning Domains, Computers. Retrieved September 24, 2005 from http://tip.psychology.org/computer.html.

Krippendorff, K., (2004). Content Analysis: An Introduction to Its Methodology, p10-11., California: Sage Publications.

Kunin, J., (n.d.). Text Design for Elderly Eyes. Retrieved September 8, 2005 from San Diego State, Department of Educational Technology at http://coe.sdsu.edu/eet/articles/TDelderly/start.htm.

Leedy, P. and Ormrod, J., (2005). Practical Research, Planning and Design *(8th Ed.), Characteristics of a Proposal* (pp 142 -144). New Jersey: Prentice Hall.

Lemieux, A., (2000). Gerontagogy Beyond Words: A Reality. Educational Gerontology, Vol. 26, Issue 5, p475-498.

Lewin, M., (2001). "Equal with Everyone": Computers in the Lives of Older People. Retrieved October 2, 2005 from http://www.Odeluce.stir.ac.uk/lewin/Disertation.htm.

Lieb, S., (1991). Principles of Adult Learning. Retrieved September 20, 2005 from the Honolulu Community College, Internet Committee website at http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/adults-2.htm.

Lok, B., (2004). Studies.ppt, Chapter 3. Retrieved October 27, 2005 from the University of Florida, Department of Computer and Information Science and Engineering Staff website at http://www.cise.ufl.edu/~lok/teaching/hcif04/studies.ppt#265,10.

Manheimer, R., (2002). Older Adults Education in the United State: Trends and Predictions. Retrieved September 23, 2005 from the University of North Carolina, North Carolina Center for Creative Retirement website at http://www.unca.edu/ncccr/Reports/older_adult_education_in_the_US.htm.

McCort, A., Telsavaara, T., Scipio, C., & Stanton, J., (2000). Issues in Teaching Older Adults How to Use Computers. Retrieved May 17, 2005 from the University of North Carolina, Faculty website at http://www.unc.edu/~jdumas/projects/aging.htm.

Nielsen, J., (2002). Usability for Senior Citizens. Retrieved September 8, 2005 from http://www.useit.com/alertbox/20020428.html.

Overholtzer, A., (2004). Literature Review. Retrieved October 12, 2004 from the Washington and Lee University at http://info.wlu.edu/literature_review/literature_review.html#what.

Palme, J., (2000). Use of Networks for Reducing the Isolation of Elderly People and People with Mobility Impairments. Retrieved May 17, 2005 from http://dsv.su.se/jpalme/sol/senior-online.html.

Palmquist, M., et al., (2005). Content Analysis. Writing@CSU. Colorado State University Department of English. Retrieved October 7, 2005 from http://writing.colostate.edu /references/research/content/.

Saunders, E., (2004). Maximizing Computer Use Among the Elderly in Rural Senior Centers. Educational Gerontology, Vol 30, Issue 7, pgs 573 – 585.

SeniorNet, (2005). About SeniorNet. Retrieved September 29, 2005 from http://www.seniornet.org/php/default.php?PageID=5005.

Shapiro, P., (1995). Computers Use and the Elderly. Retrieved May 17, 2005 from http://www.his.com/~pshapiro/computers.and.elderly.html.

Sheridan, R., (2005). Internet Health Research for the Elderly. Retrieved September 17, 2005 from http://home.infostations.net/oranit/model/glossary.html.

Shrewbury, C., (2000). Information Technology and Rural Elderly: Policy Issues for American States. Retrieved from Minnesota State University (Mankato), Student, Staff, and Faulty Personal website at http://krypton.mnsu.edu/~cbury/web/Research/Rural/APSA.html.

Smith, M., (1999). Andragogy, the Encyclopedia of Informal Education. Retrieved October 18, 2005 from http://www.infed.org/lifelonglearning/b-andra.htm.

Springer, S., (2004). Inclusion of Older Adults in Higher Education…The Last Frontier. Retrieved May 17, 2005 from http://www.celt.lsu.edu/cfd/E%2DProceedings04/Springer.pdf.

Stephenson, M., (2002). Older Learners and IT: Challenge for Inclusion, Adults Learning, Mar 2002, Vol 13, Issue 7, p12.

Stewart, K. and Walton, R., (1992). Tips on Teaching the Elderly. Nursing Oct92, Vol. 22 Issue 10, p4.

Stuur, A., (2005). Internet and E-mail for Seniors with Windows XP: For Senior Citizens who want to start using the Internet (p 19). Netherlands, Visual Steps (2005).

Trogg, J., (2005). Internet Usage Among Seniors. Retrieved September 30, 2005 from http://www.seniormag.com/compcorner/articles/iusage1201.htm.

US Census Bureau, (2004). Age Data. Retrieved September 177, 2005 from http://www.census.gov/Press-Release/www/releases/archives/facts_for_features_special_editions/004210.html.

US Census Bureau, (2004). Facts for Features and Special Editions. Retrieved September 7, 2005 from http://www.census.gov/Press-Release/www /releases/archives/facts_for_features_special_editions/004210.html.

Wesselhoff, D., (2000). Investigating the Attitude of the Elderly towards Computer Use. Retrieved May 17, 2005 from San Diego State University, student website at http://et.sdsu.edu/DWesselhoff/690.htm.

