



Experiences of women over 70 years of age learning computer skills
by Joan Walker Cook

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education
in Education

Montana State University

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Abstract:

Educators working with older adults need to understand how computer learning environments and selected teaching strategies are experienced by older women in order to design computer education programs that are most beneficial to them. The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman. A model was developed to guide computer course design and instructional practice for use with older women.

One group of 14 women participated in a series of six computer classes held on campus. Data was collected using five methods. Verification was established through nine means commonly used in the qualitative research paradigm.

Data analysis consisted of analyzing and coding supporting statements from focus group interviews, participant reflections, audiotaped class sessions, and instructor observations. Data in each category was compared to develop themes for each research question. The central phenomenon was synthesized, research questions were answered, and a model was developed.

The women were making connections socially, societally, and intellectually. They chose to take this computer course because it offered a unique opportunity to learn with women of similar age, learn relevant skills, and immersed them in a respectful learning environment that helped them succeed in spite of age-related difficulties. The instructor's role should be one of a guide and companion in learning who harmoniously fits the social classroom atmosphere.

Recommendations follow: allow learners to select course content, hold class in a location with easy access where one computer per participant is available, schedule a two-hour class once per week for six weeks, accept 6 to 10 women in each group. Teaching strategies include: "Demonstration-Do-Redo," verbal "share-pair," "shifting," mnemonics and rhythmic expressions, repetition, restating, reminding, providing a rationale for each procedure, encouraging learners to ask for help and share knowledge, and tying new learning to prior knowledge.

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MONTANA STATE UNIVERSITY
Bozeman, Montana

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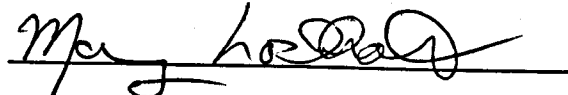
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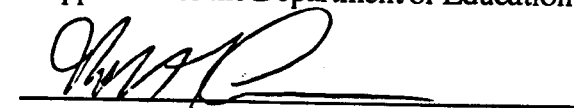
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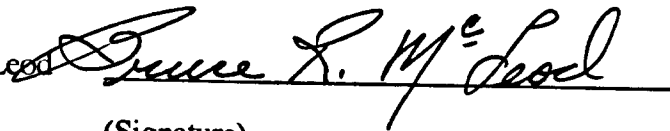
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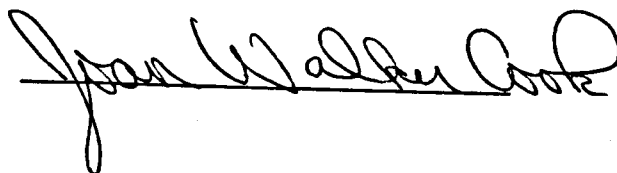

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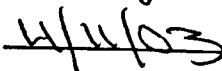
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This work is dedicated to my mother, Phyllis (1926-1997). Mom, you passed down two "pearls of wisdom" that have served me well in life. The most important has been, "If you start something, finish it." You also impressed upon me the idea that I could accomplish anything that I set my mind to doing. These two notions have fueled the stamina and determination needed to complete my doctoral program. Thank you for sharing these perceptive "pearls of wisdom."

VITA

Joan Walker Cook was born in Reno, Nevada, in 1952. Her parents are Heward and the late Phyllis Walker. She received a Bachelor of Science degree in Secondary Education in 1977 and a degree of Master of Education in 1990 from Montana State University-Bozeman. She has taught courses in Instructional Computing at Montana State University since 1987. Joan has been the Director of Instructional Computing/Media in the Department of Education at Montana State University-Bozeman, since 1991. She is married to Gary L. Cook, D.V.M., and has two sons, Jacy Lee Cook, D.V.M., and Jeff Walker Cook, helicopter pilot.

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ABSTRACT

Educators working with older adults need to understand how computer learning environments and selected teaching strategies are experienced by older women in order to design computer education programs that are most beneficial to them. The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman. A model was developed to guide computer course design and instructional practice for use with older women.

One group of 14 women participated in a series of six computer classes held on campus. Data was collected using five methods. Verification was established through nine means commonly used in the qualitative research paradigm.

Data analysis consisted of analyzing and coding supporting statements from focus group interviews, participant reflections, audiotaped class sessions, and instructor observations. Data in each category was compared to develop themes for each research question. The central phenomenon was synthesized, research questions were answered, and a model was developed.

The women were making connections socially, societally, and intellectually. They chose to take this computer course because it offered a unique opportunity to learn with women of similar age, learn relevant skills, and immersed them in a respectful learning environment that helped them succeed in spite of age-related difficulties. The instructor's role should be one of a guide and companion in learning who harmoniously fits the social classroom atmosphere.

Recommendations follow: allow learners to select course content, hold class in a location with easy access where one computer per participant is available, schedule a two-hour class once per week for six weeks, accept 6 to 10 women in each group. Teaching strategies include: "Demonstration-Do-Redo," verbal "share-pair," "shifting," mnemonics and rhythmic expressions, repetition, restating, reminding, providing a rationale for each procedure, encouraging learners to ask for help and share knowledge, and tying new learning to prior knowledge.

CHAPTER 1

INTRODUCTION

Overview

One of the greatest challenges in the new century will be how families, business, and government will respond to the needs, preferences, and lifestyles of the growing number of older adults. In so many ways, technology has made longer life possible. Policymakers must now go beyond discussions of health and economic security to anticipate the aging boom and the role of technology in responding to the needs of an aging society....One of the greatest risks in aging is not necessarily poor health but isolation....Advances in information technologies make it possible and affordable for older adults to remain connected to the world around them (Coughlin, 1999, p. 1).

Two dynamic trends in American society have created a need for education for older women in the use of personal computers and the Internet. The two trends are the growing number of older women in our population (Administration on Aging, 2001a, US Census Bureau, 2001) and the greater reliance on personal computers and the Internet by society (Bell & Guenette, 2000; Coughlin, 1999; Microsoft, 1999; Norton & Wiburn, 1998; Newburger, 2001; SeniorNet, 2002).

Older women need training in these new technologies because most were not exposed to these technologies when they were in the workforce and many find it difficult to find computer courses designed to meet their learning needs (Granick, 2001; Kasworm & Londoner, 2000). Numerous researchers argue that the main factors in teaching older people to use computers are the selection of teaching strategies and course design (Cahoon, 1998; Bell & Guenette, 2000; White & Weatherall, 2000).

Technology in the form of MRIs and CAT scans has also affected the field of education by illuminating how the brain works (Caine & Caine, 1991; Clark, 1997; Sylwester, 1997). More has been learned about how the brain functions in the past 10 years than has been learned in the previous 90 because of the convergence of

cognitive-psychology, neuroscience, and technology (Reardon, 1999). Educational researchers have used new discoveries to develop teaching methods that enhance learning. Active learning methods, concept mapping, multiple intelligence based activities, and learning styles awareness, are examples of educational procedures that are reported to improve student learning (Caine & Caine, 1991; Clark, 1997; Sylwester, 1997; Wilson & Spears, 2001).

Research in gerontology and lifespan development has revealed that cognitive difficulties are results of normal aging (Hainsworth, 2002; Park, 2002). Teaching strategies must take into consideration that reaction times are slower in the older adult brain, short-term memory difficulties are to be expected, and that the ability to filter out extraneous details is diminished (Bragdon & Gamon, 1999; Hainsworth, 2002; Hertzog & Hultsch, 2000). Research also supports the importance of providing activities for the elderly to improve their quality of life through connections with others and increased fellowship as preventative services that keep the elderly healthier and happier (Binstock & George, 2001; Litwin, 1999; Wilson, 2000). Researchers have found that use of the Internet can provide an important form of communication and connection for the elderly (Baltes & Staudinger, 1996; Berger, 2002; Coughlin, 1999; Ito, Adler, Linde, Mynatt & O'Day, 1998; SeniorNet, 2002; Wilson, 2000; White & Weatherall, 2000).

In addition, studies have shown that there is increased need for computer training for older adults (Bell & Guenette, 2000; Brown, 2001; Coughlin, 1999; Microsoft, 1999; SeniorNet, 2002; White & Weatherall, 2000).

Statement of the Problem

Educators working with older adults need to understand how computer learning environments and selected teaching strategies are experienced by older women in order to design computer education programs that are most beneficial to them.

Purpose of the Study

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman.

The results of this study may be used to guide computer course design and instructional practice for use with older women. Those managing adult living facilities and adult activity centers may use these results by offering computer courses to expand social activities. As a new and interesting activity, participation in a computer course may provide an avenue to enhance mental acuity and social involvement. Results of this study may also be helpful in developing computer courses for older adults at libraries, museums, institutions of higher education, and extended education programs.

Research Questions

The following questions were used to structure the inquiry and guide development of methodologies.

- I. What experiences do older women describe as they participate in a computer course on the campus of Montana State University-Bozeman as related to:

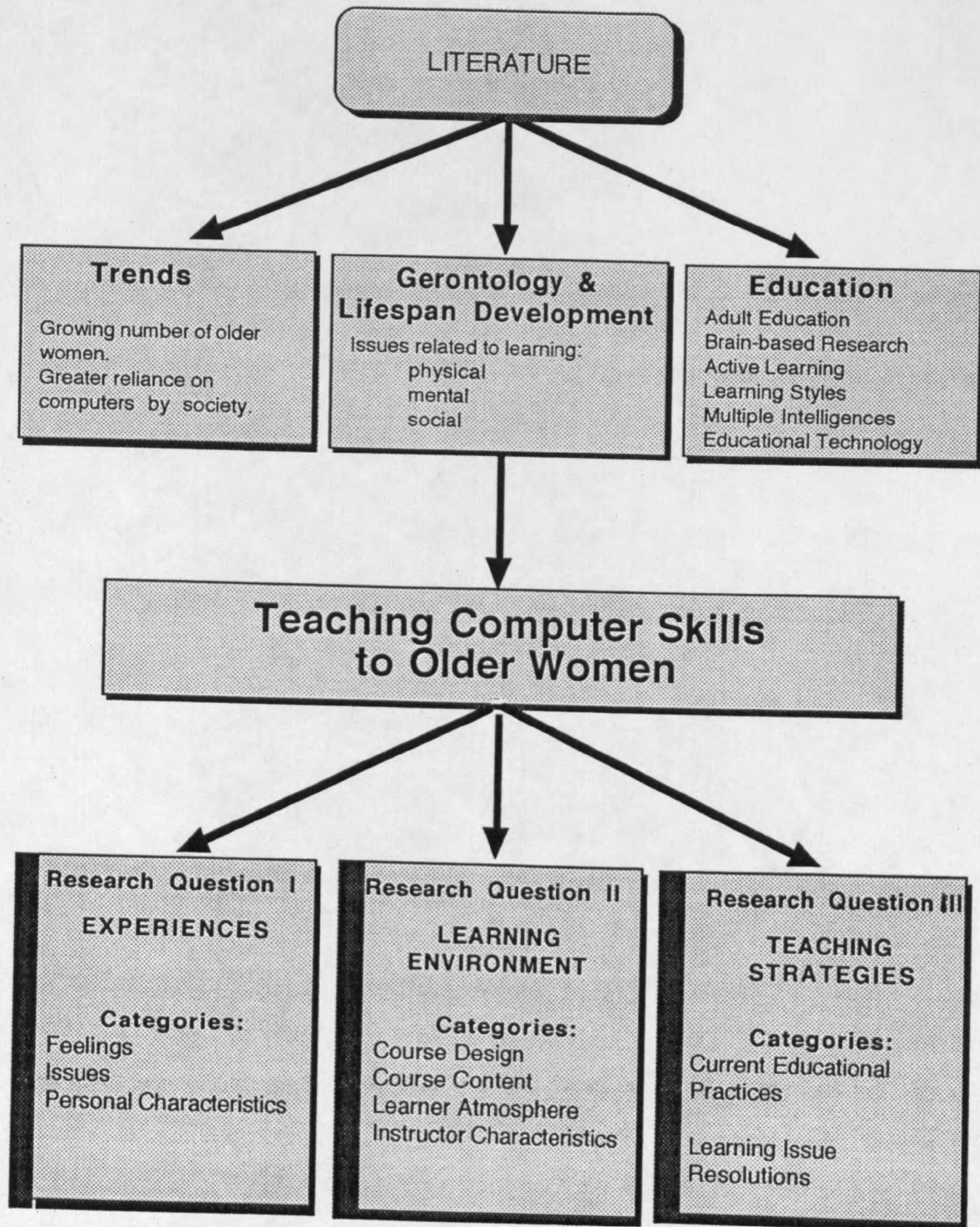
1. Feelings.
 2. Issues.
 3. Personal Characteristics.
- II. What recommendations do older women express when considering the most fulfilling environment for learning as related to:
1. Course Design.
 2. Course Content.
 3. Classroom Atmosphere.
 4. Instructor Characteristics?
- III. What teaching strategies do older women believe are most conducive to their learning as related to:
1. Current Educational Practices.
 2. Learning Issue Resolutions?

For the purposes of this study, feelings were defined as any state of mind expressed by the participants. Issues were topics the participants voiced in which they had a concern. The following conceptual framework (Figure 1) illustrates the scope of this study. The literature review included three areas: trends, gerontology, and education. These were linked to the research questions which dealt with the experience, learning environment, and teaching strategies.

Significance of the Study

Older adults are the fastest growing segment of the population in the United States. It is predicted that, in the United States, there will be 53 million people over the age of 65

Figure 1. Conceptual framework consisting of literature review topics and research categories examined during the grounded theory study.



by the year 2020, as compared to 35 million in 2001 (Administration on Aging, 2001a; US Census Bureau, 2001). In 2000, there were 20.6 million American women over 65 years of age. In the United States, one in every 10 people is a woman, who is at least 60 years old (Administration on Aging, 2001c; US Census Bureau, 2001). Women comprise 54% of people in the 65-69 year age group, while women make up 71% of the 85 and over age group in the United States population (Administration on Aging, 2001a).

Social interaction is vital to optimal health and morale of older women, computers can be a lifeline through communication using the Internet (Baltes & Staudinger, 1996; Berger, 2002; Ito, Adler, Linde, Mynatt & O'Day, 1998; Litwin, 1999; Wilson, 2000; White & Weatherall, 2000).

Our society is experiencing a phenomenal drive to use digital technology. Media, business, health institutions, caregivers, and financial institutions, request that people visit their Internet sites to perform a range of activities including voting for proxies, finding the latest investment data, and tracking health related information. In addition, people increasingly use e-mail and the World Wide Web to maintain close communication with friends, relatives, doctors, and other caregivers (Berger, 2002; Coughlin, 1999; Kasworm & Londoner, 2000; Newburger, 2001; Norton & Wiburn, 1998).

A result of the boom in digital technology has been the increased purchase of personal computers by older adults. In 2001, 5.3 million households, where the householder was 65 or older, had a computer (Administration on Aging, 2001a; US Census Bureau, 2001). Internet access was also present in 3.9 million of these elderly households (Administration on Aging, 2001b, US Census Bureau, 2001). Women account for 52% of home Internet users, which represents 55 million women surfing the

Internet (Berger, 2002). Through the Internet, women can share their life experiences and feelings in online communities (Berger, 2002).

As computers and related technologies become more relevant and necessary, adult educators need to develop new models, strategies, and understandings of computer mediated learning systems and teaching computer skills. Researchers argue that there needs to be collaboration between adult educators and the technologist. At present, technology and technologists are driving the teaching of technology in adult education without knowledge of adult learning (Kasworm & Londoner, 2000). People studying instructional technology should also study adult education in order to have a better understanding of characteristics of adult learners and the underlying principles of program planning and instruction (Kasworm & Londoner, 2000; Merriam & Caffarella, 1999, SeniorNet, 2002).

“To date, researchers with expertise in education or communications technologies have done little work in the aging field, and as a result, teaching methods now used for the elderly are often extrapolated from adolescent or vocational education” (Brown, 2001, p. 1). Studies on computer training for older adults are limited; even fewer studies have been done to understand older women and their involvement in computer learning activities (Bell & Guenette, 2000; Lockhart & Cook, 2000; White & Weatherall, 2000). Computer use appears to be very important to many older adults in order to communicate with important others, to keep up with society’s extraordinary use of the Internet, and to keep the mind active (Cook, 2002; Microsoft, 1999; SeniorNet, 2002).

Educational methods emphasizing social aspects of learning, active learning, concept mapping, multiple intelligence integration, authentic learning, and metacognition are reported being more effective than straight lecture, simple demonstration of techniques,

and other non-active methods (Friedrich, 2001; Gardner, 1998; Glatthorn, 1999; Hartman, 1995; Jonassen, Beissner, & Yacci, 1993; Mathews, 1996; Merriam & Caffarella, 1999; Novak & Gowin, 1994; Silver, Strong & Perini, 2000; Svinicki, Hagen & Meyer, 1996; Visser, 1996). These strategies were utilized by the researcher and explored for effectiveness by the participants in this study.

Research in adult education has shown that adults learn better through use of relevant projects, social learning activities, self-direction, and when learning in a respectful learning environment (Merriam & Caffarella, 1999; Morgan, Ponticell & Gordon, 1998). Researchers argue that society must develop activities targeted specifically for older men and women because they have different concerns and needs than younger adults (Binstock & George, 2001; Friedrich, 2001; Wilson, 2000).

Research in gerontology and lifespan development contribute to development of a sense of age-related changes that must be considered when working with older adults. *Being old* appears to be a different experience for men and women. These differences should be taken into account when planning services for older adults; especially women, since they are the majority of older population (Binstock and George, 2001; Gilleard & Higgs, 2000; Paoletti, 1998). Several studies reported that women choose activities for their social atmosphere more so than men, and women prefer to participate in activities with only women (Bell & Guenette, 2000; Paoletti, 1998).

Numerous researchers explain how older women find fewer opportunities to engage in activities that provide them with social rewards and feelings of competence and achievement which are both vital components of a happy and healthy life for older women. Older women select and continue to attend activities in which they receive positive

reinforcement and see achievement in their efforts (Binstock and George, 2001; Gilleard & Higgs, 2000; O'Beirne, 1999; Paoletti, 1998; Wilson, 2000).

Many older women may enjoy a new sense of liberation as they choose to become involved in what interests them rather than spend all of their time and energy taking care of family (Gilleard & Higgs, 2000; Paoletti, 1998). Friedrich (2001) reported that using a computer can become a psychological intervention activity while taking a computer class can become a social intervention activity.

Learning from the participants' perspectives and developing a model to guide computer course design and instructional practice will help educators understand characteristics of the learning environment that create a satisfying and motivating computer learning experience. Those managing adult living facilities and adult activity centers may use these results by offering computer courses to expand social activities. Results of this study may also be helpful in developing computer courses for older adults at libraries, museums, institutions of higher education, and extended education programs.

Pilot Study

The researcher conducted a pilot study in the Spring of 2002 which reinforced the need for a model to guide computer learning experiences for older women (Cook, 2002). The study explored the experiences of eight women over 75 years of age who attended two-hour computer classes, once a week for eight weeks, on the campus of Montana State University-Bozeman. The results suggested that older women *do* want to learn to use a computer; yet, they have difficulty finding a computer course that is designed to meet their particular learning needs.

The participants selected course content based upon their needs. The content selected was searching the Internet, sending and receiving e-mail, understanding computer terminology, using word processing, and installing and running a program.

The pilot study revealed the preferences of older women to participate in a pleasant, social, and sharing learning environment without participation of men in the class. Observations reinforced that older women tend to have age-related difficulties such as decreased short-term memory, difficulty staying focused on the task if the procedure required many steps to complete, and difficulty moving the cursor.

The study found that two-hour sessions were preferred by the women. Participants felt that one-hour sessions would be too short and three-hour sessions would require them to sit too long. The group recommended a course of six classes to learn the basics; ten classes would require too long of a commitment. Results of the pilot study suggested that additional research was warranted to ascertain which teaching strategies are most effective with older women and to learn how a computer course should be designed to encourage older women's participation.

Limitations of the Study

1. The computer lab in the Education Department at Montana State University-Bozeman was available for a two-hour time period on Mondays from 10:00 am. to 12:00 pm., Mondays from 1:00 pm. to 3:00 pm., or Thursdays from 12:00 pm. to 2:00 pm. Therefore, all participants had to be able to commit to one time block that was chosen by the majority of the participants.
2. All participants lived in a rural university town composed generally of a well-educated, more affluent, population of 35,000.

3. Participants lived within 10 miles of the land-grant university where the study took place.

Delimitations of the Study

Rationale for selecting the age of participants for this study follow. Computer courses offered for younger adults seem to move too rapidly and offer less individual assistance (Cook, 2002). In addition, women younger than 70 years may have been exposed to computers during their working years, and thus, may not have as great a need for training as the older group (Granick, 2001). The size of the group was limited to 14 participants in order to examine the perceptions of each participant more extensively and personally than a larger group would have allowed. The researcher believed adults learn more effectively if immersed in an adult learning environment, rather than one based on the pedagogy of children or young adults. This environment consisted of teaching skills that were relevant to the needs of the learners, encouraging an enjoyable surrounding in which participants were willing to help each other and to share their knowledge, and providing a great deal of positive reinforcement (Merriam & Caffarella, 1999; Wilson, 1993; Wlodkowski, 1995). Since women learn differently than men; the learning environment was designed to enhance "women's ways of knowing" (Hiemstra, 1993; Munro, 2000, O'Beirne, 1999). The class atmosphere was designed to encourage that laughter replace frustration, that participants share their knowledge and help each other, and that participants ask for help as soon as needed. The course was offered at no fee since the participants were volunteering their time and sharing their valuable experiences with the researcher.

Method

The experiences of older women participating in a six-week, non-credit, computer course offered in the Education Department at a Montana State University-Bozeman were explored in this grounded theory study. The course was offered at no fee. One group of 14 women over the age of 70 participated in a series of six computer classes held on campus. It was recommended that each participant have access to a computer on which to practice between classes. The criterion method was used for participant selection in this study (Creswell, 1998). Criteria required that the participant was a female over 70 years of age, was willing to come to campus to take a computer course, and was willing to participate in a research study as part of the computer course. A key individual who met all criteria was identified. She was asked to identify others whom she thought would meet the criteria of the study. The snowball method was used to find additional individuals who met the criteria.

Data Collection

Data were collected using five methods: (a) A Background Information/Needs Assessment questionnaire designed by the researcher was given at the first class session (Appendix A); (b) instructor observations containing descriptive and reflective notes were written after each of the six class sessions (Appendix B); (c) participant reflections containing comments about the teaching strategies used in class, their importance to the learner, and descriptions of the experience, i.e. feelings, thoughts, concerns, and observations, were collected (Appendix C); (d) focus group interviews took place in the computer lab during the first 30 to 40 minutes of each class session. The interviews were audiotaped and transcribed. Focus Group Interview Forms were used to guide questions

used for discussion each week (Appendix D). Interview questions were developed using the literature and research questions; (e) all class learning sessions were audiotaped and transcribed, providing additional information to the researcher.

Course Topics (Appendix E)

The researcher and participants suggested topics, then the women selected those that they wanted to learn. Topic order was designed to move from less computer skill required to more skill required as participants increased eye-hand coordination, typing skills, and desire for exploration. The course topics were:

1. Searching the Internet.
2. Sending and Receiving E-mail.
3. Understanding Computer Terminology.
4. Using Word Processing.
5. Installing and Running a Program.

Teaching Strategies

The teaching strategies utilized in this study were selected from a combination of methods described in the literature on adult education, brain-based research, active learning, multiple intelligences, and educational technology. Participants were asked to assess the effectiveness of each strategy following their experience. The strategies utilized during the study follow.

1. Verbal descriptions only.
2. Instructor demonstration of the procedure using the large screen at the front of the classroom.

3. Demonstration, Do, Redo: instructor demonstration while participants took notes, a second demonstration while participants did the procedure for the first time, followed by participants completing the procedure on their own.
4. Use of strategies involving multiple intelligences (Gardner, 1993; 1995) and brain-based learning principles (Caine & Caine, 1991; Sylwester, 1990).
 - A. Utilizing "share-pairs" in which participants told each other how to do the procedure or described new knowledge.
 - B. Using mnemonics to remember procedures and new skills.
 - C. Creating mind maps and other drawings to reinforce new knowledge.
 - D. Helping each other by sharing procedures that worked.
 - E. Creating musical or rhythmic sentences to reinforce memory of procedures.
 - F. Helping the learners learn about their own learning styles, strengths, weaknesses, and accommodations.
5. Repeating, clarifying, restating, summarizing, and reminding participants to take notes or underline existing procedures were also utilized.
6. Delivering frequent positive reinforcement.
7. Encouraging laughter.
8. Encouraging knowledge sharing.

Verification/Trustworthiness

A verification process occurred throughout the collection of data, analysis, and writing of the findings. Trustworthiness was established through the following procedures.

1. The criterion method of sampling provided quality assurance because the criterion sample has the highest ability to contribute to the developing theory due to the fact that the participants were most similar to the audience who may be affected by the study's results.
2. Numerous sources and approaches for data collection and prolonged engagement in the field were utilized: six 30 - 40 minute focus group interviews (audiotaped and transcribed), six audio taped and transcribed class sessions, participant take-home reflections from each of the first five classes, Background/Needs Assessment form, and six instructor observation forms.
3. Member checking assured that the researcher had actually heard and analyzed the data correctly. Member checking took place during classes three, four, five, and six. Data collected each week were analyzed, placed into categories, and themes were developed. The researcher asked the participants to verify the themes that were emerging.
4. In order for the participants to feel more comfortable in expressing their opinions, a different instructor lead the focus group interview section asking for positive and negative characteristics of the instructor of a computer course.
5. Peer auditing was sought from a competent individual in the educational technology field. Descriptions, interpretations, and evaluation of and placement of data into categories and themes was examined.
6. Triangulation took place through comparisons of transcribed focus group interview data with instructor observations, participants' take-home reflection forms, and transcribed class sessions.
7. Limitations and delimitations of the study were clearly articulated in Chapter One.

8. Confidentiality of all participants' comments and materials was planned into the process.
9. Thick, rich descriptions were reported by the researcher.

Data Analysis

Data analysis progressed from particular statements to general themes. First, the supporting statements in the focus group interviews, participant reflections, audiotaped class sessions, and instructor observations were coded and placed under the research question or questions that it supported. Second, statements under each research question were analyzed and placed into the predetermined research categories. An additional category, Learning Issue Resolutions, was added to Research Question III after analysis of the data because these statements did not fit under the predetermined research categories. Third, the data in each category were thoroughly compared in order to fully develop the themes. Fourth, a predominant theme statement was written to describe an overall message for each research question. Fifth, a central phenomenon was synthesized for the study. Finally, the research questions were answered and a model was developed.

About the Researcher

The researcher was also the instructor of the computer course in which the women participated. She has been teaching Instructional Computing courses in the Department of Education at Montana State University for 15 years. She has extensive knowledge of instructional design, curriculum design, technology integration strategies, and possesses skill in using many computer applications. She has provided numerous professional

development workshops for teachers. She has also taught computer classes for five semesters to adults over 50 years of age, in order to investigate how learning materials should be redesigned to be more effective for the older adult. Interest in the current topic and development of the study grew out of the personal experiences of the researcher as a provider of educational technology classes for adults and out of her interest and enjoyment in working with older adults. The researcher believes that active learning teaching strategies, rather than only lecture and "sage on the stage" type of instruction, are most effective for adult learners and thus, had designed learning activities in such a way that learners were actively involved.

Definition of Terms

Research in the fields of computer technology, gerontology, and education requires clarification of specific terms used in this study.

1. Andragogy encompasses the strategies and theories that are involved in helping adults learn (Merriam & Caffarella, 1999).
2. Brain-based research refers to research on how the brain works. Brain-based learning explains methods of teaching which are based upon brain-based research (Novak and Gowin, 1994).
3. Cognitive refers to the thinking activity of the brain; learning and understanding.
4. E-mail is "Text messages sent between computers across computer networks. Increasingly, e-mail systems are allowing users to send pictures, sounds, and videos, as well as text" (Tiene & Ingram, 2001).
5. Educational technology refers to courses or workshops designed to teach others to use computers and related technologies (Tiene & Ingram, 2001).

6. Feelings, for the purposes of this study, are defined as any state of mind expressed by the participants.
7. Internet and the World Wide Web (WWW) --“The full collection of interconnected Web servers that hold the billions of pages of information currently available....The Web is a subset of the Internet as a whole, which also includes e-mail services, listserves, newsgroups...” (Tiene & Ingram, 2001).
8. Issues, for the purposes of this study, are topics in which the participants voiced a concern.
9. Long-term memory is permanent memory. The cerebral cortex stores this information in many different parts of the brain after organizing, categorizing, and after making repeated associations (Johnson, 2000).
10. Metacognition is thinking about how one thinks and learns (Morgan, Ponticell, & Gordon, 1998).
11. Short-term memory is memory that lasts a few hours to a week. Much of short-term memory begins to blur within a day unless deemed important, then it is transferred to long-term memory through organization and associations (Johnson, 2000).
12. Visual cognitive organizers refer to tools that students can draw to help them organize information: mind maps, concept maps, mind webs, visual conceptual models, and graphic organizers (Novak & Gowin, 1994).

