**Learning Styles of Older Adults
in Educational Settings**

by

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Abstract

Learning Styles of Older Adults in Educational Settings, is an investigation into the learning styles of the baby boomer generation who are now entering retirement. With typical retirement at 65 years of age and life expectancy now 80 to 85 years of age, millions of retirees will have fifteen to twenty years of healthy retirement to fill. This change has created a new demographic of older adults--baby boomers. Today's seniors want to be productive during retirement and many plan to use those years to fulfill dreams and goals postponed during child rearing years, or when careers took priority. The activities seniors want to pursue will require further education, training, or new learning and millions of older adults who will be entering learning environments to acquire the skills necessary to remain active and engaged during the retirement years (Narushima, Liu, & Diestelkamp, 2013; Parks, Evans, & Getcg, 2013). Studies reveal that remaining involved in life and pursuing new learning experiences promotes not only a longer life but, a healthier, more fulfilling, and meaningful life in the senior years, reducing the dependency on social services and thus taxpayers (Taylor, Morin, Parker, Cohn, & Wang, 2009).

Universities, community colleges, technical, and trade schools, as well as civic organizations, government agencies, and non-profit organizations must be prepared to meet the learning needs of this new demographic of older adults who will be entering retirement and seeking educational opportunities that will allow them to fully participate in a healthy lifestyle, both mentally and physically. This study was conducted to determine the learning style preferences of older adults, and will prepare educators and instructors to adapt to the needs of this new demographic of learners. Participants were surveyed by age, race, and sex using the four

constructs of the Gregorc Learning Style Delineator: Concrete Sequential, Abstract Sequential, Concrete Random and Abstract Random (Gregorc, 1984).

Three chi square analyses were conducted to assess the learning preference of each of the participants according to each category of age, sex, and race with results indicating categorical preferences. Learning style preferences showed no statistical significance between different ages and sexes. However, the difference between the learning style preferences by race was statistically significant. Individual characteristics vary, but this research provides generalizations as a guideline to assess learner needs and will be of vital importance to the success of new learning for our older adult population especially in racially diverse learning environments.

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I sincerely appreciate the opportunity to advance my studies with a terminal degree in Adult Education which I proudly consider the preeminent field in academia. My professors and committee members: professors James Witte, Maria Witte, and Leslie Cordie were innovative and inspirational in their teaching methods and will continue to be an influence throughout my career. Faculty and students at Auburn University have expanded my world view to include multicultural and diverse aspects of teaching and I aspire to eventually match their expertise. I would like to thank all of the gracious participants in my research study, and the respective directors of the agencies who kindly allowed this research to take place at their organizations: Linda Shook, director of Auburn University OLLI, Jackie Pinkard, director of the Lee-Russell Area Agency on Aging, and Rev. C. Lynn Hopkins of the Montgomery Unitarian Universalist Fellowship. I would also like to thank the Auburn University Graduate School for funding my research and the University reader, Dr. Lee Ann Alderman. A special thanks goes to Ron and Joan Belcher of Montgomery AL, who were always there to lend much needed support. I will genuinely miss Auburn University and all of the wonderful people I have met.

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Chapter 1: Introduction

"Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young. The greatest thing in life is to keep your mind young" (Henry Ford).

Background

America is aging. In 2009 there were 39.6 million Americans aged 65 and older. By 2030 there will be 72.1 million Americans over the age of 65 causing this age group to increase dramatically from just 12% of the population to almost 20% (US Department of Health and Human Services, 2009). This upward trend is the result of the baby boomer generation reaching and entering the retirement years. In 1950, the average life expectancy of Americans was 68 years (Gendell & Siegel, 1992). People were expected to work most of their lives until health conditions caused retirement, but today with better health care and healthier lifestyles people are living into their 90s and enjoying good health throughout their 60s and 70s. Figure 1.1 represents the gradual increase in life expectancy since 1900. Today, the average age of retirement is 62 years, and life expectancy is 80 to 85 years leaving millions of retirees fifteen to twenty years of healthy active retirement to fill (Rausch, 2013). This change has created a new demographic of adults. Older adults now want to enjoy retirement, and many plan to use those years to fulfill dreams and goals postponed during child rearing years, or when careers took priority. Many will use this time to finish a college degree, attain a higher degree, learn a new skill at a trade or
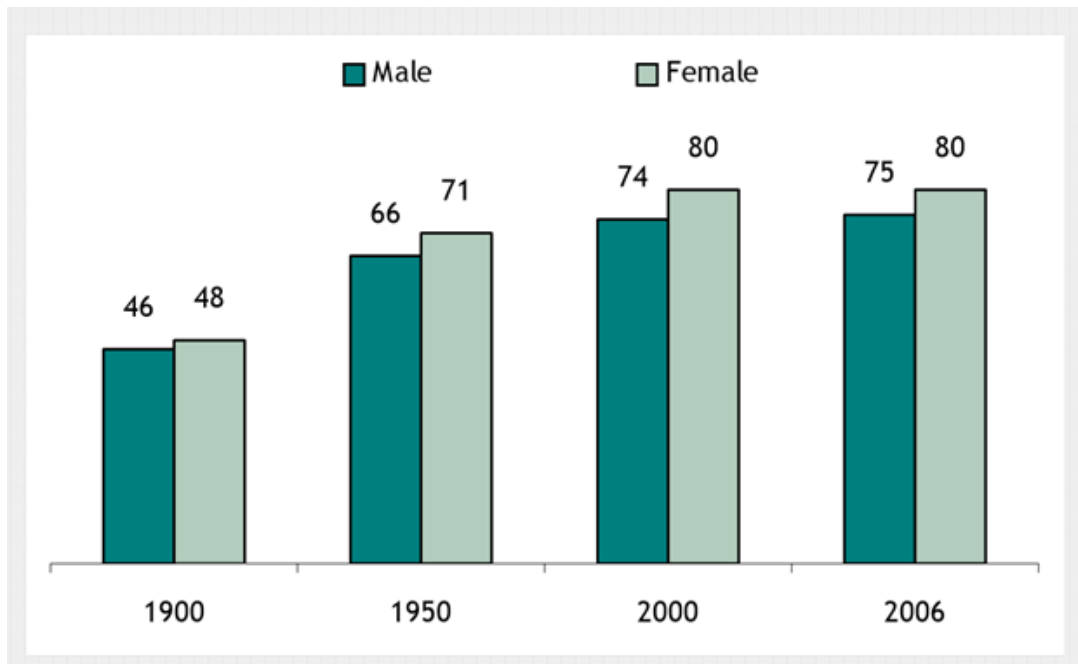
Figure 1.1: Life Expentancy 1900-2006

Adapted from Centers for Disease Control and Prevention, National Center for Health Statistics

vocational school, start a new career, or a new business, take classes at senior centers such as yoga, or computer skills, learn a new sport like golf or swimming, develop a new talent taking singing, music or dance lessons, and many will volunteer at non-profits, faith based organizations, libraries, museums, and hospitals. All of these activities will require further education, training, or new learning (Fairlie, 2006), and millions of older adults will be entering these learning environments to acquire the skills necessary to remain active and engaged during the retirement years. Universities, community colleges, technical and trade schools, as well as civic organizations, government agencies, and non-profit organizations must be prepared to meet the learning needs of this new demographic of older adults who will be entering retirement and seeking educational opportunities that will allow them to maintain a fruitful and productive life

(Erikson, Erikson, & Kivnick, 1994). Bolded years in Figure 1.2 represent the increase in U.S. births from 1946 to 1964 (represented in the thousands) after soldiers returned from World War II and started families. Figure 1.3 illustrates the baby boomer years figuratively from 1946 to 1964.

1940	2,559	**1955**	**4,097**	1970	3,731	1985	3,761
1941	2,703	**1956**	**4,218**	1971	3,556	1986	3,757
1942	2,989	**1957**	**4,300**	1972	3,258	1987	3,809
1943	3,104	**1958**	**4,255**	1973	3,137	1988	3,910
1944	2,939	**1959**	**4,245**	1974	3,160	1989	4,041
1945	2,858	**1960**	**4,258**	1975	3,144	1990	4,158
1946	**3,411**	**1961**	**4,268**	1976	3,168	1991	4,111
1947	**3,817**	**1962**	**4,167**	1977	3,327	1992	4,065
1948	**3,637**	**1963**	**4,098**	1978	3,333	1993	4,000
1949	**3,649**	**1964**	**4,027**	1979	3,494	1994	3,979
1950	**3,632**	1965	3,760	1980	3,612		
1951	**3,823**	1966	3,606	1981	3,629		
1952	**3,913**	1967	3,521	1982	3,681		
1953	**3,965**	1968	3,502	1983	3,639		
1954	**4,078**	1969	3,606	1984	3,669		

Figure 1.2. The Birth of the Boomer

Source: Copyright 1998-2011 Baby Boomer Head Quarters- wwwbbhq.com

According to Gendell and Siegel (1992), the number of retired Americans over the age of 65 will double by 2020, and these older adults will be entering educational environments in record numbers. Barriers to learning must be overcome by older adults, and educators in academic settings must be prepared to meet the learning challenges facing older learners. The educational environment must be able to adapt to the needs of older learners by using adaptive teaching strategies as well as physical accommodations. Implications for educators and administrators include: agism, stereotyping, mobility, transportation problems, and the physical limitations inherent with aging (Coudin & Alexopoulos, 2010). Moreover, an awareness of the barriers to learning, an understanding of learning preferences, and learning styles of older adults will be crucial in providing programs and services that meet the needs of the increasing number of
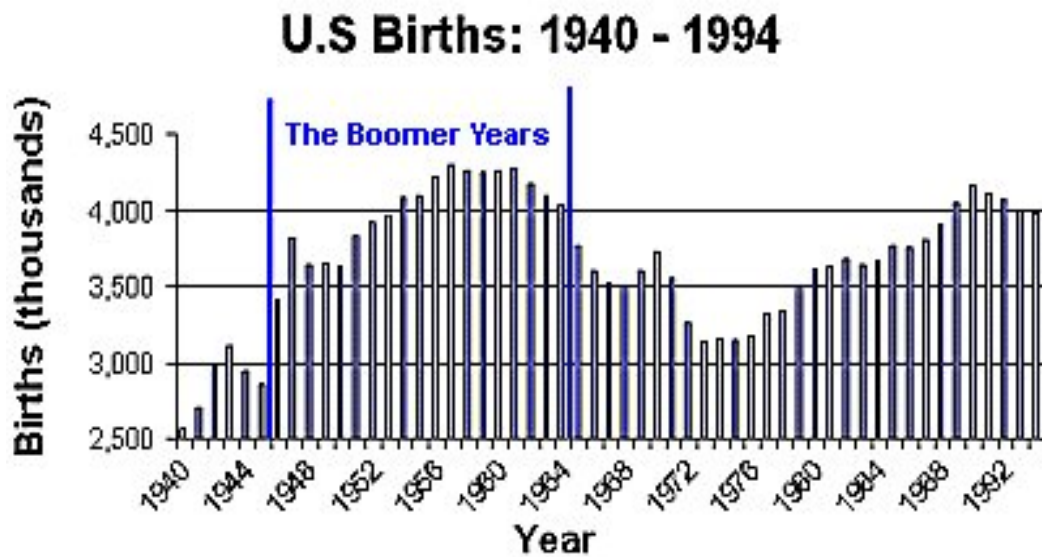
retirees entering learning environments.

Figure 1.3 The Boomer Year

Source: Copyright 1998-2011. Baby Boomer Head Quarters-wwwbbhq.com

Today, older adults entering formal and informal learning environments are more diverse than older adult learners of the past (Cruce & Hillman, 2012), and require policy or procedural changes, and new strategies to accommodate the learning styles and needs of these learners who want to remain active and engaged during the retirement years. As educators, it is incumbent upon us to develop awareness, and create a vision for this new demographic of students as millions of baby boomers enter retirement and redefine our concept of this stage of life.

Statement of the Problem

Current research lacks an expanded definition of the learning styles of older adults especially the current population of seniors who will be overwhelming learning institutions. "The sheer magnitude of people slated to reach late adulthood within the next few decades makes the quest to understand the precursors of successful aging a public priority" (Pruchno, Genderson, Rose, & Cartwright, 2010, p. 821). According to Truluck and Courtney (1999), the learning style preferences of children and adolescents has been extensively researched; however, there is a lack of research related to the learning styles of older adults. Learning style inventories such as David Kolb's experiential model is best suited for class room environments, and Peter Honey and Alan Mumford's model is best suited for adults in an employment related environment. Even Neil Fleming's VAK/VARK model identifies learning styles as simply visual, auditory, reading, or kinesthetic.

A more comprehensive understanding of the learning styles and preferences of older adults is necessary to meet the learning needs of the large influx of baby boomers soon to retire and seek learning opportunities in a wide variety of educational settings. Fewer studies have investigated the learning styles and preferences of older adults and with this population of adults

increasing exponentially, an investigation of this specific cohort of seniors can serve as a template for learning scenarios and practices for future generations.

In the past, research related to elders usually explored plans for retirement, health care, and end-of-life issues leaving little information on participation in educational endeavors or an understanding of the learning preferences and styles of older adults. Furthermore, research of the past has focused on older adults who are white, middle class, and highly educated leaving racial minorities, new immigrants, and elders in rural areas, under investigated and underserved (Kim & Merriam, 2004). Seniors from previous generations may have been tested to determine learning styles. However, the current cohort of adults over 65 years of age, has not yet been sufficiently tested as to their learning style in relation to age. If tested previously in their adult lives, current results would differ due to cognitive changes in the function of the older adult brain and in the neural pathways used to acquire and retain new knowledge (Manard, Carabin, Jaspar, & Collette, 2014). An assessment of learning styles of this generation at an advanced age is imperative not only for these seniors, but for generations of senior learners in the future.

The baby boomers cover two distinct generations, and older learners can be divided into two separate age groups, young-old adults (65-74) and old-old adults (75-99) (Ginsberg & Lynn, 2002). This study will identify the learning styles of each age group using the Gregorc Learning Style Delineator. Also, using the Gregorc Delineator differences in learning styles between men and women, and race: African American and Caucasian, were assessed. These distinctions will add value and significance to this study by examining specific demographics within this current population of older adults, thereby contributing to the existing body of scientific inquiry in the field of Adult Education.

Purpose of the Study

The purpose of this study was to identify the learning styles of older adults using the Gregorc Learning Style Delineator. In this study, older adults were ages 65 to 75 years or over 75 years of age. This study also identified race (African American or Caucasian), and sex (male or female) as additional variables. Data were collected from participants in university life-long learning programs, an area agency on aging, and faith-based settings. This study sought to ascertain the learning styles that were used by older learners or groups of older learners. Learning style instruments, such as the Gregorc Learning Style Delineator, assist individuals in building an awareness or identifying learning and teaching practices that are best suited to their own cognitive abilities.

Research Questions

The following research questions were used in this study:

1. What are the learning styles of older adults in relation to age?

2. What are the learning styles of older adults in relation to sex?

3. What are the learning styles of older adults in relation to race?

Significance of this Study

The results of this study will prepare educators, educational institutions, and program administrators for the influx of older adults who will enter educational settings in the near future. By 2030 seventy million adults will be 65 years of age and older—20% of the US population (US Census Bureau, 2004; Lakin, Mullane, & Robinson, 2007). By 2050, Figure 1.4 projects the

population over 65 years of age to increase to one in five Americans compared to one in eight today (Taylor, et al., 2009). According to Shinagel (2012), by 2050 the number of Americans over 65 is now projected by the US Census Bureau to be 88.5 million which is more than double the 2010 projected number of 40.2 million. Current research and organizational surveys from the Pew Research Center's, Growing Old in America (2009), and The Met Life Foundation's, Framing New Terrain: Older Adults & Higher Education indicate that most of these senior citizens plan to maintain active and engaged lifestyles, leaving learning institutions and organizations to potentially contend with one-fifth of our nation's population seeking opportunities to remain connected (Lakin, et al, 2007). Learning environments could become overwhelmed, and resources in educational settings could be stretched to unprecedented levels, while educators would be unprepared to meet the demands of these new learners. Higher education administrators, instructors, policymakers, non-profit administrators, business owners, and leaders of government and religious organizations must be aware of the implications for their organization regarding funding, strategic planning, implementation, resource allocation, and more importantly for instructors who must learn to accommodate the learning styles of this influx of new older students.