Williams, M. and Williams E., (n.d.). Teaching ICT Skills to Third Agers. Retrieved October 16, 2005 from Ulm University, Learning in Later Life website at http://www.uni-ulm.de/LiLL/5.0/E/teaching/section1.html.

Williamson, K., Bow, A., and Wale, K. (1997) Older People and the Internet. Link-Up, March 1997 (pp9-12). Retrieved September 9, 2005 from Monash University (Australia), Information Technology Department website at http://www.sims.monash.edu.au/research/itnr/papers/olderp2.html.

Appendix A

Stage 1 and Stage 2 Coding Set

Bean, C., (2003). Meeting the Challenge: Training an Aging Population to Use Computers. *Southeastern Librarian* 51(3).

Bean, C. and Laven, M., (2003). Adapting to Seniors: Computer Training for Older Adults. Retrieved September 16, 2005 from The University of Arizona, School of Resources and Library Science website at http://dlist.sir.arizona.edu/260/.

Becker, K. and Coleman, J., (2005). Instruction for Older Adults, TriCon 2005. Retrieved September 20, 2005 from http://skyways.lib.ks.us/tricon/2005/handouts/ tips_for_teaching.pdf.

Bedell, D., (1999). Seniors Proving You're Never Too Old to Surf Internet. Retrieved September 19, 2005 from http://www.dougbedell.com/seniors.htm.

Browne, H., (2000). Accessibility and Usability of *Information Technology by the Elderly*. Retrieved May 17, 2005 from the University of Maryland, Department of Computer Science website at http://www.otal.umd.edu/UUGuide/ hbrowne.

Campbell, R. and Nolfi, D., (2005). Teaching Elderly Adults to Use Internet to Access Healthcare Information: Before and After Study. Retrieved September 8, 2005 from http://www.jmir.org/2005/2/e19/.

Carroll, M., (1996). Never Too Old to Net-Surf. Electronic Engineering Times, Issue 904, p62.

Christopher, P., (2000). Older Adults – Special Considerations for Special People. Retrieved on May 17, 2005 from Georgia State University, Stephen W. Harom website at http://www2.gsu.edu/~mstswh/courses/ it7000/papers/newpage31.htm.

Conover, K., (1997). The New Generation of Net Surfers: Seniors. Christian Science Monitor, V90 Issue 1, p8.

Crowell, A., (1997). Age Brings Capabilities, Not Limitations. Retrieved May 17, 2005 from http://gtresearchnews.gatech.edu/reshor/rh-win97/aging.htm.

Czaja, S. J. & Lee, C., (2001). The Internet and Older Adults: Design Challenges and Opportunities. Communication, Technology and Aging: Opportunities and Challenges for the Future (pp. 60 –81). New York: Springer Publishing Co.

Fainges, K., (1999). How Older Learners want to Learn Computer Application? Retrieved September 15, 2005 from http://www.users.bigpond.com/sagatech/pr01.htm.

Holba-Puacz, J., (2000). Surf's Up for Seniors. Computers in Libraries, September 1, 2000, Vol 20, Issue 8.

Hudson, B., (1996). Teaching Computers to Senior Citizens. Retrieved from http://www.seniorcomp.org/essay.html.

Hotz, R., (2005). Higher Education May Benefit Brains of Elderly, Study Finds. Retrieved September 9, 2005 from http://www.post-gazette.com/pg/pp/05073/470997.stm.

Lewin, M., (2001). "Equal with Everyone": Computers in the Lives of Older People. Retrieved October 2, 2005 from http://www.Odeluce.stir.ac.uk/lewin/Disertation.htm.

Lieb, S., (1991). Principles of Adult Learning. Retrieved September 20, 2005 from the Honolulu Community College, Internet Committee website at http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/adults-2.htm.

McCort, A., Telsavaara, T., Scipio, C., & Stanton, J., (2000). Issues in Teaching Older Adults How to Use Computers. Retrieved May 17, 2005 from the University of North Carolina, Faculty website at http://www.unc.edu/ ~jdumas/projects/aging.htm.

Nielsen, J., (2002). Usability for Senior Citizens. Retrieved September 8, 2005 from http://www.useit.com/alertbox/20020428.html.

Palme, J., (2000). Use of Networks for Reducing the Isolation of Elderly People and People with Mobility Impairments. Retrieved May 17, 2005 from http://dsv.su.se/ jpalme/sol/ senior-online.html.

Saunders, E., (2004). Maximizing Computer Use Among the Elderly in Rural Senior Centers. Educational Gerontology, Vol 30, Issue 7, pgs 573 – 585.

Shapiro, P., (1995). Computers Use and the Elderly. Retrieved May 17, 2005 from http://www.his.com/~pshapiro/computers.and.elderly.html.

Springer, S., (2004). Inclusion of Older Adults in Higher Education…The Last Frontier. Retrieved May 17, 2005 from http://www.celt.lsu.edu/cfd/E%2DProceedings04/ Springer.pdf.

Stephenson, M., (2002). Older Learners and IT: Challenge for Inclusion, Adults Learning, Mar 2002, Vol 13, Issue 7, p12.

Wesselhoff**,** D., (2000). Investigating the Attitude of the Elderly towards Computer Use. Retrieved May 17, 2005 from San Diego State University, student website at http://et.sdsu.edu/DWesselhoff/690.htm.