Chapter Summary

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week,

non-credit computer course offered by the Education Department at Montana State University-Bozeman.

Background information, problem, purpose, research questions, conceptual framework, design of the study, significance of the study, and definitions were presented in Chapter 1. Literature supporting the three trends prompting this study, gerontology and lifespan development, and education, is presented in Chapter 2.

CHAPTER 2

LITERATURE REVIEW

Introduction

Literature for this research encompassed three fields of study. First, the two social trends that created the need for this study are presented: growing numbers of older women and greater reliance on computers and the Internet by society. Second, analysis of research from gerontology and lifespan development is presented to provide a background for understanding social, mental, and physical issues of aging, as related to learning. Third, the field of education was examined to develop teaching strategies from adult education, brain-based research, active learning, multiple intelligences, learning styles theory, and also to analyze current research in educational technology.

Criteria for Selecting the Literature, Strengths and Weaknesses

Literature was selected from professional fields that were considered to be most relevant to this research study and appeared to be the most recently published on the topics. Literature available in the field of gerontology and lifespan development was excellent and saturated. Especially appreciated was the 1999 research by the International Research and Training Institute for the Advancement of Women (INSTRAW) which provided comparisons of women's aging issues from different cultures around the world. Brain-based research and its implications to education also yielded a wide range of quality literature with a large number of authors sharing many of the same results and strategies used to enhance learning. Of course, as technology continues to develop, so too

will advancements be made in understanding the brain and how people learn. This will bring fresh insights into teaching strategies which enhance learning.

Literature weaknesses do appear. There was a limited amount of research available specifically on older women and computer use. Additionally, the literature concerning computer use by adults utilized research participants of mixed gender and most were younger adults. There is a growing number of research articles available on computer use by older adults; however, more research is certainly needed.

Trends in Society Leading to this Study

Growing Number of Older Women

In the United States, older adults are the fastest growing segment of the population. It is predicted that there will be 53 million people over the age of sixty-five by the year 2020, as compared to 35 million in the year 2001 (Administration on Aging, 2001a; US Census Bureau, 2001). In 2000, there were 20.6 million women over 65 years of age. One in every 10 persons is a woman, who is at least 60 years old (Administration on Aging, 2001c; US Census Bureau, 2001). As age increases, so too does the ratio of females to males in this age group. Women comprise 54% of people in the 65-69 year age group, while women make up 71% of the 85 and over age group (Administration on Aging, 2001a).

Greater Reliance on Computers and the Internet by Society

Our society is experiencing a phenomenal drive to use computers and the Internet. In addition, people are increasingly using e-mail and the World Wide Web to maintain close communication with friends, relatives, and caregivers (Berger, 2002; Coughlin, 1999;

Kasworm & Londoner, 2000; Norton & Wiburn, 1998; US Census Bureau, 2001).

Numerous researchers argue that a critical change has taken place since the 1980s and 1990s because of the Internet. It is the first time that our nation is using the human mind more to process and produce *information* than process and produce *goods*. They believe that one of the greatest challenges today is that of providing opportunities for people to learn to live in this world driven by information and technology (Coughlin, 1999; Granick, 2001; Norton & Wiburn, 1998).

Coughlin (1999) argues that technology used for communications will be a vital component of caregiving in this century. He believes that an online caregiving network will be crucial to delivering services that enhance individual lives and facilitate caregiving. "Boomers experience technological innovation every day in their cars, their office computers, and their home appliances. They will expect technological genius to respond to their needs in old age" (Coughlin, 1999, p. 6). Coughlin reports that the federal government is beginning to look for ways to address the needs of older adults. The ElderTech initiative would support investment in technology for an aging society. Coughlin (1999) believes that Congress should provide tax incentives for families to purchase technology for the purpose of providing services to older adults. Since social interaction and networking are essential to the health and morale of older women, the computer and the Internet can be important tools for communication (Baltes & Stadinger, 1996; Berger, 2002; Coughlin, 1999; Ito, Adler, Linde, Mynatt, & O'Day, 1998; Litwin, 1999; White & Weatherall, 2000; Wilson, 2000).

Use of computer technology is becoming increasingly common in the lives of people in our modern society. Older adults should not be left behind. Research is

beginning to focus on the benefits and uses of computers by older people (Merriam & Caffarella, 1999; Norton & Wiburn, 1998; SeniorNet, 2002; White & Weatherall, 2000).

Gerontology and Lifespan Development

Two perspectives were found in the literature on aging: the study of gerontology and the study of lifespan development. Each view contributes to a sense of age-related changes and helps one develop a picture of what life is like as an older adult.

Gerontology was organized in 1942 as the study of characteristics of the changing older person. Gerontology views aging as a separate period in which numerous forces result in a decline in physical, social and psychological function. It was not until the 1960s that lifespan development became important to research. In contrast to gerontology, lifespan development views aging as a continuous period of growth and change; older age is only one facet of one's entire life; and, each period is dependent on preceding periods and responses (Friedrich, 2001).

Types of Aging

There are two categories of aging; chronological age (number of years since birth) and those which focus on the conditions of aging (biological age, psychological age, sociological age, and historical age (Friedrich, 2001). Chronological age is used as a means to segregate individuals with the focus of research being on related differences in different study variables of age. Fry states:

...most research on aging in biology, psychology, and the social sciences has focused on what happens in time. Bodies are transformed and societies respond to individuals who are very young and those who have been here a long time. Age becomes a variable only insofar as it is culturally conceptualized and incorporated into social life. Age also becomes a

variable when a society becomes aware of its own demographics and begins to worry...(in Friedrich, 2001, p. 43).

Biological age refers to the vital organ structure and function capacities. Most research on older people stated that the "younger" one's biological age, the better the quality of life and length of life (Friedrich, 2001; INSTRAW, 1999; Paoletti, 1998; Wilson, 2000). In our western society, there is much emphasis directed toward older people to maintain one's body for a youthful appearance which may lead to a longer, healthier life. When bodily changes cause problems, American society views it as negative and the person is seen as being old, feeble, and elderly, even if chronological age is not comparable (Friedrich, 2001; INSTRAW, 1999; Paoletti, 1998; Wilson, 2000).

Psychological age refers to a person's intelligence, motivations, and emotional/personality capabilities. People who are considered old chronologically may differ significantly in psychological age. Research agrees that the behavioral dispositions of psychological age have greater influence on whether one is viewed as being old or not and in the decision to become involved in life's activities or to become isolated during the *Golden Years* (Friedrich, 2001; Paoletti, 1998; Wilson, 2000).

Social age refers to the social expectations and roles defined by societies for each stage of life and for significant phenomena that occur. During the older years one would deal with retirement, loss of a spouse, possibly the loss of close family as they move away, and with dying (Friedrich, 2001; Wilson, 2000).

Numerous researchers in gerontology and lifespan development argue that people in American society must change their view of aging as being unproductive and burdensome because these false stereotypes affect the identities of older people. Activities need to be targeted specifically for older men and women because identity can cause changes in physiological well-being through one's involvement in environments that are either hostile

or supportive (Binstock & George, 2001; Gilleard & Higgs, 2000; INSTRAW, 1999; O'Beirne, 1999; Wilson, 2000).

Personal Identity and Women's Issues

"Ageing, as a stage of development, is a challenge for women. In this period of life, women should be enabled to cope in a creative way with new opportunities..." (INSTRAW, 1999). Numerous researchers reported that older women must *reinvent the self*. In old age, their lives are changing dramatically. After years of living under cultural expectations of womanhood, older women must now attempt to identify with contemporary expectations of what it is to be an "older woman." Their personal identities are not the same as their lived experiences. Many studies point out that older women (a) are no longer working for pay; (b) have lost their slim trim bodies and thus, their sense of femininity and perceptions of desirability; (c) many have lost their spouses through death or divorce and must learn to become more independent; (d) may have less mobility and increased illness resulting in greater isolation; and (e) may have fewer family members around due to the globalization of our society (Binstock & George, 2001; INSTRAW, 1999; O'Beirne, 1999; Wilson, 2000). These major changes can cause feelings of uselessness and futility along with the knowledge that in our western society older women are expected to "stay young" (Gilleard & Higgs, 2000; O'Beirne, 1999; Wilson, 2000).

Paoletti (1998) argues that activities for seniors could produce new and different identities in women. Women need participation in activities in which they can perceive themselves as justified and capable. Women have the will to choose integration and well-being over isolation and despair by choosing to be involved in social activities. Older women may even gain a new sense of liberation as they make choices to become involved in what interests them (Gilleard & Higgs, 2000; O'Beirne, 1999; Wilson, 2000).

Researchers suggest that older women ask themselves questions to reflect upon who they want to be and what they want to do with their lives. They could think about what they have actually achieved in their lives, acknowledge the contributions they have made to community, friends, and family, and think about the wisdom and skills that they have accumulated over the course of their lives (Gilleard & Higgs, 2000; O'Beirne, 1999; Wilson, 2000). Researchers argue that more research needs to be done to understand the life changes required of women and that this research should be done in the voice of the older women themselves (INSTRAW, 1999; O'Beirne, 1999).

Women in all regions are now actively engaged in an effort to change the way in which older people, especially women, are viewed by society. In order that societies everywhere view older people as a vital and valuable resource, it is necessary that people understand that ageing is a process that involves ongoing changes and multiple identities, and that these are shaped by structures and relations of privilege and inequality, including those of gender.... Thus research concerning women and ageing requires not only an identification of relevant policy and its impact on different segments of the population but also an examination of the myths and assumptions about older women that underpin policy discussions and decisions (INSTRAW, 1999, p. viii).

The myth that older women remarry or are absorbed into an extended family, has been proven to be incorrect; older women are increasingly living alone worldwide (INSTRAW, 1999; Wilson, 2000). The myth that older women want to be the caregivers of others has been dispelled, as well. Older women are at a stage in their lives when they want to experience things that interest them and not always be expected to take care of others (INSTRAW, 1999; Paoletti, 1998; Wilson, 2000).

Paoletti (1998) conducted a study with older women who participated in activities at several senior citizen centers in Italy. She reported that being elderly appears to be a very different condition for men and women and these differences should be taken into account in planning services for elderly people (Paoletti, 1998). The researcher explained how simply creating a center with services and activities for older people does not mean older

men and women will use or access the center equally. Paoletti also observed power relationships between the men and women. The women felt that they did not communicate effectively with the older men. Women voiced that men did not understand the relevance or value of their initiatives and did not fully permit them to take part in decision making; reinforcing women's feelings that men did not listen to them and that women did the work while men took the credit. This led to women opposing involvement of men in activities attended primarily by women. Paoletti reported that women felt the senior center was a *male space*. Women came to the center only after activities were introduced that were specifically designed for them--all women of similar age.

Networking and Social Interaction

Social networks are interpersonal ties that individuals maintain. Generally, these connections provide a support system necessary for well being. Numerous researchers reported that the presence of friends in the network was a positive morale booster as was the building and maintenance of numerous types of networks over a wide range of social activities. Having friends in the social activity and being able to provide helping behaviors was associated significantly with higher morale among older women. The researchers argue that society needs to provide services for the elderly to improve their quality of life through connections with others and increased fellowship as preventative services that keep the elderly more healthy and happy. Maintenance of a communication network of family, friends, neighbors, health professionals, specifically selected activities and classes can contribute positively to a healthy life as people age. In addition, several researchers reported that engaging in discussion and negotiation with peers lead to greater

understanding and provided good mental stimulation (Baltes and Staudinger, 1996; Litwin, 1999; Wilson, 2000).

Self-Esteem and Self-Efficacy

First, several definitions provided by Binstock and George (2001), may help the reader develop a clear understanding of *self*, *self-esteem*, and *self-efficacy*. *Self* is the content of who we think we are, our feelings about who we are, and our actions taken because of our self-perceptions. *Self-esteem* refers to our sense of worth, how we feel about ourselves, either positively or negatively. *Self-efficacy* refers to our sense of control of our world. It includes feelings of self-worth and how effective we are living our lives and participating in the activities in which we choose.

Numerous researchers explain how older women find fewer opportunities to engage in activities that provide them with social rewards and feelings of competence and achievement; very necessary components of a happy and healthy life for older women. These researchers argue that older women select and continue to attend activities in which they receive positive reinforcement and see achievement in their efforts. Women self-select themselves into environments that positively influence their self-esteem (Binstock & George, 2001; Gilleard & Higgs, 2000; O'Beirne, 1999; Wilson, 2000).

When we interact with others, we continually pick up cues and feedback about ourselves from others and from our observations of ourselves. We interpret this information and integrate it into our self-concepts--who we think we are, how we feel about ourselves, and how we act (Binstock & George, 2001, p. 296).

Women tend to have a lower sense of self-efficacy than men; therefore, instructors should help women to learn how to solve problems when they occur in order to decrease the feelings of helplessness and ignorance (Binstock & George, 2001). The researchers analyzed results of actions of women with inadequate coping behavior and found that

higher self-efficacy makes successful problem-solving behavior more likely than passive or avoidant behavior (Binstock & George, 2001, p. 307). This study will emphasize immediate problem-solving as a teaching strategy to help learners move away from behavior that merely manages distressing feelings but does not change the situation or the learner's understanding of the problem.

A sense of understanding begins to unfold as one examines the literature on aging. Older people see old age in different ways; a time for rest, a time to keep the mind and body active, a time to slowly disengage from activities, or a time to keep in touch with the rest of society as far as possible. It is important to understand how older people see themselves and their social groups and to appreciate the idea that men and women are not just *old*, they have all kinds of experiences, pasts and futures that influence who they are and the choices they make. The literature helps the researcher develop an understanding of the challenges faced by older women, learning difficulties that come with aging, and of personal characteristics that shape and influence an older woman's desire, ability, and perceptions of learning to use computers (Binstock & George, 2001; Gilleard & Higgs, 2000; O'Beirne, 1999; Wilson, 2000). Table 1 is a synthesis of factors based in gerontology and lifespan literature that will be considered in design of the learning environment for older women.

Table 1. Factors from the gerontology and women's issues literature that were considered in design of the learning environment.

Integrate the women's sense of interpersonal relations to help them maintain productive involvement.	Provide much positive reinforcement, since women choose activities in which they receive confidence building.
Involve friends in activities to enhance aspects of positive development.	Help women to solve problems rather than allow for frustration and/or feelings of incompetence.

Education

Literature from the field of education was examined in six areas: adult education, brain-based research and its implications to learning, active learning, multiple intelligences, learning styles, and educational technology for older adults.

Adult Education

Literature in the field of Adult Education was examined in three areas: learning theory, learning atmosphere, and learner characteristics. Adult education learning theory provides a theoretical basis upon which the teaching of older adult women may be based. Much of the literature in adult education is founded on younger adult learners rather than people in their later years, and a paucity of research has been done on teaching older women (Hiemstra, 1993; Paoletti, 1998). Adult educators are trying to find a set of principles or a theory to explain how adults learn best; however, there is no single theory for adult learning.

Adult learning does not occur in a vacuum. What one needs or wants to learn, what opportunities are available, the manner in which one learns--all are to a large extent determined by the society in which one livesDemographics, the global economy, and technology are three forces affecting all of society's endeavors, including adult learning (Merriam & Caffarella, 1999, p. 22).

Andragogy is specific to adult learning and provides a means for instructing adult learners that focuses more on the process of learning than the sole acquisition of information. Several adult education models or theories that apply to this study are examined next.

Knowles provides a "Model of Assumptions" which includes the following ideas: adults need to learn experientially, readiness to learn is related to developmental tasks of one's social role, adults are more problem-centered than subject-centered in learning, adults

are not learning for future use but more for immediate use, and adults are motivated to learn by internal factors rather than external ones (Merriam & Caffarella, 1999; TIP, 1998)

McClusky's Theory of Margin states that adulthood is a time of growth, change, and integration (Merriam & Caffarella, 1999). The researcher describes a balance between the amount of energy needed and the amount of energy available to live one's life is necessary. The theory states that adults must have some energy left after primary responsibilities, in order to engage in the learning process because adults juggle many responsibilities and demands on time. As adults age, they adjust their energy by modifying their roles; older adults may have fewer responsibilities and they may have more money and time than younger adults, thus increasing their chances to invest time and energy in learning opportunities. Younger adults usually have more life responsibilities, less money, and less time to invest in educational opportunities. McCluskey's theory does not address how adults learn but rather "when" they are most likely to learn (Merriam & Caffarella, 1991, 1999).

Knox's Proficiency Theory states that adults have the desire to perform well at given tasks. They want to be proficient. Therefore, when the adult recognizes a discrepancy between the skills she has and the desired level of proficiency, she will design, or find, a learning opportunity to become proficient at the level desired. This involves attitudes, knowledge, and skills (Merriam & Caffarella, 1991, 1999).

Wilson (1993) shares the theory of situated cognition and the adult learner. Wilson reinforced other adult education theories by stating that learning and knowing are typically social activities. His second notion is that thinking and learning must be forged in authenticity; teaching should provide examples and learning that can be transferred to the real world.

Wlodkowski (1995) reinforces that teaching of adults must be grounded in the authentic needs of the learners. "...needs motivate adults....One way to view successful instruction is as a process that meets the fundamental needs of learners" (Wlodkowski, 1995, p.105). Wlodkowski stresses that adult education must include a needs assessment to determine the "felt needs" of the adult learner (Merriam & Caffarella, 1999; TIP, 1998). Table 2 is a synthesis of factors based in the adult education literature that will be considered in design of the learning environment and teaching strategies selected for older women.

Table 2. Synthesis of factors based in adult education literature that were considered in design of the learning environment and selection of teaching strategies.

Develop learning activities that are task oriented, relevant to the learner, and that can be transferred to the real world.	Challenge adults to move to advanced stages of personal development.
Take into account the wide range of different background of learners.	Give choice in the selection of learning activities and their organization.
Allow learners to discover things for themselves.	Create an atmosphere that allows for social aspects of learning and sharing of learners' knowledge.
Adapt to the aging limitations of the participants.	

Brain-based Research: Implications for Teaching and Learning

For the past twenty years educators have witnessed a dramatic shift in beliefs about the fundamental goals and strategies of education as well as a deeper yearning to understand how people learn. These educational shifts are driving new research on how the brain works and how learning can best take place. It is also providing interest in helping adults remain life-long learners (Roblyer, 1997; Starr, 1999). In today's society,

perceptions of the role of adult educators and adult learning are changing as new technologies provide new insights on brain-based research and how this influences what is known about learning.

More has been learned about how the brain works in the past ten years than has been learned in the previous ninety because of the convergence of cognitive-psychology, neuroscience, and technology (Reardon, 1999). The function of the brain has been examined since the time of Roger Bacon in 1268, Leonardo de Vinci in the 1500's, Sir Thomas Brown in 1648, to the 1800's with Horsley, Jackson and Wigans (Reardon, 1999). By the late 1950's and early 60's, researchers such as B.F. Skinner were describing the observable behavior of stimulus and response. Teaching strategies utilized rote memorization, lecture, and regurgitation of facts (Reardon, 1999).

Considered a tremendous discovery, a more updated model of how the brain functions was introduced in the late 1960's by Dr. Roger Sperry. He discovered that the brain has two hemispheres and that the right brain controls the left side of the body while the left brain controls the right side of the body (Reardon, 1999). Recent research has determined that many functions are shared between the two hemispheres even though certain skills are associated with specific hemispheres (eg. left brain skills are those that are more uniquely human (problem solving, language, associations, logic, higher level musical skills), while the right brain houses skills that are shared with the animals--emotions, spatial visualization (Bragdon & Gamon, 1999).

The next great leap in understanding was the triune brain theory proposed by Dr. Paul MacLean working from the Laboratory for Brain Evolution and Behavior at the National Institute for Mental Health in the late sixties, early seventies (Reardon, 1999). The triune brain is actually three brains working together. The sensory motor brain

governs the flight or fight response, basic need for food and safety, our basic instincts and awareness of the environment. The emotional-cognitive brain oversees emotions, relationships, and learning. This is where thinking skills are performed- mostly the lower level thinking skills of knowledge and comprehension. The third part of our brain is the neo-cortex in which high level thinking is performed. These are the application, analysis, evaluation and synthesis skills.

Understanding the triune brain has been possible through the use of PET, CAT, and MRI scans in which scientists are able to view activity in the brain of a living person. Until this time, observable behavioral responses to the environment and comparison of normal and dysfunctional brains through dissection of brains from dead people were the only ways to study the brain (Clark, 1997; Reardon, 1999; Sylwester, 1995).

Based on the education revolution that is taking place because of brain-based research, Geoffrey and Renate Caine (1991) have become renowned with their original research on what the new brain-based research means to educators and learning. The Caines developed nine principles of learning on which many others have elaborated (Clark, 1997; Park, 2002; Reardon, 1999; Sylwester, 1995). The following principles provide brain-based research with implications for educators.

Principle 1 states that the brain is a parallel processor that can do many things at one time. *Implications for educators:* a variety of teaching methods must be used to encompass the variations of learners' brains. Use a variety of methods: roleplaying, simulations, lecture, and hands-on projects. Use pictures, charts, colorful posters and multi-sensory immersion.

Principle 2 states that the learning brain uses input from the entire body. Things which affect one's physiology will also affect one's learning. *Implications for educators:*

incorporate multi-sensory experiences in which learners can become immersed. Use live experiences, film, reading, sound, movement, pictures, and song.

Principle 3 states that the brain naturally tries to find patterns and categories in which to store new information. "The greater number of connections the more associations. The greater the number of associations the brain elicits, the more firmly the information is neurologically woven in" (Reardon, 1999, p. 14). *Implications for educators:* relate new learning to past experiences and prior knowledge, immerse the learner in rich, thematic environments, use visual, auditory and kinesthetic involvement. Create opportunities for the learner to teach--reinforcing connections.

Principle 4 states that emotions are critical to the method in which the brain stores information and in ways in which we recall our experiences. *Implications for educators:* create an environment that is challenging, engaging, respectful, and enjoyable. Use activities that release tension, increase rapport, provide for peer discussion, and a chance to express emotions. Provide positive reinforcement to express acknowledgements and celebrate success. "...learning is tied to the state of mind experienced at the moment of learning" (Reardon, 1999, p. 15).

Principle 5 states that the brain processes parts (small pieces) and wholes (larger relationships) simultaneously. *Implications for educators:* provide overviews of the lesson, follow a sequence of steps for learning that builds understanding and skills over time, show the big picture as well as the details.

Principle 6 states that the brain absorbs that to which it gives direct attention and is also aware of what is going on in the periphery. *Implications for educators:* for adults, the brain remains attentive up to 20-25 minutes before a break or diffusion activity should be given for several minutes: peer discussion, reflection time, writing. Color, sounds, smells and music can boost recall. Post charts and diagrams, color code related information, use music in the background if learners desire. Research by Lozanov, Nadel,

and Rosenfield (Reardon, 1999) found that Baroque music with 60-80 beats per minute was identified as helping learners become relaxed and alert. Teachers should also model enthusiasm and interest in the subject so learners pick up the same *vibrations*.

Principle 7 states that facts and skills embedded in contextual memory are remembered more quickly. Information is stored in contextual or content form. Contextual information is stored according to relationships, associations, and circumstances.

Implications for educators: teach memory skills such as mnemonics, pegs, link, and rhythm. Tell stories with intensity, use role-playing, dramatics, and body motions. Include humor and metaphors. Using real-life activities such as fieldtrips, visual imagery projects, and demonstrations integrated with content area skills (reading, math, art, science, etc.) can help the brain absorb more than would normally be learned due to the complex interaction of the senses. Reardon (1999) provided a tip for reviewing information; the 10-24-7 Principle. "Review within 10 minutes, again within 24 hours and then within 7 days. Review, especially in a variety of ways, strengthens the current neural connections and builds additional pathways" (Reardon, 1999. p. 16).

Principle 8 states that learning is inhibited by threat and enhanced by challenge. The brain becomes less flexible and more primitive when faced with threat. *Implications for educators:* create an atmosphere of relaxed alertness for learners and that continuously provides an element of challenge. Materials should be selected with care to match that of the learners' ability level and beyond rather than below the level of abilities.

Principle 9 states that each brain is unique. Emotions and senses are integrated in different ways in every brain. Teaching should provide multiple avenues in which the student can interact visually, emotionally, and tactilely. "Providing choices that are variable

enough to attract individual interests may...facilitate optimal brain functioning (Caine & Caine, 1991, p. 87).

Robert Sylwester's (1995) research was based on brain-based research. Sylwester utilized the Caines' principles to explain to educators how brain-based research can be used to design teaching strategies that enhance learning. Sylwester stated that the more times a person verbally tells what he or she knows, the stronger the connections are made in the brain. According to Sylwester (1995), asking learners to explain certain procedures verbally to another person and then taking time for reflection on what they learned in that setting, increases the chances that the new learnings will be remembered.

Numerous researchers share educational strategies which are based on brain-based research and include the following. Capitalize on the teachable moment: learning takes place more efficiently when answers can be discovered when the problem occurs or when the necessary information is needed in order to connect to prior learning. The use of mind-maps, drama, costumes, movement, talking, handling, singing, rhyming, dancing, tapping out, writing, and so forth are shown to enhance memory. Active discussion and tutoring others are also reported to enhance learning (Caine & Caine, 1991; Clark, 1997; Park, 2002; Reardon, 1999; Sylwester, 1995; Wilson & Spears, 2001). Wilson and Spears (2001) also found that vanilla candle scent can calm while peppermint scent can stimulate the senses. Canadian psychologist Bernard Schiff reported that one can switch on the brain hemisphere that is best for problem-solving abilities by squeezing a tennis ball with the right hand while trying to solve a problem; this activity stimulates the left brain (Schiff, 1994, as cited in Bragdon & Gamon, 1999).

Clark (1997) provides factors involved in brain development and intelligence with teachers' roles that enhance learning. These factors match well with recommendations from

adult education and brain-based research. "Instruct from the concrete to the abstract, from familiar to unfamiliar, known to unknown. Examine topics by determining facts, concepts, generalizations, principles, and theories related to them....Develop student production skills including planning and organizing" (Clark, 1997, p. 9). Clark also argued that teachers must continuously assess knowledge, understanding, and interest of the learners in order to strengthen planning and delivery of the learning experience.

In contrast, there were a small number of research articles that cautioned educators that much more research needs to be done connecting brain function to educational practice. Caution must be applied before applying lab research to classroom practice (Davis, 2000; Jensen, 2000).

Brain-based Research and The Older Mind

All research on the aging mind which was analyzed for this study revealed that cognitive difficulties are typical of normal aging; aging is not a disease or affliction (Bragdon & Gamon, 1999; Hainsworth, 2002; Hertzog & Hultsch, 2000; Johnson, 2000). Older learners may need more time to respond to tasks because there is decreased capacity to process information. There is also a decline in working memory function and storing and recalling information (Hainsworth, 2002; "Tweaking the Brain to Remember Better," 2002; Park, 2002). Many researchers believe the "Use it or lose it" phrase; they have identified evidence that if an older person exercises her mind, memory may not decline as much in older age (Bragdon & Gamon, 1999; Hainsworth, 2002; Hertzog & Hultsch, 2000; Johnson, 2000). Vocabulary-based language skills tend to improve with age, while performing rapid calculations for filtering out extraneous details tend to decline with age (Bragdon & Gamon, 1999).

New research is discovering that older people have more difficulty “inhibiting” relevant information; it is harder to focus on the necessary information because the brain is having problems keeping out the distractions (Bragdon & Gamon, 1999; Persad, Abeles, Zacks & Denberg, 2002). Recent brain-based research has also shown that older brains do grow more brain cells and do continue to make more connections between existing cells (Bragdon & Gamon, 1999).

A synthesis of brain-based research and learning appears to lead to a key factor that growing more brain power involves enriching one’s environment with social activities and mental activities that are enjoyable and challenging (Bragdon & Gamon, 1999; Hainsworth, 2002; Hertzog & Hultsch, 2000; Johnson, 2000; Sylwester, 1995).

A Harvard medical study reported that the frontal lobes were active in memory formation and that this area undergoes changes as people age (“Tweaking the Brain to Remember Better,” 2002). However, the human brain has remarkable compensation mechanisms. This study recommended using “semantic elaboration” as a technique to use when trying to remember. Semantic elaboration requires that the learner take time to classify the word to be remembered as concrete or abstract, or classify the word into a specific category with other words that have similar meanings. This may help the brain make stronger associations which lead to better recall (“Tweaking the Brain to Remember Better,” 2002).