Seniors will be seeking activities that will improve their self-esteem, develop talents and skills, increase retirement income, achieve career and personal goals, and improve their quality of life (Cruse & Hillman, 2012). To better meet these needs a statistical analysis will identify the learning styles of older learners, and allow educators to potentially modify teaching strategies that would include methods that address each of the four learning styles identified by the

Gregorc Learning Style Delineator: Concrete Sequential, Abstract Sequential, Abstract Random, and Concrete Random.

Furthermore, an increase in the awareness of future trends and learning styles in educational settings will allow a clearer perspective of the expectations of seniors in learning environments, and enable educators to facilitate learning for elders by being aware of learning styles in regard to age, sex, and racial differences within this population.

The results of this study will add to the limited existing body of knowledge in regards to older learners by preparing educators and administrators for the large influx of elders entering learning environments. Furthermore, educators can apply distinct learning principles to individual older learners or groups of older learners. The learning styles identified by the Gregorc Learning Style Delineator will further assist individuals to self-identify the teaching practices best suited to their own cognitive abilities.

Share of U.S. Population Ages 65 and Over, Selected Years 1900-2008 and Projected 2010-2050
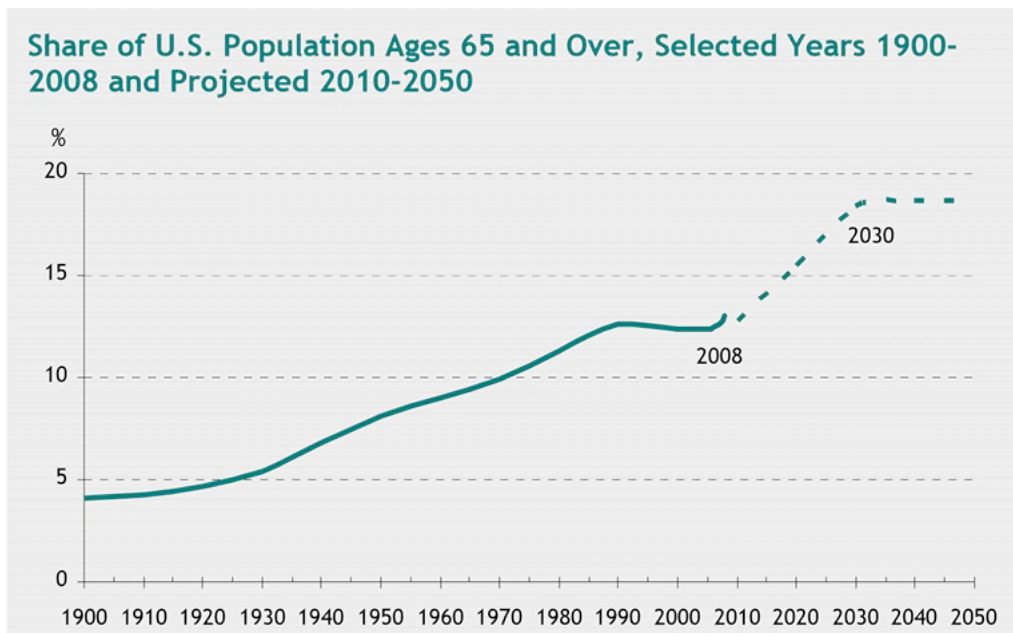
Figure 1.4 Older Population Projected to 2050

Adapted from 1900 – 2008 Census Bureau. 2010–2050 projections are based on a starting point of 2005, Pew Research Center.

Assumptions

The following assumptions were made with this study:

1) The Gregorc Style Delineator was a valid instrument to identify the learning styles of older adults.

2) The participants understood the questionnaire and were able to answer the questions honestly and consistently.

3) The participants in this study are representative of the older adult population in central Alabama.

Limitations

The following limitations apply to this study:

1) The limitations of this study relate to the geographic area of central Alabama and may not be generalizable to older adults in other areas of the United States.

2) This study is limited to the results of the Gregorc Learning Style Delineator which is not intended as an all-inclusive assessment of learning, but as an evaluation tool for self-analysis (Gregorc, 1984).

3) The selected sample population of this study was limited to older adults who possessed the cognitive ability to volunteer to have their learning style measured and the ability to understand the directions given by the researcher to complete the survey.

Definition of Terms

Andragogy- specific learning methods that cater to the learning needs of adults: A need to know why certain information must be learned, autonomy in the classroom, internal motivation to learn, responsible learners, and life or task oriented learners who have a mutually cooperative relationship with the instructor (Taylor, & Kroth, 2009).

Agism- the affective, cognitive, behavioral, and institutional prejudice against an older person that is based on the premise of a uniform relationship between chronological age and functional limitations (Palmore, Branch, & Harris, 2005).

Baby boomers–the two generations of individuals born between 1946 and 1964.

Crystalized memory-uses skills and knowledge garnered from a lifetime of experiences and relies somewhat on long term memory.

Episodic memory–long term memory

Executive processing–higher level functioning: reasoning, analysis, and memory.

Fluid intelligence-the ability to solve novel problems with deductive and inductive reasoning and logic.

Forebrain and prefrontal cortex–also known as grey matter, responsible for executive processing.

Neuro-chemical transmitters-chemical signals passed from one brain cell (neuron) to the next.

Neuro-plasticity-the ability of neurons to create new neural pathways when previous pathways are no longer available.

Pedagogy-teacher focused educational practices based on the dependency of the student to the teacher to provide subject information (Taylor & Kroth, 2009).

Phenomenology-a research method using techniques to measure the perception or emotional

response of the participants (Gregorc, 1984).

Synaptic sites–on brain cell neurons that either excite or inhibit neuro-chemical transmission.

Summary

The intent of this research study was to further expand the body of scientific knowledge and provide a more comprehensive definition of how older adults learn new information. This study will provide recommendations as to how educators can prepare programs that will address the needs of this generation of older learners entering educational settings. Resource allocation and curriculum planning are important components when considering the learning styles of older adults. Educators, administrators, and policy makers must be aware of these components in order to make informed decisions on curriculum planning, design, implementation, and evaluation of older adult programs, training, classes, and lessons.

Chapter 1 has explained the necessity of educational programs that address the learning styles of older adults as retirement age is reached and provided insight to educators, and others who will administer educational programs, regarding the large numbers of older learners to expect in the upcoming years. In addition to describing the large number of seniors entering educational settings, Chapter 1 further explained the significance of examining the current cohort of seniors in regard to learning styles by age, sex, and race. Chapter 2 provides a literature review of seniors in retirement, successful aging, learning style models, barriers to learning for elders, learning institutions specifically for elders, the cognitive changes of aging, and lastly, models of aging. In Chapter 3 the methods of data collection, a detailed description of the sample participants, and an explanation of the instrument including validity and reliability results are

provided. Next, Chapter 4 provided the findings of Chapter 3. Each research question was addressed regarding age, sex, and race, and major findings were discussed.

Lastly, Chapter 5 provided the conclusions of the research and the implications for older learners and educators. The impact of this study on the Needs Assessment and the Implementation Phase of the generic Instructional Systems Design Model (ADDIE) was discussed along with recommendations for program planning for older adult learning environments. Innovative suggestions were also made for future research.

Chapter 2: Literature Review

Chapter 2 is a review of the current research on the aging process and the impact of the aging process on new learning and the acquisition of knowledge. Examined in Chapter 2 are the constituents of successful aging, learning in older adulthood, distinctions of age, sex, and race in relation to learning, an examination of learning style models, the relevance of educational institutions and programs specifically for seniors, cognitive changes of the aging brain in relation to learning, models of aging, and lastly, a short analysis of the Gregorc Learning Style Delineator. Chapter 2 also provides an overview of the literature on senior living and factors that affect older adults in learning environments. An understanding of the older adult's life and circumstances is crucial to an understanding of the rationale for this research.

Purpose of the Study

The purpose of this study was to identify the learning styles of older adults using the Gregorc Learning Style Delineator. In this study, older adults were ages 65 to 75 years or over 75 years of age. This study also identified race (African American or Caucasian), and sex (male or female) as additional variables. Data were collected from participants in university life-long learning programs, an area agency on aging, and faith-based settings. This study sought to ascertain the learning styles that were used by older learners or groups of older learners. Learning style instruments, such as the Gregorc Learning Style Delineator, assist individuals in building an awareness or identifying learning and teaching practices that are best suited to their own cognitive abilities.

Research Questions

The following research questions were used in this study:

1. What are the learning styles of older adults in relation to age?

2. What are the learning styles of older adults in relation to sex?

3. What are the learning styles of older adults in relation to race?

Seniors in Later Years

Agism and the stereotypical concept of seniors as frail, infirm, helpless, isolated, and out-of-touch has been redefined by the latest generation of older adults—the baby boomers. In fact, many older Americans perceive their health as "excellent" as represented in Figure 2.1.

PERCENT

Group	Percent
65-74	71
75-84	64
85+	46
65+ Men	68
65+ Women	63
65+ White	68
65+ Black	49
65+ Hispanic	50
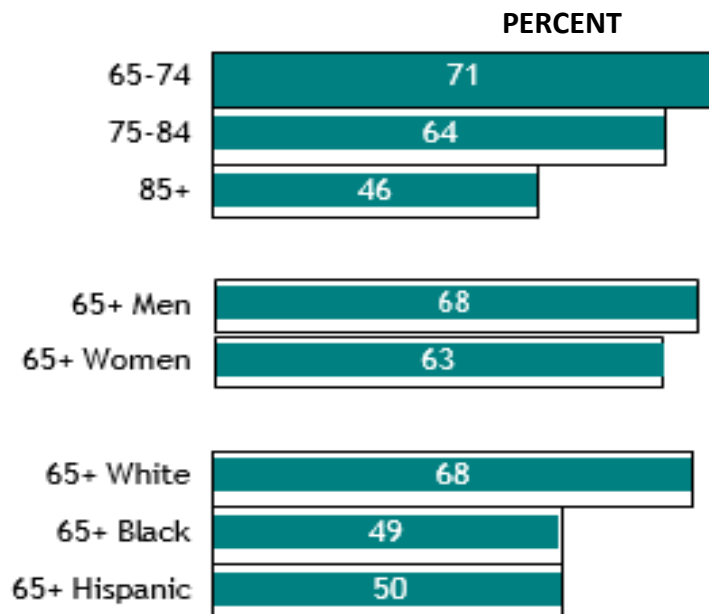
Figure 2.1 Percentage of Older Adults Who Rate Themselves as in Excellent Health

Source: Pew Research Center

Today's seniors want to enjoy an active and engaged retirement (Merriam & Kee, 2014) that includes social activities, political involvement, physical sports, civic engagement, travel, and a life balanced with time spent enjoying leisure activities and productive activities such as part-time work, volunteerism, a new career, entrepreneurship (Franklin & Frick, 2008), and completing or beginning a formal education (Dillon, Marini, & Miller, 2009). Learning new information and education are key to maintaining active participation and creating a meaningful, fulfilling life for our aging population.

Successful Aging

The concept of exactly what constitutes successful aging differs from theorist to theorist and from one individual to another, depending on circumstances and personal characteristics or life choices. An older adult's concept of life and the aging process can affect the decision to remain actively engaged or retreat into isolation and disengagement in the final stage of life. According to Erik Erikson's last stage of Erikson's Life Stages: Integrity vs Despair (Erikson, 1997); If one has lived a fulfilled life and completed many of the goals and aspirations set out for themselves, the final years are spent with integrity and dignity.

Conversely, if one lives with regret and remorse over poor decisions and outcomes, despair is the result and older adults slip into sadness and isolation, and disengage from society (Erikson, 1997). Erikson wrote his seminal work on the eight stages of life earlier in his career. Once Erikson entered old-old age, in his 90s, he added another stage to his eight stages of development—a ninth stage, one that he found himself experiencing personally. In the newly developed ninth stage, hope and faith for further wisdom and enlightenment are named as the syntonic quotient with no dystonic quotient mentioned as was the case in his previous life stages.

Erikson diverged from his model of positive versus negative developmental life stages and envisioned the final stage of life as one of quiet reflection, with no adverse tasks or challenges to overcome (Erikson, 1997). Other researchers and gerontologists, however, theorize old age differently.

According to Rowe and Kahn (1998), "… successful aging consists of three factors: avoidance of disease and disability, maintenance of high physical and cognitive functioning, and sustained engagement in social and productive activities" (p. 133). Disease or disability may be unavoidable, but maintaining physical and cognitive functioning, and staying active and engaged is certainly under the control of every individual. In contrast, "…poor social connections, infrequent participation in social activities, and social disengagement predict the risk of cognitive decline in elderly individuals" (Zunzunegui, Alvarado, Del Ser, & Otero, 2003, p. 135). Indeed, the role of active social engagement, be it in education, employment, volunteerism, cultural activities, or religious institutions can reduce or eliminate the negative effects of aging on the brain. Research by Goh and Park (2009), on neuroplasticity and cognitive aging revealed that, "Cognitive engagement improves cognition. Social engagement is just as effective as cognitive engagement [in improving cognition]" (p. 398). Engagement is key. The link between social, cognitive, and physical activity with successful aging and a higher quality of life for seniors is undoubtedly one of the most important social issues of the day.

Making the Decision to Learn

Numerous studies reveal that older adults are increasingly interested in formal and informal educational programs (Danner, Danner, & Kuder, 1993; Pearse, 1991). Moreover, a cognitive interest and a desire to learn are an older adult's primary motivation to pursue new

learning experiences (Byrum & Seaman, 1993; Kim & Meriam, 2004; Scala, 1996; O'Connor 1987). Lin (2011) also found that older adults showed more interest than middle–aged adults in experiencing formal and informal learning environments. Indicating that an older adult's desire to learn is more important than that of younger counterparts. In general, the motivating factors for older adults to seek learning opportunities is personal growth and satisfaction (Lin, 2011), improved self-esteem, to reduce the adverse effects of aging, and for social contact and interaction (Graham & Donaldson, 1996; Kim & Merriam, 2004; & Little, 1995). Lin (2011), using in-depth interviews, for more specific information, found five main reasons that adults over 60 years of age were motivated to learn. First, a desire for knowledge, and the acquisition of new information such as learning a new language or a new skill. Secondly, a desire for stimulation, to exercise the mind, develop deeper understanding, and to be able to learn at a higher level. Thirdly, a desire for self-fulfillment. Academic achievements are a credit to one's self-esteem and provide an inner status symbol. Next, a desire for generativity. The concept of generativity is based on a need to pass on information to the next generation, by sharing and passing on knowledge learned throughout a lifetime to younger learners. Generativity is the major motivating factor in the desire to teach others. Lastly, new learning can be a transition to another lifestyle or another career. Second careers are popular with today's older adults and many want to reinvent themselves in another field or a more meaningful occupation.

For older adults the impetus to seek new learning whether from a desire to reinvent oneself and change one's self-image and self-worth, or the need to make improvements or changes in one's life involves an internal redefining of identity and making value judgments that will achieve a new self-view. A life altering event such as the death of a spouse, divorce, or

retirement can be the trigger that precludes these changes (Palazesi, Bower, & Schwartz, 2007). New learning for these older learners could involve informal lessons or formal learning in a community college or the attainment of a university degree commensurate with the new image, but the initiation of new learning does not necessarily start as a response to internal angst or external situations. Aslanian and Brickell (1980) reported that 83% of older adult learners encounter a past, present, or future life event of either momentous or less significant proportions that prompts new learning, and 56% of this group name career changes as the trigger that began the process.

Many older learners see retirement as an opportunity to begin a new career in a field with challenges and personal fulfilment, or to attain lifelong educational aspirations. Decisions can now be made based on dreams of desire rather than that of need. In fact, as presented in Figure 2.2 the majority of seniors want to work compared to the few who actually need to work for financial reasons. Moreover, older adults have the ability to instigate learning and direct the learning process until the desired goals are met. These characteristics are integral components of adult learning and differentiate adults from the pedagogical learning characteristics of children, and therefore require different learning methods to engage the adult learner.