The research by Persad, Abeles, Zacks, and Denberg (2002) has shown how older adults have difficulty learning because irrelevant information is allowed into the brain making it difficult to focus on the relevant information necessary to complete a task--the inhibitory process is not working as it should. These researchers studied people between 60 and 85 years of age. Their results reported that the inhibitory functioning process

caused a decline in verbal memory and attention in older adults. Aartsen, Smits, Tilburg, Knipshceer, and Deeg (2002) examined the impact of everyday activities on four cognitive functions of immediate recall, learning, fluid intelligence, and information-processing speed on older adults with a mean age of 68.7 years. The researchers used interviews, verbal tests, and tests of immediate recall in a longitudinal study of six years. They found that people with good cognitive functioning preferred cognitively demanding activities. They did not find evidence about a causal effect of everyday activities on cognitive functioning or vice versa.

...it is safe to say that no other century has seen such a shift in the definition of intelligence as we have in the 20th century. This recent evolution corresponds with our increasing understanding of the human brain and its cognitive processes (Silver, Strong, & Perini, 2000, p. 5).

Active Learning

The following literature was analyzed in order to provide background for teaching strategies and theories that were examined for effectiveness in this study.

There have been distinct periods of educational experimentation through history. The 1980s and 1990s brought major changes in educational strategies based on cognitive science and brain research, as new technologies became available to “watch” the brain. Research on how to teach and how those strategies affect learning has been at the national attention level since the 1980s (Stark & Lattuca, 1997). The literature on learning and teaching strategies reinforces the fact that teaching practices can either facilitate or hinder learners’ information processing (Upcraft, 1996).

Helping students learn how to learn is a recent concern of educators. Fortunately, there are numerous research reports available on how the brain works and how brain-based research can be used by educators to improve learning (Abbott, 1997; Caine & Caine,

1991; Cardellichio & Field, 1997; Scheibel, 1997; Starr, 1999; Sylwester, 1991, 1995, 1997; Yehovich, 1994). These reports reinforce how the brain creates organization and structure when storing information into memory. This awareness led to contemporary educational practices involving active learning.

Visual Cognitive Organizers. According to Jonassen, Beissner, and Yacci (1993) and Sylwester (1990), discussions of the psychology of learning have distinguished between declarative knowledge (knowing that), procedural knowledge (knowing how), and structural knowledge (knowing why). Structural knowledge is essential to recall and application. According to Jonassen et al. (1993), there are two methods of conveying structural knowledge: implicit and explicit. If the material to be taught is organized by the educator for the student, but is not stated, it is implicit. Explicit methods are those in which the educator creates organization and structure for the learner as a means to help him or her understand how the material is structured. Maps, tables, modeling, illustrating, verbal depictions, figures, concept maps, and conceptual models are used in conjunction with the material to be learned.

A concept map is divided into nodes and links. Nodes (circles) represent various concepts and links (lines) represent the relationships between concepts. Words are used to label the links in order to more explicitly depict relationships. Once completed, the concept map is a visual graphic that represents how the creator thinks about and organizes a subject or topic (Novak and Gowin, 1994). "Each of these methods intends to organize learning by conveying the structure of the ideas to be learned" (Jonassen et al., 1993, p. 99). There are numerous research studies and articles on effective learning strategies that conclude that materials that are better organized are better remembered. Since the goals of instruction are to help learners create a deeper understanding of concepts, use of cognitive organizers

helps them create their own understandings by creating connections and relationships to concepts (Cardellichio, 1997; Carnine, 1990; Entwistle, 1997; Jonassen, Beissner, & Yacci, 1993; Jones, 1995).

Research has also taken place to study the effects of different types of organizers on student achievement. Kiewra, DuBois, Christian, and McShane (1988) indicated that of three different types of instructor supplied notes (full text of lecture, outline of lecture, a two-dimensional matrix of categories and attributes) used for review for a performance test, the most effective type was that in which students filled in a matrix to visually show internal connections that exist in the information. This research utilized a one time situation taking place over one week.

Dorough and Rye (1997) found that construction of graphical concept maps improved learners' understanding of relationships between terms in science. The researchers scored concept maps designed by students for academic achievement rather than analyze the relationship to achievement tests. Anderson-Inman and Horney (1996) found that computer-based concept mapping used as tools for visual thinking enhanced writing, reading and studying skills. They felt that the concept map made the visual thinking process more explicit and simplified. This research evaluated learning from the concept maps designed by students. The researchers pointed out the difficulty in evaluating learning from the concept maps.

Zeilik, Schau, Mattern, Hall, Teague, and Bisard (1997) found that use of concept maps and cooperative groups helped learners identify interrelationships that are necessary for connected learning. These researchers reported large increases in students' understanding in achievement testing. The study provided the organizers and assignments which stressed concept application. Min, Kommers, Vos, and Van Dijkum (2000)

developed a learning model which incorporated "visual tools" such as concept maps and computer simulations to help students learn. They felt that good learning tools helped learners think in terms of conceptual overviews which lead to improved learning because the tools decreased the *resistance* to learn. Organizers were provided to the students rather than using student produced organizers.

Novak and Gowin (1994) did extensive research on the use of concept maps and the Vee heuristic. They reported that these were two useful tools to help students learn about the structure of knowledge and the process of knowledge production, or meta-knowledge.

On the other hand, there is research reporting the negative consequences of the use of concept maps. Researchers report that incorrect notions can become ingrained and go unchallenged when using concept maps (Roth & Roychoudhury, 1993). In addition, there were negative effects reported when teachers required students to memorize concept maps provided by textbook publishers or themselves (Shavelson, 1993).

Letteri (1992) provided a list of techniques used to help students develop thinking skills. These techniques included modeling, metacognitive reflection, use of procedural checklists, rehearsal, use of graphic organizers, cuing, and labeling. Letteri explains that cognitive based research has shown that one of the most important factors leading to achievement is the collection of cognitive skills that a learner brings to the academic task. According to Keefe (1992), weaknesses at the lower levels of thinking often lead to other weaknesses in the thinking process. He strongly argues that educators must know about the process of learning and thinking in order to teach students how to learn and think.

Multiple Intelligences

Howard Gardner's Multiple Intelligences theory was presented in 1983 (Gardner, 1993). Gardner observed that for every complex task humans encounter, the brain uses a variety of "intelligences" in which to solve the problem. Intelligence is defined by Gardner as: (a) "The ability to solve problems that one encounters in real life; (b) The ability to generate new problems to solve; and (c) The ability to make something or offer a service that is valued within one's culture" (Silver, et al., 2000, p. 7). Gardner described seven, and now eight, categories of intelligences that people use, and he reminds educators that learners use all of them in different situations and contexts. Learners tend to have higher ability in just several of the intelligences.

The different intelligences allow each learner to process and make sense of information through different avenues using different materials and methods (Silver, et al., 2000). The following generally describe the intelligences. Logical mathematical intelligence deals with numbers, recognition of abstract patterns, scientific thinking, reasoning and logic. Riddles, puzzles, scientific reasoning are activities to use in this area. Interpersonal intelligence is displayed by the person who enjoys groups, collaborating, and social interaction. This person has the ability to notice other's moods, temperaments, and motivations. Group activities, brainstorming, and role playing are appreciated. Intrapersonal intelligence relates to self-reflection and connections to inner thoughts and feelings. Setting personal goals, self-esteem building and individual study are welcome activities.

Verbal/linguistic intelligence is the ability to use words and language, to convince others, to remember, to explain. Storytelling, journal writing, speeches, debates and reading are enjoyed and provide a good way to learn using this intelligence. Musically

intelligent people have a sensitivity to rhythm and beats, an understanding and use of music, sounds, and instruments to express themselves. Spatial intelligence involves the ability to create mental images and pictures and to manipulate and transform them.

Visualization, navigation, seeing from different angles come easily. Art projects are favorites. Bodily/kinesthetic intelligence evokes an enjoyment of dance, sports, movement, building, and an easy control and coordination of the body. Hands on learning, drama, field trips, and “messy” activities are truly enjoyed through this special aptitude. Natural and spiritual (intuitive) are the two new intelligences currently undergoing research and inclusion into the Multiple Intelligence Theory (Armstrong, 1994; Gardner, 1993; Silver, et al., 2000).

The value of possessing an understanding of the multiple intelligence theory for educators is to make sure to teach with a variety of methods which reach the different preferences used by students because *every brain is unique*. Teachers can target specific intelligences through the use of activity centers and also through the use of a variety of projects that the learners perform.

Research has shown that children learn the most complex activities by using all of their intelligences, sensors, and capacities. Visser (1996) argues that adults can incorporate use of the whole brain and their senses to learn more quickly and to improve memory. Visser sites numerous companies that are using the learning theory of multiple intelligences in their practice to “accelerate the learning process and increase worker performance” (Visser, 1996, p. 39). Training and consulting firms are applying brain research and multiple intelligence theories to teach people to do a variety of new endeavors in business.

Most learning-styles advocates agree that individuals develop a mixture of styles as they live and learn, that styles change and adapt to differing degrees (Armstrong, 1994; Silver, Strong, & Perini, 2000; Visser, 1996).

The literature contains reports of caution in use of multiple intelligences as well. Ediger (1995) was concerned that educators would not enhance individual talents and abilities but rather, work to increase overall ability. The researcher warned educators to be cautious when considering new movements in education. A negative view of Multiple Intelligence theory was also discussed among intelligence testing researchers. A battle appears to be focussed between those who believe strongly that intelligence be measured through cognitive activity rather than the “newer” practical intelligences suggested by Multiple Intelligence advocates (Merriam & Caffarella, 1999).

Learning Styles

“A style of thought is a preference for using abilities in certain ways. It is not an ability itself, but rather a way in which one likes to utilize abilities” (Sternberg, 1996, p. 347). A knowledge of learning styles can guide development of appropriate teaching materials as well as provide direction in the selection of the most effective teaching strategies.

Carl Jung’s learning styles paradigm, first presented in 1923, involves two fundamental cognitive functions: perceptions (how humans absorb information) and judgment--how the information is processed once perceived (Silver et al., 2000). Humans absorb or perceive information either concretely through sensing or abstractly through intuition. Humans also process the information by either logic or feeling. Thus, Jung’s learning style paradigm utilizes four dimensions of personality: sensing, thinking, feeling,

and intuition. He also considers whether one is introverted or extroverted in the way in which he or she interacts. The combination of the way in which a learner interacts with her environment is a disposition. Each learner has an inclination toward certain types of input (Silver et. al, 2000).

Researchers argue that people develop and mix learning styles throughout life, and each can be strengthened through use (Merriam & Caffarella, 1999; Silver et. al, 2000). Teachers are encouraged to help students understand how they think in order to help them adapt to different situations and ideas and to look at information in various ways. The popular and much used Myers-Briggs Type Indicator is based on Jung's work.

Kolb's Theory of Learning Styles explains that learning styles could be seen on a continuum running from (a) concrete experience--being involved in a new experience; (b) reflective observation--watching others or developing observations about one's own experience; (c) abstract conceptualization--creating theories to explain observations; and (d) active experimentation--using theories to solve problems and make decisions. Although Kolb thought of these learning styles as a continuum that one moves through over time, usually people come to prefer, and rely on, one style above the others. And it is these main styles that instructors need to be aware of when creating instructional materials (Merriam & Caffarella, 1999; Silver et. al, 2000; Sternberg, 1996).

Hartman (1995) took Kolb's learning styles and gave examples of how one might teach to each of them:

1. For the concrete experienter: offer laboratories, field work, observations or trigger films.
2. For the reflective observer: use logs, journals or brainstorming.
3. For the abstract conceptualizer: lectures, papers and analogies work well.
4. For the active experimenter: offer simulations, case studies and homework.

Integrated Learning: Styles and Intelligences. Multiple Intelligences Theory is centered more around the content of learning while learning styles theories tend to be centered more around the process of learning. Therefore, educators have noted that there are strong relationships between intelligences and styles and that these need to be blended together to be most effective (Silver, Strong, & Perini, 2000).

Two great minds of the 20th century--Howard Gardner (multiple intelligences) and Carl Jung (learning styles)--have supplied us with our two learning models. We live and learn in an increasingly diverse world. New students, new issues, and new ideas appear on an almost daily basis, fueling the movement to address all forms of diversity--intellectual, physical, and cultural. By uniting the two best models we have for understanding the diverse ways students think and learn, integrated learning strives to create an environment where all learners feel that their ideas, contributions, and work are valued, and that they are able to succeed (Silver et al., 2000, p. 2-3).

Numerous researchers argued that learners should be taught about the ways in which they think--metacognition. They reported that this knowledge helped learners better understand themselves and stimulated their motivation to improve as learners. It helps learners understand where their strengths and weaknesses are and ways in which they can improve as learners (Armstrong, 1994; Silver, et al., 2000; Visser, 1996).

A synthesis of active learning research informs the educator that people learn best through active involvement with learning. Hands-on learning situations are especially important. Learning can be increased by designing learning environments that stimulate, motivate, and allow for a variety of learning opportunities.

Educational Technology and Older Adults

"To date, researchers with expertise in education or communications technologies have done little work in the aging field, and as a result, teaching methods now used for the elderly are often extrapolated from adolescent or vocational education" (Brown, 2001,

p.1). Studies of computer training for older adults are limited; even fewer studies have been done to understand older women and their involvement in computer learning activities (Lockhart & Cook, 2000; White & Weatherall, 2000).

Ito, Adler, Linde, Mynatt, and O'Day (1998), completed a one-year ethnographic study on the issues of the nature of older adult access and use of Internet based computer offerings of SeniorNet in the United States. SeniorNet is an world-wide organization which provides computer training for adults 50 years and older. The study by Ito et.al. (1998) reported how a group of older adults made computer and computer networking meaningful in their daily lives and how the social contexts of computer use and networking was a major factor motivating and supporting continued use of technology. The researchers also found that people over the age of 65 were at risk of social isolation and many had added physical ailments escalating this risk. The Internet offered a type of social access and was thus, uniquely beneficial to older adults. The study reported that older adults using the Internet benefited through interaction, affiliation and identification, found ways to overcome barriers to access to technology, found relevance in learning this new technology, and enjoyed empowerment through helping the community (Ito, et. al, 1998).

Six women and three men, who ranged in age from 59 to 77 and who were involved in SeniorNet in New Zealand, were studied by White and Weatherall (2000). Four main themes emerged from their exploration of older adults using computer technology and the Internet. The results stated (a) that computers were used by older adults because it facilitated other interests; genealogy and other hobbies; (b) that computer mediated communication (e-mail, chats, listserves) played an important role in providing mental and social stimulation; (c) that ownership of computers was impacted by the cost of the equipment; many older adults may not have incomes great enough to purchase

computers; and (d) that communication with relatives (especially grandchildren) and friends was very important in the decision to use computers.

Echt, Morrell, and Park (1998) studied young-old (ages 60-74) and old-old (ages 75-89) adults as they learned basic computer skills. The participants were tested on their ability to perform computer procedures immediately after training and then again one week later. The researchers reported that old-old adults required more time than young-old adults to acquire computer skills, that there was a general slowing of perceptual and motor processes that were necessary for responding to computer procedures and tasks, and that working memory capacity (the ability to process and store information simultaneously) declined with age. They also reported that forgetfulness of how to complete computer tasks increased over time in both age groups.

A research study completed by Cahoon (1998) examined the types of basic computer skills needed in order to use the Internet. The results indicated that motor skills and perceptual skills were necessary and were strongly correlated with the frequency of practice and the duration of that practice. Cahoon described using mental models of the Internet to help learners develop a spatial and temporal understanding of the connection and communication between the hardware and the human. The researcher reported that two elements were found to be especially effective in teaching computer skills; learners sharing what they know and selecting strategies that combine practical exercises with verbal presentation of concepts and principles. This study was completed using five two-hour sessions with continuing education adult students of undisclosed ages.

James, Gibson, McAuley, and McAuley (1996) reported on their research to introduce older people to computer use through the strategy of word processing their own life stories. The study compared younger users to older users in several categories: ease of

use of the technology, attitudes toward the use of technology, differences in acquisition of skills, and memory processes. This study involved 12 older adults (mean age of 70) and 13 individuals between 18 and 45 years of age, mixed gender groups, as they participated in two-hour classes held once per week for ten weeks. This study was significant in that the researchers used surveys to measure the mental health of the participants. The researchers found that those individuals who had been recently widowed showed dramatic mental improvement over the course of the study. The participants ranked social aspects of the course, feelings of achievement, and usefulness of computers high in the surveys given at the end of the sessions.

Czaja and Sharit (1998) studied age differences in attitudes toward computers. The researchers found, in spite of the commonly held myth that older adults have negative attitudes toward computer technology, there were no age differences in overall attitude. They reported that older people in their study perceived less comfort, efficacy, and control over computers than did the other participants and that computer attitudes can be modified by acquiring more experience with the machine.

Linkages Made Between Literature, Research Questions, and Study Design

Literature analyzed for this study--trends, gerontology, and education--reinforces the need for our society to provide computer learning opportunities for older adults in order that they utilize the technology affecting so much of life in America (Coughlin, 1999; Norton & Wiburn, 1998; SeniorNet, 2002; White & Weatherall, 2000). "If older adults are to play an equal part in our increasingly technological societies, then consideration must be made of the effect and use of information technology in their lives" (White and

Weatherall, 2000, p. 372). Table 3 represents the linkages made between the literature review, research questions, and study design.

Chapter Summary

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman.

The literature review for this study documented what was known in three relevant areas: trends leading to the need for this study, gerontology, and education. The design of the study, including methodology, data collection, and verification techniques are presented in the following chapter.

Table 3. Linkages between literature, research questions, and study design.

1. Trends Creating the Need for this Study ◆ Growing population of older women ◆ Greater reliance on computers by society	Questions and Observations 1. What motivates older women to learn to use the computer? RQ1 2. What skills and new knowledge do the women desire to learn? Why are these important to them? RQ1,2 3. In what ways do these women feel that the experience will affect their lives? RQ1	Week 1-6 1-6 1-6
2. Gerontology ◆ Social, psychological, and physical issues that aging brings to the learning environment. - Age-related difficulties and needs. ◆ Feelings, experiences, issues. ◆ Women's ways of knowing.	Questions and Observations 1. How do the participants interact with each other? RQ1,2 2. How does this interaction affect their learning experience? RQ1,2,3 3. What significant events lead to their desire to take the computer course? RQ1 4. What are the difficulties older women experience when learning to use computers? RQ1,2,3 5. What ways do the women express as being "women's ways of knowing"? RQ1,2,3 6. Who is providing motivation and support? How does this help or hinder learning? RQ1,2 7. What personal characteristics such as frustration, patience, risk-taking, sharing, shyness, etc., help or hinder learning? RQ1,2 8. In what ways can participants increase positive characteristics that enhance learning? RQ1,2 9. In what ways does the class develop into a social environment? How is this beneficial or not to the learners? RQ1,2 10. What feelings are associated with participating in a computer class? How do these feelings change as the course progresses? RQ1,2 11. How does participation in the course affect your life; mentally, socially, physically, etc.? RQ1,2,3	Week 1,3 1-6 1 1-6 5 1,3 1-6 1-6 2-6 1-6 1-6
3. Education ◆ Adult education - Methods for teaching older adults. - Instructor characteristics, classroom atmosphere, course content, course design location. ◆ Brain-based research and implications for learning. ◆ Educational strategies: share-pairs, concept mapping, active learning, multiple intelligences, learning styles. ◆ Educational technology.	Questions and Observations 1. What recommendations do older women express when considering the most fulfilling environment for learning as related to: course design, course content, learner atmosphere, and instructor characteristics. RQ2,3 2. How do the women feel about attending class on the campus of a four-year institution? RQ1,2 3. What kinds of barriers/issues are encountered and how do they resolve them? RQ1,2,3 4. What teaching strategies do the women feel are most beneficial to their learning? RQ3 5. What teaching strategies do the women feel are least beneficial to their learning? RQ3 6. What elements do women recommend as being most motivating to their learning? RQ1,2,3	Week 1-6 1,2 1-2 1-6 1-6 1-6

CHAPTER 3

DESIGN OF THE STUDY

Qualitative research is complex, involving fieldwork for prolonged periods of time, collecting words and pictures, analyzing this information inductively while focusing on participant views, and writing about the process using expressive and persuasive language (Creswell, 1998, p. 24).

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman. The design of the study, including methodology, data collection, and verification techniques are presented in this chapter.

Participant Selection

The women were selected from the Bozeman, Montana area in southwest Montana. Montana is a rural state with a population of 880,000 and has a geographical area of 147,000 square miles. Bozeman is a rural university town composed mainly of a well-educated, more affluent, population of 35,000.

Women over 70 years of age were included in the study. The researcher believes from past experiences that this age group of adults has difficulty in learning and seems to have fewer opportunities to find computer courses tailored to their learning needs. Computer courses offered for younger adults seem too rapid and offer less individual assistance (Cook, 2002). In addition, women younger than 70 years may have been exposed to computers during their working years, and thus, not have as great a need for computer training (Granick, 2001).

The determination to group from 70 years and older was based on a review of the age groupings reported in the literature and analysis of how those researchers categorized the years. Three cross-sectional studies reported in Friedrich (2001) broke age into categories of 70-74 years, 75-79 years, 80-84 years, 85-89 years, 90-94 years, and 95+ years. No rationale was provided for dividing the age groups in such a way. Numerous studies reported by Hertzog (2001) classified young-old from 60-69 years, middle-old from 70-79 years, and old-old from 80+ years. Litwin (1999) used the category of 70-90 years of age.

Criterion

A criterion method of sampling was used in this study (Creswell, 1998). The researcher chose this purposeful sampling strategy because these individuals were most able to contribute to the evolving theory; they represented one group of people for whom the resulting model was aimed at assisting.

All participants met the following criteria:

1. Female.
2. Seventy years of age or older.
3. Able to come to campus to take a computer course.
4. Willing to participate in a research study as part of the computer course.

A key individual who met all criteria was identified. Using the snowball method, she was asked to recommend additional individuals who met the criteria. Women who agreed to participate were asked to recommend other women who met the criteria.

Participant Demographics

Table 4 provides demographic information about the women who participated in the study. The names have been changed to protect the privacy of the individuals.

Table 4. Demographic information for each participant.

Pseudonym	Age	Work Before Retirement	Computer Skill	Education
Lois	78	Assistant to VP at univ.	beginning	secretarial school
Priscilla	72	Rancher, homemaker	beginning	four year univ. degree
Elizabeth	82	Teacher for 30 years	beginning	Master's degree
Ruth	75	Teacher for 10 years	intermediate	four year univ. degree
Mary	72	Homemaker	beginning	four year univ. degree
Helen	84	Rancher, homemaker	beginning	high school
Rebecca	82	Nurse, homemaker	beginning	professional cert.
Deb	77	Secretary	beginning	2 year assoc. degree
Fern	73	Bookkeeper for 32 years	beginning	high school
Lucy	76	Artist, homemaker	beginning	four year univ. degree
Margaret	80	Nurse, rancher, homemaker	intermediate	professional cert.
Francis	83	Artist, homemaker	beginning	four year univ. degree
Dee	80	Secretary	beginning	2 year assoc. degree
Alene	79	Business woman	beginning	four year univ. degree

Site Selection

The Department of Education's Instructional Computing Lab at Montana State University-Bozeman was used for the location of the computer course. It was selected because the instructor had access to the lab and there were undergraduate students who were willing to provide assistance for individual tutoring, if needed. The lab had nineteen Macintosh G4 computers and was arranged so each computer user could see the large presentation screen at the front of the room. All computers were connected to the Internet. Course content dealt predominantly with programs that appeared similarly whether using Windows or Macintosh machines. The researcher felt that those using Windows-based

machines would benefit as much as those with Macintosh computers because of the similarity in applications used.

Accessibility issues were considered. An elevator was available to take participants to the computer lab on the fourth floor. Parking problems were solved by the participants themselves as they made arrangements to ride the county senior transportation van. The van brought the women to the west entrance of the building in which the computer lab resided and picked them up at the same location when the class was finished.

Preparation of Materials

A request for designation of this study to be exempt from the requirements of the Human Subjects Committee Review was approved by the Human Subjects Committee. (Appendix F). An initial interest letter with a course day and time preference checklist was sent to each woman identified as being interested in the study (Appendix G). A confirmation letter was sent prior to the first class (Appendix H). This letter informed the participants of the purpose of the study, ideas for content of the computer course, time and location of the computer classes, and contained a description of how and when to complete the take-home reflection forms. The researcher prepared an introductory packet of material for each participant. The materials included a consent form and a notebook with computer application directions. This packet was given at the first class session.

The consent form (Appendix I) explained the following: the purpose of the research study, information about the right to withdraw at any time, a statement that confidentiality would be protected and valued, a statement that there were no known risks associated with participation in the study, a description of how data would be collected, the expected benefits to accrue to the participants, a space for signing, and the date.

Course Topics (Appendix E)

The researcher and participants suggested topics, then the women selected those that they wanted to learn. Topic order was designed to move from less computer skill required to more skill required as participants increased eye-hand coordination, typing skills, and desire for exploration. The course topics were:

1. Searching the Internet.
2. Sending and Receiving E-mail.
3. Understanding Computer Terminology.
4. Using Word Processing.
5. Installing and Running a Program.

Teaching Strategies

The teaching strategies utilized in this study were selected from a combination of methods described in literature from adult education, brain-based research, active learning, multiple intelligences, and educational technology. Adult education learning theory provided key strategies and recommended characteristics of the learning environment which have been shown to enhance learning by adults. Literature in brain-based research provided successful teaching strategies based on how the brain works and how people learn. It was anticipated that brain-based strategies along with the those based on active learning, would be new to these older women because these strategies have been developed over the last two decades. Understanding how these methods were experienced by older women was one piece of this research. Participants were asked to determine effectiveness following their experience using each strategy. The following strategies were utilized during the study.

1. Verbal descriptions only.
2. Instructor demonstration of the procedure using the large screen at the front of the classroom.
3. Demonstration, Do, Redo: instructor demonstration while participants took notes, a second demonstration while participants did the procedure for the first time, followed by participants completing the procedure on their own.
4. Use of strategies involving multiple intelligences (Gardner, 1993; 1995) and brain-based learning principles (Caine & Caine, 1991; Sylwester, 1990).
 - A. Utilizing "share-pairs" in which participants told each other how to do the procedure or described new knowledge.
 - B. Using mnemonics to remember procedures and new skills.
 - C. Creating mind maps and other drawings to reinforce new knowledge.
 - D. Helping each other by sharing procedures that worked.
 - E. Creating musical or rhythmic sentences to reinforce memory of procedures.
 - F. Helping the learners learn about their own learning styles, strengths, weaknesses, and accommodations.
5. Repeating, clarifying, restating, summarizing, and reminding participants to take notes or underline existing procedures were also utilized.
6. Delivering frequent positive reinforcement.
7. Encouraging laughter.
8. Encouraging knowledge sharing.

Forms of Data Collection/Instrumentation

Data were collected using five approaches. These approaches were selected in order to provide trustworthiness and quality control in the study. Questions in each approach were based on the related literature. Explanation of each type of data collected follows.

Background Information/Needs Assessment Form (Appendix A).

A Background Information/Needs Assessment Form was given during the first class to gather information from the participants on the kinds of new skills and knowledge that they wanted to learn and to assess the level of computer ability and knowledge in the beginning of the course. The form was also used to gather demographic information about each participant.

Instructor Observations (Appendix B).

The researcher recorded observations and reflections immediately following each computer class. Forms were composed of one column for descriptive notes and one column for reflective notes.

Participant Take-Home Reflections (Appendix C)

The Take-Home Reflection Form contained questions and provided spaces for comments upon: two new skills or new discoveries that were learned that day in class, an indication of how important those new skills were to the individual, a description of the most helpful teaching method used that day, and space for comments about one's experience in class--feelings, thoughts, concerns, and observations. Participants were

asked to complete the form as soon as possible after the class and to return it at the next class session. If a problem occurred with participants forgetting to return the forms, the instructor was prepared to call the women before class as a reminder to bring the forms. The reminder phone call was given only to one woman who would have forgotten to bring her form most weeks. These hand-written reflections were checked for matches with the audiotaped data and with the instructor observations as a means of triangulation.

Focus Group Interview Forms (Appendix D).

At the beginning of each class, approximately 30 to 40 minutes were utilized to collect focus group interview data. An interview form was used each week by the researcher to guide the questions and discussion. The researcher read the introduction to participants to explain the purpose of the study, to remind participants that the interviews would be audiotaped, to reinforce confidentiality issues, and to encourage participation by all. The researcher lead discussion of each question, making sure that every participant had an opportunity to respond. The questions written for discussion each week were developed through linkage with the literature and research questions. The questions were discussed on the week that the instructor believed participants would have experienced the teaching strategy or developed an opinion to answer the research questions. Additionally, as a means of triangulation, the most significant questions were asked in slightly different ways in several weeks' interviews (see Table 3, page 53). Weeks five and six had fewer questions at the beginning of the study because the researcher did not know what kinds of questions would arise during the study. As the interviews progressed, different questions and comments were anticipated.