Other important characteristics of adult learners are the adult's ability to be autonomous, self-directed learners who can learn collaboratively with others. Self-directed learning is defined by Knowles (1975) as, "A process in which individuals take the initiative with or without the help of others in diagnosing their learning needs, formulating goals, identifying human and material resources, selecting appropriate learning strategies, and evaluating learning outcomes" (p. 23). Self-directed learning is any learning initiated by an individual based on self-determined

learning needs, and can take place individually with an instruction manual, or a self-help book, or in a more formal setting such as college or university, the workplace, or in the community at a community center, non-profit, faith-based, or other organization.
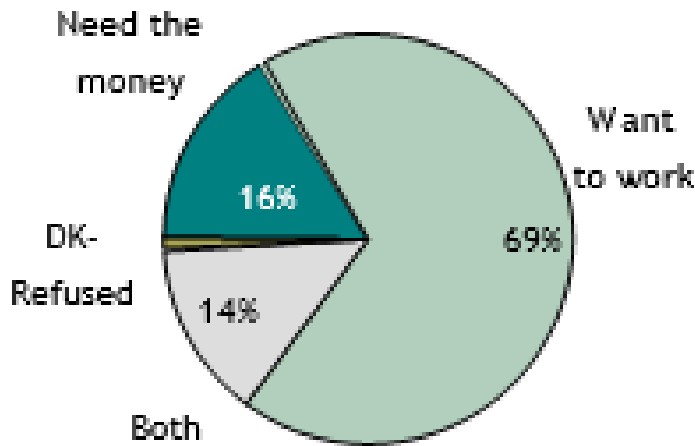
Figure 2.2 Rationale for Working in Retirement

Note: Asked only of those retirees who worked part time or full time, n=139.

Pew Research Center

The primary component of self-directed learning is that the learner takes the initiative to pursue new learning and assumes responsibility for the tasks and exercises involved until the completion of the learning experience. Furthermore, the realization by the individual that there is a need to know certain information is critical in initiating the entire learning process. This initiative has been described by Caffarella (1993) as a survival skill in response to the rapid pace of change in modern society.

Our rapidly changing society has caused many seniors to rethink their role as retirees. Social roles and life cycle phases indicate the way in which people view themselves and interact

with the world around them. Individuals have different roles as the life cycle revolves: parent, partner, employee, caregiver, home-maker, and other roles relevant to each individual's life circumstances. The social developmental level of an individual runs concurrent with changing social roles, during life, age, and, situations, and is responsible for personal growth and development throughout life, as changes occur in the cognitive, emotional, physical, and environmental aspects of life. One aspect of personal growth and development that does not appear to change throughout the life cycle: the fact that people are lifelong learners. However, as Ginsberg (2002) concludes, the current research "…provides no definitive answer as to learning [styles] in the older years" (p. 42).

As lifelong learners, people seek learning experiences for intellectual stimulation, community involvement, and a need for personal development, including one of the most important motivators for new learning, the development of new job skills to achieve future career goals (Cruse & Hillman, 2011). In fact, only 17% of the current generation of older adults plan to stop working at the traditional retirement age of 65 years old. Many plan to continue working to supplement their income, or for benefits included in a job package, such as health insurance or a pension fund, but many are retraining for second careers or advancement in a current career. Additionally, 33% of adults aged 55 to 79 years of age participate in formal learning such as, credentialing programs, work related courses, or courses of personal interest, and 69% are involved in informal learning such as club or group activities, and attending work related conferences or conventions. Age also has an influence on the decision to pursue an education related to work skills development. Twenty-six percent of 55 year olds take classes for employment related skills compared to 13% of 70 year-olds (Cruse & Hillman, 2009). With so

many senior citizens motivated to learn, the number of obstacles to overcome to achieve educational goals can be overwhelming. Some barriers are self-imposed, and some are due to ageism, and the stereotypes that exist in our society.

Learning Style Models

There are many types of learning style assessments, most of which are directed towards young students in a classroom setting. Learning style assessments of adult learners are often performed in higher education or workplace situations. However, adult assessments can be of value in any adult population though results are often contradictory. For instance, as reported in Truluck and Courtenay (1999), using the Gregorc Learning Style Delineator, Davenport's (1986) investigation of learning style preferences of a group of Elderhostel participants found gender to be a significant factor in learning style preferences, but the age differences were not considered significant. In contrast to Davenport's (1986) research, Delargy (1991) using Kolb's Learning Style Inventory, found age to be a significant factor in learning style preferences between younger adults and adults 55 years of age and older. This current research using the Gregorc Learning Style Delineator found neither age nor gender to be significant. The discrepancies continue, and criticisms of every learning style model exist, each with proponents and detractors.

Kolb's Learning Style Inventory

Kolb first developed the Learning Style Inventory (LSI) in 1971. The instrument has undergone several revisions until the current version, the LSI3 was developed in 2000. The instrument is a 12 sentence completion, rank-ordered, questionnaire that results in four learning styles: diverging, assimilating, converging, and accommodating (Ginsberg, 2002). Described by Kolb (2000) as experiences translated into concepts which are then used as guides in the choice

of new experiences. New learning consists of four stages which are Immediate/Concrete

Experiences—the basis for observation and reflection. Observations/Reflections are then

assimilated into a Concept from which new implications for action can be drawn and lastly, the

new implications serve as guide**s** for new experiences (Ginsberg, 2002).

To be effective, learners must be able to demonstrate learning abilities as follows:

Concrete Experience—fully involve themselves in new experiences

Reflective Observation—reflect on experiences from different perspectives

Abstract Conceptualization—create concepts that integrate observations into theories

Active Experimentation—use the new theories to problem solve and make decisions

Ginsberg (2002) using Kolb's LSI3 found no differences between sample participants

who were young/old (65 to 74 years of age) and old/old (75 to 99 years of age). All participants

were Caucasian and were divided by sex, age, and marital status. Ginsberg (2002) also found that

all participants preferred either the diverging or assimilating learning style and concurred with

Kolb's (2000) assessment that learning styles do not change as individuals move from young/old

to old/old.

Felder and Silverman's Learning Style Model

In an analysis of learning style models, Platsidou and Metallidou (2009) describe Felder

and Silverman's Learning Style Model as categorizing an individual's learning style preference

by type and mode of perceiving new information: sensory or intuitive; verbal or visual, in

processing new information: inductive or deductive; active or reflective, and in the rate that

information is understood: sequential or global. Using this information, individuals are then

classified into one or the opposite pole of the following four styles: sensing or intuitive, visual or verbal, active or reflective, sequential or global.

The unique aspect of the Felder and Silverman's model is that the dichotomous learning style dimensions are on a continuum and not set as one dominant learning style. The learner's score on each construct may be strong, moderate, or mild, and may change with time or situation (Platsidou, & Metallidou, 2009). This feature demonstrates learner flexibility depending on learning circumstances in much the same manner as the Gregorc Learning Style Delineator reveals a dominant learning style followed by a secondary style and two less developed learning styles. The dominant learning style is often closely followed by a secondary style and learners often exhibit two equally dominant learning styles as was the case in this research with 13 of 101 participants displaying two equally dominant learning styles. Flexibility and the ability to utilize different learning modalities to solve novel problems and accomplish difficult tasks could be the reason that learning style tests encounter difficulty in definitively identifying one single learning style within an individual or groups of individuals.

Barriers to Learning

Education Equals More Education

Whether new learning is sought out for practical reasons or for personal enhancement the relationship between previous educational attainment and the decision to seek new learning opportunities increases commensurately. Cruce and Hillman (2009) estimated that only 7% of older adults with an eighth grade education pursue formal learning, compared to 11% with a high school education, 14% with an associate degree, 17% with a bachelor's degree, 20% with a master's degree and 29% with a doctorate. The lower educational rates for certain seniors appear

to reflect a racial component. Figure 2.3 represents the older population's educational attainment of a bachelor's degree by race and Figure 2.4 presents the older population's attainment of an associate's degree by race. Outreach programs targeting seniors with low levels of education would encompass a group usually marginalized by traditional educational institutions, yet this group is in need of a fully engaged meaningful retirement as much as their more highly educated counterparts, and efforts to recruit these undereducated seniors should be of primary concern to both formal and informal institutions of education.

The 55+ Population Holding a Bachelor's Degree or Higher: 2006

African American — 14
Asian American — 37
Hispanic — 11
Non-Hispanic White — 26

Percentage

The 65+ Population Holding a Bachelor's Degree or Higher: 2006

African American — 11
Asian American — 31
Hispanic — 9
Non-Hispanic White — 21

Percentage
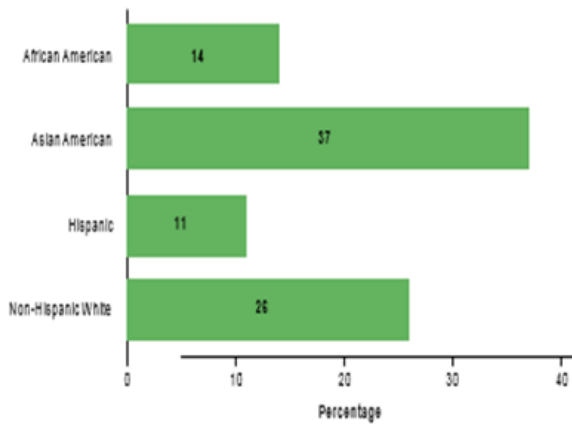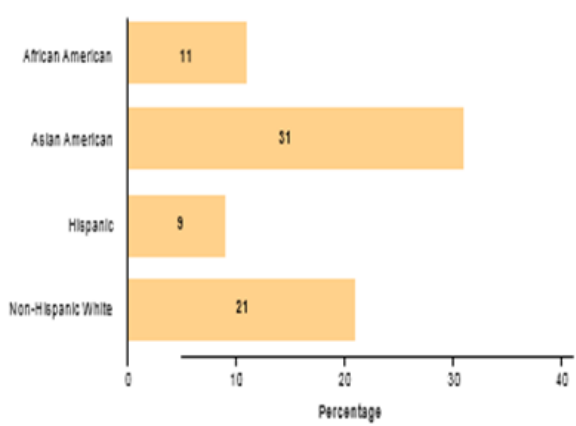
Figure 2.3 Older Population with Bachelor's Degree by Race

Adapted from the U.S. Census Bureau 2006

The 55+ Population Holding an associate Degree: 2006

African American — 6
Asian American — 5
Hispanic — 4
Non-Hispanic White — 7

Percentage

The 65+ Population Holding an associate Degree: 2006

African American — 4
Asian American — 5
Hispanic — 3
Non-Hispanic White — 5

Percentage
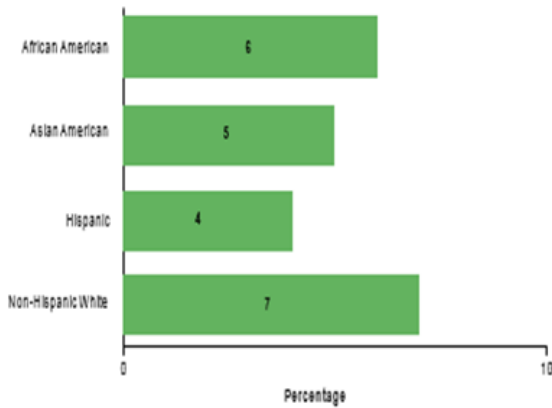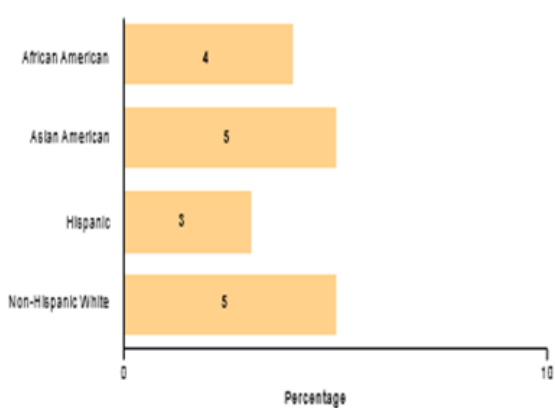
Figure 2.4 Older Population with an Associate's Degree by Race

Adapted from the U.S. Census Bureau 2006

Agism

Agism is also a barrier to educational opportunities for seniors. Agism is any attitude, action, or institutional structure that subordinates a person or group because of age or any role in society, such as retirement, purely on the basis of age (Woolf, 1998). As an "ism," agism reflects a prejudice in our society against older adults. Although federal laws protect workers from age discrimination in the work place, agism still exists in many segments of our society (Larkin, et al. 2007). Older people are also stereotyped and considered of little value, a burden, slow to accept change, economically and physically dependent, deaf, in poor health, politically conservative, alienated, nonsexual, and living alone (Coudin, & Alexopoulos, 2010). In fact, lifestyle choices including cognitive training, higher education, physical activity, and social interactions have been shown to prevent memory and cognition declines and, "The belief that all memory seriously declines with age is just an agist stereotype that is contrary to the facts" (Palmore, Branch, & Harris, 2005, p. 225). Palmore et al. (2005), further stated that knowledge about the facts of aging can reduce negative stereotypes and prejudices against elders.

The Digital Age

Most classes today require computer access, so a certain degree of technological skills are necessary before an older learner can enter most learning environments. Educational outreach has progressively reached many of the computer illiterate older generation and some have embraced technology; however, a lack of accessibility, has still left some older learners out of the computer age (Sargant, 1997). Not only do some older learners face a lack of technological skills, but physical problems also limit an older learner's ability to successfully engage in learning opportunities. Many common health problems that affect an older adult's decision to

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engage in new learning include a decrease in vision and hearing, immobility, heart conditions, and arthritis (Coudin & Alexopoulos, 2012).

Transportation

Transportation is another issue that older learners who can no longer drive must overcome. Automobile accidents are the second leading cause of accidental death among seniors over 65 years of age, and there is little doubt that visual acuity and hand-eye coordination account for a senior's ability to safely operate a motor vehicle (Palmore et al., 2005). The loss of the ability to drive and be mobile in a society that depends on transportation to exist is a major debilitating factor in the life of an older adult. Alternate modes of transportation must be made available for continued participation in an active lifestyle. Isolation and the cognitive decline associated with a lack of social interaction, access to resources, and access to educational opportunities contribute to unhealthy aging and a dependency on social services at tax payer expense (Taylor, Morin, Parker, Cohn, & Wang, 2009).

Seniors in Rural Areas

Another educationally underserved population of seniors are those in rural areas. Location is a major factor in an older learner's decision to pursue educational activities with proximity to home a convenience that increases attendance. Only 7% of older adults in rural areas participate in new learning opportunities compared to 14% of their counterparts in urban and suburban settings (Cruce & Hillman, 2009). For African Americans in rural areas the statistics are even lower. The National Center for Education Statistics (1978), reported that less than 2% of elderly African Americans were involved in adult education programs. Using a factor analytic approach researchers Darkenwald and Valentine (1985), and Scanlan and Darkenwald

(1984), identified six deterrents as to why elderly African Americans do not participate in educational programs: lack of confidence, lack of course relevance, time constraints, low personal priority, cost, and personal problems. A similar rationale has been found by other researchers. Borthwick (1983), found cost, inconvenience, transportation problems, and attitude towards self, education, and educational institutions as major deterrents. Spence (1997) also mentioned an issue not common in the literature—embarrassment. Individuals unable to read or write or with problems reading and writing, may not want to expose these vulnerabilities.

Access is problematic, but the number and variety of classes now offered on-line could bring geographically isolated older learners into the realm of higher education, and provide a degree of socialization and interaction for these seniors while contributing to the need for lifelong learning and a more satisfying retirement.

Older Women and Men in Education

In 1970 only 6% of women over 55 years of age held a bachelor's degree (US Census Bureau, 1970), but by 2006, 25% of women 55 to 64 years of age, and 15% of women over 65 years of age held a bachelor's degree (US Census Bureau, 2006). However, educational levels for both sexes are increasing incrementally as men in the 55 and older age group in 1970 also had an extremely low graduation rate for bachelor's degrees at 9% (US Census Bureau, 1970), compared to a 29% graduation rate for bachelor's degrees in 2006. (US Census Bureau, 2006). Conversely, more associate degrees are held by older women than older men. In the 55 to 64-year-old age group 8% of women and only 6% of men hold associate degrees. In the 65 and older age group, there is an even wider margin of 10% women and only 7% of men holding

associate degrees (US Census Bureau, 2006). The discrepancies in education between women

and men, also, apply to the workforce.

Older Women and Men in the Workplace

Women have historically outlived men, and as the population ages the larger portion of

older adult learners will be women. The average life span for women in the United States in

1998, was 79.2 compared to 73.6 for men (US Census Bureau, 1999). Although women outlive

men, older adults in the workforce are predominately men. In 2004, 70% of the men aged 55 to

64 were in the workforce, but only 57% of the women in the same age group were working.