Audiotaped and Transcribed Class Sessions.

Each two-hour class session was audiotaped and transcribed. The data provided additional information to the researcher because it allowed her to listen in to the entire experience taking place during the class. Noises, conversations, questions, and discussion of strategies that the instructor may not have remembered or may not have been a part of, provided valuable information about the atmosphere and class experience. These data were used for triangulation and reporting purposes.

Verification/Trustworthiness

A verification process occurred throughout the collection of data, analysis, and writing of the findings. Trustworthiness was established through the following procedures.

1. The criterion method of sampling provided quality assurance because the criterion sample has the highest ability to contribute to the developing theory due to the fact that the participants were most similar to the audience who may be affected by the study's results.
2. Numerous sources and approaches for data collection and prolonged engagement in the field were utilized: six 30 - 40 minute focus group interviews (audiotaped and transcribed), six audio taped and transcribed class sessions, participant take-home reflections from each of the first five classes, Background/Needs Assessment form, and six instructor observation forms.
3. Member checking assured that the researcher had actually heard and analyzed the data correctly. Member checking took place during classes three, four, five, and six. Data collected each week were analyzed, placed into categories, and themes

- were developed. The researcher asked the participants to verify the themes that were emerging.
4. In order for the participants to feel more comfortable in expressing their opinions, a different instructor lead the focus group interview section asking for positive and negative characteristics of the instructor of a computer course.
 5. Peer auditing was sought from a competent individual in the educational technology field. Descriptions, interpretations, and evaluation of and placement of data into categories and themes was examined.
 6. Triangulation took place through comparisons of transcribed focus group interview data with instructor observations, participants' take-home reflection forms, and transcribed class sessions.
 7. Limitations and delimitations of the study were clearly articulated in Chapter One.
 8. Confidentiality of all participants' comments and materials was planned into the process.
 9. Thick, rich descriptions were reported by the researcher.

Data Management

To assist in the organized retrieval of data, all collected data were organized and filed into an accordion folder by type: Background Information Forms (Appendix A), Instructor Observation Forms (Appendix B), Take-home Reflections Forms (Appendix C), Focus Group Interview data (Appendix D), and transcribed class sessions. Focus group interview comments were entered into a word processor in the form of sentences by individuals, saved on disk, and printed. Taped class sessions were transcribed into the word processor as descriptions of what was taking place and with quotes from participants.

In order to maintain a link from each datum to its origin, each type of data was color coded by printing on a different color of paper. Background Information Forms were printed on green paper, Participant Reflection Forms were printed on blue paper, statements from the focus group interviews were printed on white paper, instructor observations were printed on yellow paper, and class session transcriptions were printed on off-white paper.

Data Analysis

Data analysis began with a general review of all data collected from each class session. This process helped the researcher get a sense of the data as a whole before breaking it into parts. Each type of data collected each week was analyzed and categorized as soon as it was collected. When all study data were collected, the researcher again analyzed the data in each category to make certain that each statement had a proper fit.

Data analysis progressed from particular statements to general themes. First, the supporting statements in the focus group interviews, participant reflections, audiotaped class sessions, and instructor observations were coded and placed under the research question or questions that it supported. Second, statements under each research question were analyzed and placed into the predetermined research categories. An additional category, Learning Issue Resolutions, was added to Research Question III after analysis of the data because these statements did not fit under the predetermined research categories. Third, the data in each category were thoroughly compared in order to fully develop the themes. Fourth, a predominant theme statement was written to describe an overall message for each research question. Fifth, a central phenomenon was synthesized for the study. Finally, the research questions were answered and a model was developed.

Triangulation took place as the data from four different sources were compared: focus group interviews, audiotaped class sessions, instructor observations, participant reflections. Member checking occurred weeks three, four, five, and six. The participants were asked to verify that the researcher understood correctly and to confirm that the category themes were congruent with their experiences.

Chapter Summary

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman.

The design of the study, including methodology, data collection, and verification techniques were presented in this chapter. The purpose of the following chapter is to present the results of the study, to define the themes and central phenomenon which emerged through careful analysis of data sources, and to provide comparisons of the findings with the literature reviewed.

CHAPTER 4

RESULTS

Introduction

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman.

The purpose of this chapter is to present the study's results, define the themes and central phenomenon which emerged from the careful analysis of the collected data, and compare these findings with the literature.

The research questions which directed this study are as follows:

- I. What experiences do older women describe as they participate in a computer course on the campus of Montana State University-Bozeman as related to:
 1. Feelings.
 2. Issues.
 3. Personal Characteristics.
- II. What recommendations do older women express when considering the most fulfilling environment for learning as related to:
 1. Course Design.
 2. Course Content.
 3. Classroom Atmosphere.
 4. Instructor Characteristics.

III. What teaching strategies do older women believe are most conducive to their learning as related to:

1. Current Educational Practices.
2. Learning Issue Resolutions.

Data Analysis

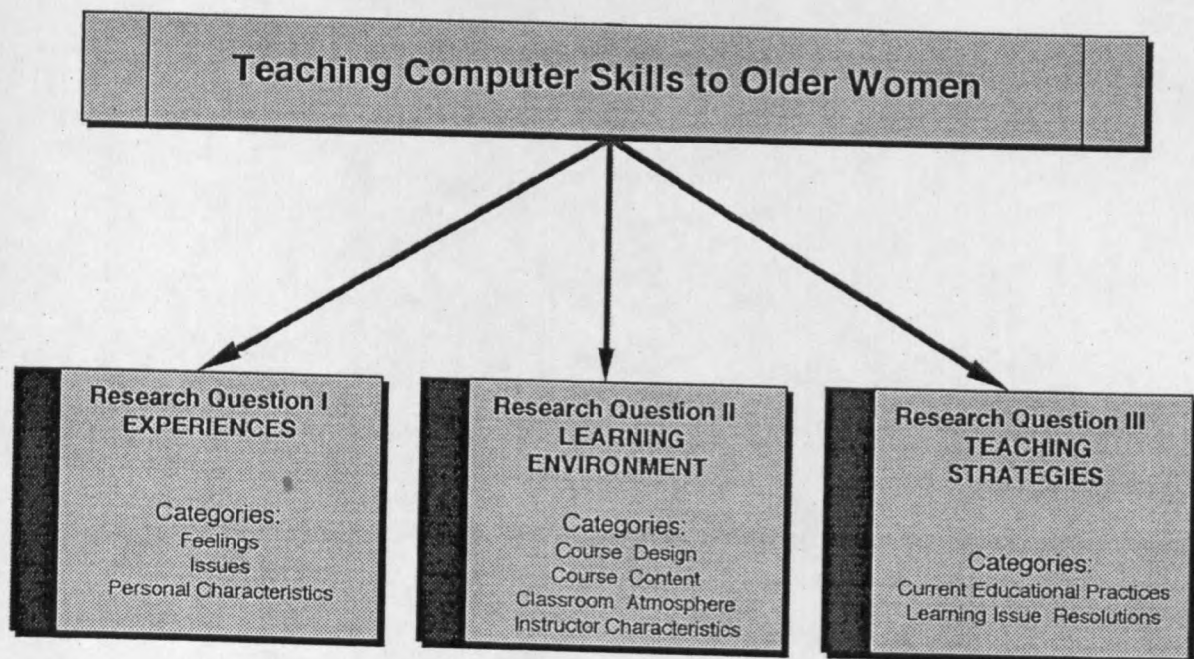
Data analysis progressed from particular statements to general themes. First, the supporting statements in the focus group interviews, participant reflections, audiotaped class sessions, and instructor observations were coded and placed under the research question or questions that it supported. Second, statements under each research question were analyzed and placed into the predetermined research categories. An additional category, Learning Issue Resolutions, was added to Research Question III after analysis of the data because these statements did not fit under the predetermined research categories. Third, the data in each category was thoroughly compared in order to fully develop the themes. Fourth, a predominant theme statement was written to describe an overall message for each research question. Fifth, a central phenomenon was synthesized for the study. Finally, the research questions were answered and a model was developed.

Reporting of Results

A visual framework of the method in which the results are reported is provided in Figure 2. Results and supporting data are presented for each component in the diagram. In the narrative report, the researcher refers to "They" when the majority of women or all of the women agreed or reported their experiences as being similar. When a diversity of

opinion was found about their experience, the researcher reports the number of women making similar comments. The narrative includes words within quotations to indicate specific, descriptive words spoken by participants. "Researcher" and "instructor" are used interchangeably because the researcher was the instructor.

Figure 2. Framework for reporting results.



Research Question I: Experiences

I. What experiences do older women describe as they participate in a computer course on the campus of Montana State University-Bozeman as related to:

1. Feelings.
2. Issues.
3. Personal Characteristics.

Research Question I: Experiences: Predominant Theme Statement

Through every step of the experience, from finding the opportunity to learn, to feeling the camaraderie with other women learners, to discovering the means to overcome age-related difficulties, to reflecting on their learning experience, the women expressed powerful feelings of excitement, pride, and appreciation.

These women over seventy years of age were excited to learn computer skills and appreciated the opportunity. They particularly enjoyed being together socially in class and helping each other through the learning process. They were proud to achieve their goals and enjoyed the intellectual and social stimulation the experience provided.

Feelings of anxiety, frustration, and guilt were also expressed. Clearly, these older women encountered a range of age-related issues when learning computer skills, yet accommodations were made to overcome them, making it an enjoyable and rewarding experience. The women found that learning was enhanced when they possessed positive personal characteristics such as patience, humor, and an optimistic attitude.

Research Question I: Experiences: Category 1: Feelings

For the purposes of this study, feelings are defined as any state of mind described by the participants. Feelings experienced during this study include the following themes:

Theme 1. Motivated.

Theme 2. Enthusiastic.

Theme 3. Excited, Nervous, Anxious.

Theme 4. Proud.

Theme 5. Accepted and Validated.

Theme 6. Encouraged and Confident.

Theme 7. Guilty.

Research Question I: Experiences: Category 1: Feelings: Theme 1: Motivated.

Four of the women decided to take the computer course at this time in their lives because of significant events which motivated them to seek a computer learning experience. Lois's husband passed away leaving his computer with many important documents that she needed. She even had to try to discover his password in order to retrieve documents. Lois took the course because she had a need, and she said it would help her to occupy her mind. Elizabeth's husband had a stroke a year earlier. She said, "I need to fill up time in the day and to occupy my mind." Helen had been ill and her husband required surgery several months earlier. She said the computer would be a way for her to communicate with friends and relatives when she could not get around or was alone. Mary had attended a class reunion three months earlier and found that she was "behind the times." Many of her former classmates were sending e-mail and she felt she "should be doing it too."

Seven of the 14 women had been given a computer by their children and they did not know what to do with it. Five of the seven had looked for a computer course but could not find one suitable for their learning needs. They reported that the classes were full of young people who worked much faster, that the classes were too large and did not offer the content they desired. Hence, they found it too overwhelming to continue attending those classes. These women were excited to hear about a computer course tailored to women of their age and ability.

Three women had other reasons to participate in the course. Lucy had been living alone for many years and felt lonely. She thought the course would help her to meet new friends and occupy some of her time. She also wanted to see what computer games could

offer in "challenging her mind." Dee owned a computer that she did not utilize as much as she felt she should. She took the course in order to learn more about her computer.

Margaret also felt she was not utilizing her computer's potential; in addition, she felt using the computer would sharpen her intellectual faculties.

Research Question I: Experiences: Category 1: Feelings:
Theme 2: Enthusiastic.

All participants stated that they were enthusiastic about the experience because they benefited *socially*, i.e. learning to communicate with friends and family and receiving positive reinforcement from those around them. They were also enthusiastic because they gained *personally*, i.e. achieving their goal to use the computer to feel connected to today's society by searching the Internet and by understanding more of the computer terminology used by society and their grandchildren. They benefited *intellectually* by having to think through various procedures and by using software applications that were mentally engaging. When asked how and if learning to use the computer was helpful, Dee immediately replied, "It makes me think." The others followed saying that using the computer stimulates the brain and makes them keep up mentally. They were eager for opportunities to challenge their brains. "Use it or loose it" was a common reply during the course. The participants were proud that they were able to learn something new at every class. They specified that using a computer: (a) was a means for keeping in touch, (b) was the right thing to do in society, and (c) was intellectually stimulating.

- Rebecca: It keeps me asking questions. When I work on it, there is always something that comes up that I don't know about that I have to learn. I have to think about it and learn what to do. Learning to use the computer is better than going to a book club or a sewing class; it makes you keep your mind working.
- Margaret: Playing games is good for the mind. Also, my grandchildren are really pushing me to learn to use the computer.

- Mary: I have watched three-year-olds on the computer and they were so adept; that is the other thing that spurred me on to do this.
- Mary: I think you feel more with it. I mean, now if somebody gives you an e-mail address or an address on the web, now you go, "Oh yes, I know what that is." Before, it was just letters or whatever, there was nothing cognizant about it. The other thing is, when you are in the supermarket, when you check out, you don't feel as intimidated [using the credit card machine]. I didn't know what button to push when I wanted to use my charge card. It's like that's not as big a deal after we learn to use the computer.
- Fern: Discovered I was maybe scared to try new programs on the computer. Fear of losing my work or ruining the computer. Now I like to explore with the mouse even if I get lost once in a while, I'm able better to control what I want to do.
- Fern: I found I am learning to slow down and listen to the instructor and to the computer. Sometimes I think the computer, if I read and not in haste, will tell most everything to do. I used to just give up. The classes have helped me overcome this bad habit.
- Mary: I go to class reunions and they have class e-mail. I want to keep up and have e-mail and I want to browse the net. Browsing the net isn't just for shopping or something. When you watch the news, PBS, Martha Stewart... I want to know what else they are saying. I want to go look where they say to look [web site].
- Rebecca: I want to do banking on my computer and I want to stay up with it. My grandchildren want me to learn to use the computer. You know when you get proxies, they always give their e-mail or Internet address, or even the catalogs. If you want to send for something they give you the number, the e-mail number. My grandkids don't think I know anything.
- Dee: I was feeling like a dunce, like I didn't know a darn thing. Like everyone else is doing this thing and I'm not.
- Mary: I just think it is wonderful to learn more about it and it is hard to find the right class because when you are our age, you are embarrassed to be the one who can't do it when you are with college kids. So it is wonderful to be with people who are as confused as you are.
- Priscilla: I felt that I had this computer and just didn't know what it do, I needed help.
- Helen: I want to stay connected with people. I want to make the computer useful in my life since it seems to be useful to so many other people. I also think, when I can't leave the house, I don't get around good, that I can use the computer to stay in touch. I want to keep my brain alive too.
- Elizabeth: All my friends were using computers and sending e-mail and I was getting left behind. I want to keep learning.

Research Question I: Experiences: Category 1: Feelings:
Theme 3: Excited, Nervous, Anxious.

On the first day of class, the participants expressed excitement, nervousness, and anxiety. They were excited to be able to take the course and develop the computer skills they believed were important to them. Half of the women expressed that they were a little nervous because they did not know what to expect. All the women said that they were anxious because each felt that her learning ability was diminishing because of her age. The participants all agreed that they were very concerned about their ability to continue to learn, that time was getting short for them to learn, and that they felt an urgency to do so while they could. The women stated that they felt so very far behind others with their lack of computer abilities; it was urgent that they keep up with society and grandchildren's expectations. Feeling statements from the first class session follow.

- Mary: This is a whole world of unknowns. I feel excited and I feel intimidated.
- Fern: It is exciting.
- Helen: I am nervous, but excited to be here. Can I do it with my old brain?
- Dee: I was looking forward to it.
- Ruth: It feels good, like old times.
- Fern: I felt apprehensive--not knowing just what it would entail.
- Dee: I want to keep up. I am way behind everyone, I can't even get even with them.
- Margaret: Well, we all want to be with-it!

One woman who had never attended college confided that she wasn't sure she could learn or be "as smart" as the other women who had attended some type of higher education. She was surprised and pleased with herself during the first class when she realized that she did as well as everyone else.

Excitement continued throughout the course as the participants learned new skills which satisfied their needs to remain connected to family and friends, society, and their own intellectual powers. The researcher observed that the women were noticeably excited when describing a situation in which they were able to successfully accomplish a task at home or to solve a problem that occurred.

- Fern: I heard the news about a spider in Montana--the Hobo Spider. So I got on the computer and searched to find out more about it. I found more information, they didn't give a picture, but I found the information!
- Mary: I can keep in touch with old friends!
- Margaret: This is fascinating! Every page you turn to, you get something new!
- Mary: I did it! This is so fun! I actually found what I was looking for and was able to print it!
- Dee: Look where I am now Margaret! "Oh, that is lovely," replied Margaret.

Research Question I: Experiences: Category 1: Feelings:
Theme 4: Proud.

All participants agreed that participating in the computer course boosted self-esteem. The women reported that they received very positive remarks from others when they told them they were participating in a computer course at the university. They felt that learning to use the computer was necessary, but also a prestigious thing for older women to do. This positive reinforcement provided motivation to continue to learn. The researcher observed that the more positive reinforcement the women received, the more willing they were to experiment with new features on the computer, which also increased their confidence in their ability to use the computer. Participant comments follow.

- Helen: We are learning that maybe we are not too old to learn something.
- Rebecca: When I told my children [that I was taking a computer class] they immediately wanted to send e-mail to me. That really boosted my self-esteem a lot to think that they thought that I was capable of this.

- Mary: Learning to use the computer is a little bit like driving the car. I didn't learn to drive a car until I was 21. My husband taught me. It is learning a technique. As you age in our society, you will be more and more handicapped if you don't know the techniques. It is awful not to know how to do it. It's like a car, if you don't know how to drive it's awful. Now, I can operate a computer too.

The women developed a greater sense of pride and accomplishment through each class. They excitedly and proudly shared their successes. They exclaimed their pride and astonishment in accomplishing tasks at home. Five minutes of each class were devoted to listening to the successes of each participant, and then to discussing any problems.

Hearing the problem that occurred and the manner in which the woman solved it, was valuable for the others since they, too, may have encountered the same situation.

- Rebecca: Every time I watch TV they give their web site to order things and learn more about an issue. Now that I can do it, I know what they are talking about. I still hesitate to do it, but as I practice I get better. I want to check my stock and bonds next. I like being able to order things on the computer.
- Ruth: I am more inclined to work through the steps now.
- Helen: Being able to get connected to the Internet was exciting. So that was the main thing I was hoping to learn. I was surprised there were so many different areas you are able to search!
- Deb: This is so good for the brain. It is so good!
- Ruth: Lord, what a triumph! Good for us!!

Research Question I: Experiences: Category 1: Feelings:
Theme 5: Accepted and Validated.

All of the women stated that the computer course developed into a social activity that they looked forward to each week. They enjoyed meeting new people and were soon at ease sharing what they learned with others in class. Friendship and camaraderie were important to the women and important as an element of the learning environment.

- Fern: Because we are a friendly bunch, it is fun to come. I even enjoy the bus ride here with the ladies.
- Dee: Well, you get to meet new people.

- Rebecca: I like creating a bond with these people.
- The following conversation took place during class. Dee asked, "How did you do that?" Margaret replied, "Just do this." She patiently told Dee how to do the procedure while Dee did it on her own computer. Dee said, "Oh, I got it!" Margaret answered with a smile, "There you have it now!"

Research Question I: Experiences: Category 1: Feelings:
Theme 6: Encouraged and Confident

All of the women expressed the importance of receiving encouragement in class and from friends and family. However, when encouraging them to try new things, that person should be patient and *show* them how to do the procedure rather than *tell* them how.

Receiving encouragement increased their confidence; yet, when encouragement came with a hint of condescension, the women agreed that it was not at all helpful.

- Dee: My daughter-in-law provides encouragement to me. I say I am too dumb for this, I can't do this. She says "Yes you can." and she shows me again and again. It is important to have someone who will show you slowly how to do things.
- Fern: I have my two daughters and two grand-daughters. They are always "Why don't you do this and why don't you do that [with the computer]."
- Helen: I have my daughters and daughter-in-law, they are real encouraging. I am disappointed in my husband. He doesn't want anything to do with it and thinks I am foolish to want to learn. I am learning. He can't take that away from me.
- Rebecca: My daughter was doing things on the computer when she was visiting and she was doing things too fast. I told her and she said "Oh, mom, just watch. Rebecca told the class members, "That doesn't help." All agreed.

Research Question I: Experiences: Category 1: Feelings:
Theme 7: Guilty.

All of the women explained that they felt guilty taking time to work on the computer at home. They felt they should be doing something active or pressing. The women commented that they thought they needed to learn to use the computer, but they still felt guilty taking the time necessary to learn to use it. One women repeatedly told the others they were worth the time they spent using the computer.

- Rebecca: You know what is defeating to me, I want to hurry it [working on the computer]. I feel guilty taking so much time because I have other things to do. I feel guilty when I spend too much time.
- Fern: This is a feeling I have also. Guilt that I am spending too much time on it. Even if I play a game, I say, "Look at the time I have spent!"
- Mary: You must say, "Look, I am worth the time."
- Rebecca replied, "It is hard to teach that to me."
- Ruth: Without a second [phone] line into the house, I hate to spend too much time on line because I think someone may be trying to reach me.
- Helen: It is hard to wait for the computer sometimes because I am in a hurry.

Research Question I: Experiences: Category 2: Issues

There were a number of issues expressed and discussed by the participants during the study. These issues revolved around special needs unique to this group--age-related difficulties and how these might be resolved. The themes included the following:

Theme 1. Physical Difficulties.

Theme 2. Mental Learning Difficulties.

Theme 3. Knowledge Transfer.

Theme 4. Parking.

Research Question I: Experiences: Category 2: Issues:

Theme 1: Physical Difficulties.

Physical difficulties experienced in the group of women included arthritis in the hands, impaired vision, hearing loss, and poor eye-hand coordination. Each difficulty was discussed and a variety of solutions were suggested by the learners and researcher. There was no physical difficulty for which a solution was not found, so the women could enjoy working with the computer.

One women had crippling arthritis in both hands. She was able to click the mouse with her fingers or knuckles and to move the mouse by pushing it. She typed using just a few fingers. She never complained and had certainly learned to compensate for her disability. She was a model for the others in showing them that if you want to learn something, "You just do it!"

Two concerns were expressed in relation to vision: the need for reading glasses when working at the monitor and the need to sit close to the large projection screen at the front of the class. Mary explained the difficulty of having the wrong glasses, "You have to tip your head too much up and down. The right glasses would help. And I went and bought new glasses. I am going to use my reading glasses." Margaret stated that she uses reading glasses entirely when she uses the computer. The instructor explained the proper positioning of the monitor and chair that may help reduce neck and eye strain. She also recommended that the front row of computers be used by those needing to sit closer to the projection screen.

Hearing was mentioned as being a problem by one participant. She was asked to sit on the end of the row closest to the instructor. The instructor also looked directly at the participant when speaking to her and when explaining many of the procedures. This method mitigated the difficulty.

Twelve of the 14 women felt that they needed practice in controlling the mouse. The instructor provided an activity which helped them become more comfortable and competent using the mouse. See Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions: Theme 1: Controlling the Mouse, for a discussion of the teaching strategy used by the researcher to address this issue.

Research Question I: Category 2: Issues:
Theme 2: Mental Learning Difficulties.

Memory difficulties and slower reaction time were frequently expressed learning problems. Eight of the 14 women quickly forgot the procedure, forgot what the purpose of a procedure was while following the steps, or forgot that the class had covered the topic previously. Six of the 14 participants exhibited more mild memory difficulties; however, they were very much aware that changes were taking place. All of the women expressed having some sort of memory problem. They often laughed together about this in class.

- Rebecca: I sometimes forget that I have even turned the computer on. I go do something else and forget. It doesn't hurt the computer does it?
- Rebecca: I wish I could remember what I forgot! Even if I could remember this for just a little while. I even need to have the instructor remind me that I have directions which will remind me what to do!
- Fern: You mean to say we learned this already? I don't remember it.

See Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions: Theme 2: Memory Difficulties, for a discussion of the teaching strategies used by the researcher to address this issue.

Slower reaction time did not develop into a major learning problem for the women because the instructor taught at a slower pace when the women voiced their need.

Research Question I: Category 2: Issues:
Theme 3: Knowledge Transfer.

The four participants who had a Windows machine at home, but were using a Macintosh in class expressed difficulty in transferring their knowledge from class to home. The researcher experimented with a method that appeared to lessen the problem. See Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions:

Theme 3: Knowledge Transfer, for a discussion of the teaching strategies used by the researcher to address this issue.

Three women using Macintosh computers at home experienced some problems with knowledge transfer. They said their problems were caused by a lack of practice soon after the class or by not taking the time to practice between classes. Rebecca replied, "I get lazy, I do not practice right away, then I forget how." Helen said she spends a couple of hours each week and that it helped. Several women recommended that the instructor develop take-home worksheets which would help them practice the procedure.

Research Question I: Category 2: Issues:
Theme 4: Parking.

Parking on the campus was difficult, and then it was several blocks walking on campus to arrive at the building where the computer class was located. The participants solved this "institutional barrier" by utilizing the county senior transportation system. The "Galavan" picked the women up at three locations, then brought them directly to the west entrance of the building where the class was held. After class, the van picked up the women and took them back to their original locations. The participants paid \$1.00 for the ride. Only one of the 14 participants drove to campus and walked to class. Rebecca was afraid that if she did not ride the van, she would never find the building. "Well, what bothers me is, will I find my way here the next time? My direction finder was never good." Her friend, Margaret, told her to ride the van each time to class--which she did. Margaret stated, "The Galavan is essential. I came because the Galavan made it possible. I don't have to park."

Research Question I: Experiences: Category 3: Personal Characteristics

The women shared their opinions about personal characteristics that positively helped them learn, those that negatively impacted learning, and how they learned to shift to positive characteristics which enhanced learning. The following themes were developed:

Theme 1. Positive Characteristics.

Theme 2. Negative Characteristics.

Theme 3. Shifting.

Research Question I: Experiences: Category 3: Personal Characteristics:
Theme 1: Positive Characteristics.

The women identified the following positive characteristics:

- having a positive attitude;
- believing that one can learn;
- possessing the ability to laugh at oneself;
- having patience; and
- being willing to take a risk (being unafraid to click a new button or try a new procedure).

Research Question I: Experiences: Category 3: Personal Characteristics:
Theme 2: Negative Characteristics.

The women identified the following negative characteristics:

- getting mad at oneself;
- becoming frustrated;
- feeling guilty about taking time to use the computer;
- hurrying; and

- having a lack of confidence to explore the computer, i.e. “being afraid that things will disappear. And they do!” replied Rebecca.

Research Question I: Experiences: Category 3: Personal Characteristics:
Theme 3: Shifting.

The participants appreciated discussing how to shift a frustrating situation into an experience in which they enjoyed the discoveries that unfolded as patience, humor, problem solving, and risk-taking replaced negative characteristics. Discussing the positive and negative behaviors that helped or hindered learning, enabled the women to shift the behaviors that were impeding their learning. For example, Lucy became frustrated when she did not know what to do on the computer; then she would immediately restart the computer. This caused her to wait several minutes each time she restarted, causing her to lag behind the rest of the class. She restarted the computer numerous times during class. The instructor observed this behavior and spoke to Lucy to help her understand that she should ask for help immediately upon encountering the problem. She was assured that the instructor would help her understand the situation, and she would learn what to do to solve the problem. It was pointed out that this was what the other women did and that it was working well for them. Lucy shifted a negative, hindering characteristic into a positive, enhancing characteristic. She shifted her frustration into problem solving and began to develop the attitude that learning to use the computer was a stimulating discovery. She learned that taking time to think through the problem and to explore possible solutions was helpful. From that day on, Lucy began to ask for help and also learned that she actually possessed good skills and could be helpful to others.

The instructor encouraged the women to laugh at themselves when they could not remember, complete a procedure, or determine how best to solve a problem. She reminded the women that age can bring some *funny* situations and that using humor is more effective

than anger and frustration. When one woman laughed, the rest of the group laughed too since they could relate to the situation.

- Fern: Discovered I was maybe scared to try new programs on the computer. Fear of losing my work or ruining the computer. Now I like to explore with the mouse even if I get lost once in a while. I'm able better to control what I want to do. I used to just give up. The classes have helped me overcome this bad habit.
- Mary: Sometimes anger can really make you work. It helps me get to the answer. I say I am not going to let this defeat me. Usually with frustration, you want to walk away. Patience is important.