Although the number of women 55 to 64 years old in the workforce is lower than men of the

same age group, the number of older women working is double that of the older women working

in 1950. In the 65 and older age group 19% of men compared to 12% of women were still

working (US Census Bureau, 1999). Figure 2.5 is a comparison between men and women in the

workforce in 1950 and in 2004.

The substantial increase in working women is due in part to women who stayed in or

returned to the work place because of the higher divorce rate today, or because of the increased

longevity of women (US Census Bureau, 2004). With the increase of senior adults staying in the

workforce concerns about discrimination and agism persist. As one older student at a community

college explained, "Finding employment will be the biggest problem after I graduate…because

of my age. There is a lot of discrimination against women my age in the workforce" (Larkin, et

al., 2007, p. 16). Apparently these concerns are valid. The poverty rate in elderly women at

11.8% is almost twice that of elderly men at 6.9%. Of elderly single women including single

African American women 3.8% live in poverty compared to 10.6% of elderly married women of both races.

Older men in the workforce: 1950 and 2004

Older women in the workforce: 1950 and 2004
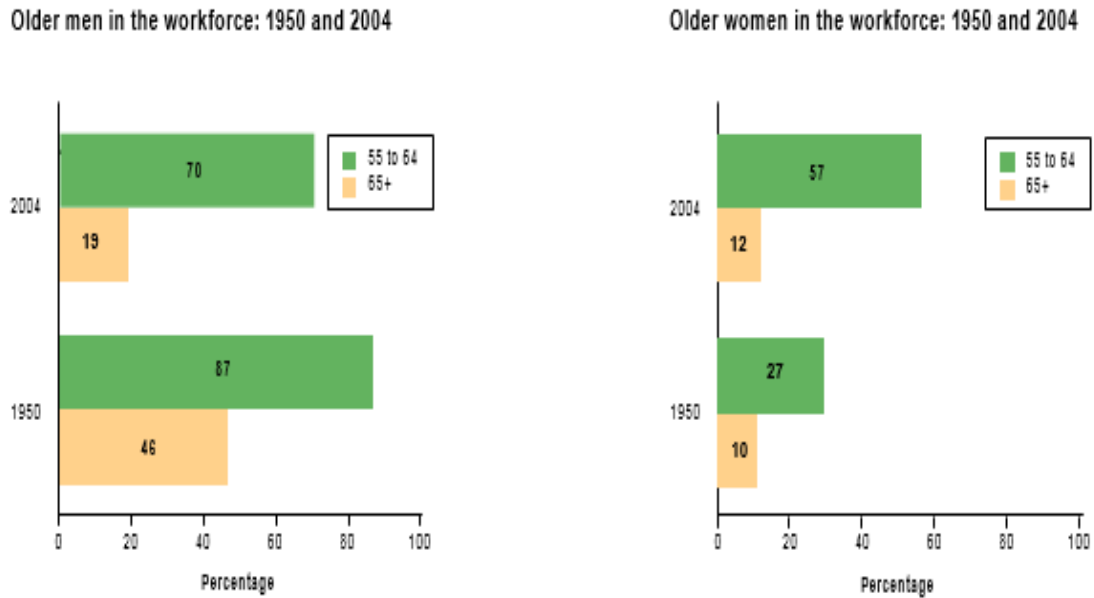
Figure 2.5 Older Men and Women in the Workplace 1950 and 2004

Adapted from Fullerton, 1999 (1950 statistics) and US Census Bureau, 2004.

Of all elderly single Caucasian women 10.3% live in poverty and 26.4% of all elderly single African American women live in poverty (Zhan & Pandey, 2002). There are many reasons that older women are more likely than older men to live in poverty. According to Zhan and Pandey (2002), women in general spend less time in the workforce compared to men, due to child bearing and child rearing responsibilities. Thus, retirement benefits that are linked to employment are decreased for women. However, women with a post-secondary education are economically more self-sufficient and independent throughout their lives which is especially important in the retirement years. Better educated women are more likely to be paid higher

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wages, be in more stable employment, and contribute more to pension plans (Henderson &

Ottinger, 1985; Hudson, 1984; Leon, 1985). Less economic stability in retirement for women of

a low educational level will compel these women to seek opportunities to enhance skills and

marketability through educational endeavors that can place them in better paying jobs and

provide needed income during retirement.

Unfortunately, employers are slow to adapt and accommodate older workers and continue

to believe outdated notions and negative stereotypes (American Association for Retired People,

2006), leaving older workers few options. One viable option available to older adults who want

to continue to work is to start their own business. One in five older workers is self-employed and

one-third of these entrepreneurs started a new business at the age of 50 or older (American

Association for Retired People, 2007). There is an increasing trend in the number of individuals

55 to 64 years old who are willing to take risks and pursue entrepreneurial endeavors during

retirement years (American Association for Retired People, 2004). As presented in Figure 2.6

seniors have diverse employment related plans after retirement, and Figure 2.7 illustrates the

percentages of seniors still in the workforce, especially the 55 to 64-year-old age group that does

not yet qualify for federal retirement benefits.
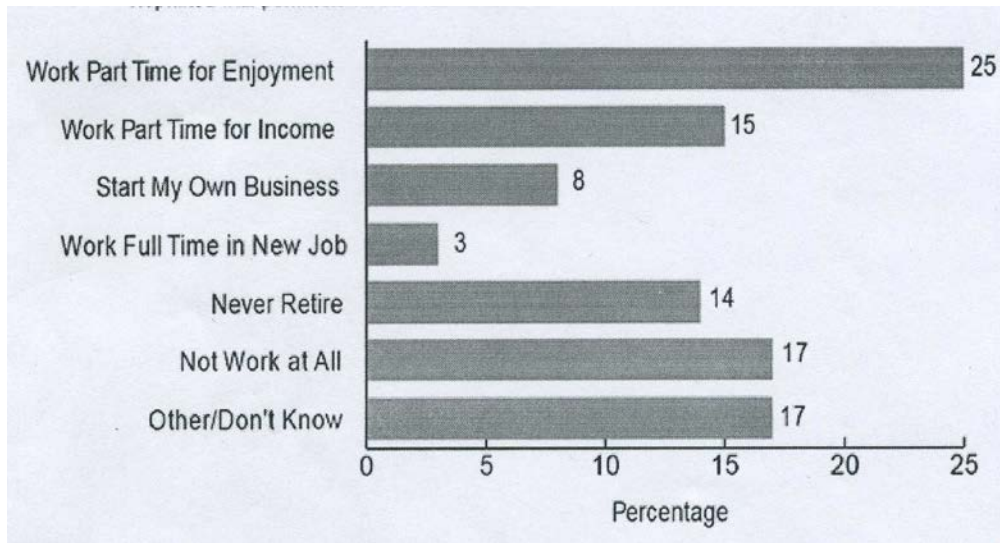
Figure 2.6 Plans to Work in Retirement

Adapted from Metlife Foundation/Civic Ventures New Work Survey 2005
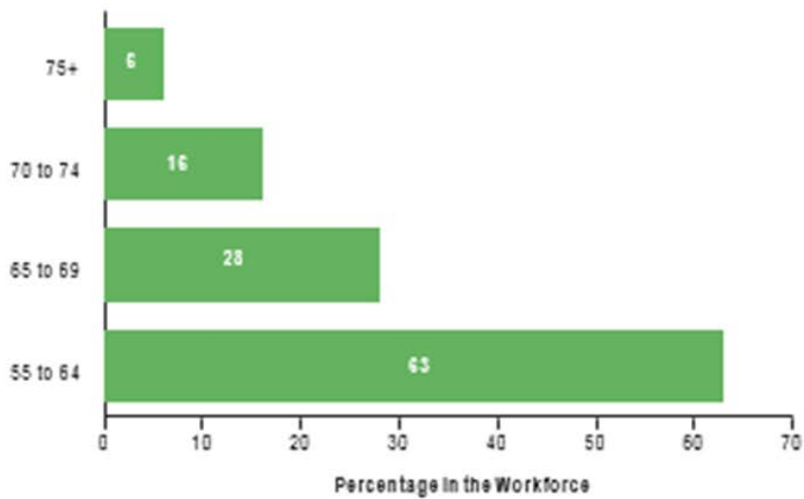
Figure 2.7 Workforce Participation Rates Among the Older Adult Population

Adapted from AARP, 2006

Older African Americans and Caucasians in Education

The number of older African Americans in attendance at institutions of higher education is increasing and will continue to do so as the peak of the current population wave reaches maturity. In 2004 approximately 9% of the 55 to 79 year-old group was composed of African Americans. By 2050 African Americans will constitute about 14% of this same age group (US Census Bureau, 2004). Comparably, the number of Caucasian Americans in the 55 to 79 age group will increase in numbers, but by 2050 Caucasian Americans will only be 57% of the 55 to 79 year olds--down from 81% in 2004 (US Census Bureau, 2004) In 2006 only 14% of African Americans 55 to 64 years of age earned a bachelor's degree, and only 11% of the age group of African Americans 65 and older had a bachelor's degree, compared to Caucasian Americans at 26% and 21% respectively. African Americans and Caucasian Americans over 55 years of age hold Associates Degrees at approximately the same rate: 6% and 7% respectively. At the high school level 86% of Caucasian Americans and 66% of African Americans in the 55 to 64-year-old age bracket graduated from high school, and in the 65-year-old and older group 80% of Caucasian Americans and 55% of African Americans held a high school diploma (US Census Bureau, 2006).

Older African American Women in Education

Older African American women face more obstacles in the pursuit of education and employment than any other segment of the senior population. Low education levels combined with low expectations of their ability to earn a living wage leaves older African American women especially vulnerable to the conditions of poverty, and therefore an impoverished retirement. Jones (2007), of The National Caucus and Center on Black Aged, described the

plight of domestic workers who still need to work after age 65, but can no longer perform physically demanding labor—leaving these workers with limited options. Even entry level jobs in health care or customer service require training and computer skills, but with lower education levels across the lifespan, it is unlikely that older African American women will have the confidence to return to an educational setting. A concerted outreach effort will be required to reach this underserved and marginalized segment of older learners.

In contrast, older African Americans in general, are more likely than older Caucasian Americans, at 63% and 47% respectively, to seek career changes that provide more meaningful employment (Larkin et al., 2007). A fulfilling job in the retirement years is even more important to seniors who, after a lifetime of experiences and knowledge, want an opportunity to give back, and leave a legacy for future generations (Kassab, 2011), but for seniors of low income, the cost of education or re-training can present a problem.

Prohibitive Costs

Price is another consideration that senior learners take into account when making the decision to pursue new learning--formal or informal. With older adults living on a limited fixed income, discounted or cost-free classes would enable more seniors to engage in formal education, and a few states agree, some to a lesser extent, but almost all states offer some form of incentives or other discounts for older students. Twenty-two states provide full tuition waivers to accommodate senior students returning to school, but most of these come with restrictions and limitations such as audit only, or non-credit classes. A few states restrict the field that an older learner can enter, or the type of institution that can be attended, and some states offer tuition waivers only to senior citizens of low income. Ten states offer discounts of up to 50% on tuition

but again, restrictions apply. The age restriction is one limitation that applies in every state, but

the age limit differs from state to state. Eight states require an older learner to be at least 65

years old, and 15 states allow waivers at 60, but California alone allows older students to be

eligible for tuition waivers starting at 50 years of age (A Senior Citizen Guide for College,

2016).

Most states have statutes requiring institutions of higher education to offer tuition waivers

and discounts to older citizens, but seven states leave the decision to the discretion of each

school's administration, and two states have no provisions for older learners at all, but ten states

offer full tuition waivers with no limitations or restrictions except that of age. Alabama is not one

of those states. Alabama offers older students, at least 60 years of age, a full tuition waiver at any

of the state's 24 two-year post-secondary schools (A Senior Citizen Guide for College, 2016).

Universities are not included in Alabama's senior citizen tuition waiver, but trade, technical, and

community colleges offering two-year associates degrees are, and credits earned at these

institutions at no cost can be transferred to universities offering four-year bachelor's and

graduate degrees. The cost of a bachelor's degree, though not tuition free, would be substantially

reduced for Alabama's older citizens.

<div align="center">**Activities of Successful Aging**</div>

Working in the Later Years

As this new generation of senior citizens redefines retirement, even the word,

"retirement" has fallen out of favor and been replaced by the term, "The Third Age" (Laslett,

1998). The Third Age is described as occurring when individuals leave the workforce and

become free to pursue personal ambitions and desires. Contrary to this picture of The Third Age,

many older adults plan to continue working and not necessarily for financial reasons. Figure 2.8 presents the percentage of seniors who continue to work well past traditional retirement age. In a study by the Pew Research Center: Social and Demographic Trends Report (Taylor, Morin, Parker, Cohn, & Wang, 2009), of those over 65 years of age 69% have a part-time or full-time job because of a desire to work, not because income is needed. Only 16% claim to work for financial reasons. In fact, 31% of working adults 65 and older plan to never stop working, and another 27% are undecided about ever leaving the workforce and retiring. Eleven percent claim to still be in the work force even though not all have jobs. The Social and Demographic Trends Report by The Pew Research Center (Taylor, et al., 2009), conducted nationwide, included 1,332 individuals who were 65 years old and older, and revealed some conflicting reports on what it actually means to be retired from work.

> …retirement means different things to different people. Some 8% of adults
> ages 65 and older say they are retired but working part-time; 2% say they are
> retired but working full-time; and 3% say they are retired but looking for work.
> Most of these retirees who are still in the workforce say the main reason they
> continue to work is that they want to, not because they need the paycheck.
> (p. 9)

The demarcation between work and retirement has become a nebulous concept at best, and can only be determined by each individual retiree, according to a personal definition. The classic definition of a retiree who no longer works, no longer applies.

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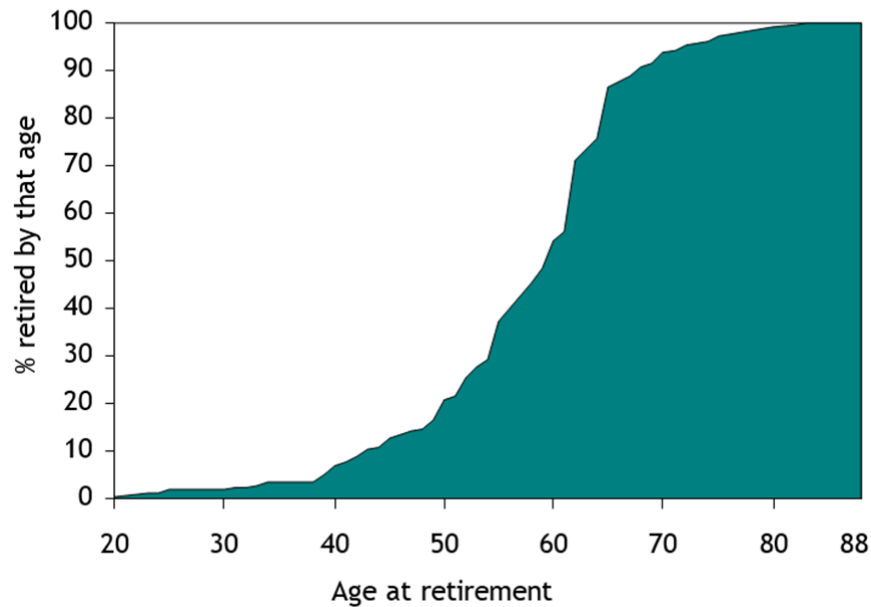
Figure 21.8 Percentage of Retirement by Age

Note: based only on those who say they are retired. Pew Research Center

The ambiguity that older adults feel towards the relationship between retirement and work may, in part, be due to the perception that older adults have towards their chronological age. According to Taylor, et al., (2009), in the Pew Research Center's Report on Social and Demographic Trends; of adults aged 65 and older, 60% claim to feel younger than their chronological age, while 32% said they feel the same as their calendar age, and only 3% said they feel older than their chronological age. As presented in Figure 2.9 the difference between the calendar age and the age an individual actually feels increases as age progresses.
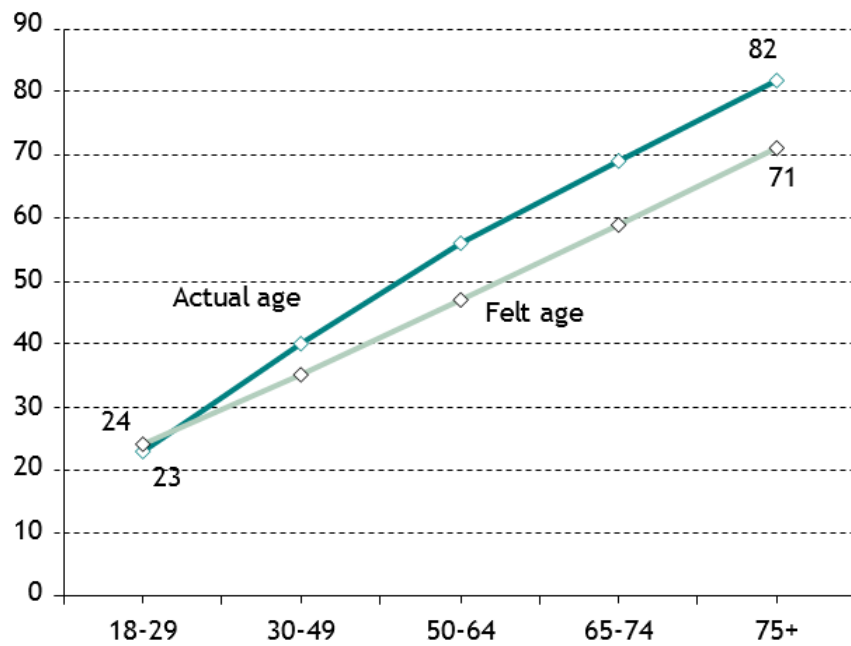
Figure 2.9 Difference Between How Old We Feel vs Actual Age

Note: Asked of all 2,969 adults in the survey. Pew Research Center

Seniors 50 to 64 years of age report feeling at least 10 years younger than their chronological age, but of the individuals aged 65 to 74 one-third said they feel 10 to 19 years younger than their chronological age, and one in six said they feel 20 years younger than their actual age. Of the study participants 65 to 74 years of age only 21% said they feel old, and of those participants 75 and older only 35% said they feel old, leaving 61%, the majority of the oldest seniors, saying they do not feel old. Figure 2.10 presents the large number of seniors who feel younger than their chronological age compared to those who feel their chronological age and the relatively few who actually feel older than their calendar age (Taylor, et al., 2009).