Research Question II: Learning Environment

II. What recommendations do older women express when considering the most fulfilling environment for learning as related to:

1. Course Design.
2. Course Content.
3. Classroom Atmosphere.
4. Instructor Characteristics.

Research Question II: Learning Environment: Predominant Theme Statement

Deliberate, thoughtful design of the adult learning environment was essential to learning. According to the women in the study, the heart of learning was the instructor's ability to assess their needs when selecting teaching strategies; to create an atmosphere that provided positive reinforcement, respect, and challenge; to use relevant projects, social learning activities, and repetition; and, to enjoy the journey alongside the participants. The women stated the learning atmosphere designed for older women should be one in which the learner feels supported, valued, and empowered. The atmosphere that was deliberately

created, maintained, and most appreciated by these women was one of a *family of learners*, in which the instructor's role was that of a member and guide.

Research Question II: Learning Environment: Category 1: Course Design

Course design included aspects for which the instructor must deliberately plan. Each of these decisions impacted the learners and the desired learning environment. The following themes are based upon the opinions expressed by the participants in this study:

Theme 1. Location/Facility.

Theme 2. Class Schedule.

Theme 3. Class Size.

Theme 4. Participant Criteria.

Research Question II: Learning Environment: Category 1: Course Design:
Theme 1: Location/Facility.

All of the women felt that learning at the university made the experience feel "more valid and more professional." Those who had attended a university in a degree program during their younger years voiced that it felt good to be back. The following statements detail the overall opinion of attending a computer course on a university campus.

- Lois: There is nothing like feeling like a coed again.
- Donna: I have been here before so it wasn't hard.
- Fern: It is exciting.
- Dee: I was looking forward to it.
- Ruth: It feels good, like old times.
- Helen: I am nervous, but excited to be here.

Another reason the women enjoyed coming to campus for the classes was that the facility had enough computers so each participant could work individually. Dee stated, "At [the] senior center, each one cannot have her own computer. They have a limited number of computers and I think each person needs to have her own computer." All of the participants agreed that they learned best by having their own computer to work on rather than doubling up. The room also had a large projection screen in front of the classroom on which the women could view the demonstrations. They voiced that use of this equipment made their learning much easier.

Research Question II: Learning Environment: Category 1: Course Design:
Theme 2: Class Schedule.

The participants agreed that attending a class one time per week was most ideal. All of the women reported that they would not have time to attend class more than once per week and that they would forget too much if the classes were held every other week. They also thought that a six week session was "just right." Many expressed that a course of ten weeks would require too long of a commitment and fewer than six weeks would not allow for reinforcement of learning.

The number of hours for each session was discussed. Mary stated, "Three would really push us--sitting and concentrating--and an hour is not long enough." Ruth commented, "We don't get tired sitting for two hours. I think we need it." All participants agreed.

The majority of the women felt that early spring would be a good time to offer a course. They felt that classes should not be offered in the summer because so many of them travel. "The best time to travel in Montana is in the summer, you know," commented Margaret. They all recommended that the holiday season of Thanksgiving through New

Year's be avoided. However, they stated that if the winter holiday season were the only time for a course offering, they would certainly participate. Ruth stated, "We are thinking that we need to buy school supplies in September, that would be good."

Research Question II: Learning Environment: Category 1: Course Design:
Theme 3: Class Size.

The women recommended that class size be limited to 6-10 people because "older women need individual assistance--which is not available in large classes." All the women expressed the fact that their decision to participate in the course was heavily influenced by the opportunity to take a course with a small number of participants. All agreed that participating in a class with at least six people was "nice" because they liked having an opportunity to visit with others. The following comments reflect the opinions of the women.

- Rebecca: Individual help makes a big difference. I tried a computer class that had 19 people and it was hard to get help.
- Deb: If you are lost, you don't feel that you will be lost the whole class. We learn more [with a small number of women in the class].
- Mary: You are learning a technique which is different from learning from a history class, the process is different. [We need individual assistance.]
- Mary: I took a class in which the room was filled with people. There were too many people--nineteen--and I just didn't get it. I like this when the number is small enough that we can get help when we need it.

Research Question II: Learning Environment: Category 1: Course Design:
Theme 4: Participant Criteria

All women in this study concurred that they would take a computer class if men were in it, but that they preferred participating in a class composed exclusively of women. The women felt they could more easily ask for help, they wouldn't be rushed along, and that women are more patient and helpful with each other.

- Margaret: No men, they try to take over.
- Priscilla: I think men get more frustrated and they don't wait for help.
- Dee: I think women are more understanding of each other and more patient with each other.
- Fern: I feel a little intimidated sometimes with men in a class.
- Lois: You don't feel as stupid [with all women].
- Margaret: We all feel more comfortable and we don't mind making fools of ourselves [with only women in class].
- Mary: I don't know why we should feel that way [intimidated by men in a class]. But you know it is something we have been taught.
- Helen: It seems like they think they are learning more than we are.
- Rebecca: They are more aggressive.
- Priscilla: I think they are more impatient. If they don't get it right away they over-react.
- Fern: If they are nice they will help you out.
- Carol: In the museum, we had groups of school children. If the group was mixed, the boys talked and took over and the girls didn't talk. If we had groups of only girls-they would talk just as much. So we learn very young that boys talk more.

The women were very pleased to take a class in which the participants were of similar age. The eleven women who had tried attending computer courses offered at senior centers or through adult education programs reported that those courses offered content which did not match their needs. Moreover, such classes typically included younger people who had the ability to work faster than they could. The participants felt that those younger than 70 years of age had worked on computers more recently and could think more quickly. They did not recommend a cut-off for an upper age limit. They believed that anyone over 70 would have similar needs even if they were 90 years old.

- Mary: How we process our thinking is different from younger people, our reflexes are slower, our eye coordination and memory is shorter.

- Rebecca: A lot of things happen after 70 years old!
- Ruth: I think we like that we are all pretty much on the same level. I have taken computer courses before and the first night they tell you the history of computers and you are in there with high school and college students. The skill level is too broad. We are not so different. We are all struggling along.

Research Question II: Learning Environment: Category 2: Course Content

Course content must be determined by the instructor. How the instructor chooses course content can be determined in several ways: teach the required content of an institution or program, teach required job skills, or teach to the needs of the learners. In this study, the instructor chose to have the participants of the course select content. The instructor and participants suggested content, then the women selected the topics that were most relevant to them. The following themes reflect the content selected by the participants:

Theme 1. Searching the Internet.

Theme 2. Sending and Receiving E-mail.

Theme 3. Understanding Computer Terminology.

Theme 4. Using Word Processing.

Theme 5. Installing and Running a Program.

Research Question II: Learning Environment: Category 2: Course Content: Theme 1: Searching the Internet.

The first topic selected by the group was learning to search the Internet. They were astonished at the vastness of information and understood how important it was to know how to search for specific information. They were taught the basics of using a web browser, the differences between a variety of search engines, and three methods of searching: (a) a key word search, (b) a category search, and (c) a question search. The women agreed that learning to search the Internet was extremely beneficial and "good for

the brain.” They reported that they had to think categorically, to use relevant keywords, and to sort through a long list of site descriptions displayed after a search. All participants commented that one of the most difficult tasks was learning to sort through the list of site descriptions. The women reported, and the researcher observed, that learning to be selective, quickly examining site descriptions, and getting back to the original search list were difficult tasks.

The instructor warned participants not to open the ads at the top of the window since most asked for money in some way. Rebecca received an ad that she was “...the 1001 person to come here today” and that she had won 1001 prizes. Rebecca excitedly said, “Oh, I think I have won!” The instructor told her that the ads usually asked for money and were often not what they seemed, then went on teaching the class. Rebecca continued to ponder. She knew that she had won and that the instructor was not helping her get her prizes. She was determined to get her prizes, so the instructor stopped instruction, and together as a whole class, followed the ad to discover what Rebecca had won. As it turned out, she would have to pay \$199 to learn what she had won and how to get the prizes. This spontaneous exploration served as a useful lesson for all of the women. They discussed how easily older people fall for deceptive advertising and gimmicks that look so real. All of the women agreed that learning to search more efficiently was a useful skill. Comments describing the experience of learning to search the Internet follow.

- Mary: I want to keep up and have e-mail and I want to browse the net. Browsing the net isn't just for shopping or something. When you watch the news, PBS, Martha Stewart, I want to know what else they are saying. I want to go look where they say to look [website].
- Dee: I hope to “catch-on” to the skill of knowing where to go and not to feel as though I'm lost in all the knowledge.

- Mary: I needed to learn how to use the Internet. I liked learning how to search for information using several sources.
- Margaret: I liked getting to be more familiar with the search engines and the many sources of info they provide.
- Deb: There's so much knowledge to receive. Many hours could be spent just searching the long lists that's presented on the computer.
- Helen: Being able to get connected to the Internet was exciting. So that was the main thing I was hoping to learn. I was surprised there were so many different areas you are able to search!
- Deb: This is so good for the brain. It is so good. Searching the web, learning to put in the right words...
- Margaret: Oh look! Yahoooligans, Helen, this is a site for you! [Everyone laughed in fun at the thought since Helen was a young, fun, lively 82-year-old who they thought fit the children's Yahoooligans site better than the more "adult" sites.]
- Mary: I did it! This is so fun. I actually found what I was looking for and was able to print it out!

Research Question II: Learning Environment
Theme 2: Sending and Receiving E-mail.

The women selected sending and receiving e-mail as the second topic to learn. Seven women already had an Internet Service Provider and the remainder quickly set up an account using Yahoo's free e-mail service or by purchasing Internet and e-mail service. They learned about the role of an Internet Service Provider (ISP) and where the least expensive services were found. They were astonished that the highly advertised America Online (AOL) was one of the most expensive (\$22/month) and that Internet Montana (IMT) was \$5 per month for similar services. The women became better consumers of Internet and e-mail services. They learned how to send the same e-mail message to a list of people using Blind Carbon Copy (BCC) so that everyone on the list would not receive the e-mail addresses of those to whom the message had been sent. They also learned to send electronic greetings. This was particularly enjoyed by 13 of the 14 women. They liked the

colors, beautiful pictures, animations, and sound. The following statements illustrate the women's pride and enjoyment at being able to accomplish the task of sending e-mail and electronic greetings.

- Margaret: I was doing e-mail and I did the BCC [blind carbon copy] and I did fine [at home]. I hope it went through to the five different people.
- Mary: I did BCC. I was able to pull up documents in AppleWorks.
- Rebecca: Oh, look at the streaking turkey! This is fun! I know who would enjoy receiving that card!

Research Question II: Learning Environment: Category 2: Course Content:
Theme 3: Understanding Computer Terminology

The women liked having about 10 minutes devoted to describing the basics of how a computer worked and spending just a few minutes learning the terminology associated with each skill or topic when encountered. The instructor showed the women the inside of a computer. They asked, "Where is the silicon chip?"; "What is the mother board?"; "What is RAM?"; "What is a hard drive?"; "What is the difference between a CD and a video?" They appreciated getting prompt answers because they said they would later forget they had a question. The women said that it was intriguing to see inside of the computer.

Research Question II: Learning Environment: Category 2: Course Content:
Theme 4: Using Word Processing

The women enjoyed learning how to use a word processor. All of them had tried to use their home word processing program with limited success. They were happy to learn how to enlarge the font size, add an image, correct mistakes using the delete key, and check spelling. They were shown how to save documents so they would know where to find them. The women felt this was a major accomplishment since every one had experienced problems saving and then retrieving their work.

Seven women had been experiencing disconnection from their modem when sending e-mail because they were taking too long to type the message. The instructor taught them to type the message in a word processor before connecting to the Internet. The women then learned to copy and paste the message into the body of the e-mail when online. This strategy allowed them to spend as much time as they needed to write.

Twelve of the 14 women had trouble understanding how to do the copy and paste procedure. They reported that they just did not understand how the computer could move text from place to place. The researcher reminded them to use the recipe (directions). The participants practiced this skill during each of the remaining three class sessions. Practice was successful in helping the women grasp the concept. They also practiced with a rhythmic verse, i.e. "Highlight, copy, click, and paste."

An actual product was created when teaching the women to use the word processor. A letter was word processed, the mail-merge feature was utilized, then the personalized letter was printed on colorful pre-printed Christmas stationery. All of the women were amazed at the capability. Half of them went to the store to purchase stationery and returned the following week to make their own letters. They appreciated the relevancy of learning a skill that would make a task easier for them. Comments regarding the word processing experience follow.

- Margaret: I liked learning about how to copy and paste.
- Dee: Like spell checking and learning how to enlarge the print.
- Deb: Liked learning to cut, copy, and paste. This will be useful and save time instead of moving manually. The spell checking was interesting to have list of words come up, chose the right one, and be on your way.
- Helen: Actually learning how to correct mistakes in my typing was really important to me.
- Priscilla: I liked using AppleWorks on an actual product.

Research Question II: Learning Environment: Category 2: Course Content:
Theme 5: Installing and Running a Program.

Ten of the 14 women wanted to purchase or had already purchased computer games, encyclopedias, children's software, small business applications, and/or other computer programs on CD. They reported that they had trouble knowing how to run the programs. In class, the women learned how to insert a CD, install the program, and problem-solve through the process of running the program. Each participant was asked to state a special hobby or interest, then the researcher gathered software on which each of the women could experiment. The lab was a center for teaching future teachers how to integrate technology into teaching; therefore, approximately 500 software titles on literally hundreds of topics were available.

The women were captivated by the content of the software: the sounds, video, images, games, tutorials, simulations. They were amazed that the encyclopedias contained such vast amounts of information with pictures, video, and sound, rather than just text. The classroom was full of sounds as each of the women ran different pieces of software; every piece provided verbal commentary and all had sound effects.

One piece was about the Aborigine people of Australia. It opened up with an Aboriginal man dancing across the computer screen. Rebecca exclaimed, "Oh, he is barely clothed." At that, all of the women wanted to see and laughed in awe that the computer could actually show a video with such vivid music, color, and sounds.

The researcher observed that the experience of learning to run new software helped the women increase their willingness to click new buttons and to explore new options without being afraid that something would "blow-up" or be lost forever. This strategy worked well to help them increase their confidence. The women reported that learning to install and run a piece of software was useful. The women expressed that now they could

purchase software for their grandchildren and not be afraid to try running it. Four of the women had purchased card games on CD and were excited about exploring new options.

Research Question II: Learning Environment: Category 3: Classroom Atmosphere

Classroom atmosphere is a dynamic interplay of factors involving the roles and responsibilities of the instructor and students. The atmosphere is designed by and facilitated by the instructor, who must have an understanding of the most beneficial learning environment for each unique group of learners. Themes reflecting the experiences of the women follow:

Theme 1. Family of Learners.

Theme 2. Social Time.

Theme 3. Learner Centered.

Research Question II: Learning Environment: Category 3: Classroom Atmosphere:
Theme 1: Family of Learners

From the first day of class, the instructor deliberately set a classroom atmosphere which encouraged talking, laughing, asking for help, discussing difficulties, and sharing new learning. The atmosphere was one of a *family of learners* rather than a content oriented, get the work done, behaviorist-type classroom atmosphere. Productive talking and cheerful laughter took place during each class. The classroom was never quiet; the women were helping each other by explaining what they did "to make it work," asking for help, or talking themselves through a procedure. The researcher observed a confidence building, enjoyable atmosphere that motivated the women to come back each week and to work hard so they would be able to help others.

Actions taken by the instructor to create this classroom atmosphere included: (a) Cheerfully welcoming the women at the door to the classroom immediately upon their arrival; (b) speaking to the women individually during every class and using each woman's first name, (c) telling the women that they could ask any question and not be ridiculed; (d) asking for constant feedback about their learning, i.e. successes, difficulties, suggestions, and questions; (e) modeling how to laugh at oneself and encouraging the shift to humor rather than frustration; (f) describing how each one should feel free to talk to the person sitting next to her, i.e. ask questions and share knowledge; (g) reminding the women that all of the mistakes they were making had been made by many others before as they, too, learned to use the computer, (h) exhibiting a happy, calm perspective; (i) providing individual assistance as soon as possible; and (j) thanking them for their participation and expressing the sincere desire that they come again the following week. The participants expressed the following comments regarding the classroom atmosphere.

- Mary: Well, I think we are learning something each week. I like the atmosphere.
- Helen: It is fun and I get to meet nice ladies.
- Margaret: It is fun. Great company! [Followed by laughter.]
- Mary: I like the individual attention. It is good, I need someone to hold my hand.
- Rebecca: I like the laughter we have in class.
- Ruth: "The best thing is, I don't know how you do it, but you somehow get around to everyone. I know that you will get to me to help. Otherwise you just kind of sit here and wait. I don't know what I would do."

Research Question II: Learning Environment: Category 3: Classroom Atmosphere:
Theme 2: Social Time

As the classes progressed, the women reported that each class had become a social time. Essentially, the women became friends who helped each other through the learning

process. The actions of the women themselves impacted the classroom atmosphere. Eleven of the women were outgoing, all were friendly, and all were willing to share their successes, difficulties, and suggestions. The researcher observed that the women were very polite to each other and extremely appreciative to have the unique learning opportunity of learning with other women of similar age and ability. Following was a typical conversation illustrating how the women impacted the classroom atmosphere by helping each other and providing positive reinforcement. Dee asked, "How did you do that?" Margaret replied, "Just do this." She patiently told Dee how to do the procedure while Dee did it on her own computer. Dee said, "Oh, I got it!" Margaret smiled and said, "There you have it now!"

Research Question II: Learning Environment: Category 4: Instructor Characteristics

Instructor characteristics are the unique blend of needs, beliefs, attitudes, and behaviors that the instructor displays. These characteristics greatly impact the teaching style of the instructor (Grasha, 1996). They are multidimensional and affect how the instructor defines, guides, and directs the instructional process. These factors have effects on learners and their ability to learn. Themes developed from this category follow:

Theme 1. Positive Instructor Characteristics.

Theme 2. Negative Instructor Characteristics.

Theme 3. Harmonious Teaching Style.

Research Question II: Learning Environment: Category 4: Instructor Characteristics: Theme 1: Positive Instructor Characteristics

All of the women said that the characteristics of the instructor were more important than excellent technological ability, since the instructor is the one who establishes and maintains the tone of the entire experience. They commented that the instructor must not

set him or herself above the learners; moreover, the instructor must enjoy the journey alongside them. When asked to describe characteristics of a computer instructor with whom they would enjoy working, the women quickly responded. Deb replied that a good instructor makes the procedures *look* easy and teaches so the procedures *become* easy.

The participants reported the following positive instructor characteristics: patience, a sense of humor, friendliness, cheerfulness and calmness, respectfulness, and knowing the topic as well as the special characteristics of adult learners. The women in the study appreciated the patience, humor, understanding, and enthusiasm of an instructor; they wanted attend each class because they felt good about coming to an enjoyable and rewarding learning experience. The only time someone missed class was when a funeral or other personal commitment arose.

All participants agreed that the instructor must exhibit respect and appreciate the uniqueness of each learner. They felt that every person had something to offer to the benefit of the others, if given a chance to do so. They also felt that having a sense of humor and helping the learners relax through humor was a very positive characteristic for an instructor. Another characteristic was that of honoring the learners desire to select learning topics. The women reported that having an instructor who told the learners what they needed to know was not as beneficial as having one who helped the learners discover what they felt they needed to know. The women strongly agreed that the characteristics of the instructor were more important than location, size of the group, gender of the group, and even, content knowledge.

**Research Question II: Learning Environment: Category 4: Instructor Characteristics:
Theme 2: Negative Instructor Characteristics**

The women commented that there are instructor characteristics which hinder learning. The most common reply from the women was “having an instructor who made them feel dumb, who made them think they couldn’t do it, or who taught too fast.” They felt that a computer instructor who is good with computers, but who does not know how to work with adults, was certainly not as effective as one with skill in both areas. The women reported that they would not continue to attend classes if they did not feel comfortable, able to make mistakes without feeling badly, were too rushed to absorb anything, or did not learn relevant skills. Positive and negative instructor characteristics are listed in Table 5.

Table 5. Participant described characteristics of an instructor of a computer course.

Positive Characteristics	Negative Characteristics
Much patience.	Arrogant.
Enthusiasm for teaching.	Has a short fuse.
Well organized.	Puts others down for learning slowly.
Compassionate.	Insinuating that the learner is dumb.
Understands adult learners.	Disorganized.
Can teach at the speed necessary for each learner	Hurried.
Genuinely interested and nice.	

**Research Question II: Learning Environment: Category 4: Instructor Characteristics:
Theme 3: Harmonious Teaching Style**

This theme was developed from the instructor’s observations and reflections on the experience of teaching this group of older women to use the computer. The learners tended to create an interactive relationship with those involved in the classroom environment; these relationships are highly influenced by the instructor. Classroom atmosphere was critically important to these older women; therefore, the instructor’s characteristics and teaching style

must fit harmoniously with the atmosphere desired most by the learners. In this case, the women did not want a “sage on the stage,” they wanted the “guide on the side.”

Research Question III: Teaching Strategies

III. What teaching strategies do older women believe most enhance their learning as related to:

1. Current Educational Practices.
2. Learning Issue Resolutions.

Research Question III: Teaching Strategies: Predominant Theme Statement

Teaching strategies that stress active involvement, repetition, verbal sharing, visual display, and relate content to the women's vast reservoir of life experiences are most effective and enjoyable to the learners. Teaching strategies can be used to resolve learning issues in order to help the learners enjoy the computer class experience.

Research Question III: Teaching Strategies: Category 1: Current Educational Practices

The teaching strategies utilized in this study were selected from a combination of methods described in the literature on adult education, brain-based research, active learning, multiple intelligences, and educational technology. Participants were asked to assess the effectiveness of each strategy following their experience. The following strategies were utilized during the study.

1. Verbal descriptions only.
2. Instructor demonstration of the procedure using the large screen at the front of the classroom.

3. Demonstration, Do, Redo: instructor demonstration while participants took notes, a second demonstration while participants did the procedure for the first time, followed by participants completing the procedure on their own.
4. Use of strategies involving multiple intelligences (Gardner, 1993; 1995) and brain-based learning principles (Caine & Caine, 1991; Sylwester, 1990).
 - A. Utilizing "share-pairs" in which participants told others how to do the procedure or described new knowledge.
 - B. Using mnemonics to remember procedures and new skills.
 - C. Creating mind maps and other drawings to reinforce new knowledge.
 - D. Helping each other by sharing procedures that worked.
 - E. Creating musical or rhythmic sentences to reinforce memory of procedures.
 - F. Helping the learners learn about their own learning styles, strengths, weaknesses, and accommodations.
5. Repeating, clarifying, restating, summarizing, and reminding participants to take notes or underline existing procedures were also utilized.
6. Delivering frequent positive reinforcement.
7. Encouraging laughter.
8. Encouraging knowledge sharing.

Research Question III: Teaching Strategies: Category 1: Current Educational Practices:
Strategy 1. Verbal Descriptions Only

None of the women felt that only hearing how to do a procedure was effective.

Mary stated, "I forget. It is too fast. I have to see it, I do." Deb replied, "I don't have a picture in my mind."

Research Question III: Teaching Strategies: Category 1: Current Educational Practices:
Strategy 2. Demonstration Using Large Screen

Demonstration of the procedure while displaying the computer window on the large screen at the front of the classroom was thought to be very effective. Mary stated, "Using the screen in front of the room is better than just listening to you and better than just reading directions, too." Margaret replied, "I like that, too." All women agreed that they learned much better when they could see the procedure demonstrated.

Research Question III: Teaching Strategies: Category 1: Current Educational Practices:
Strategy 3. Demonstration, Do, Redo

A three-step strategy was developed and found to be the most valuable to the women. First, the instructor demonstrated the procedure using the large projection screen so the learners could watch. The participants made additional notes on their recipe sheet while watching the demonstration. Second, still using the large screen, the instructor did the procedure again as the participants tried it on their own computers, all together, one step at a time with the instructor. Third, the participants "redo" by following their recipes to perform the procedure on their own. At this time, the instructor was able to provide individual assistance as needed.

- Priscilla: We need that time to reinforce what we are learning. Repetition is the best way.
- Mary: Having help when I needed it [was beneficial]. You don't feel like you will never get to us because of the small class size; I know you will come help me.

Research Question III: Teaching Strategies: Category 1: Current Educational Practices:
Strategy 4. Multiple Intelligences and Brain-based Learning

A. Linguistic. The verbal "share-pair" experience was felt by the women to be effective. The share-pair strategy requests each participant to verbally tell another how to do the procedure or to describe what she just learned. These women agreed that they liked

talking to the person next to them as well as getting reinforcement on the concept or procedure just learned. The partner would provide additional details or correct misconceptions.

B. Spatial. The women were shown how to make a variety of visual organizers and then were asked to draw a visual organizer while the instructor verbally described a computer procedure and wrote key points on the whiteboard in the front of the room. The women were asked in a following class to use their maps to remember the procedure. This strategy was used twice during this study. All the women agreed that creating a visual organizer did not facilitate their learning or help them to recall procedures or topics. Four of the 14 women could not remember doing the procedure even while looking at the visual map they had previously drawn.

C. Interpersonal. The interpersonal relationships that developed during the course provided motivation to attend and nurtured a sense of pride from the women's ability to contribute by helping another. Participants were asked to share what they learned with peers and to immediately ask for help when needed. Assistance was provided either by the instructor or by other class members. All of the women said that the strategy of working with another was helpful. The class was never silent; the women were constantly talking to others, sharing what worked, or receiving help.

D. Musical/rhythmic. The class "experimented" with creating musical or rhythmic mnemonics to reinforce memory of procedures. For example, *Highlight, copy, click and paste* was a rhythmic statement used to help the participants remember how to copy and paste text into the body of an e-mail message. Because the copy and paste procedure was

difficult for most of the women, the mnemonic helped them to follow and remember the procedure.

A mnemonic created by Rebecca was often used by the participants when they wanted to remember whether to double or single-click the mouse. Rebecca created “Two to get in and one to make a fast getaway.” This meant two clicks to open a document or program and one click to close. The instructor also used “Knock, knock--open the door” to signify the need for two clicks to open a document.

E. Intrapersonal. As a means to help the learners develop an understanding of their own learning, the instructor led a discussion about Gardner’s Multiple Intelligences Theory (Gardner, 1993; 1995). This discussion included the importance of learning about one’s learning strengths and weaknesses, and methods used to accommodate, or become more flexible in learning. The women enjoyed using a computer generated inventory of learning styles based upon the multiple intelligences. The inventory was not scientific; however, it helped them realize that each person learns through a combination of intelligences or abilities. They also enjoyed searching the Internet for other inventories and just to satisfy their own interest. The women reported that they enjoyed the experience and benefited by learning how to change their note-taking strategy by using the spatial intelligence along with the verbal intelligence.

Research Question III: Teaching Strategies: Category 1: Current Educational Practices: Strategy 5. Additional Teaching Strategies

Repeating, clarifying, restating, summarizing, and reminding participants to take notes or underline existing procedures were also utilized. Repeating, summarizing, and reminding were especially valuable strategies used by the instructor. The women commented that the instructor “must have the patience to repeat, restate, and remind!”

Clarifying and restating were also very valuable teaching strategies. The researcher found herself restating quite often in order to find words and descriptions to which the women could relate. This helped them use the brain to categorize and code new learning for easier recall, which is associated with brain-based learning principles. The idea to call directions a *recipe* worked because the women could relate to this label more easily and they already knew the importance of following a recipe. A full description of the recipe strategy is presented in Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions: Strategy 2: Memory Difficulties: Use of Recipes.

The researcher often found she had to remind the women that they had a recipe for the procedure on which they were working. Those women who remembered to use the recipe reported being able to do the procedure more easily at home .

The researcher discovered the importance of providing a rationale for learning each procedure or skill. As soon as the women understood how the skill or procedure could be utilized, their interest and motivation levels rose.

Research Question III: Teaching Strategies: Category 1: Current Educational Practices: Strategy 6. Positive Reinforcement

The researcher deliberately chose to provide abundant positive reinforcement to each individual, as well as to the whole group. The women appreciated receiving verbal cues that let them know they could do the procedure and that they were on the right track. The researcher used this reward strategy to motivate the women to take a risk and try new features, and create an enjoyable atmosphere where the women wanted to come.

**Research Question III: Teaching Strategies: Category 1: Current Educational Practices:
Strategy 7. Laughter**

Deliberately using humor and encouraging laughter were beneficial strategies for all participants. They commented that they enjoyed the laughter in class and how it helped them to relax and enjoy the learning experience. The instructor helped the learners change frustration into laughter. The women had not expected humor and laughter. Rather, they thought the course might be technical and intimidating.

**Research Question III: Teaching Strategies: Category 1: Current Educational Practices:
Strategy 8. Knowledge Sharing**

The women reported that the teaching strategy of deliberately asking them to share what they knew was beneficial to their learning. They reported that it gave them a sense of pride when they were able to help others. It also put them at ease since they could always get assistance from someone. The women agreed their early years of schooling were spent listening to teachers and they were not supposed to talk together. They enjoyed the opportunity to talk with other women who were experiencing the same situations.

Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions

There were a number of issues expressed and discussed by the participants during the study, as reported under Research Question I. These issues revolved around needs unique to this age group and how these could be met. Three themes from Research Question I required the use of teaching strategies to resolve the issues: Physical Difficulties, Mental Learning Difficulties, and Knowledge Transfer. Participants were asked to assess the effectiveness of each strategy. The following describes the teaching strategies used by the researcher to resolve the issues found in these areas:

Strategy 1. Controlling the Mouse.

Strategy 2. Memory Difficulties.

Strategy 3. Knowledge Transfer.

Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions
Strategy 1. Controlling the Mouse.

A description of the teaching strategy used by the researcher to resolve difficulties experienced due to poor eye-hand coordination follows. On the first day of class, the instructor had the women use a paint program to learn to coordinate the mouse cursor with their brain and hand. The program had tools to draw, paint, and add clip-art. The women learned to drag, highlight, double-click, single-click, point the cursor on a tool to use the tool, and find the cursor on the screen. The participants felt that the experience helped them learn how to control the intricate movement of the mouse and prepared them for skills needed in following class sessions. The researcher had to make it explicitly clear that the paint program was being used to practice other skills such as eye-hand coordination, clicking once or twice, highlighting, etc. When the rationale was made clear, the women were delighted to experiment with the drawing tools and cursor control.

Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions
Strategy 2: Memory Difficulties

The women frequently expressed that memory issues caused learning problems. All of the women expressed having some sort of memory problem. Five different teaching strategies were shared with the participants: (a) Learning About Memory, (b) Talking Aloud to Oneself, (c) Mnemonics and Rhythmic Statements, (d) Use of Recipes, and (e) Concept Mapping. Descriptions of the strategies and the women's experiences follow.

Learning About Memory. The researcher shared an article from the National Policy and Resource Center on Women and Aging: *Your Memory: What Changes and What You Can Do About It* (Lachman, 1996). The article reinforced that having a positive attitude about memory is beneficial and important. "If you expect to forget something, you often do. This is because you are preoccupied about forgetting, you don't focus on the necessary skills needed to remember information" (Lachman, 1996, p. 5). The women were excited to receive the information and have the web address to go to themselves. The instructor shared another piece of research (Schiff, 1994) about squeezing a ball in the right hand in order to stimulate the left side of the brain--the thinking brain. Everyone squeezed a ball in the right hand for 30 seconds to a minute. They completed the procedure planned for the day and commented that they did not believe this method did anything to help them; all of them laughed at the idea but were certainly willing to try if it could possibly help.

Talking Aloud to Oneself. Three of the women always talked aloud to themselves as they worked through the procedure. The researcher asked them about this strategy and they each said they thought it helped them learn. The researcher asked everyone to try it. The entire group talked outloud to themselves as they worked through the procedure. When asked if that strategy worked for them, only those who had originally done it replied that it helped. The whole class laughed and enjoyed the "experiment."

Mnemonics and Rhythmic Statements. Mnemonics and rhythmic statements were also used. When the women were confused about when to double-click or single click, the researcher explained "...to double-click when you want to open something like 'knock-knock, open the door' and single-click when you see a box or button and want to close or select something." The researcher asked the women for a way to remember that difference. Rebecca immediately replied, "Oh! Two to get in and one to make a fast getaway!"

Laughter followed and during remaining classes, someone always reminded the others about “Two to get in, one to make a fast getaway!” They remembered this statement and used it often.

Use of Recipes. Directions were created for each procedure or skill in order to help in learning the process at the time and to help the women remember the process at a later time. The directions were sequentially numbered, had brief written steps, and also contained screen shots (pictures) of what the window would look like. The researcher noticed the women only worked with the directions while she demonstrated the procedure, then they all put the directions away. After, they would have to ask for help from someone next to them or from the instructor. The researcher asked them why this was occurring, because it was making it more difficult for them to learn the procedure by trying to rely on memory only. One woman replied that they were used to having manuals in which they did not understand the directions anyway. All of them agreed. Another replied that she was lazy and preferred to ask for help. Most of them agreed.

The researcher spoke to a faculty member with expertise in the area of educational psychology about this phenomenon. She suggested that the researcher rename the directions and call each a *recipe*. The women would know that they should follow a recipe very carefully until they knew it by heart, then they could put the *recipe* away. The researcher created each page of *directions* for the topics coming up in the same manner as the previous *directions* but instead, titled each one “Recipe for Copy & Paste” or “Recipe for Searching the Internet,” etc.

During the next class, the researcher spoke to the participants about the new method of using a *recipe*. She explained the importance of following the *recipe* very carefully;

thus, they should keep the *recipe* out rather than put it away. They should also refer to the *recipe* when they forgot how to do a procedure. The women immediately understood the importance of the recipe. Amazingly, they kept the sheet out, wrote additional comments if desired, and referred to the *recipe* throughout the class. They even asked for additional *recipes* for a variety of smaller tasks such as Save As and Spell Check, even though they already had a *direction* sheet for these procedures. When a woman was absent, at the next class she always asked for the *recipes* we used the previous class. Ruth stated, "The info included in our class notebook is concise and will be helpful--most manuals are dismal."

Concept Mapping. Concept mapping was introduced as a means to help the women remember the procedure and develop a greater understanding of the process. The women were asked to draw a concept map, mind map, tree structure, web, etc. as the instructor explained the process. They did this two times and twice were asked to recall information using their visual organizers. The women unanimously agreed that creating the visual organizer did not help them remember or better understand and referring back to the drawings did not help them recall the information. When asked again later, they still felt that the process was unhelpful.

Research Question III: Teaching Strategies: Category 2: Learning Issue Resolutions Strategy 3. Knowledge Transfer.

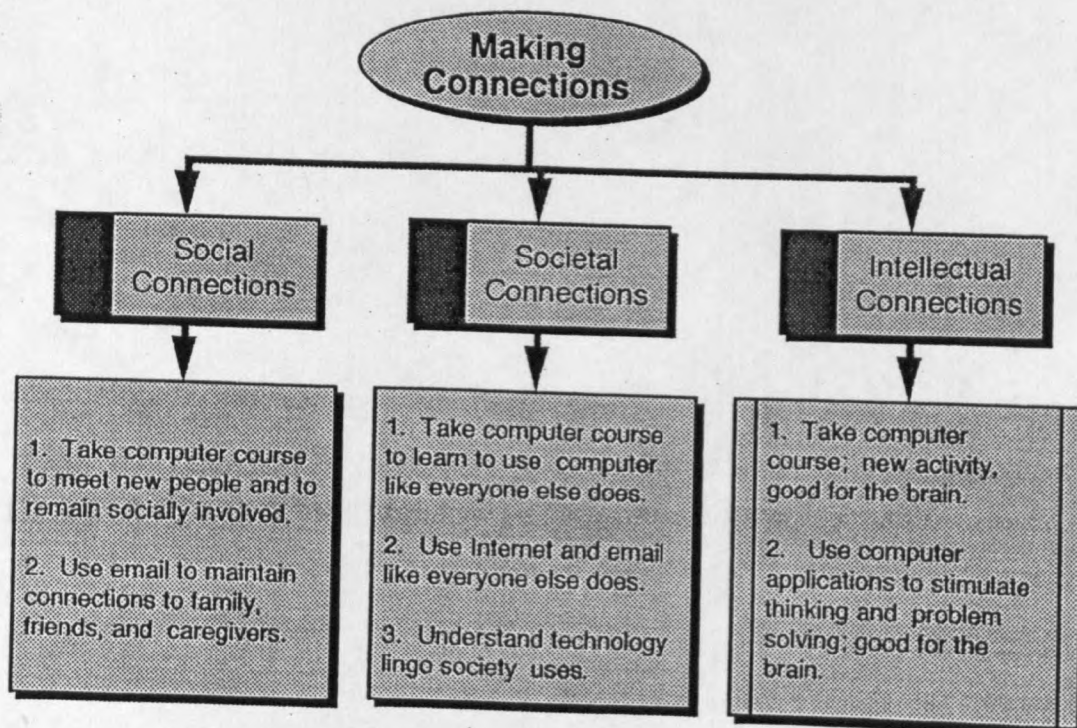
The four participants who had a Windows machine at home, but were learning in class using a Macintosh, expressed difficulty in transferring their knowledge from class to home. The researcher developed a method to help them resolve this issue. The researcher visited each of these women at their homes in order to learn what type of system they were using and to show the women the similarities and differences between the two types of

machines. Then, she was able to help these women during class by pointing out how the procedures were similar or different, and by asking them to visualize how the window would look on their home computers. All the women involved reported that this method was extremely helpful.

Central Phenomenon

The central phenomenon that emerged from this study was the importance of making connections (see Figure 3). The women were making connections socially, societally, and intellectually. Computer use appeared to be very important to these women in order to (a) connect with important others, i.e. to communicate with family, friends, and caregivers; (b) connect with society, i.e. to keep up with society's growing reliance on computers and the Internet; and (c) connect with the brain, i.e. to keep mentally active.

Figure 3. The conceptual model of the central phenomenon.



The women chose to take this computer course because it offered a unique opportunity to learn with women of similar age, to learn relevant skills, and to immerse themselves in a respectful learning environment that helped them succeed in spite of age-related difficulties. The instructor can make a significant difference by creating an enjoyable and motivating learning experience. The instructor's role should be one of a guide and respectful companion in learning, who zealously watches the reactions of the learners, adjusts strategies, and provides positive feedback and encouragement. An enjoyable learning environment along with teaching strategies based on the needs of the participants provide the most gratifying opportunity for these women to make the important social, societal, and intellectual connections they seek.

Findings in Relation to Literature Reviewed

Literature reviewed for this study encompassed three fields of study: social trends, gerontology and lifespan development, and education. Comparisons of the research results to the literature described in Chapter 2 are provided in the following section. The reference to "this study" refers to the results of this study with women over seventy years of age as presented in this dissertation.

Trends

Social trends that created the need for this study were the growing numbers of older women and greater reliance on computers and the Internet by society. Descriptions of how this study compared to those reported in the literature reviewed are presented below.

Greater Reliance on Computers and the Internet by Society

Our society is experiencing a phenomenal drive to use digital technology. Media, business, health institutions, caregivers, and financial institutions request that people visit their Internet sites to perform a range of activities including voting for proxies, finding the latest investment data, and tracking health related information. In addition, people increasingly use e-mail and the World Wide Web to maintain close communication with friends, relatives, doctors, and other caregivers (Berger, 2002; Coughlin, 1999; Kasworm & Londoner, 2000; Newburger, 2001; Norton & Wiburn, 1998). The women participating in this study felt anxious because they did not know how to make connections to society or family and friends using the dominant technologies used today. Their feelings and comments were in agreement with the assessment provided by the authors listed above.

Coughlin (1999) argued that communications technology will be a vital component of caregiving in this century. He believes that online caregiving networks will be crucial to delivering services which enhance individual's lives and facilitate caregiving. Numerous participants in this study revealed that their interest in using computers was to have a method to communicate with family, friends, and caregivers. They reported that as their own ability to remain mobile diminished, the computer would be a good way to stay in communication with others.

Many older women need training in new technologies because they were not exposed to these technologies when they were in the workforce, and they find it difficult to find computer courses designed to meet their learning needs (Granick, 2001; Kasworm & Londoner, 2000). The women's experiences reported in this study resemble those reported by Granick, Kasworm, and Londoner. These women also reported having difficulty finding a computer course that took into account their age-related difficulties and, the majority of these women had not learned to use a computer in their working years.

Gerontology and Lifespan Development

An analysis of research from gerontology and lifespan development was presented in Chapter 2 in order to provide a background for understanding social, mental, and physical issues of aging, as related to learning. Types of aging, personal identity and women's issues, networking and social interaction, and self-esteem and self-efficacy were categories analyzed in the literature. Comparisons with findings from this study are presented below.

Types of Aging. Gerontological researchers agree the behavioral dispositions of psychological age had greater influence on whether one is viewed as being old or not, i.e. whether one gets involved in life's activities or becomes isolated (Friedrich, 2001; Paoletti, 1998; Wilson, 2000). The researcher in this study believed that every one of the participants seemed psychologically younger than their chronological age. These women took action on their desire to stay involved and active in life; socially, societally, and intellectually.

Personal Identity and Women's Issues. Paoletti (1998) argued that women need participation in activities in which they can perceive themselves as justified and capable. The findings from this study reinforce those of Paoletti, Gilleard and Higgs (2000), O'Bierne (1999), and Wilson (2000).

Paoletti (1998) observed power relationships between the men and women. In her study this led to women opposing participation of men in activities attended primarily by women. The women in this study reported the same feelings. They enjoyed having a class composed of only women. They felt men would take over and they felt more comfortable

with all women in the class. Bell and Guenette's (2000) research also found that women preferred to participate in activities with only women, if given a choice.

Networking and Social Interaction. Baltes and Staudinger (1996), Litwin (1999), and Wilson (2000) reported on the social networks older individuals maintain. These connections provide a support system necessary for the well-being of older persons. These researchers reported that the presence of friends in the network was a positive morale booster as was the building and maintenance of numerous types of networks over a wide range of social activities. Having friends in a social activity and being able to provide helping behaviors was associated with higher morale among older women. Maintenance of communication networks of family, friends, neighbors, health professionals, and attendance in activities and classes, contributed positively to a healthy life as people age. The researcher in this study observed how the women created a social connection with others in the class. They enjoyed coming to class because of the "nice" women they met. They enjoyed the increased fellowship as the other researchers described. The women in this study even suggested that they sign up for the course with a friend, so they would have someone to motivate them to practice and could share their computer "troubles" and new learnings.

Self-Esteem and Self-Efficacy. Binstock and George (2001), Gilleard and Higgs (2000), O'Beirne (1999) and Wilson (2000) explained how older women had fewer opportunities to engage in activities that provide them with social rewards and feelings of competence and achievement which are necessary components of a happy and healthy life for older women. These researchers argued that older women selected and continued to attend activities in which they received positive reinforcement and saw achievement in their

efforts. Women self-selected themselves into environments that positively influenced their self-esteem. The women in this study strongly stated that one motivation to come to class was gaining personal rewards by receiving compliments from friends who heard that they were participating. They also received positive reinforcement from the instructor and the other participants. The women described how their increased feelings of self-esteem impacted their learning and motivation. It was fun and rewarding to participate. They also commented how they felt that their involvement in learning to use the computer was quite prestigious.

Education

Literature from the field of education was examined in four areas: adult education, brain-based research and its implications to learning, active learning, learning styles and multiple intelligences, and educational technology for older adults. Comparisons to findings from this study are presented below.

Adult Education

Adult education learning theory provided a theoretical basis upon which the teaching of older adult women was based. Knowles provided a "Model of Assumptions" which included the following ideas: readiness to learn is related to developmental tasks of one's social role, adults are more problem-centered than subject-centered in learning, adults are not learning for future use but more for immediate use, and adults are motivated to learn by internal factors rather than external ones (Merriam & Caffarella, 1999; TIP, 1998). The researcher of this study felt that the women challenged the norm of expected social roles. Women of this age are not expected to take a computer class or to keep up with society.

The other assumptions by Knowles were reinforced by this study: problem centered learning, learning for immediate use, and motivation from internal factors.

McCluskey's theory does not address how adults learn but rather "when" they are most likely to learn (Merriam & Caffarella, 1991, 1999). McCluskey stated that older adults may have fewer responsibilities and they may have more money and time than younger adults, thus increasing their chances to invest time and energy in learning opportunities. In contrast to McCluskey, the researcher in this study did not find that these older women had a great deal of time to spend in learning. In fact, the women reported that it was difficult to find time to practice their computer learning and that they felt guilty taking the time because they had more pressing things to do and were very busy.

Knox's Proficiency Theory stated that adults have the desire to perform well at tasks. They want to be proficient. Therefore, when the adult recognizes a discrepancy between the skills she has and the desired level of proficiency, she will design, or find, a learning opportunity to become proficient at the level desired (Merriam & Caffarella, 1991, 1999). The comments from the women in this study concerning motivation to attend a computer course parallel those of Knox's Proficiency Theory. These women felt a need to keep up socially, societally, and intellectually by learning to use the computer to satisfy their needs. They expressed a desire to become proficient and found a learning opportunity to do so at their own level of desired proficiency.

Wlodkowski (1995) reported that teaching of adults must be grounded in the authentic needs of the learners. Wlodkowski stressed that adult education must include a needs assessment to determine the "felt needs" of the adult learner (Merriam & Caffarella, 1999; TIP, 1998). The researcher in this study used a needs assessment during the first class to assess learner skill level and needs. The women wanted to specify their own

learning needs to make sure the course would target those needs. The selection of relevant and useful topics was of great importance to these women.

Brain-based Research: Implications for Teaching and Learning

Geoffrey and Renate Caine (1991) are known for their original research describing implications of brain-based research for educators and learning. Several of the principles identified by Geoffrey and Renate Caine were utilized in this study and found to be effective.

Principle 1 stated that the brain is a parallel processor that can do many things at once. This study found that it was important to utilize a variety of teaching strategies to focus attention and maintain a higher level of motivation. For educators, the value of the Multiple Intelligences theory is to make sure to teach using a variety of methods which reach the different preferences of students because "every brain is unique." The variety of strategies used in this study included listening, writing, doing, talking, teaching others, using rhythmic sentences and mnemonics, and drawing. No single strategy was used for more than approximately 10 minutes.

Principle 2 stated that the learning brain uses input from the entire body. This study found it effective to create a relaxed and pleasant learning environment which made it possible for the women to focus completely on the learning tasks rather than being sidetracked by nervousness or distraction. Room lighting was adjusted when using the projection screen, room temperature was regulated according to preferences of the learners, and extraneous noise and movement of other people in the room was kept to a minimum.

Principle 3 stated that the brain naturally tries to find patterns and categories when storing new information. The women did not use their *directions* before the researcher

related the *recipe* concept to their prior knowledge of knowing the importance of carefully following a recipe. Using this principle positively affected the way the women learned. In addition, the principle stated that creating opportunities for the learner to teach, reinforces brain connections. The women in the study reported that employing the share-pair strategy in which they taught others enhanced their learning and recall, and provided an opportunity to help others.

Principle 4 stated that emotions are critical to the method in which the brain stores information and how we recall our experiences. This study utilized the recommendations underpinning this principle during every class. The women reported that the atmosphere created by providing positive reinforcement, respect, and challenge was beneficial and essential to their learning and motivation to participate. They also reported that the humor used in class and peer discussions held each week contributed to their learning.

Principle 5 stated that the brain processes parts (small pieces) and wholes (larger relationships) simultaneously. This study found that providing overviews of the lesson, following a sequence of steps that build understanding and skills over time, and showing the big picture as well as the details were beneficial teaching strategies. When the researcher gave the overall picture, rationale, and how the skills could be utilized, the interest and motivation level of the group increased. The women always wanted to know how the procedure or skill was useful to them. In addition, the directions (recipes) were designed to provide a step-by-step sequence necessary for success. These simple, concise directions were much appreciated by the learners.

Principle 7 stated that facts and skills embedded in contextual memory are remembered more quickly. This study found that the importance of this principle was essential to the women's learning and recall. Often, metaphor and mnemonics were used to

help the women remember a procedure. The women reported that these helped them learn and recall the procedure. They even enjoyed trying to create their own metaphors and mnemonics.

Active Learning

An active learning strategy recommended by numerous researchers was to make sure that the learner informed the instructor immediately when encountering a problem so answers could be discovered when the problem occurred (Binstock & George, 2001; Caine & Caine, 1991; Clark, 1997; Park, 2002; Reardon, 1999; Sylwester, 1995; Wilson & Spears, 2001). Binstock and George (2001) also stated that instructors should especially help women learn how to solve problems when they occur in order to decrease feelings of helplessness and ignorance. This study employed immediate problem-solving as a teaching strategy to help learners shift from negative personal characteristics that caused frustration to positive personal characteristics of risk-taking, problem solving, and humor. Shifting to positive reactions increased the ability of the learner to face the problem, learn how to solve it, and enjoy the adventure.

Teaching practices can either facilitate or hinder learners' information processing (Upcraft, 1996). There were numerous research studies reporting that better organized materials were better remembered (Cardellichio, 1997; Carnine, 1990; Entwistle, 1997; Jonassen, Beissner, & Yacci, 1993; Jones, 1995). These researchers reported that since the goals of instruction were to help learners create a deeper understanding of concepts, use of cognitive organizers helped them create their own understandings by creating connections and relationships to concepts. This researcher believed that use of concept maps and other visual cognitive organizers would be effective with the women because she had done an earlier study using visual cognitive organizers with undergraduate students and found

significant results for those using the strategy to recall information. She designed two opportunities for the women in this study to create visual cognitive organizers. In contrast to positive research on use of this learning tool, all the women in this study reported that they did not believe the strategy was beneficial to their learning. In addition, four women felt that even looking at the previously created visual organizers did not help them recall information or procedures.

Learning Styles and Multiple Intelligences.

Merriam and Caffarella (1999) and Silver, Strong, and Perini (2000) argued that people develop and mix learning styles throughout life and each is strengthened through use. They encouraged teachers to help learners understand how they think in order to help them adapt to different situations and ideas and look at information in different ways. In this study, the researcher explained learning styles and multiple intelligences to the women. They also completed an unscientific, yet informative, computer generated assessment of learning preferences. The women reported that the experience was enjoyable and interesting, but they would need more time learning about how they learn and how such knowledge could be useful to them. They reported that this knowledge could possibly help them to better understand their learning strengths and weaknesses and find ways in which they could improve as learners. This supports research by Armstrong (1994), Silver, Strong, and Perini (2000), and Visser (1996). The women concluded that they would need more time to think about learning styles and multiple intelligences, since this was new to them.

The researcher in this study did use multiple intelligences (Gardner, 1993; 1995) learning strategies such as verbal share-pairs, interpersonal and intrapersonal intelligences activities, kinesthetic and spatial activities, and musical/rhythmic intelligences activities.

She felt that using a variety of learning strategies that focused on different kinds of learning was an effective teaching tool. This method also has links to brain-based learning principles (Caine & Caine, 1991). The women in this study were not told that different strategies targeted different intelligences. Even though they reported beneficial learning, they did not know that the instructor deliberately selected these strategies based on multiple intelligences and brain-based learning research. The women simply reflected on their experiences with the strategy by reporting how enjoyable and effective each was.

Educational Technology for Older Adults

Research by Bragdon and Gamon (1999), Hainsworth (2002), and Hertzog and Hultsch (2000) reported that teaching strategies must consider age-related difficulties experienced by older adults. These include slower reaction times, short-term memory difficulties, and difficulty filtering out extraneous details. These researchers found evidence that if older people exercise their minds, their memories may not decline as much. A common expression used by the women in the study was "Use it or loose it." They felt strongly that the computer offered opportunities for them to stay connected with their brain power, and using a variety of computer applications would help keep them mentally active.

Echt, Morrell, and Park (1998) reported a general slowing of perceptual and motor processes that were necessary for responding to computer procedures and tasks, and that working memory capacity (the ability to process and store information simultaneously) declined with age. Echt, Morrell, and Park (1998) also reported that forgetting how to complete computer tasks increased over time for the older age group of computer users. This researcher observed similar occurrences, and the women expressed their impressions that slower processing and forgetfulness were indeed occurring.

Cahoon (1998) reported that two elements were especially effective in teaching computer skills: learners sharing what they knew and selecting strategies that combined practical exercises with verbal presentation of concepts and principles. This research reinforces Cahoon's first finding of beneficial effects when learners share what they know. Cahoon also reported increased learning when verbal presentation of concepts and principles were given. In contrast, the participants in this study reported that verbal presentation was not effective unless accompanied by visual demonstration.

Binstock and George (2001), Litwin (1999), and Wilson (2000) reported the importance of providing activities for the elderly to improve their quality of life by establishing connections with others and through increased fellowship. Those researchers reported that social interaction was vital to optimal health and morale of older women and that computers and the Internet could be a communication lifeline. Baltes and Staudinger (1996), Berger (2002), Coughlin (1999), Ito, Adler, Linde, Mynatt and O'Day (1998), SeniorNet (2002), Wilson (2000), and White and Weatherall (2000) reported that using the Internet could provide an important form of communication and connection for the elderly. These findings were consistent with the results of this study.

This study also concurred with the following themes reported by White and Weatherall (2000). Four main themes emerged from their exploration of older adults using computer technology and the Internet: (a) computers were used by older adults because use facilitated other interests, i.e. genealogy searches and other hobbies, (b) that computer mediated communication (e-mail and chats) played an important role in providing mental and social stimulation, and (c) that communication with relatives (especially grandchildren) and friends was very important in the decision to use computers. The women in this study reported that one reason they took the computer course was to gain the ability to send

e-mail to family and friends. They reported that they enjoyed being able to search the Internet for information for hobbies, recipes, etc. The women reported that using the computer was mentally stimulating, but they did not specifically mention that using e-mail was mentally stimulating.

One theme from the White and Weatherall (2000) study that was not confirmed by this study was that the cost of computer equipment was not a major factor affecting the group of women in this study. This may have been because many of the women in this study were given computers as gifts by their children.

Kasworm and Londoner (2000), Merriam and Caffarella (1990, and SeniorNet (2002) argued that there needs to be collaboration between adult educators and the technologist. At present, they believe, technology and technologists are driving the teaching of technology in adult education without knowledge of adult learning. They stated that people studying instructional technology should also study adult education in order to gain an understanding of the characteristics of adult learners and the underlying principles of program planning and instruction. This researcher believes these comments to be true. She found that the instruction of older women was more effective because she combined adult education strategies with those of the educational technologists. The women agreed that the instructor must have a good understanding of the technology; however, more importantly, the instructor must have the ability to teach. These women felt that just having an instructor who knew how to use the technology was not enough; the instructor had to be able to teach the selected audience of learners using strategies which were most suitable for that group of learners.

Chapter Summary

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over seventy years of age, as they participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman.

The central phenomenon that emerged from this study was "Making Connections." The women were making connections socially, societally, and intellectually. Computer use appeared to be very important to these women in order to: (a) connect with important others, i.e. to communicate with family, friends, and caregivers; (b) connect with society, i.e. to keep up with society's growing reliance on computers and the Internet; and (c) connect with the brain, i.e. to keep mentally active. The women chose to take this computer course because it offered a unique opportunity to learn with women of similar age, to learn relevant skills, and to immerse themselves in a respectful learning environment that helped them succeed in spite of age-related difficulties. The instructor can make a significant difference by creating an enjoyable and motivating learning experience. The instructor's role should be one of a guide and respectful companion in learning, who zealously watches the reactions of the learners, adjusts strategies, and provides positive feedback and encouragement. An enjoyable learning environment along with teaching strategies based on the needs of the participants provide the most gratifying opportunity for these women to make the important social, societal, and intellectual connections they seek.

The predominant theme for Research Question I was concerned with the computer course experience as reported by the participants. Through every step of the experience, from finding the opportunity to learn, to feeling the camaraderie with other women learners, to discovering the means to overcome age-related difficulties, to reflecting their

learning experience, the women expressed powerful feelings of excitement, pride, and appreciation.

These women over seventy years of age were excited to learn computer skills and appreciated the opportunity. They particularly enjoyed being together socially in class and helping each other through the learning process. They were proud to achieve their goals and enjoyed the intellectual and social stimulation the experience provided.

Feelings of anxiety, frustration, and guilt were also expressed. Clearly, these older women encountered a range of age-related issues when learning computer skills, yet accommodations were made to overcome them, making it an enjoyable and rewarding experience. The women found that learning was enhanced when they possessed positive personal characteristics such as patience, humor, and an optimistic attitude.

The predominant theme that emerged for Research Question II involved the learning environment. Deliberate, thoughtful design of the adult learning environment was essential to learning. According to the women in the study, the heart of learning was the instructor's ability to assess their needs when selecting teaching strategies; to create an atmosphere that provided positive reinforcement, respect, and challenge; to use relevant projects, social learning activities, and repetition; and, to enjoy the journey alongside the participants. The women stated the learning atmosphere designed for older women should be one in which the learner feels supported, valued, and empowered. The atmosphere that was deliberately created, maintained, and most appreciated by these women was one of a *family of learners*, in which the instructor's role was that of a member and guide.

The predominant theme that emerged for Research Question III was concerned with teaching strategies. Teaching strategies that stress active involvement, repetition, verbal sharing, visual display, and relate content to the women's vast reservoir of life experiences

are most effective and enjoyable to the learners. Teaching strategies can be used to resolve learning issues in order to help the learners enjoy the computer class experience.

The purpose of this chapter was to present the results of the study, to define the themes and central phenomenon which emerged through careful analysis of data sources, and to provide comparisons of the findings with the literature reviewed. The model that was developed from the results of the study, conclusion/discussion, and suggestions for further research are presented in Chapter 5.

CHAPTER 5

CONCLUSIONS

Introduction

The purpose of this chapter is to summarize the study's procedures and results, provide conclusions/discussion, and present a model that was developed to guide computer course design and instructional practice for use with older women. Suggestions for further research are also presented.