This phenomenon is consistent across age groups in the Pew Research Center's Report: Half of all adults said they feel younger than their actual age, with only 9% who said they feel older than their actual age, and 38% who said they feel their chronological age (Taylor, et al.,

2009). These findings could explain why older adults want new challenges and experiences late in life, and why seniors want to forgo the stereotypical life of leisure that is a common misconception of retirement.
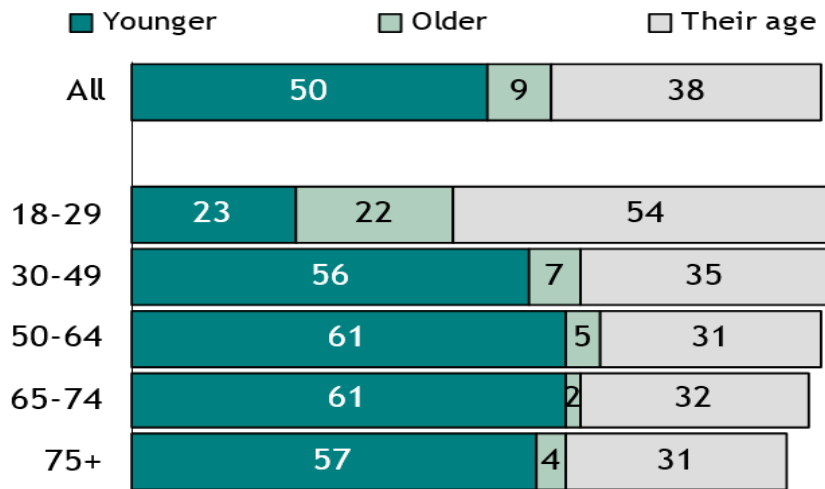
Figure 2.10 Percentage Feeling Younger, Older, or the Same as Actual Age

Note: "Don't Know/Refused" responses not shown. Adapted from the Pew Research Center

If older adults perceive themselves as 10 to 19 years younger than they actually are, age would not be a deterrent in the pursuit of long held dreams and aspirations, such as a formal education, a new career, entrepreneurship, a new life skill, hobby, or sport. The possibilities are endless, but almost all dreams and aspirations require new learning, and educators as well as educational institutions must be prepared to meet the challenges that older and elderly adult learners will create in learning environments.

Volunteerism - Giving Back

Especially appealing to many professionals from fields outside education is K-12 education. According to a 2005 survey, 20% of the 35,000 people who took alternative teaching

certification programs were 50 years old and older (Foster, 2010). Retired science, technology, engineering, and mathematics, (STEM), professionals from outside education are eager to give back by helping to develop the next generation of the STEM workforce while combining a passion for their field with additional income (Foster, 2011). The concept of "giving back" to society in later years after a wealth of knowledge and expertise is acquired, is especially popular with seniors who now have time to contribute in fulfilling and creative second careers.

Entrepreneurship

A second career is the term used for any career taken up after an initial career, but Encore Careers is a non-profit philanthropic organization that funds entrepreneurship for seniors over 60 years of age. At Encore Careers new enterprises must have a social impact in areas of public interest, such as education, the environment, health, the government sector, social service, or non-profits. Encore Fellowships transition experienced professionals from the corporate sector to the social sector and allow older adults to find fulfilling work that combines personal values and interests with meaning and income, while "giving back" and having a chance to leave a legacy. One Encore sponsored organization employed Native Americans over 50 years of age to teach their native language to children. Another Encore organization teaches environmentally sound farming practices, and another assists the disabled elderly to remain independent at home (Kassab, 2012).

Marc Freedman, founder of Encore Careers, names Al Gore as an example of the capacity people have to reinvent themselves in later years, "…Gore found himself by losing himself…and being liberated from ambition, the idea that there's a particular ladder you have to scurry up and if you don't make it to the top it's all over. Essentially he found a different ladder"

(Goodman, 2007, p. A.17). After losing the presidential nomination in 2000, Al Gore became an advocate against global warming and won a Nobel Peace Prize in 2007. Gore also went on to win a Grammy Award, an Emmy Award, an Academy Award and wrote a best-selling book, An Inconvenient Truth (nobelprize.org). The analogy of finding a different ladder is one that resonates with many older Americans. Research conducted for Encore Careers revealed that as many as nine million Americans aged 44 to 70 years old are already in second careers, and half of the nine million not already in second careers are interested in another occupation for the retirement years (Berland, 2011). Freedman built the concept of Encore Careers to fit the longer lifespans and circumstances of the 21st century's older adults. Freedman's vision also aligns with the value systems of the current cohort of elders who have successfully created social change through advocacy and awareness in younger years, and created a lasting impact on society that still exists today. Freedman also notes, "The U.S. will need experienced seniors as it…faces labor shortages in such critical areas as education and health care" (Franklin & Frick, 2008, p. 30) and the US Department of Labor (2006) reiterates this claim, stating that in 2016 the U.S. will have 47% more workers who are 55 and older than in 2006, a prediction that will increase the growth rate for seniors to five times the projected growth rate for the overall work force (Franklin, & Frick, 2008).

Formal Education in Later Years

Older adults today are an extremely diverse group (Bjorklund, 2011; Findsen & Formosa, 2011), so there are many reasons that seniors would pursue an education in later years: personal growth and development, academic interests (Perkins, & Robertson-Tchabo, 1981), intellectual stimulation (Kingston, 1982), and the desire to learn something new (Romanuik & Romanuik,

1982). In other words, learning for learnings sake. As presented in Figure 2.11 seniors participate in education for many reasons other than the attainment of a formal education. However, the completion of an academic degree or learning a new skill can fulfill lifelong aspirations of a career in a certain field, and many seniors want to update or learn new skills to stay current or make a late life career change (Dillon, Martini, & Miller, 2008). Formal education does not necessarily mean a commitment to an intense four-year bachelor's degree. Certificate level programs include certificates in information technology, health care, teaching, and other service professions which are available at local community colleges and can be completed in as little as six months, thereby preparing seniors for civic, volunteer, or employment opportunities (Dillon, et al., 2008).
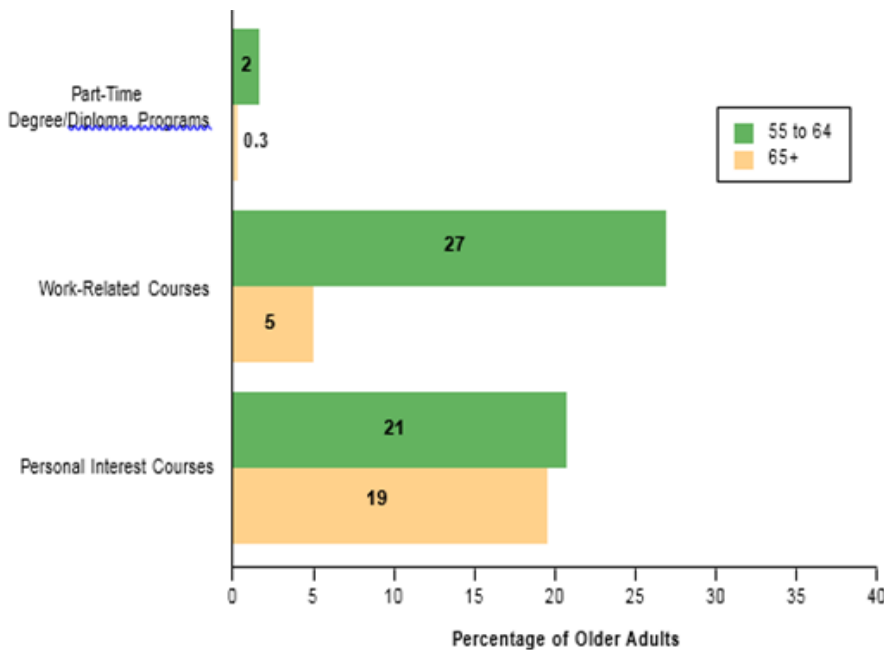
Figure 2.11 Education Participation Among Older Adults

Adapted from the U.S. Department of Education, National Center of Education Statistics, 2007.

A Successful College Transition

One north-eastern community college that has successfully integrated older learners into the school's strategic planning and sustainability has done so with a $3.2 million grant from the American Association of Community Colleges. This school has taken advantage of the availability of local resources and creatively constructed programs specifically aimed at older learners. Called the Plus 50 Initiative, matches with community, civic, and service opportunities were made by gathering focus groups and surveys of local community seniors to identify the talents and experiences of the older population. The school then offered specific courses, programs, services, and job training that the seniors needed--creating an advantageous situation for both the school and the seniors (Dillon, et al., 2008).

However, many extenuating factors were responsible for the success of the Plus 50 program, some incidental, and some more purposeful and challenging. One of the most instrumental reasons for the success of the program was the demographics of the county that the college serves. Twenty-three percent of the workforce was 55 years old or older, compared to the national rate of 3.5%, and 60% of the households in the county include at least one adult over the age of 55, which is double the national average (Smith, & Sheffield, 2003), leading college president Kathleen Schatzberg to predict, "…we look like the rest of the nation will look in 15 years" (Dillion et al., 2008, p. 44).

The college also sought out input from community leaders, and advocates for older adults. A strategic approach to recruiting students over 50 years of age targeted older workers who were in transition back to employment, and wanted to update skills in information technology, make career changes, earn a certificate, or begin a degree. As a result, short-term

flexible credit programs were developed specifically for adults who wanted to return to paid employment, and advising services for these seniors in transition was created by the student affairs department. Sustaining the new initiative also required a commitment from the entire campus staff: the president, faculty, and administration, plus workforce development leaders, human services leaders, and advocates for elders in the community. Plus 50 learners were incorporated into the enrollment management program, and the orientation process which was developed with the assistance of representatives from the Plus 50 learners who were also on college advisory boards, and committees as Plus 50 advocates. An age–appropriate curriculum was developed by faculty members to stress andragogical principles, and older adult learning styles, with stipends for faculty who integrated Plus 50 perspectives into their classes. A public relations officer, conveyed the school's commitment to older learners through proactive newsletters, senior events, success stories, outcomes, and public awareness presentations in the community (Dillon et al., 2008). The sustainability of the Plus 50 program was achieved through a commitment to the mission, strategic planning, a campus paradigm shift, structural and procedural improvements, and a message that welcomed older learners back to school.

Lifelong Learning Institutes

Another avenue of education for seniors, in a less formal environment, exists in lifelong learning institutes. As longevity in the United States increased during the 20th century, from 47 years in 1900 to 84 years in 2012, the number of Americans over the age of 65 also increased, from 3 million to 40 million, respectively (Shinagel, 2012). Other industrialized nations of the world experienced the same demographic shift. The changing demographics and compulsory retirement in industrialized nations left many older adults worldwide searching for productive

activities rather than a retirement spent in isolation and boredom (Shinagel, 2012). As policy makers and health care providers became aware of the vital connection between well-being and physical and mental decline in elders, education became crucial in keeping older adults active and engaged, thereby delaying the tax burden of large numbers dependent elderly citizens (Shinagel, 2012).

Institutions of lifelong learning, specifically for older learners, were first established in France in 1968 and relied upon a close connection to universities. The focus was on academic subjects with university teachers, teaching in university classrooms, and all at no cost to elders. Another version of lifelong learning institutes, established in Britain in 1981, was based on a more informal model, with members paying a small fee, and class subjects chosen and taught by peers, often in the homes of other members. (Villar, & Celdran, 2012). Under either the French or British model, both are now known collectively as Universities of The Third Age, or U3As, and both maintain goals of raising the level of physical, mental, social, health, and quality of life for elders (AIUTA, 2006). The success of U3As has spread to five continents, and now includes 820 separate sites and 300,000 members with a Virtual University of The Third Age launched in 2009 for isolated or homebound learners who lack involvement and a sense of community so vital to healthy aging (VU3A, 2012).

In the United States, the Bernard Osher Foundation founded the Osher Lifelong Learning Institutions, known as OLLI, in 1977. Like the French model of U3As, each site is associated with a college or university for support and volunteer leadership (Shinagel, 2012). OLLIs offer non-credit courses of interest to seniors aged 50 and older and are supported and administrated by member volunteers similar to the British model. Classes include a wide variety of topics such

as the sciences, foreign languages, hobbies, and physical fitness (Osher Lifelong Learning Institute, 2015). Classes support the needs and preferences of older learners which include the application of andralogical principles espoused by adult educators and supported by evidenced based research. The local Auburn OLLI also offers university library privileges, an opportunity to audit university credit classes, and discounts for membership in the Alumni Association, university bookstore, and university event tickets (Osher Lifelong Learning Institute at Auburn University, 2015).

The success of lifelong learning institutions in keeping older learners active and engaged is undeniable. Formosa (2010), reported that in a 2006 survey conducted by the International Association of Universities of the Third Age, the participants were motivated to join an institution of lifetime learning for two main reasons: to learn new knowledge (41%), and to make social contacts (38%); however, after joining the members reported an increase in friendships (15%), personal satisfaction (9%), self-awareness (4%), social involvement (5%), and acquiring new knowledge (17%) thus adding unanticipated benefits to the learning experience.

Also, for seniors over 50 years of age in the United States, Legacy Leadership Institutes provide 45 to 65 hours of class room training in civic engagement followed by an internship of 200 to 450 hours in a community organization. Students are then expected to become involved in a non-profit organization on a paid or unpaid basis (Villar, & Celdran, 2012), creating benefits for the individual, the organization, and the community.

Another venue for older adults is Elderhostel which originated in the United States in 1975 (Shinagel, 2012), and has now spread worldwide. Also administrated by volunteers, Elderhostel, recently renamed Road Scholars, offers seniors a liberal arts education, with support

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from an affiliation with a university through educational travel with peers, which also provides the essential social component conducive to older learning (Chen, Kim, Moon, & Merriam, 2008). According to Brady (1983), the typical Road Scholar is educated, middle-income, over 60 years of age, and in relatively good health. Chen et al. (2008), further called attention to the homogeneity of the participants in OLLI programs as predominantly Caucasian, educated, middle class, men and women, although women usually outnumber men. Formosa (2010), reports that most OLLI programs offer a limited selection of courses of interest to men, however; a review of local OLLI class selections indicated a broad range of diverse topics in Liberal Arts: literature, science, history, languages, and personal development: painting, cooking, gardening, and fitness (OLLI, Auburn, 2015). The classes offered by OLLI are not gender specific, indeed the assumption by Formosa (2010), that men would be interested in topics that would not be of interest to women is gender-biased and outdated. The fact that women outlive, and therefore out number older men is more likely to account for the larger number of older women engaged in OLLI activities (Taylor, et al., 2009).

Also, older learners are segregated from younger adults at U3As and Lifelong Learning Institutes. Elderly learners are interested in the same educational programs as younger students, though for different reasons, and should therefore be integrated into the same educational classes. Intergenerational contact also benefits both generations by reducing stereotypes about older adults, improving social skills for younger adults, and increasing the self-worth of both generations (Villar & Celdran, 2012). In fact, gender, and age are not the only inequity in lifelong learning institutions. A lack of diversity in general is also evident. Peers of lower educational and socio-economic levels, ethnic backgrounds, and frail physically dependent older

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learners are overlooked (Formosa, 2010). Yet, the concept and rationale of lifelong learning also applies to elders of diverse backgrounds: social engagement and learning opportunities reduces dependency on community resources and the concomitant costs to tax payers. Equal rights to learning opportunities requires learning institutions to make a concerted outreach effort to the marginalized members of the senior population.

Cognitive Changes in Older Adults

The Aging Brain

As normal healthy older adults experience a decrease in eyesight, hearing, and physical strength, so too does the brain undergo changes in mental processing. The loss of two percent of white matter per year throughout the brain begins at age 30 and causes the brain to lose both weight and volume. Other structural changes that contribute to cognitive changes in the cyto-architecture of the aging brain include vascular decreases in blood flow and a decrease in neuro-chemical-transmitters and the synapses (connections) used by the transmitters for neural processing (Crossley, 2008). The aging process includes a normal, gradual decrease of cognitive function in healthy adults, including processing speed, in which response time and time on tasks is slower (Salthouse, 1996), working memory, which is the retrieval of information in temporary storage (Baddeley, & Hitch, 1974), and executive functions, which are important for the higher cognitive processing involved in reasoning, and the ability to plan, monitor, activate, and manipulate new information (Cicerone, 2006). Long term memory, known as episodic memory, and short term memory, known as working memory, together have the largest effect on cognitive decline because memory is affected by other processes including the speed of retrieval and higher level executive functions. Memory decline leaves older adults with problems

remembering new information, retrieving previously learned information, such as names, and experiencing word finding problems, such as having difficulty remembering even common words (Zelinski et al., 2011).

Improving Cognitive Decline

Certain areas of the brain are particularly sensitive to age related changes. Correlations between age and cognitive changes in the brain such as reasoning, spatial visualization, episodic memory, and speed of information processing, are associated with these areas. However, vocabulary and language based functions remain intact (Kaszniak, & Newman, 2000). The forebrain and prefrontal cortex is especially vulnerable to normal age related changes, although individual differences do occur and certain individuals appear to be resilient to these normal age related changes (Woods, & Clare, 2008). Evidence exists that cognitive decline, though not completely preventable, can be reduced or even improved through a multi-faceted theoretically based cognition rehabilitation program for older adults experiencing normal cognitive decline (Zelinski, 2009), and indications are that these interventions can produce enduring improvements in memory, and performance (Winocur, Craik, & Levine, 2007), meaning that participation in new learning and educational programs can have lasting effects on memory improvement.

Studies of the use of cognitive training strategies in executive processing and speed, have demonstrated a transfer of improved cognitive skills to untrained activities (Zelinski, 2009), indicating the brain's ability to activate additional sites for neuro-cognition thus, improving cognition when applied to new activities. Also, neuroimaging has revealed increased neural activity in key frontal regions of the brain, which are associated with executive functioning, after participants performed cardio vascular training, indicating that increased blood flow to the brain

from physical exercise, increases neural activity. Increased blood flow also helps to reduce brain shrinkage and maintain brain volume (Hertzog, 2009).

In addition, studies into the cognitive benefit of social networks, group cognitive activities, civic engagement, and other social activities that engage seniors, reveal less cognitive decline than in uninvolved older adults (Zelinski et al., 2011), indicating that socializing improves cognition. Furthermore, much of the current research on the aging brain and cognitive function, discuss the protective effects of higher education in maintaining levels of cognitive performance (Stern, 2006). According to Stern (2006), higher educational levels are used as an index of cognitive reserves that can compensate for, or be protective of, normal cognitive decline. Whether higher education levels act as a reserve supply of cognitive functions, or as protection against cognitive decline is still uncertain, but the general consensus among researchers is that higher education levels in individuals equals slower cognitive decline in later years.

Neuro-Plasticity

According to Goh and Park (2009), the aging brain has the ability to expand activity by recruiting additional sites of activation in response to the effects of cognitive decline associated with advanced age, such as decreased blood circulation which causes brain shrinkage and a decrease in the number of neurotransmitters which are the chemical impulses that the brain uses for communication between brain cells which are known as neurons. Synaptic sites on each neuron then receive and transmit the neurotransmitters to the next neuron thus increasing activation sites for neural expansion and cognition. Known as neuro-plasticity, this recruitment of additional sites of activation can enable the aging brain to compensate for structural and

neurobiological decline. The two most important structural changes in the aging brain are reductions in brain volume, and cerebral cortical thickness, both caused by a loss of neurons. The cerebral cortex, also known as grey matter, is a dense layer of neurons that covers the prefrontal and frontal cortex and is responsible for higher executive level thinking such as memory, reasoning, and problem solving (Davatzikos, & Resnick, 2002; Head, Buckner, Shimony, Williams, Akbudak, & Conturo, 2004; Moseley, 2002; Raz, Lindenberger, Rodrigue, Kennedy, Head, & Williamson, 2005; Resnick, Pham, Kraut, Zonderman, & Davatzikos, 2003; Salat, Buckner, Snyder, Greve, Desikan, & Busa, 2004; Sullivan, Adalsteinsson, & Pfefferbaum, 2006; Wen, & Sachdev, 2004). The thickness of the cortex, decreases with age, and spinal fluid levels increase in the cranial cavity to replace lost brain volume as the brain decreases in size. However, compensatory mechanisms are in place to overcome cognitive decline.

Recent studies reveal that short term or working memory, the ability to maintain (store) and manipulate (process) information for short periods of time, can be improved through cognitive training. Working memory also supports more complex cognitive functions that include logical reasoning and problem solving, and is closely related to fluid intelligence which relies on deductive and inductive reasoning to solve novel problems rather than crystalized intelligence which relies on previous experiences and knowledge to problem-solve (Zinke, Zeinti, Rose, Putzmann, & Kliegel, 2014)

These recent studies assume the principles of the disuse hypothesis in that, "… cognitive decline in old age may be associated with a reliance on automatic modes of cognitive processing as opposed to frequent engagement in cognitively demanding activities" (Hultsch, Hertzog, Small, & Dixon, 1999, p.245). Kliegel, Zimprich, and Rott (2004), and Zinke, Zeintl, Rose,

Putzmann, Pydde, and Kliegel (2014), also agreed that engagement in challenging activities improves cognition in the aging brain and takes place whenever new learning is undertaken, with educational settings being prime locations for older adults to improve cognition.

The Scaffolding Theory

The scaffolding theory of cognitive aging, which is based on studies using Transcranial Magnetic Stimulation, demonstrates another compensatory mechanism that the aging brain may use when performing cognitive tasks (Rossi, Miniussi, Pasqualetti, Babiloni, Rossini, & Cappa, 2004). Older adults show activation of both right and left hemispheres of the frontal cortex (grey matter) in response to cognitive tasks, whereas younger adults use left lateralized activity (left hemisphere only) for verbal recognition, working memory, semantic processing, and memory recognition, and right lateralized activity (right hemisphere only) for face processing, spatial working memory, and episodic recall. According to the Scaffolding Theory and supported by Magnetic Resonance Imaging, older adults are able to recruit bilateral activation of both right and left hemispheres of the brain for cognitive processing which younger adults are unable to do. The aging brain responds to age related degeneration of cortical thickness and brain volume by the enhanced recruitment of frontal structures, or scaffolding, which distributes neurons across neural synaptic sites bilaterally, thus enabling older adults to use both hemispheres of the brain for cognitive tasks, rather than just using the right hemisphere for certain cognitive activities and the left hemisphere for other tasks of cognition. (Goh, & Park, 2009).

Goh and Park (2009), also indicated that the key factor in moderating the compensatory activity is engagement in activities that enhance the ability to engage in scaffolding, including engagement in novel activities such as participating in cognitive training strategies, or learning

new information, which has an impact on structural development throughout the brain. An enriched environment also promotes neuro-plasticity in older adults through novelty, and physical exercise increases brain volume by increasing vascularization (blood flow) to the brain. Goh and Park (2009), also refer to other studies that reveal promising results for the influence of lifestyle factors such as an enriched environment, physical activity, and social involvement in promoting neuro-plasticity in older adults.

Other compensatory mechanisms for age related cognitive decline have also been posited. A number of researchers (Small, Huges, Hultsch, & Dixon, 2007; Stern, 2002, 2009), have hypothesized a concept of passive and active cognitive reserves. The passive reserve is generally neuron (brain cells) and synapse number (the number of connections between brain cells), brain size and volume, cortical thickness (thickness of grey matter), and other objective indices primarily determined by genetics. The active reserve focuses on neural processing (brain speed) and synaptic organization (neural pathways) which includes the ability to reorganize neural pathways through plasticity, but both are also enhanced by environmental factors such as cognitive engagement, physical exercise, and social interactions.

Compensation is another type of active reserve in which alternate brain structures and networks can become active following brain pathology. (Dixon, Garrett, & Blackman, 2008; Lovden, Backman, Lindenberger, Schaefer, & Schmiedek, 2010). In other words, the active reserve would compensate for brain injury, stroke, or old age decline, by constructing new neural pathways through brain reconstruction (neuro-plasticity). Activities and new learning that promote neuro-plasticity need not be formal or complicated. A unique study by Boyke, Driemeyer, Gaser, Buchel, and May (2008), revealed that an activity as simple as learning to

juggle balls is associated with increased cortical thickness (grey matter) in older adults due to the visual requirement of monitoring the coordination of physical movement with active cognitive focus. Juggling is probably an extremely difficult task for older adults to master as the physical coordination and concentration necessary for juggling is challenging even for younger adults, but the benefits of learning this simple and fun activity on the executive functioning process of an aging adult brain would be invaluable.

Research studies expose participants to conditions that allow the researchers to measure differences before and after the condition was experienced. In the case of research involving cognitive functioning, the improvement measured after strategic cognitive training takes place is duplicated when older adults engage in formal or informal educational endeavors, or any experience in which new learning takes place, leading to the concept of lifelong learning as being an essential component of healthy old age.

Lifestyles and Cognitive Decline

In the 1980s a 12-year longitudinal study of the protective effects of cognitive, physical, and social activities on cognitive performance during the aging process revealed factors such as improved cerebro-vascular health, decreased neuro inflammation, and enhanced cognitive reserve, all elements that mediate the degree of brain pathology associated with normal aging (Small, McArdle, Dixon, & Grimm, 2012). The research, consisting of predominantly Caucasian women, (n-288), and men (n-196) between the ages of 55 and 85, was conducted every two years, and focused on the extent that a lifestyle of physical activities, social activities and cognitive activities acted as a buffer to age related decline in cognitive performance. A second sample of participants was begun in the 1990s with a sample of 355 women and 175 men

between 55 and 94 years of age. As a base line the participants were first tested using standardized tests to assess for verbal speed processing in a word matching scenario. Next, episodic (long term) memory was tested using word and story recall tasks; then semantic memory of details and facts was assessed using a test of recall of world knowledge for recognition. Lastly, a self-report standardized test was used to assess the frequency of everyday activities that included cognitive activities such as computer use or playing cards, physical activities such as jogging or gardening, and social activities, such as visiting friends or attending social events. Social activities in this context were measured by the number of social resources, and measures of social support (Bassuk, Glass, & Berkman, 1999; Seeman, Lusignolo, Albert, & Berkman, 2001), as well as participation in social activities (Small et al., 2012). The results of this extensive study lead the researchers to conclude that lifestyle activities in general, serve as a protective buffer from cognitive decline. Specifically, verbal speed influenced cognitive performance, episodic memory decreased with a decrease in both physical and cognitive activities, and semantic memory increased with increases in social activities (Small et al., 2012). The results of this study, especially the association between lifestyle, and active engagement in cognitive, physical, and social pursuits that lead to an improvement of cognitive performance, are consistent with current research in the field of aging and neuro-cognition.

Another longitudinal study of 1,135 adults 70 to 92 years of age examined the association between educational level and cognition, using a battery of psychological and intelligence tests to compare crystalized intelligence (previous knowledge) tasks with fluid intelligence (reasoning) tasks. Younger adults perform rote memorization tasks, considered part of fluid intelligence, at higher levels than older adults whereas, older adults rely on better verbal abilities

and judgement which are considered components of crystalized intelligence (Merriam, 2001).

Several well-known and reliable tests were administered: the SLMT (Symbol Letter Modalities

Test) a timed letter substitution task, The EMT (Episodic Memory Test) of short term recall, and

the CRT test (Choice Reaction Time). These aforementioned tests, the SLMT, EMT, and CRT

are all tests of fluid intelligence. The NART (National Adult Reading Test) a test of vocabulary,

similarities, and information, and the MMSE, (Mini Mental State Examination) to test for

evidence of dementia were administered to evaluate crystalized intelligence (Christensen,

Korten, Jorm, Henderson, Jacombs, & Rodgers, 1997).

　　　　After 3.6 years a follow-up examination was performed with the remaining participants

(483 had died or were unavailable to be interviewed). This situation is inherent in any

longitudinal study conducted with older adults and leaves researchers with internal validity

issues to overcome when participants are unavailable to complete the research. Of the remaining

652 participants those with a low educational attainment were associated with a lack of

improvement in the crystalized intelligence tests including the Mini Mental State Examination,

but not on the fluid intelligence tests, thus confirming epidemiological studies by other

researchers (Colsher, & Wallace, 1991; Evans, Becket, Albert, Herbert, & Scherr, 1993; White,

Katzman, Losonczy, Salive, Wallace, Berkman, Taylor, Fillenbaum & Havlik, 1994).

Christensen et al., (1997) concluded that, "…the findings of the present study are consistent with

the operation of a compensatory process, whereby tests reflecting expertise and knowledge show

a slower rate of change. Information, Vocabulary, and Similarities [tests] were associated with

faster decline in the less well educated" (p. 328). Christensen et al., (1997) further elaborated,

"…the effect of education may compensate for rather than protect against the effects of

biological aging" (p. 329). This study reaffirms the compensatory process taking place in the aging brain, but asserts that the process only stabilizes the crystalized intelligence in well educated people while having no effect on the fluid intelligence of either the educated or less educated participants. The conclusions drawn by Christensen et al., (1997), of a compensatory rather than protective effect of education in reducing the cognitive decline in an aging brain reaffirms the scaffolding theory of neurogenesis: the production of new brain cells in response to a demanding cognitive activity, such as new learning.