Overview

Statement of the Problem

Educators working with older adults need to understand how computer learning environments and selected teaching strategies are experienced by older women in order to design computer education programs that are most beneficial to them.

Purpose of the Study

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman.

Research Questions

The following questions were used to structure the inquiry and guide development of methodologies:

- I. What experiences do older women describe as they participate in a computer course on the campus of Montana State University-Bozeman as related to:
 1. Feelings.
 2. Issues.
 3. Personal Characteristics.
- II. What recommendations do older women express when considering the most fulfilling environment for learning as related to:
 1. Course Design.
 2. Course Content.
 3. Classroom Atmosphere.
 4. Instructor Characteristics.
- III. What teaching strategies do older women believe are most conducive to their learning as related to:
 1. Current Educational Practices.
 2. Learning Issue Resolutions.

Methods

The experiences of older women participating in a six-week, non-credit, computer course offered in the Education Department at a Montana State University-Bozeman were explored in this grounded theory study. The course was offered at no fee. One group of 14 women over the age of 70 participated in a series of six computer classes held on campus. The criterion method was used for participant selection in this study (Creswell, 1998). Criteria required that the participant was a female over 70 years of age, was willing to come to campus to take a computer course, and was willing to participate in a research study as part of the computer course. A key individual who met all criteria was identified.

She was asked to identify others whom she thought would meet the criteria of the study. The snowball method was used to find additional individuals who met the criteria.

Data Collection/Verification

Data were collected using five methods: self-assessment/background information, focus group interviews, instructor observations, participant take-home reflections, and class transcriptions. Verification/trustworthiness was established through nine different means throughout collection of data, analysis, and writing of the findings. The methods selected followed common practice for the qualitative paradigm, i.e. member checking, criterion sampling, peer auditing, triangulation, data collection from numerous sources, and reporting of thick, rich descriptions.

Data Analysis

Data analysis progressed from particular statements to general themes. First, the supporting statements in the focus group interviews, participant reflections, audiotaped class sessions, and instructor observations were coded and placed under the research question or questions that it supported. Second, statements under each research question were analyzed and placed into the predetermined research categories. An additional category, Learning Issue Resolutions, was added to Research Question III after analysis of the data because these statements did not fit under the predetermined research categories. Third, the data in each category were thoroughly compared in order to fully develop the themes. Fourth, a predominant theme statement was written to describe an overall message for each research question. Fifth, a central phenomenon was synthesized for the study. Finally, the research questions were answered and a model was developed.

Results

Research Question I: Experiences

What experiences do older women describe as they participate in a computer course on the campus of Montana State University-Bozeman as related to:

1. Feelings.
2. Issues.
3. Personal Characteristics.

Through every step of the experience, from finding the opportunity to learn, to feeling the camaraderie with other women learners, to discovering the means to overcome age-related difficulties, to reflecting on their learning experience, the women expressed powerful feelings of excitement, pride, and appreciation.

These women over seventy years of age were excited to learn computer skills and appreciated the opportunity. They particularly enjoyed being together socially in class and helping each other through the learning process. They were proud to achieve their goals and enjoyed the intellectual and social stimulation the experience provided.

Feelings of anxiety, frustration, and guilt were also expressed. Clearly, these older women encountered a range of age-related issues when learning computer skills, yet accommodations were made to overcome them, making it an enjoyable and rewarding experience. The women found that learning was enhanced when they possessed positive personal characteristics such as patience, humor, and an optimistic attitude.

Research Question II: Learning Environment

- II. What recommendations do older women express when considering the most fulfilling environment for learning as related to:

1. Course Design.
2. Course Content.
3. Classroom Atmosphere.
- 4) Instructor Characteristics?

Deliberate, thoughtful design of the adult learning environment was essential to learning. According to the women in the study, the heart of learning was the instructor's ability to assess their needs when selecting teaching strategies; to create an atmosphere that provided positive reinforcement, respect, and challenge; to use relevant projects, social learning activities, and repetition; and, to enjoy the journey alongside the participants. The women stated the learning atmosphere designed for older women should be one in which the learner feels supported, valued, and empowered. The atmosphere that was deliberately created, maintained, and most appreciated by these women was one of a *family of learners*, in which the instructor's role was that of a member and guide.

Research Question III: Teaching Strategies

What teaching strategies do older women believe most enhance their learning as related to:

1. Current Educational Practices.
2. Learning Issue Resolutions.

Teaching strategies that stress active involvement, repetition, verbal sharing, visual display, and relate content to the women's vast reservoir of life experiences are most effective and enjoyable to the learners. Teaching strategies can be used to resolve learning issues in order to help the learners enjoy the computer class experience.

Central Phenomenon

The central phenomenon that emerged from this study was "Making Connections." The women made connections socially, societally, and intellectually. Computer use appeared to be very important to these women in order to (a) connect with important others, i.e. to communicate with family, friends, and caregivers; (b) connect with society, i.e. to keep up with society's growing reliance on computers and the Internet; and (c) connect with the brain, i.e. to keep mentally active. The women chose to take this computer course because it offered a unique opportunity to learn with women of similar age, to learn relevant skills, and to immerse themselves in a respectful learning environment that helped them succeed in spite of age-related difficulties. The instructor can make a significant difference by creating an enjoyable and motivating learning experience. The instructor's role should be one of a guide and respectful companion in learning, who zealously watches the reactions of the learners, adjusts strategies, and provides positive feedback and encouragement. An enjoyable learning environment along with teaching strategies based on the needs of the participants provide the most gratifying opportunity for these women to make the important social, societal, and intellectual connections they seek.

Model for Course Design and Instructional Practice

From the results of this study, the following model is proposed to guide computer course design and instructional practice for use with older women (see Figure 4).

Course Design

Hold class in a facility where one computer per participant is available. The classroom should also have a large projection screen in front and a computer projection

Model for Computer Course Design & Instructional Practice for Use with Older Women

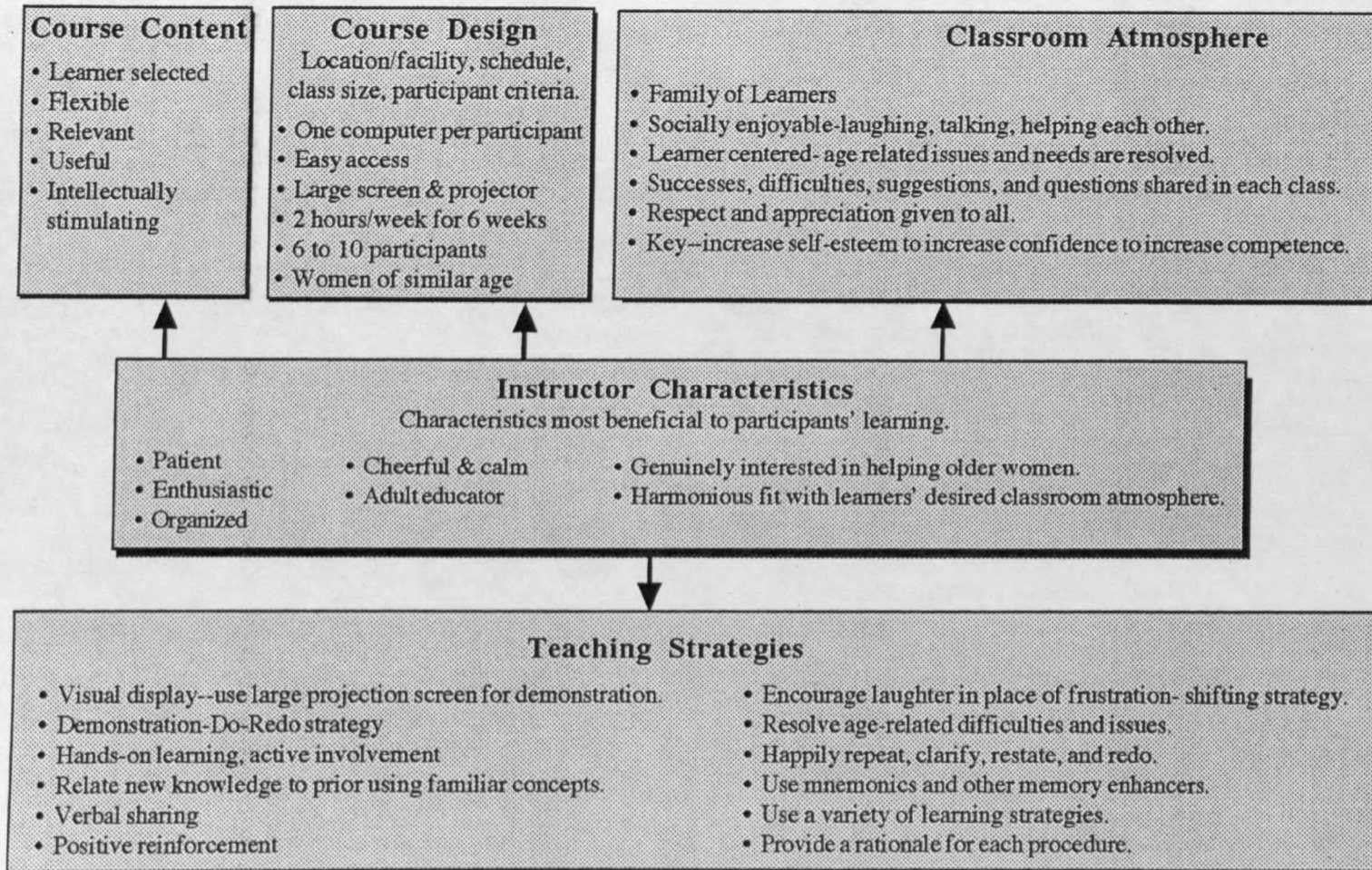


Figure 4. Model developed to guide computer course design and instructional practice for use with older women and technology.

device. The facility should be easily accessible. Schedule a two-hour class once per week for six weeks. Accept 6 to 10 participants in each group. Include only women of similar age in each group.

Course Content

The instructor and participants should make suggestions for course content. Allow the learners to select the topics that are most relevant to them and be flexible in adding topics as new learner needs arise.

Classroom Atmosphere

Design the classroom atmosphere so that each learner feels supported, valued, and empowered. All participants and the instructor should work together to help each learner achieve and to feel good about the experience. Facilitate a socially enjoyable atmosphere in which laughter, talking, and sharing predominate. Resolve learning issues and needs as soon as possible in order to help the learners enjoy the experience in spite of age-related difficulties. Maintaining this social learning environment increases the learners' self-esteem, which increases their confidence, which increases their computer competence.

Instructor Characteristics

Choose an instructor whose characteristics and teaching style fit harmoniously with the social classroom atmosphere desired by the women. It is imperative that the instructor knows how to create and facilitate this enjoyable, social learning environment. The instructor must possess patience and enthusiasm, be cheerful and calm, demonstrate organization and preparedness, show genuine interest in helping older women succeed, and is knowledgeable in the methods of teaching older people. The instructor's style should be

the “guide on the side” not “the sage on the stage.” Select an instructor with positive characteristics and harmonious teaching style over a person with only high technological ability.

The older women in this study were highly motivated learners, enthusiastic, and appreciative. Nervousness, anxiety, and guilt were also expressed; however, the instructor can help reduce these feelings by carefully selecting teaching strategies and by facilitating an enjoyable environment in which learners increase feelings of accomplishment. The instructor should use strategies to shift negative characteristics such as frustration to those which enhance learning: patience, humor, and a positive attitude. During every class, the instructor should *proclaim* that they can learn and succeed. Use this as the charge for the day. A desired goal is to empower them with excitement and confidence in knowing that they can succeed!

Teaching Strategies

Eight teaching strategies are recommended and most will be needed in each class session:

1. Use the three step strategy, “Demonstration-Do-Redo” for active involvement in the learning process.
2. Use the verbal “share-pair” strategy which reinforces one’s own knowledge while providing a means to help others.
3. Encourage learners to ask for help immediately when needed.
4. Use the shifting strategy to help learners shift negative to positive characteristics that enhance learning.

5. Use mnemonics and rhythmic expressions to provide an easier means of remembering procedures.
6. Help learners tie new learning to prior knowledge using descriptions and terms that link to what they already know.
7. Use repeating, clarifying, restating, and reminding; be happy to do so.
8. Provide a rationale for learning each procedure to help them understand the "So what." Increased motivation to learn can be achieved when the women understand the applicability of the topic.

Conclusions/Discussion

The researcher found several differences between results of the pilot study and this study. First, the women in this study did not know everyone else in the class while the women in the pilot study knew everyone in their group. Therefore, it took two weeks before the women sufficiently trusted one another as compared to the pilot study in which the women began the experience with a great deal of trust. The researcher believes that trust allowed the social atmosphere to develop: laughing, sharing, teaching each other, etc. To expedite trust building, an instructor of a computer course for older women may try to group women together in a course with their friends in order to accelerate feelings of trust. In addition, during the first class session, the instructor could do several social activities which help develop friendliness and feelings of trust. These could include asking the women to perform introductions, remembering each person's name along with a creative, descriptive adjective beginning with the same first letter as one's first name, and creating a group motto and name.

The second difference was that none of the women in the pilot study expressed feeling guilty about practicing on the computer; all of the women in this study reported feeling guilty. The researcher cannot explain this incongruence. The instructor could comment on the importance and benefits of practicing and help the women feel that they are worth the time it takes. The instructor could prepare take-home worksheets that guide them through the practice but take only a short amount of time. These worksheets could be briefly practiced several times during the week, rather than taking up a longer block of time once per week. In other categories, the women in both studies reported similar experiences and recommendations.

This study forged new ground in exploring the benefits of using teaching strategies synthesized from adult education, brain-based research, multiple intelligences, active learning, and educational technology. The heart of effective teaching is the instructor's ability to assess learners' needs when designing a course and selecting teaching strategies. To facilitate an enjoyable learning environment for older women, it is especially important that the instructor know who the adult learners are, why they are involved in the learning activity, how older adults learn, and how aging affects their learning abilities. This knowledge can be gained through adult education coursework or reading the literature. The researcher became a computer technologist first, then an adult educator. This study provided an opportunity to combine both skills and reinforced her conviction that those teaching older adults should have a background in adult education as well as in the content area they are teaching.

Younger students must develop content knowledge even if immersed in an undesirable classroom atmosphere. In contrast, these women over seventy years of age expressed that participation in the social, enjoyable classroom atmosphere was more

important than sole acquisition of content knowledge. The researcher believes that educators can facilitate and teach so learners enjoy both goals. If educators become companions in learning, rather than an authority who knows all, shows all, and tells all, they can create an enjoyable learning environment for everyone in the class.

Real learning for these women was not learning a string of isolated pieces of knowledge. They needed the instructor to relate new learning to prior knowledge. Each class was designed to help the learner to see, to do, and to understand. Once again, the skill of the instructor is essential and use of adult education strategies is critical. There needs to be deliberate collaboration between adult educators and technologists. People working in instructional technology should learn about adult education in order to have a better understanding of characteristics of adult learners and the underlying principles of program planning and instruction.

Furthermore, the researcher believes that one of the greatest risks of aging is isolation. The women in this study were concerned about making connections with important others, keeping up with society, and stimulating their mental powers. Our governmental policy makers will need to go beyond discussion of providing health care and economic security to our older citizens and respond to the socialization needs of the growing number of older adults. Technology can provide a means to help our older citizens stay connected: socially, societally, and intellectually.

Suggestions for Further Research

The results of this study can provide direction for further research. The following suggestions are offered.

- 1) A goal of qualitative research is to provide a model or theory upon which additional research may be carried out to test the model or theory. A quantitative

study could provide information supporting or negating the results of this study.

The researcher could administer a survey using Lickert scales as a means to gather data about participants' beliefs, feelings, and recommendations. These data could be analyzed using statistical measures.

- 2) A researcher could conduct a study, similar to this grounded theory study, to explore and describe the experiences of older men of similar age. A comparison to the results of this study could also be made.
- 3) A quantitative study could compare the differences between class experiences of older men and older women using a Lickert scale method to gather data. The data of both groups could be compared using statistical measures such as descriptive statistics and T-test.
- 4) Conduct a study in which the women participants of this study participate in a class in which the learners are of mixed gender of similar age. Compare the experiences of the women to this study. The results may help instructors determine the importance of offering same gender classes or if participants in mixed gender classes can enjoy and benefit from the experience.
- 5) Research could be conducted at different locations in order to more accurately determine which are most or least suitable for teaching computer skills to older people. Recommendations should also be sought for changing the least suitable locations to enhance the learning experience.
- 6) A study could be conducted to analyze differences between groups taking the course at the same time, that have the same criteria for participation, i.e. age and gender. Because qualitative studies cannot generalize to the larger population, this qualitative study would provide additional information to the reader of the

study. If done using the quantitative paradigm, the study may provide more generalizability.

- 7) A follow-up study could be completed to examine how the participants from this study are using their new computer skills, to determine the kinds of difficulties that may have arisen and how the women sought to resolve them, and to gather their recommendations for support following a computer course.

Chapter Summary

The purpose of this grounded theory study was to explore, describe, and interpret the experiences of women, over 70 years of age, who participated in a six-week, non-credit computer course offered by the Education Department at Montana State University-Bozeman.

The results of this study may be used to guide computer course design and instructional practice for use with older women. Those managing adult living centers and adult activity centers may use these results by offering computer courses to expand social activities. As a new and interesting activity, participation in a computer course may provide an avenue to enhance mental acuity and social involvement. Results of this study may also be helpful in developing computer courses for older adults at libraries, museums, institutions of higher education, and extended education programs.

The purpose of this chapter was to present an overview of the study and the model that was developed to guide computer course design and instructional practice for use with older women. A discussion of the broader implications of the results and suggestions for further research were also presented.

References Cited

- Aartsen, M., Smits, C., Tilburg, T., Knipshceer, K., & Deeg, D. (2002). Activity in older adults: causes or consequences of cognitive functioning? A longitudinal study on everyday activities and cognitive performance in older adults. *Journal of Gerontology: Psychological Sciences*, 57B, 153-162.
- Abbott, John. (1997, March). To be intelligent. *Educational Leadership*, 54, 6-10.
- Administration on Aging (2001a). *A profile of older Americans: 2001*. [On-line]. Available: <http://www.aoa.gov/aoa/stats/profile/2001/1.html> Accessed October 4, 2002.
- Administration on Aging (2001b). *Special Topic: Computer and internet access*. [On-line]. Available: <http://www.aoa.gov/aoa/stats/profile/2001/13.html> Accessed February 8, 2002.
- Administration on Aging (2001c). *Meeting the needs of older women: A diverse and growing population*. [On-line] Available: <http://www.aoa.gov/Factsheets/ow.html>. Accessed June 14, 2002.
- Anderson-Inman, L. & Horney, M. (1996, December). Computer-based concept mapping: Enhancing literacy with tools for visual thinking. *Journal of Adolescent & Adult Literacy*, 40, 302-308.
- Armstrong, Thomas (1994). Multiple intelligences in the classroom. *ASCD*, pp. 51-57.
- Baltes P., & Staudinger, U. (1996). *Interactive Minds. Life-span perspectives on the social foundation of cognition*. Cambridge: Cambridge University Press.
- Bell, B. & Gienette, J. (2000). New communication technologies and women's learning. *Canadian Congress for Learning Opportunities for Women*. [On-line] Available: <http://www.nald.ca/canorg/cclow/womenlrn/research/contents.htm>. Accessed October 28, 2002.
- Berger, S. (2002). Women impact the online world. Feature article of *American Association of Retired Persons*. [On-line] Available: <http://www.aarp.org/comptech/features/features056.html> Accessed April 4, 2002.
- Binstock, R & George, L. (Eds.). (2001). *Handbook on aging and the social sciences*. Academic Press: San Diego.
- Bragdon, A. & Gamon, D. (1999). Building left-brain power: Conditioning exercises to develop language, math, and other uniquely human skills. Barnes & Noble, Inc.
- Brown. M. (2001). Understanding principles of older adult learning in order to increase effective communication of new health information and decision making. Grant briefs report of the *Robert Wood Johnson Foundation*. [On-line]. Available:

http://www.rwjf.org/aap/rw_grant_results/re_grr/036002s.htm Accessed March 7, 2002.

- Cahoon, B. (1998). Teaching and learning internet skills. *New Directions for Adult and Continuing Education*, 78, 5-13.
- Caine, R., & Caine, G. (1991). Principles of brain-based research: teaching and the human brain. *Association for Supervision and Curriculum Development*. Alexandria, Virginia.
- Cardellichio, T. & Field, W. (1997, March). Seven strategies that encourage neural branching. *Educational Leadership*, 33-36.
- Carnine, D. (1990, January). New research on the brain: Implications for instruction. *Phi Delta Kappan*, 372-377.
- Clark, B. (1997). Optimizing learning: Using brain research in the classroom. Presented at the Lilly Conference on Excellence in College Teaching, March, 1997, UCLA Conference Center, Big Bear, CA. Materials developed from Clark, B. (1997). *Growing up gifted* (5th Ed). New York: Merrill/Prentice Hall Publishers.
- Cook, J. (2002). Grounded theory pilot study exploring the experiences of women over seventy-five as they learned to use the computer. Montana State University-Bozeman. Part of course "Qualitative Research Design" taught by Dr. Rich Howard.
- Coughlin, J. (1999, Fall). Technology needs of aging boomers. *Issues in Science and Technology*, 16, 53.
- Creswell, J. (1998). *Qualitative Inquiry and Research Design: Choosing Among Five Traditions*. Thousand Oaks, CA. Sage Publications.
- Czaja, S. & Sharit, J. (1998, September). Age differences in attitudes toward computers. *The Journals of Gerontology, Series B*, 53, 329-342.
- Davis, S. (2000-2001). Look before you leap: Concerns about brain-based products and approaches. ERIC Abstract: EJ633381. *Childhood Education*, 77, 100-101.
- Dorough, D. & Rye, J. (1997, January). Mapping for understanding: Using concept maps as windows to student's minds. *The Science Teacher*, 64, 36-42.
- Echt, K., Morrell, R., & Park D. (1998). Effects of age and training formats on basic computer skill acquisition in older adults. *Educational Gerontology*, 24, 3-25.
- Ediger, M. (1995). *To every action there is an opposite and equal reaction: An essay on teaching*. ERIC Abstract: PS023570.
- Entwistle, N. (1997). Learning and studying: Contrasts and influences. In D. Dickson (Ed.), *Creating the Future*. Seattle, WA. New Horizons for Learning. [Online].

- Available: http://www.newhorizons.org/crfut_entwistle.html Accessed: July 11, 1998.
- Friedrich, D. (2001) *Successful aging: integrating contemporary ideas, research findings, and intervention strategies*. Springfield, IL. Charles Thompson Publishe, LTD.
- Gardner, H. (1993). *Multiple intelligences: Theory in practice*. New York, Basic Books.
- Gardner, H. Intelligence in seven steps. *Creating the Future: Perspectives on Educational Change*, compiled by Dee Dickson, 1998, New Horizons for Learning. URL: <http://www.newhorizons.org/crfut-gardner.html>.
- Garfein, A.J., & Hertzog, R. (1995) Robust aging among the young-old, old-old, and oldest-old. *Journal of Gerontology, Social Sciences*, 50B, 77-88.
- Gilleard, C., & Higgs, P. (2000). *Cultures of ageing: Self, citizen, and the body*. Prentice Hall, Harlow, England.
- Glatthorn, A. (1999). *Performance standards & authentic learning*. Larchmont, NY. Eye On Education.
- Granick, L. (2001). Teaching computers to older adults. SeniorNet. [Online]. Available: <http://adulthood.about.com/cs/olderlearnerarti/> Accessed March 7, 2002.
- Grasha, T. (1996). *Teaching with style. A practical guide to enhancing learning by understanding teaching & learning styles*. Pittsburgh, PA. Alliance Publishers.
- Hainsworth, A. (2002). *Use it or lose it: Could this be the key to memory maintenance?* Institute Communications and Public Affairs. [Online]. Available: http://www.psychology.gatech.edu/chertzog/whistle_article.asp Accessed Spring, 2002.
- Hartman, V. (1995, Summer). Teaching and learning style preferences: Transitions through technology. *VCCA Journal*, 9, 18-20. Available online: <http://www.so.cc.va.us/vcca/hart1.htm> Accessed July 2002.
- Haskell, R. (2001). *Transfer of Learning: Cognition, Instruction, and Reasoning*. San Diego, CA. Academic Press.
- Hertzog, C. & Hultsch, D.F. (2000). Metacognition in adulthood and aging. In Salthouse, T. & Craik, F. (Eds). *Handbook of aging and cognition II* (pp. 417-466). Mahwah, NJ: Erlbaum.
- Hiemstra, R. (1993). *Older women's ways of learning: tapping the full potential*. Paper presented at conference: "The Enduring Spirit: Women as They Age." University of Nebraska at Omaha. Omaha, Nebraska. [Online]. Available <http://home.twcny.rr.com/hiemstra/unospeech.html> Accessed March 4, 2002.

- INSTRAW (International Research and Training Institute for the Advancement of Women. (1999). *Ageing in a gendered world: Women's issues and identities*. Judd, K., Ash de Pou, J., Taveres-Bucher, J., Sikoska, T., & Soloman, J. (Eds.). Dominican Republic: INSTRAW.
- Ito, M., Adler, A., Linde, C., Mynatt, E., & O'Day, V. (1998) Broadening access: Research for Diverse Network Communities. *SeniorNet*. Available <http://www.seniornet.org/> Accessed March 4, 2002.
- James, D., Gibson, F., McAuley, G., & McAuley, J. (1996). Introducing older adults to information technology through life history writing. *International Journal of Lifelong Education*, 15, 50-58.
- Jensen, E. (2000). Brain-based learning: A reality check. *Educational Leadership*, 57, 76-80.
- Johnson, G. (2000, June 12). Lots of action in the memory game. *TIME*, 55-56.
- Jonassen, D. H., Beissner, K., & Yacci, M. (1993). *Structural knowledge: Techniques for representing, conveying and acquiring structural knowledge*. Hillsdale, New Jersey: Lawrence Erlbaum Assoc.
- Jones, R. (1995, November). Smart brains: Neuroscientists explore the mystery of what makes us human. *The American School Board Journal*, 22-26.
- Kasworm, C., & Londoner, C. (2000) Adult learning and technology. Wilson, A & Hayes, E. (Eds). *Handbook of adult and continuing education*. San Francisco: Jossey-Bass.
- Keefe, J. (1992). Thinking about the thinking movement. In Keefe, J. & Walberg, H. (Eds), *Teaching for Thinking* (pp. 111-128). Reston, Virginia: National Association of Secondary School Principals.
- Kiewra, K, DuBois, N., Christian, D. & McShane, A. (1988). Providing study notes: Comparison of three types of notes for review. *Journal of Educational Psychology*. 80, 595-597.
- Lachman, M. (1996). *Your memory: what changes and what you can do about it*. Waltham, MA: National Policy and Resource Center on Women and Aging. [Online]. Available: <http://www.heller.brandeis.edu/national/Memory-M11.pdf> Accessed January 20, 2003.
- Letteri, C. (1992). Diagnosing and augmenting basic cognitive skills. In Keefe, J. & Walberg, H. (Eds), *Teaching for Thinking* (pp. 59-71). Reston, Virginia: National Association of Secondary School Principals.
- Litwin, H. (1999). Formal and informal network factors as sources of morale in a senior center population. *International Journal on Aging and Human Development*, 48, 241-256.

- Lockhart, M., & Cook, J. (2000). Effective techniques and strategies for teaching older adults computer skills. Presentation and paper given at the *National Conference on the Adult Learner*. May 28-31, 2000. Atlanta, Georgia.
- Mathews, R. (1996) Collaborative learning: Creating knowledge with students. In Menges, R., Weimer, M. & Associates (Eds.) *Teaching on solid ground: Using scholarship to improve practice* (pp. 101-124). San Francisco: Jossey-Bass
- Merriam, S., & Caffarella, R. (1991). *Learning in adulthood*. San Francisco: Jossey-Bass.
- Merriam, S., & Caffarella, R. (1999). *Learning in adulthood: A comprehensive guide*. San Francisco: Jossey-Bass.
- Microsoft (1999). *Seniors attitudes and perceptions of computer and the internet*. [On-line]. Available: <http://www.microsoft.com/seniors/content/pr99/ASAresearch.asp>.
- Min, R, Kommers, P, Vos, H., & Van Dijkum, C. (2000, Fall). A concept model for learning. *Journal of Interactive Learning Research*, 485.
- Morgan, R., Ponticell, J. & Gordon, E. (1998). *Enhancing learning in training and adult education*. West Port, CT: Praeger Publishers.
- Munro, M. (2000). Older women and learning. *Designing Our Future--Women's Learning, Education and Training in Canada: 2000 & Beyond*. Conference Report. [On-line]. Available: <http://www.nald.ca/CANORG/cclow/design/congress/page6.htm#technology> women's learning. Accessed March 4, 2002.
- Novak, J. & Gowin, B. (1994). *Learning how to learn*. Melbourne, Australia. Cambridge University Press.
- Norton, P., & Wiburn, K. (1998). *Teaching with technology*. Orlando, FL: Harcourt Brace & Co.
- Newburger, E. (2001). Home computers and internet use in the United States. Department of Commerce. [On-line] Available: <http://www.census.gov/population/> Accessed July, 2002.
- O'Beirne, N. (1999). Identity, culture, and older women. In Judd, K., Ash de Pou, J., Taveres-Bucher, J., Sikoska, T., & Soloman, J. (Eds.). INSTRAW (International Research and Training Institute for the Advancement of Women. *Ageing in a gendered world: Women's issues and identities* (pp. 291-314). Dominican Republic. INSTRAW.
- Park, D. (2002). *The aging mind*. [On-line]. Available: http://www.fathom.com/story/story.jhtml?story_id=122249 Accessed, April, 2002.