Four phases of cognitive decline in the second half of life were devised by Cohen (2005). The first phase occurs between 40 and 65 years of age during a transition when children move away and parents become, "empty nesters." Older adults begin an evaluation of life experiences and often "…a better coordination between the brain's many modules, more effective integration of the brain's hemispheres, and more efficient signal transmission throughout the brain, all of which support the more flexible and nuanced thinking characterized by post formal thought and wisdom…" (p. 102). Cohen's (2005), second phase occurs in the late 50s to early 70s. "New neuron formation in the information processing of the brain is associated with a desire for novelty…" and a "…desire to try something new" (p. 52). During the third phase, from the late 60s into the 90s, older adults try to find meaning in life and are motivated to share acquired wisdom and stories with younger generations. Cohen (2005), further stated that, "bilateral involvement of the hippocampi [used for memory storage] contribute to our capacity for autobiographical expression" (p. 53). Among other processes, the hippocampus is responsible for moving short term memory into long term memory. The final phase occurs in the late 70s until life's end. This period has identifiable changes in the brain's amygdalae which is responsible

for, among other processes, emotions and the monitoring of emotions. The amygdalae promotes positive feelings, and the investigation of new ways of viewing and interpreting those feelings. These transitional periods in the aging brain are conducive to creative activities, the exploration of new experiences, self-reflection, experimentation, and sharing wisdom (Capps, 2012; Cohen, 2005). Cohen (2005), further elaborated:

Education for older adults should incorporate a developing paradigm

that strongly points to a more flexible balanced and efficient brain,

that is identified as, …simultaneously able to integrate left and right

hemispheres, and a maturing synergy of cognition, emotional

intelligence, judgment, life experiences, and a consciousness expressed

in deepening wisdom judgment, perspective, and vision. (pp. xix-xx)

If Cohen's (2005) conception of the educational needs of older adults, and the complex mechanisms of the aging brain are true, then the need for older adults to be involved in a stimulating learning environment would be imperative, and seniors should therefore be accommodated with learning opportunities regardless of the barriers imposed by economic, cultural, physical, or any other limitations.

Another study using cognitive strategies such as rehearsal, feedback, and a gradual increase in the difficulty of tasks, examined the potential for training induced neuroplasticity of working memory in 80 adults from 65 to 95 years old. After accomplishment of the trained tasks the participants were next tested on an untrained task to determine if a transfer of improved cognitive ability could be maintained on new tasks. Working memory training produced gains in training and transfer effects in the sample of participants, thus providing further evidence of

neuro-plasticity through cognitive training interventions and the capacity to improve cognition and brain health (Zinke, et al., 2014).

Kemperman, Gast, and Gage, (2002) found increased neuro genesis (new brain cells) in older animals exposed to an enriched environment, suggesting that there is a potential to modify brain structure in old age by participating in stimulating activities. Certain aspects of the lifestyle-cognition link have been proven, others are in progress, and others have yet to be determined but, research has proven that the link between a lifestyle that includes, physical activity, social interaction, mentally challenging pursuits, and a healthy aging brain does exist. The extent and implications for older adults, especially in educational environments, cannot be understated.

Models of Aging

Erikson's Generativity

Although Erikson described Generativity as the seventh of his eight life stages of development in the 1950s, many researchers today have assigned the activities of Erikson's Generativity Model to describe older adults in the retirement years rather than at a preretirement stage of life as Erikson envisioned (Erikson, 1982). Erikson describes the Generativity Stage as one of caring and altruistic activities such as taking care of dependent individuals, educating and mentoring younger generations, providing services for the needy, or being involved in social, civil, or political activities, and contributing to society as a whole. The new generation of older adults today are in better health, more educated, and eager to contribute to the community (Villar, & Celdran, 2012), therefore; Erikson's Generativity Model now applies to retirees, rather than to an earlier pre-retirement stage of development as was the case in the 1950s. Erikson's last

developmental stage of life during the retirement years, Integrity, is described as a period of quiet reflection after a life-time of developmental challenges, and was intended as a retrospective of one's life, but the Generativity Model best describes how the current cohort of older adults prefer to spend retirement, a stage that Erikson believed should have already been undertaken in the years preceding retirement (Erikson, Erikson, & Kivnick, 1986). Coincidentally, Erikson who lived into his 90s, added another ninth developmental stage to his renowned theory on the eight developmental stages of life, when he, himself reached what is considered old-old age--75 years old and above (Ginsberg, & Lynn, 2002). The last stage is titled simply, *Hope,* and was penned by Erikson's spouse who survived him and continued his work. During the final stage of life hope and faith is intended to be "…for further grace and enlightenment" (Erikson, 1997, p. 113), but seems anticlimactic for an active life of accomplishments and endeavors.

Hierarchical Model

In response to the diversity of interests in today's older learners, Villar and Celdran (2012), have developed a hierarchical model of programs for senior learners. First, classes for personal satisfaction and enjoyment. These classes are informal and promote social and leisure activities. The second level consists classes that are educational and increase competencies, knowledge, and personal development. At the third level programs would enable elders to contribute to the social context in which they live by offering job skills, and training or credit towards a degree or certificate. The salient point of Villar and Celdran's (2012) hierarchical model is to offer a wide range of programs to fill the range of interests, needs, and abilities of the current cohort of older students, and allow older learners to enjoy the benefits of generativity that Erikson described.

Delahaye and Ehrich (2008) developed learning techniques specific to older adults using methods based on the philosophy of humanism which focuses on the individual learner's personal growth and development. Under the humanist philosophy in adult education the learner is highly motivated, self-directed, and assumes the responsibility for learning. The teacher is a facilitator, helper, or partner who promotes, but does not direct learning, unless required to do so. Experiential learning, freedom, self-directedness, empowerment, and interactive learning are all hallmarks of the humanist philosophy of adult education (Zinn, 1983).

The four general themes of Delahaye and Ehrich's (2008) learning strategies for older adult learners are called presage factors: the learning environment, methods, and facilitation techniques. First, are several presage factors that include a general feeling of anxiety and lack of confidence that most learners feel entering a new learning situation. Another presage factor is the emotional attachment to beliefs, knowledge, and world views that most individuals hold. A certain reluctance to apply new knowledge is challenging, and requires a transformation in learning. Mezirow (2000) described transformative learning as the ability to objectively critique old assumptions through critical self-reflection and rational discourse to discover a new point of view. The last presage factor is that of autonomy. Since older individuals are accustomed to setting priorities, allocating time, and exercising judgment, opportunities to plan and control learning activities should be integrated into the class (Spigner-Littles, & Anderson, 1999).

The next element of Delahaye and Ehrich's (2008) learning strategies for older learners is the learning environment. Although contrary to other researchers in the adult education field, (Chappell, Hawke, Rhodes, & Soloman, 2003; Gelade, Catts, & Gerber, 2003; Taylor. & Rose, 2005), Delahaye and Ehrich (2008) contend that older learners feel more comfortable learning

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with cohorts of the same age. However, this statement is in direct opposition to the research consensus, discussed earlier: that intergenerational learning provides benefits to both the younger and the older learners (Villar, & Celdran, 2012).

Another environmental component is one of a supportive climate and a safe non-threatening, less formal class room (Chappelle et al., 2003; Frye, 1992; Fisher, 1998). The last aspect of an environment conducive to learning for older adults is that of peer support, peer to peer learning, mentoring, and tutoring (Taylor, & Rose, 2005). Older learners also prefer active group and team exercises rather than passive learning methods. Group discussions, and discovery based content give older adults the chance for collegial learning strategies that provide a chance to share diverse life experiences and use more mature interpersonal skills (Delahaye, & Ehrich, 2008).

The methods proposed by Delahaye and Ehrich (2008) for adult educational settings include the teacher's role as that of a facilitator, rather than that of teacher. The facilitator assists learners in the construction of their own meaning of each concept presented, and enables the learner to relate each concept to real life (Spigner-Littles, & Anderson, 1999). Taylor and Rose (2005), propose that incorporating the need for structure with the learners need for autonomy can be accomplished by starting with a structured class format and slowly progressing to less structure as learners move along a continuum from low-context knowledge dependent on the instructor to develop autonomy and reach a higher level of contextual knowledge, thus becoming autonomous learners in incremental steps.

The last of Delahaye and Ehrich's (2008) learning strategies for older learners is facilitation techniques. Fisher (1998), and Spigner-Littles, and Anderson (1999), professed that

new information needs to be connected to, and built upon prior knowledge and experiences. This principle has been well researched by adult educators and was first proposed by Houle in 1953 (Houle, 1953). Prompt meaningful feedback using both informational and motivational elements and the use of thoughtful probing open-ended questions that promote learners to share knowledge with other learners (Fisher, 1998; Spigner-Littles, & Anderson, 1999).

The Gregorc Learning Style Delineator

Anthony Gregorc, an educator, developed The Gregorc Learning Style Delineator (Gregorc, 1984) in 1982 as a psychotherapeutic instrument for school counselors and advisors. The instrument is a self-analysis tool used to identify the method individuals habitually use to analyze new information. This preferred method of processing input is commonly referred to as a learning style and determines how people routinely make sense of new learning. Using information acquired from psychoanalytically based interviews, Gregorc (1984) determined participant's perceptions of learning experiences using phenomenological methods and reoccurring themes emerged. These correlations became evident from an analysis of the data and four clusters of two sets of diametrically opposed learning styles appeared: concrete and abstract learning orientations, and random and sequential ordering orientations. Concrete and abstract characteristics represent opposing styles of perceptual consciousness and sequential and random qualities represent an order of perceptions or lack of order in perceptions, respectively. The Gregorc Learning Style Delineator was built from the data obtained from these studies and is the instrument used in this study (Gregorc, 1984).

Summary

In order to build a solid foundation for the results of this research a review of the literature in areas such as the characteristics of each demographic of participants, learning obstacles and successful strategies, biological changes in cognition, and examples of other learning style models were presented as an overview of contemporary research. Influential theorists and leaders in the fields of andragogy, gerontology, neurology, and other aspects of the aging process were referenced, as input from these seemingly disparate fields was deemed necessary to unify the research questions and understand the learning needs of older adults as a distinct segment of our population. Next, Chapter 3 will introduce and explain the methods used to conduct this inquiry.

Chapter 3: Methods

Chapter 3 describes the research design and procedures used to conduct this study of the Learning Styles of Older Adults in Educational Settings. The implementation of the Gregorc Learning Style Delineator is more fully described and the purpose of the study, research questions, methods, the instrument, the sample, data collection, data analysis, and a summary are also included. The researcher (on July 25, 2013) and supervising faculty also completed Collaborative Institutional Training Initiative (CITI) program (see Appendix A), and permission was requested from and granted on March 26, 2015, by the Auburn University Institutional Review Board (IRB) to conduct this study on human participants (see Appendix B). The instrument was administered and collected directly by the researcher and transposed into statistical data for analysis also by the researcher; therefore, participant anonymity was protected throughout the entire study. All Auburn University protocols and procedures were followed as well the recommendations for administration of this research survey provided in Dr. Gregorc's book, Development, Technical and Administration Manual (1984).

Purpose of the Study

The purpose of this study was to identify the learning styles of older adults using the Gregorc Learning Style Delineator. In this study, older adults were ages 65 to 75 years or over 75 years of age. This study also identified race (African American or Caucasian), and sex (male or female) as additional variables. Data were collected from participants in university life-long learning programs, an area agency on aging, and faith-based settings. This study sought to

ascertain the learning styles that were used by older learners or groups of older learners. Learning style instruments, such as the Gregorc Learning Style Delineator, assist individuals in building an awareness or identifying learning and teaching practices that are best suited to their own cognitive abilities.

Research Questions

The following research questions were used in this study:

1. What are the learning styles of older adults in relation to age?

2. What are the learning styles of older adults in relation to sex?

3. What are the learning styles of older adults in relation to race?

Methods

In conjunction with the instrument used--the Gregorc Learning Style Delineator--the researcher also distributed a demographic questionnaire (see Appendix C) with each copy of the instrument to each participant. This demographic questionnaire requested that each participant check a box for male or female, race, White/Caucasian, Black/African American, or other, and a blank space for the participants to record their age. After the participants completed the Gregorc Learning Style Delineator and determined their numeric score for each of the four learning styles: CS (Concrete Sequential), AS (Abstract Sequential), AR (Abstract Random), and CR (Concrete Random), the participants then transposed their scores to the appropriate boxes listed on the demographic questionnaire, which included the participant's sex, age, race, and scores for CS, AS, AR, and CR. Upon completion of the Gregorc Learning Style Delineator and the demographic questionnaire, the researcher collected all of the participant's questionnaires and allowed participants to keep their copy of the Gregorc Learning Style Delineator as a resource

for future personal use. Thus anonymity was maintained throughout. Since the researcher personally administered and collected the demographic questionnaires the response rate was 100%.

<center>**Sample**</center>

Participants

The participants for this study (n=101) were purposely selected on the basis of age. The sample selection was parsimonious in that homogenous sampling took place with all participants over 65 years of age, and possessed the cognitive ability to understand the questionnaire. Geographic proximity to central Alabama also affected the sample size. The goal of the sampling selection was to replicate the study's results to the larger population to make inferences and draw conclusions specific to these demographic parameters within the general population. Age was divided into two segments of the older adult population: 65 to 74 years of age, and 75 and above. These two age segments are considered the "young old", and the "older old" (Ginsberg, & Lynn, 2002), and were therefore differentiated according to generational differences. Sixty-five years of age was chosen as a starting point for this study because at 65 years of age citizens in the United States can begin to receive Social Security benefits and medical care under the Medicare program and therefore the majority of Americans are financially prepared to retire at 65 years old. Though not mandatory, many seniors choose to retire at 65 years of age because of these benefits. Sex was defined as either male or female depending on the self-identification of the participant. No identifiers were made for participants who may be gay, bisexual, lesbian or transgender. Race was defined as either African American

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or Caucasian with an identifier for "other" racially mixed or other racial participants. However, there were no participants who identified their race as "other."

Data Collection

Participants were volunteers from the Osher Lifelong Learning Institute in Auburn Alabama (see Appendix D), The Unitarian Universalist Church in Montgomery, Alabama (see Appendix E), and the Lee-Russell Council of Governments, Area Agency on Aging (see Appendix F), during the months of April, May and June of 2015. The demographic questionnaire did not include a question identifying the location of each participant; therefore, it was not possible to determine a response rate for each location; however, since the researcher personally administered the instrument and collected all of the demographic questionnaires the response rate was 100%.

Statistical Methods

This research used a non-experimental design analysis because the researcher did not manipulate any variables. Instead correlations were used to draw conclusions regarding the incidence, distributions, and frequencies between scores on the survey. The questionnaire was designed to capture demographic information and collect information that would enable the researcher to conduct three chi squares: One for each demographic of the participants: age, sex, and race using the four constructs identified by the Gregorc Learning Style Delineator: Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR), and Concrete Random (CR).

Upon completion of the survey the data was collected and the information was compiled and exported to the Statistical Package for the Social Sciences software for the appropriate analyses

to be run for distributions and frequencies. Figure 3.1 represents the chi square calculations for the procedure.

$$x^2 = \sum\nolimits^{r} \quad \sum\nolimits^{c} \quad \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Notation:

r = row   o = observed scores

c = column   e = expected scores

i = individual   j = group

Figure 3.1 Chi Square Calculations

Source: Ross & Shannon, 2011

Instrumentation

An ipsative survey instrument, The Gregorc Learning Style Delineator, was used in this research study. Dr. Anthony Gregorc who, among many other accomplishments, is a phenomenologist who developed this instrument in 1983. Using a word association technique to determine, "… how, why, and what individuals can, will, and do learn." (Gregorc, 1984 p. 1), participants rank order, a set of four words on a continuum from four to one indicating which words best describe how the participant feels and which words most closely resemble their manner of thinking and the method in which the individual processes new information. The choices in each set of four words were designed to elicit an association from the individual as to personal preferences and the thinking pattern used to learn, store, and retrieve new information.

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Dr. Gregorc developed four learning styles based on certain learning characteristics of each individual. First, concrete sequential thinkers are based in reality and process new information in an ordered, sequential, linear manner. These learners use their physical senses of sight, sound, touch and smell to assess information and easily recall details, facts and formulas and rules. These learners are "hands on" with strong organizational skills and prefer to break large projects down into small specific steps. A quiet learning environment is needed for the concrete sequential thinker. Next, the concrete random learner, like the concrete sequential learner is based in reality, but are able to use more divergent thinking and like to experiment and use a trail-and-error approach to new learning. Concrete random thinkers use intuition which leads to more creative thought patterns and alternative viewpoints. Next, abstract random thinkers are based in a reality of feelings and emotions, and prefer an unstructured learning environment in which they can interact with others. Abstract random learners organize thoughts through reflection and have a natural ability to work with others--learning by association. Lastly, abstract sequential thinkers prefer to be alone in highly structured learning environments and enjoy theory and abstract thought to analyze information. Abstract sequential learners are logical, rational, and intellectual (Dryden, & Vos, 1993). Figure 3.2 provides a more comprehensive description of the characteristics of the four Gregorc Learning Styles.