- Paoletti, I. (1998). *Being an older woman: a study in the social production of identity*. Mahwah, NJ: Erlbaum Assoc.
- Persad, C., Abeles, N., Zacks, R., & Denburg, N. (2002). Inhibitory changes after age 60 and their relationship to measures of attention and memory. *Journal of Gerontology: Psychological sciences*, 57B, 223-232.
- Reardon, M. (1998-1999, Winter). The brain: navigating the new reality: An exploration of brain-compatible learning. *Adult Learning*, 10, 10-17.
- Roblyer, M.D., Edwards, J., & Havrilick, M. (1997). Learning theories and integration models. *Integrating Educational Technology Into Teaching*. New Jersey: Prentice-Hall.
- Roth, W. & Roychoudhury, A. (1993, May). The concept map as a tool for the collaborative construction of knowledge: A microanalysis of high school physics students. *Journal of Research in Science Teaching*, 30, 503-534.
- Scheibel, A. M.D. (1997, February). Thinking about thinking. *The American School Board Journal*, 21-23.
- SeniorNet (2002). [On-line]. Available: <http://www.seniornet.org/> Accessed January 26, 2002.
- Shavelson, R., and Others (1993). On concept maps as potential 'authentic' assessment in science. Indirect approaches to knowledge representation of high school science. *National Center for Research on Evaluation, Standards, and Student Testing*. Los Angeles, CA. ERIC Clearhouse:TM021149.
- Silver, H, Strong, R., & Perini, M. (2000). *So each may learn: Integrating learning styles and multiple intelligences*. Association for Supervision and Curriculum Development. Alexandria, VA.
- Stark, J. and Lattuca, L. (1997). *Shaping the college curriculum: Academic plans in action*. Needham Heights, Massachusetts: Allyn & Bacon.
- Starr, L. (1999) *Growing bigger brains: research affects how teachers teach*. [On-line]. Available: http://www.education-world.com/a_curr/curr140.shtml. Accessed October 29, 2001.
- Sternberg, R. (1996). Styles of learning. In Baltes, P. & Staudinger, U. (Eds.) *Interactive Minds. Life-span perspectives on the social foundation of cognition*. (pp. 347-365). Cambridge: Cambridge University Press.
- Svinicki, M., Hagen, A., & Meyer, D. (1996). How research on learning strengthens instruction.. In Menges, R., Weimer, M. & Associates (Eds.) *Teaching on solid ground: Using scholarship to improve practice* (pp. 257-288). San Francisco: Jossey-Bass.

- Sylwester, R. (1990, October). Expanding the range, dividing the task: Educating the human brain in an electronic society. *Educational Leadership*, 16-21.
- Sylwester, R. (1991). How our brain is organized along three planes to process complexity, context, and continuity. A. Costa (Ed.). *Developing Minds: A Resource Book for Teaching Thinking*. Alexandria, VA: The Association for Supervision and Curriculum Development.
- Sylwester, R. (1995). A celebration of neurons: An educator's guide to the human brain. *Association for Supervision and Curriculum Development*. Reprinted in "Mind and Brain" document, The Fourth Knowledge Base Symposium College of Education, Health and Human Development, 1997.
- Sylwester, R. (1997, March). On using knowledge about our brain. *Educational Leadership*, 54, 16-19.
- Tiene, D., & Ingram, A. (2001). *Exploring current issues in educational technology*. New York: McGraw-Hill.
- TIP: Theories. (1998). [On-line]. Available: <http://www.gwu.edu/~tip/knowles.html> Accessed July, 2000.
- Tweaking the brain to remember better. (2002, May). Robb-Nickolson, C. (Ed. in Chief). *Women's Health Watch*, 5. Boston, MA: Harvard Health Publications.
- Upcraft, M. (1996) Teaching and today's college students. In Menges, R., Weimer, M., & Associates (Eds). *Teaching on Solid Ground: Using Scholarship to Improve Practice*. San Francisco, CA: Jossey-Bass Publishers.
- US Census Bureau. (2001). US Department of Commerce. [Online] Available: <http://www.census.gov/population/> Accessed November 5, 2002.
- Visser, D. R. (1996, September) That's using your brain! *Training and Development*, 38-40.
- White, J., & Weatherall, A. (2000). A grounded theory analysis of older adults and information technology. *Educational Gerontology*, 26, 377-386.
- Wilson, A. (1993, Spring). The promise of situated cognition. *New Directions for Adult and Continuing Education*, 57.
- Wilson, G. (2000). *Understanding old age: political and global perspectives*. Thousand Oaks, CA, SAGE Publications Ltd.
- Wilson, L. & Spears, A. (2001). *Overview of Brain-based Learning*. [Online] Available: <http://www.uwsp.edu/education/wilson/learning/overview%20%20on%20brain.htm> Accessed: October 29, 2001.

- Wlodkowski, R. (1995). Recognizing and responding to needs of adult learners. *Enhancing Adult Motivation to Learn*. New York: Jossey-Bass.
- Yekovich, Frank. (1994) Current issues in research on intelligence. *Practical Assessment Research & Evaluation*, 4. [Online]. Available: <http://ericae.net/pare/getvn.asp?v=4&n=4> Accessed: October, 29, 2001.
- Zemke, R., & Zemke, S. (1984, March). 30 things we know for sure about adult learning. *Innovative Abstracts, VI*. National Institute for Staff and Organizational Development. [On-line]. Available: <http://www.hcc.hawaii.edu/hccinfor/facdev/> Accessed July 2000.
- Zeilik, M., Schau, C., Mattern, N., Hall, S., Teague, K. & Bisard, W. (1997, October). Conceptual astronomy: A novel model for teaching postsecondary science courses. *American Journal of Physics*, 65, 987-997.

APPENDICES

APPENDIX A

BACKGROUND INFORMATION/NEEDS ASSESSMENT

Background Information/Needs Assessment

In order to design a course that meets your needs, I need some additional information about your interests and current computer ability level. Please complete the following questions.

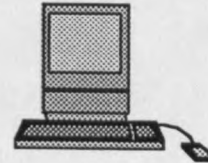
Directions: Write your answers on the blank lines provided.

Name: _____

Age: _____

Phone: _____

Address: _____



Directions:

- 1) Circle the topics that you are interested in learning.
- 2) In the empty boxes, add additional topics that you would like to learn.
- 3) For each topic that you want to learn, put an X on the line above to indicate your level of skill or knowledge in that topic at this time.

	Use email for communication.	Search the Internet effectively.	Understand computer terminology.	Save, access, and move files/documents.
Ability Level:				
Strong	_____	_____	_____	_____
Intermediate	_____	_____	_____	_____
Beginning	_____	_____	_____	_____

	Add pictures & formatting options in word processing.	Use word processing to write message, copy, and paste into email message.		
Skill Level:				
Strong	_____	_____	_____	_____
Intermediate	_____	_____	_____	_____
Beginning	_____	_____	_____	_____

1. Type of computer you use at home: ☐ Macintosh ☐ IBM, Gateway, Dell, HP

2. How long have you been using a computer? _____

3. Please check the highest level that you have completed.

☐ grade school ☐ high school
☐ two year college degree ☐ four year college degree
☐ professional certification: _____
☐ graduate degree: _____
☐ other, please explain: _____

4. Please indicate your work experience before retirement (homemaker, nurse, secretary, rancher, administrator, etc.).

_____ # of years
 _____ # of years

5. Please indicate who (child, grandchild, friend, etc.) has influenced you to learn to use computers and what that influence has been.

6. Where and from whom will you find support with your computer questions and problems?

7. Please indicate why you have chosen to take this computer course at this time in your life.

8. Anything else you would like to add?

APPENDIX B

INSTRUCTOR OBSERVATION FORM

Instructor Observation Form

Date: _____

Location: Instructional Computing LabComputer class # _____

Descriptive Notes

Reflective Notes

APPENDIX C

PARTICIPANT TAKE-HOME REFLECTION FORM

Participant Take-Home Reflection Form

Name: _____

Computer Class # _____ Date: _____

Please respond with your own thoughts and ideas to the following questions. Your comments will contribute to the understanding that I seek. You will never be personally identified or connected to the information which you provide. All of your remarks are greatly appreciated. Please fill out as soon as possible after the class.

List two skills or new discoveries that you learned today in class. How are these new skills or discoveries important to you?

1. _____

2. _____

3. Describe the teaching method that seemed to help you the most today.

Please bring the completed form with you to the next class.

APPENDIX D

FOCUS GROUP INTERVIEW FORMS

Focus Group Interview Form Class 1

Date: _____
Instructional Computing Lab Reid 425

Introduction:

1. Explain that the purpose of this research study is to develop an understanding your experiences as you take this computer course. The result will be to develop a model to guide course design and teaching practice for adult educators and other working with older women and technology.
 2. Explain that the group interviews will be recorded so I do not have to rely on my notes and can listen intently.
 3. Explain confidentiality issues-- their comments will contribute to the understanding that I seek, but they will never be personally identified nor connected to the information which they provide.
 4. Encourage questions during the interview and ask that everyone participate.
-

1. How does it feel to come to campus to take this computer course? [RQ1,2 Lit: Gerontology, Education]
2. Today, what feelings are you experiencing when thinking about being a participant in this course? [RQ1,2, Lit: Trends, Gerontology, Education]
3. What are the most significant events that lead to your desire to learn to use computers? [RQ1, Lit: Trends, Gerontology, Education]
4. In what ways do you feel that taking this class may affect your life? Does it affect you socially? Does it affect you mentally? Does it affect you physically? [RQ1,2,3, Lit: Trends, Gerontology, Education]
5. What kinds of things do you want to learn from this class? [RQ1,2 Lit: Trends, Education]
6. Is there anything else that you would like to tell me?

Concluding Remarks: Thank you for your time, for participating, and for your honesty. Please let me know next week if additional ideas occur to you.

Focus Group Interview Form Class 2

Date: _____
Instructional Computing Lab Reid 425

Introduction:

1. Explain that the purpose of this research study is to develop an understanding your experiences as you take this computer course. The result will be to develop a model to guide course design and teaching practice for adult educators and other working with older women and technology.
 2. Explain that the group interviews will be recorded so I do not have to rely on my notes and can listen intently.
 3. Explain confidentiality issues-- their comments will contribute to the understanding that I seek, but they will never be personally identified nor connected to the information which they provide.
 4. Encourage questions during the interview and ask that everyone participate.
-

1. Describe one experience that you thought was particularly effective in your learning to use the computer last week? [RQ3, Lit: Education]
2. How do feel about taking this class at the university rather than at the senior center or smaller learning center? [RQ2, Lit: Education]
3. What do you feel about the class being only women? How important is it to you? [RQ2, Lit: Gerontology, Education]
4. What differences do you think would occur if men were also in the class? [RQ2, Lit: Gerontology, Education]
5. What do you feel about the class participants being women of similar age? How do you think this affects your learning? [RQ2, Lit: Gerontology, Education]

Concluding Remarks: Thank you for your time, for participating, and for your honesty. Please let me know next week if additional ideas occur to them.

Focus Group Interview Form Class #3

Date: _____
Instructional Computing Lab Reid 425

Introduction:

1. Explain that the purpose of this research study is to develop an understanding your experiences as you take this computer course.
2. Explain that the group interviews will be recorded.
3. Explain confidentiality issues.
4. Encourage questions during the interview and ask that everyone participate.

1. Describe what you are feeling when you tell your friends and family about your participation in this computer course. Does it affect your self-esteem? How? [RQ1, Lit: Gerontology, Education]

2. What benefits do you feel are occurring with your participation in this course? (Mentally, socially, psychologically, others?) [RQ1, Lit: Trends, Gerontology, Education]

3. What disadvantages do you feel occur with your participation in this course? [RQ1, Lit: Gerontology, Education]

4. Does participation in this course affect your self-esteem and self-confidence? Does it affect you socially? Does it affect you mentally? Does it affect you physically? [RQ1,2,3, Lit: Trends, Gerontology, Education]

5. What methods do you do that seem to help you remember the procedures? [RQ3, Lit: Gerontology, Education]

6. What other methods can you think of that could help you or others? [RQ3, Lit: Education]

7. When asked why you want to learn to use the computer, many of you said that you wanted to keep up with society, that you wanted to be able to find the rest of the story when websites are mentioned in news, to please grandchildren, to have a way of communicating with family and friends, and that computer use is good for the brain. Is this what you said? Are there any other reasons for wanting to learn to use the computer?

8. You felt that it was just fine and exciting to take this class at the university. The parking could be a problem; however, that is solved using Galavan. You felt good to come to campus. Is this what you said and meant? What additional comments can you share?

9. You feel that it is important that each person have her own computer to work on in class. You like the small size of this class. What size do you feel would be ideal? How important is it that each person works on her own computer?

10. You like a class with only women of similar age because they have similar problems and women share and help each other. You feel that you can ask anything with all women in the group. Is this correct? What additional comments can you share?

11. Are you seeing accomplishments from taking this computer course? Is it rewarding to take this class? Please describe your thoughts.

12. Tips for learning: Glasses Tip. What additional tips would you give to others taking a computer course like this?

Focus Group Interview Form Class #4

Date: _____
Instructional Computing Lab Reid 425

Introduction:

Explain confidentiality issues-- their comments will contribute to the understanding that I seek, but they will never be personally identified nor connected to the information which they provide.

Encourage questions during the interview and ask that everyone participate.

1. Describe one experience that you thought was particularly effective in your learning to use the computer last week? [RQ2,3, Lit: Education]
2. What are two things that you particularly like about coming to your computer class each week? [RQ2, Lit: Gerontology, Education]
3. What are your two most difficult aspects of taking this computer class? [RQ2,3, Lit: Gerontology, Education]
4. Describe your situation of transferring your learning from this class to your home or other computer. How can you be helped to do so more easily? [RQ3, Lit: Gerontology, Education]
5. What do you feel about the class being a small size? How do you think this affects your learning? What size of class do you feel would be most beneficial to your learning? [RQ2,3, Lit: Education]
6. Describe the most beneficial characteristics you think the instructor of a computer course must possess. [RQ2, Lit: Education]
7. Describe attitudes or characteristics you think the instructor of a computer course should not have? [RQ2, Lit: Education]
8. It seems to be important for you to understand the rationale for each procedure. Is this correct? Why do you think this?
9. Individual attention is a must, as soon as possible after a problem arises. Is this correct? Please describe your thoughts about this procedure.
10. The Demonstration-Do-Redo procedure of demonstrating the procedure while you take notes, followed by leading you through the procedure all together, then having you do it on your own, is effective for you. What do you think about this teaching strategy? What doesn't seem to be effective?
11. It appears that you enjoy the classroom atmosphere in which you are encouraged to use humor and laughter instead of frustration. Is this correct? What additional comments do you have about this strategy?

Focus Group Interview Form Class #5

Date: _____
Instructional Computing Lab Reid 425

Introduction:

1. Explain that the group interviews will be recorded so I do not have to rely on my notes and can listen intently.
 2. Explain confidentiality issues-- their comments will contribute to the understanding that I seek, but they will never be personally identified nor connected to the information which they provide.
 3. Encourage questions during the interview and ask that everyone participate.
-

1. From whom do you receive encouragement and motivation? How is it important to you? [RQ1, Lit: Gerontology, Education]
2. Has this course become a social activity for you? How so? Importance? [RQ2, Lit: Gerontology, Education]
3. What are the main motivators for you to come to class? [RQ2, Lit: Trends, Gerontology, Education]
4. Do you think women learn differently than men? Please describe from your experience. In what ways do you think women learn best? [RQ2,3, Lit: Gerontology, Education]
5. What time of year do you feel the computer course best for you participate?
6. What recommendations you do have about follow-up; in what things do you suggest that you could be encouraged to continue learning to use the computer?
7. Do you feel that having "homework" each week would be beneficial to your learning?
8. We talked about changing frustration and anger into humor and laughter. What do you think about this strategy? Does it seem to help you? Do you see a difference in yourself? Please describe your thoughts.
9. Those who were having trouble with transferring your learning to your home computer use have received help by my coming to your home and then helping visualize what the procedures would look like on your computer. What do you think about this strategy? Can you think of others that might help?

Focus Group Interview Form Class #6

Date: _____
 Instructional Computing Lab Reid 425

Introduction:

1. Explain that the group interviews will be recorded so I do not have to rely on my notes and can listen intently.
 2. Explain confidentiality issues-- their comments will contribute to the understanding that I seek, but they will never be personally identified nor connected to the information which they provide.
 3. Encourage questions during the interview and ask that everyone participate.
-

1. In what ways to you feel your participation in the course has affected your life? (mentally, socially, physically, etc) [RQ1,2,3, Lit:Trends, Gerontology, Education]
2. Discussion of plans to stay involved with computer learning.
3. Last week we discussed the article about memory. It said that you must have a positive attitude about thinking you can remember. What thoughts do you have on this topic? Can you share additional ideas that might help with memory?
4. In what ways do you think women learn best?
 In order to set this class up in a way that helps you learn best, what recommendations can you share.
 Feeling comfortable.
 Set up the class atmosphere so we can share, laugh at yourself and each other, by not being intimidated.
 Women don't like to be intimidated.
5. Please share your thoughts about using the recipe idea. What do you think about that?
6. Feeling guilty. Comments, ideas to share.
7. Importance of receiving motivation and encouragement.
8. Social activity--important to you. Comments.
9. Concluding remarks, appreciation, etc.

APPENDIX E

COURSE TOPICS

Course Topics

Class 1

Introduction.
Focus group interview.
Look inside the computer.
Terminology.
Paint program: eye-hand coordination, using the mouse, double or single clicking, highlighting, dragging.

Class 2

Focus group interview.
Explanation and use of visual organizers-mind map, concept map, tree diagram, web.
Three methods to search the World Wide Web
 yahoo.com----category search
 ask.com----question (keyword) search
 google.com----keyword search
Possible search topics- genealogy, weather, recipesource.com, marthastewart.com
Caution about evaluating page content and about answering the ads that show on the top of the page.

Class 3

Focus group interview. Member checking.
Review searching WWW techniques.
Learning to send and receive e-mail.
BCC (blind carbon copy)
Electronic greetings.
Terminology.

Class 4

Focus group interview. Member checking.
Learning styles awareness. Inventory of Learning Styles for fun (not scientific).
Word processing, formatting, adding graphics, spell check.
Copy and paste from word processing to body of e-mail message.

Class 5

Focus group interview. Member checking.
Mind map review of WWW- category search, keyword search, URL/address search.
Database address book and Mail-Merge with word processed Christmas letter.
Use of decorative stationery and cards.

Class 6

Focus group interview. Member checking.
Installing and running software.
Terminology.
Completion/discussion. Appreciation.

APPENDIX F

HUMAN SUBJECTS COMMITTEE REVIEW FORM
AND RESPONSE

Human Subjects Committee Review Form

MONTANA STATE UNIVERSITY

Request for Designation of Research as Exempt from the Requirement of Human Subjects Committee Review

Approval Date:

Application Number:

TO: HUMAN SUBJECTS COMMITTEE ADMINISTRATOR, STEPHEN GUGGENHEIM, 308 LEON JOHNSON HALL, MONTANA STATE UNIVERSITY, BOZEMAN, MT 59717.

Date:

I. INVESTIGATOR:

Name: Joan Cook

Department/Address: Department of Education Reid 213 MSU-Bozeman

Telephone: 994-5950

E-Mail Address: joancook@montana.edu

Name of Faculty Sponsor: Dr. Marilyn Lockhart

II. TITLE OF RESEARCH PROJECT:

The Experiences of Women Over Seventy Years of Age
Participating in a Computer Course at a University

III. BRIEF DESCRIPTION OF RESEARCH METHODS:

The purpose of this grounded theory study is to explore, describe, and interpret the experiences of women over seventy years of age while participating in a contemporary skills computer course at a university in order to provide insight or models for practice that may be useful in future development of related policy, programs, and research.

A criterion method of sampling will be used in this study. All participants will be: 1) female, 2) over 70 years of age, 3) willing to come on campus to take a computer course, 4) willing to participate in a research study as part of the computer course.

Participants will come to the Instructional Computing Lab (Reid 425) to participate in a six week computer course. Each class will be two hours in length and will include a focus group interview of approximately 30-40 minutes at the beginning of each class. Data will be collected from an initial needs assessment questionnaire, audiotaped interviews, instructor observations, and participant reflections written after each class.

It is anticipated that participants will accrue the following benefits: learn to use a word processing program, learn to send and receive e-mail, learn to search the Internet for specific information, learn to install and use computer software, and be able to solve basic operational problems that may arise.

IV. RISKS AND INCONVENIENCES TO SUBJECTS:

No anticipated risks or inconveniences are involved.

V. SUBJECT:

- A. Expected numbers of subjects: 10-14
- B. Will research involve children? Yes ☒ No
- C. Will research involve prisoners? Yes ☒ No
- D. Will research involve any specific ethnic, racial, religious, etc. groups of people?
(If Yes, please specify.) Yes ☒ No

VI. FOR RESEARCH INVOLVING SURVEYS OR QUESTIONNAIRES:

- A. Is information being collected about:
- | | | |
|---------------------------------------|-----|-------------------------------------|
| Sexual behavior? | Yes | ☒ No |
| Criminal behavior? | Yes | ☒ No |
| Alcohol or substance abuse? | Yes | ☒ No |
| Matters affecting employment? | Yes | ☒ No |
| Matters relating to civil litigation? | Yes | ☒ No |
- B. How will information be linked with responding subjects?
- | | | |
|--|--------------------------------------|-------------------------------------|
| By name | Yes | ☒ No |
| By code | ☒ Yes | ☒ No |
| By other identifying information | Yes | ☒ No |
| No identifying information (anonymous) | Yes | ☒ No |

VII. FOR RESEARCH INVOLVING MEDICAL RECORDS, BLOOD OR TISSUE SPECIMENS RECEIVED FROM OTHER INSTITUTIONS:

- A. Are you involved in the design of the study for which the materials are being collected? Yes No
- B. Will your name appear on publications resulting from this research? Yes No
- C. Where are the subjects from whom this material is being collected?
- D. Regarding the above materials or data, will you be:
- | | | |
|-----------------|-----|----|
| Collecting them | Yes | No |
| Receiving them | Yes | No |
| Sending them | Yes | No |
- E. Do the materials already exist? Yes No
- F. Are the materials being collected for the purpose of this study? Yes No



WWAMI Medical Program
308 Leon Johnson Hall
P.O. Box 173080
Montana State University
Bozeman, MT 59717-3080
Telephone: 406-994-4411
FAX: 406-994-4398
E-mail: wwami@montana.edu



MEMORANDUM

TO: Joan Cook
Dept. of Education

FROM: Stephen Guggenheim, M.D. *Stephen Guggenheim*
Administrator, Human Subjects Committee

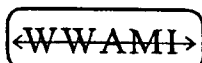
DATE: November 18, 2002

SUBJECT: The Experiences of Women Over Seventy Years of Age Participating in a
Computer Course at a University

The above research, described in your submission of November 14, 2002 is exempt from the requirement of review by the human subjects committee in accordance with the Code of Federal Regulations, Part 46, section 101. The specific paragraph which applies to your research is

- ☒ (b)(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices.
- ☒ (b)(2) Research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior.
- ☐ (b)(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these specimens are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified.
- ☐ Other

Although review by the Human Subjects Committee is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.



Regional Medical School for Washington, Wyoming, Alaska, Montana & Idaho

APPENDIX G

INTEREST LETTER AND CHECKLIST

Interest Letter
Computer Course/Research Study
Montana State University-Bozeman

Hello «first name»,

I have been given your name as someone who may be interested in taking a computer course that is part of my research study. I am studying the experiences of women over seventy years of age as they participate in a computer course on campus. From the results, I plan to develop a model to guide computer course design and offer suggestions for teaching methods that are most beneficial to women. I will be collecting several types of data to help me explore your experience. The first 30 minutes of each class will be spent talking about your feelings, thoughts, abilities, and recommendations concerning the class environment and teaching methods. It is necessary that I hear from each of you. These group interviews will be tape recorded. In addition, when you go home from class, you will be asked to write your thoughts, feelings, and reactions to similar questions. All of your comments will be kept confidential and will never be identified with you.

The content of the course will depend upon the needs of the group; however, I am anticipating that the content will include learning the following: searching the Internet, sending and receiving e-mail, using your word processor to type a longer e-mail message and to compose letters, computer terminology, installing software on your computer.

The course will meet for six weeks, once a week, for approximately two hours. The location is the Instructional Computing Lab Reid 425 on the MSU-Bozeman campus. The Galavan can be arranged to pick you up and bring you to the back door of the building. There is no charge for the course and it doesn't matter what kind of computer you have at home. You will become a more comfortable computer user and have fun too! I am hoping to start in early November. Please send the enclosed form back to me so I can determine which time and day works for most people and also to know if you are willing to participate. Thank you again for your time and willingness to share your experience with me.

Instructor/Researcher: Joan Cook
Phone: 994-5950 MSU office
587-3773 home

Checklist



Computer Course- Research Project



Name: _____

Phone: _____

Please check each box with days and times that you would be able to attend the computer class once per week for six weeks.

☐

Mondays 10:00am -12:00

☐

Thursdays 12:00-2:00 pm

☐

Mondays 1:00 -3:00 pm

☐

I am unable to attend.

Please check the type of computer on which you will be practicing between classes.

☐

Macintosh, IMac, IBook

☐

IBM, Dell, Compac, HP, etc.

Do you already have e-mail and Internet access?

☐

Yes

☐

No

APPENDIX H

CONFIRMATION LETTER

Confirmation Letter
Computer Course/Research Study
Montana State University-Bozeman

Location of classes: Instructional Computing Lab Reid 425

Time:

Day:

Thank you for agreeing to participate in this computer class, which is part of a research study to develop an understanding of your computer learning experience, as told by you. The information gained from this study will be used to develop a model which will guide design of computer courses and share effective teaching strategies with adult educators and others working with women over 70 years of age and computers.

I will be collecting several types of data which will help me explore your experience. I will record observations during the computer class and questions will be asked during each class session to which I would like you to respond with your thoughts and feelings--this discussion will be audiotaped. In addition, you will be asked to write your thoughts and feelings about the class and what you learned. All of your comments will be kept confidential and will never be identified with you.

I hope that you will become a more comfortable computer user by the end of the course! Thank you again for your time and willingness to share your experience with me. See you soon!

Joan Cook

994-5950 MSU
587-3773 home

APPENDIX I

CONSENT FORM

Consent Form

Researcher: Joan Cook
Department of Education
MSU-Bozeman 994-5950

The following information is provided to help you decide if you wish to participate in the present study. You should be aware that you are free to decide not to participate or to withdraw at any time without affecting your relationship with the Department of Education, the instructor, or Montana State University-Bozeman.

The purpose of this study is for the researcher to develop an understanding of your experiences and feelings as you participate in a computer course at the Instructional Computing Lab, Reid Hall 425, on the campus of Montana State University-Bozeman. The procedure will be for you to attend a two hour class, once per week, for six weeks. Each class will begin with a group interview session lasting approximately thirty minutes, then you will begin the hands-on computer class activities.

Data will be collected at the beginning of the course through a survey of your technology abilities, the type of skills and knowledge you want to learn, and descriptive information about you. You will also be asked to write your thoughts to several questions when you go home from each class. Observations will also be made during the classes by the instructor.

Your name will not be associated with the research findings in any way, and your identity as a participant will be known only to the researcher and the other participants. Do not hesitate to ask any questions about the study either before participating or during the time that you are participating. I am happy to share the findings with you when the research is completed.

There are no known risks or discomforts associated with this study. It is anticipated that participants will gain the following benefits: learn to use a word processing program, learn to send and receive e-mail, learn to search the Internet for specific information, be able to solve basic operational problems that may arise, and become more comfortable using the computer.

Please sign your consent with full knowledge of the nature and purpose of the study.

Signature of Participant

Date

MONTANA STATE UNIVERSITY - BOZEMAN



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