Learning Style	Description of Learners
Concrete Sequential (CS)	Learners prefer direct hands-on experience. They like concrete examples, actual experiences and teaching techniques that present information in an orderly sequence of connected parts: for example, they prefer topic outlines to concept maps. They prefer directions from instructors and a clearly defined student/teacher relationship. They exhibit extraordinary development of one or more of the five senses. They see situations as "black and white" or "right and wrong" and want to know the best or correct way. They apply literal meaning to verbal and written communication. They are able to approach tasks consisting of discrete

	parts without knowing the "big picture" delay gratification until the job is complete, follow step by step directions and are attentive to details. They are organized, habitual, punctual, and desire perfection. They are the "doers." They display a low tolerance for distractions and are practical.
Abstract Sequential (AS)	Learners prefer to deal with abstractions and avoid direct concrete experiences in favor of simulated experiences. For example, they tend to prefer lectures to lab. They prefer techniques and activities featuring substance, structure, and sequence. They are especially adept at seeing models and the "big picture." They have excellent abilities with written, verbal, and image symbols. They like to read, listen, and use their visual skills. They expect their teachers to demonstrate expertise and authority in the classroom and to provide documentation for the ideas they present. They demonstrate good analytical and evaluative abilities. They follow guidelines reasonably well but have little acceptance of nebulous directions. They display low tolerance for distractions.
Abstract Random (AR)	Learners have a capacity to sense feelings and emotions, and use their intuition to their advantage. They prefer experiences that are subjective, affective, and abstract. They like learning options as opposed to a single fixed approach to instruction. They prefer learning in an unstructured environment, such as group discussions and activities. They prefer guidance from teachers. They are highly empathetic, can easily see the "gray" areas and see the "whole" but not the parts. They apply subjective analysis to verbal and written communications and need time to reflect and assimilate new or difficult information. They are internally motivated, expect they will perform well, and look for subjective signals of approval and disapproval. They may ignore directions and not meet deadlines. They display a reasonably high tolerance for distractions.
Concrete Random	Learners prefer concrete applications of ideas through examples and practice. They like to learn independently or in small groups using trial-and-error experiments, for example they tend to prefer labs to lectures. They prefer instructional options, alternative approaches, teachers who serve as both instructors and guides. They demonstrate insight in multiple situations and can make intuitive leaps that result in creative alternative solutions to problems. They have an extraordinary ability to form relationships. They simultaneously respond to both internal and external rewards. They are problem-solvers and are application oriented, they like change and new experiences. They dislike systematic procedures and often start a new project without reading the directions. They have creative ideas, but are not the "doers." They prefer a stimulus-rich environment and can concentrate well despite a moderate amount of distraction.

Figure 3.2 Characteristics of Learning Styles Adapted from National American Colleges &

Teachers of Agriculture Journal, December, 2000.

Learning is described by Gregorc (1984) as a process in which individuals use different combinations of all four basic methods to learn new information, but most people find themselves focusing on primarily just one style. However, this primary preference was often closely followed by a secondary style as became evident during the analysis of the scores of this research. Thirteen participants had the same score on two different dominant learning styles creating an unexpected overlap. The thirteen participant's scores were considered confounded variables and eliminated from the data analysis (Wiersma, & Jurs, 2009). Gregorc (1984) identified learning as taking place in four main domains and developed the Learning Style Delineator by using these four basic methods: learning by experience, learning by doing, learning by thinking, and learning by reflection. The word choices of all four of these d as learning methods are incorporated into the Gregorc Learning Style Delineator and are designed to elicit favorable or less favorable responses in rank order, thus defining the participants learning style by the association of key words.

The Instrument

Upon reading, making a decision, and numbering each box, four through one, for the first set of four words the participant then continues to the second set of four words until all 10 sets of words are rank ordered, four through one: four for the most preferred word association, three for the next most preferred word, two for the next preferred word, and one for the least preferred word association. The participant then sums the scores and places the total in a box which designates the participant's rating, or preference for each of the four constructs: Concrete

Sequential, Abstract Sequential, Abstract Random, and Concrete Random. Each of the learning styles were constructed to reveal an individual's sub-conscious or intuitive reaction to the words presented; therefore, revealing an assessment of each person's most preferred learning style. The highest numeric score is the most preferred learning style followed by a second most preferred style and lastly the two least preferred styles (Gregorc, 1984).

Validity

There are many types of evidence for validity. In general, the two types of validity commonly assessed are internal and external validity. "Internal validity refers to the extent to which the results of a research study can be interpreted accurately with no plausible alternative explanations" (Wiersma, & Jurs, 2009, p. 6). Internal validity can be undermined by several factors. In this study internal validity could have been threatened by social interactions between the participants which could influence the results of the data. This threat was reduced by the researcher who requested that participants not discuss the survey until after everyone had finished and by requesting that during the testing participants ask questions of the researcher rather than other participants. Another threat to internal validity occurs during administration of the instrument when social interaction between the researcher and the participants takes place. Interviewer bias can occur and affect the validity of the data. The possibility of bias can never be completely eliminated especially when attention to the participants being surveyed can affect the results of the data simply by the fact that the participants know that they are being studied.

External validity refers to the extent to which the research results can be generalized to the population at large. In the case of this study, since random selection did not take place, the

results were generalizable only to the population within the parameters of this study as defined by age, sex, race, and geographic location.

The level of confidence in the accuracy of the data collection instrument is also an indication of validity (Ross, & Shannon, 2011). Therefore, relevant to this study is an assessment of the validity and reliability of the data collection instrument--the Gregorc Learning Style Delineator. One of the most important aspects of validity is construct validity which determines whether the instrument measures what it is intended to measure (Wiersma, & Jurs, 2009). The constructs of the Gregoric Learning Style Delineator are the scores pertaining to the learning style of each participant and reveal the degree to which an individual possesses the traits associated with each learning style. The scores should provide an accurate measure of each participant's learning style.

Of primary significance to this study is a type of criterion related validity--predictive validity (Ross, & Shannon 2011), which allows the researcher to understand the degree to which each participant relates to each of the four constructs with a numeric value or score for each construct: Concrete Sequential, Abstract Sequential, Abstract Random, and Concrete Random. The scores have predictive value in assigning learning characteristics or styles to each participant and thus provide a unique teaching tool for educators and the individual by creating an awareness of learning characteristics which can then reliably be transposed to educational environments.

To evaluate the constructs of the instrument, correlation patterns among indicators of each construct should correlate highly. The strength of the predictive value of the Gregorc Learning Style Delineator to assesses the accuracy of each participant's score and evaluate the

degree to which the instrument actually predicts the participant's learning style was established

by the administration of a second self-rating test using attributes that correlate with the attributes

of the instrument. The two measures are then examined for correlation using the calculation for a

correlation coefficient. A positive correlation coefficient indicates predictive validity and future

performance (Ross, & Shannon, 2009). Gregorc's second self-rating study (n =110), when

compared to the instrument scores co-related in a range of $r = 0.55$ for Concrete Random to $r =$

0.76 for Abstract Sequential, resulting in a strong predictive validity (Gregorc, 1984).

Reliability

Reliability is the extent to which the data collection instrument yields consistent results

with minimal error (Ross, & Shannon, 2011). There are several methods to test instrument

reliability. For the purposes of this study, reliability includes consistency in the methods and

evaluation of data collection, and the extent to which the research can be replicated. Consistency

in data collection, analysis, and interpretation are known as internal reliability, while external

reliability, is the ability of other researchers, using the same methods, to be able to obtain the

same results (Wiersma, & Jurs, 2009).

To establish external reliability and repeatability Gregorc conducted a test-retest to

confirm correlation coefficients of the instrument administered at one time and again at various

intervals. Correlation coefficients between the two administrations ranged from 0.85 for

Concrete Sequential to 0.88 for Abstract Random indicating a strong degree of reliability and

repeatability (Gregorc, 1984).

The internal consistency of an instrument with a high positive index of consistency is an

indication of the reliability of the instrument (Ross, & Shannon, 2011). Gregorc's internal

consistency test for reliability, used correlations among items measuring the same construct within the instrument and resulted in standardized alpha coefficients ranging from 0.89 for Abstract Sequential to 0.93 for Abstract Random which is considered moderate to strong consistency respectively (Gregorc, 1984).

Together, validity and reliability are the basis for evaluating each measurement used (Ross, & Shannon, 2011), and establish the credibility of the researcher (Wiersma, & Jurs, 2009). "Unless an instrument measures a construct consistently, it cannot be said that it is measured accurately [validity]. Therefore, the extent to which scores are consistent tells us something about the extent to which scores…are valid" (Ross, & Shannon, 2011, p. 243). In other words, without reliability there can be no validity.

Data Collection

Included in the package of instruments for the Gregorc Learning Style Delineator, are specific guidelines to be followed when administering the survey. Recommended are the administrator's awareness and attitude towards the participant's apprehension of taking the survey, and the administrator's control of the test-taking environment to ensure that any disturbances or noise are kept to a minimum while participants quietly reflect and consider each word. A copy of the tri fold Gregorc Learning Style Delineator survey with the researcher's demographic questionnaire (see Appendix C) inserted were distributed to each of the participants with pencils provided, and everyone was instructed to open the instrument at the same time. Directions of how to fill out the instrument and the demographic questionnaire were then read aloud to the participants and any questions were addressed. Participants were instructed to react quickly to the word choices and respond instinctively rather than mull over each word choice. A

quick reaction indicates a connection with the participant's actual thoughts or feelings and captures the inner processes of the mind. Administrators are cautioned that occasionally a participant may ask for the definition of a word on the instrument. This is to be expected, according to Dr Gregorc; however, if a participant does not know the meanings of several of the word choices, the participant's results would be questionable (Gregorc, 1984), and could jeopardize the validity of the results. In order to ensure validity this researcher would discard any data from participants who requested a definition numerous times. Although, participants at every site often asked the researcher for a word definition no one particular individual asked for a definition several times, and no data was eliminated or questionable; therefore, maintaining validity.

Upon completion of the instrument several participants needed assistance in scoring and transposing the scores to the demographic questionnaire. Participants shared their scores with other participants and discussed results with the researcher as the researcher collected the demographic questionnaires and reminded the participants that there is no correct or incorrect learning style and directed their attention to a chart with a more detailed style comparison listed on the back of the instrument which the participants were allowed to take home and peruse at their leisure.

Data Analysis

The data results from the demographic questionnaire were entered into the Statistical Package for the Social Sciences (SPSS). Frequencies and three chi squares were performed on each of the four constructs of the Gregorc Learning Style Delineator: Concrete Sequential, Abstract Sequential, Abstract Random, and Concrete Random. The quantitative data collected

measured the numeric scores on the survey and the chi squares provided correlations between the demographic questionnaire and scores on the Gregorc Learning Style Delineator, allowing the researcher to determine the dominant learning style for each particular variable: sex, race, and age.

Summary

Chapter 3 has provided a detailed description of the procedures used in conducting this research. Information on the sample of participants, the site locations of each group of participants, the methods used to collect the data, statistical information including validity and reliability concerns, and a description of the instrument, the Gregorc Learning Style Delineator, which included an analysis of the reliability and validity of the instrument (Gregorc, 1984). The statistical methods, formula, and analysis of the data were all explained in sufficient detail to allow duplication of the research. The research design also provided viable data, yielding important information on the dominant learning style of older adults in relation to age, sex, and race, including how older adults prefer to learn: Invaluable information to both educators and older adult learners. Chapter 4 will next discuss the findings of the statistical analysis described in this chapter.

Chapter 4: Findings

In Chapter 4 the statistical results of this study are provided to identify the learning style preferences of each group of participants and answer the three specific research questions regarding age, sex, and race. Chapter 4 is organized in terms of the three specific research questions posed in Chapter 1 and conveys the results of the data analysis in either narrative or table format with major findings highlighted and briefly summarized. Topics include: demographic results, statistical frequencies, results by age, sex, and race, chi squares, the results, and a summary.

Purpose of the Study

The purpose of this study was to identify the learning styles of older adults using the Gregorc Learning Style Delineator. In this study, older adults were ages 65 to 75 years or over 75 years of age. This study also identified race (African American or Caucasian), and sex (male or female) as additional variables. Data were collected from participants in university life-long learning programs, an area agency on aging, and faith-based settings. This study sought to ascertain the learning styles that were used by older learners or groups of older learners. Learning style instruments, such as the Gregorc Learning Style Delineator, assist individuals in building an awareness or identifying learning and teaching practices that are best suited to their own cognitive abilities.

Research Questions

The following research questions were used in this study:

1. What are the learning styles of older adults in relation to age?

2. What are the learning styles of older adults in relation to sex?

3. What are the learning styles of older adults in relation to race?

Demographic Results

Population Characteristics

One-hundred and one participants were surveyed for this research study using the Gregorc Learning Style Delineator. Participants were recruited from the Osher Lifelong Learning Institute at Auburn University, Auburn AL, the Unitarian Universalist Fellowship of Montgomery AL, and the Lee-Russell Council of Governments Area Agency on Aging, Opelika AL between the months of March and April of 2015. The only requirement to volunteer for the study was that all participants must be 65 years of age and older.

Statistical Frequencies

Of the 101 participants, 72 or 71.3% identified as female and 29 or 28.7% identified as males. The largest demographic of participants at 79 or 78.2% identified as Caucasian, and 22 or 21.8% identified as African American. In the category of age 71 or 70.3% of the participants were 65 to 75 years of age and far outnumbered the 30 or 29.7% participants who were over age 75. The sample population was predominantly female, predominantly Caucasian, and in the 65 to 75-year-old age category.

Learning Style Frequencies

As presented in Table 1 of the four learning styles described by Gregorc, Concrete

Sequential was the most preferred learning style among all participants (n = 39). The scores for

Abstract Random, Concrete Random, and Abstract Sequential were evenly spread among the

remaining 49 participants. Of the 101 participants 13 had two identical scores on the survey.

Rather than having one dominant learning style, these participants had equal scores on two

dominant learning styles. Data from these participants were not included in the data analysis

leaving the total number of participants at 88 (n = 88). This reduction in n was accounted for in

the statistical results of Style Preferences reported in Table 1.

Table 1

Gregorc Learning Style Preferences

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Concrete Sequential	*39*	*38.6*	*44.3*	*44.3*
Abstract Sequential	*14*	*13.9*	*15.9*	*60.2*
Abstract Random	*18*	*17.8*	*20.5*	*80.7*
Concrete Random	*17*	*16.8*	*19.3*	*100*
Total	*88*	*87.1*	*100*	
Missing	*13*	*12.9*		
Total	*101*	*100.0*		

What are the Learning Styles of Older Adults in Relation to Age?

The chi square analysis for the learning style differences between participants 65 to 75, and 76 and above, revealed a two-sided significance of $X^2 = .760$ which is $> .05$ indicating no statistical significance in the distribution of learning styles in regard to the two age groups. Table 2 lists the observed counts and expected counts by age group for each learning style of the Gregorc Learning Style Delineator. The learning style differences by age were relatively evenly spread for each age group, with Concrete Sequential being the preferred style for each group.

Table 2

Gregorc Learning Style Delineator Results by Age

Age	Count	Learning Styles			
		CS	AS	AR	CR
65-75	Count	28	8	13	12
	Expected Count	27.0	9.7	12.5	11.8
76 and Above	Count	11	6	5	5
	Expected Count	12.0	4.3	5.5	5.2

What are the Learning Styles of Older Adults in Relation to Sex ?

The chi square analysis for the learning style differences between male and female participants revealed a two-sided significance of $X^2 = .579$ which is $> .05$ indicating no statistical significance in the distribution of learning styles in regard to the sex of the participants. The female participant's scores were evenly spread with the exception of Concrete Sequential which

was the preferred learning style for both sexes. The males scores were the most evenly spread

among all participants with Concrete Sequential preferred over Abstract Random by only 2

individuals. Table 3 presents the counts and expected counts by sex for each learning style of the

Gregorc Learning Style Delineator.

Table 3

Gregorc Learning Style Delineator Results by Sex

Sex	Count	Learning Styles			
		CS	AS	AR	CR
Female	Count	30	9	11	11
	Expected Count	27.0	9.7	12.5	11.8
Male	Count	9	5	7	6
	Expected Count	12.0	4.3	5.5	5.2

What are the Learning Styles of Older Adults in Relation to Race?

The chi square analysis for the learning style differences between Caucasian and African

American participants revealed a two sided significance of X^2 = .026 which is <.05 indicating

statistical significance in the distribution of learning styles between the two racial groups. In this

case, a X^2 =.026 is important because the implication is that there are statistically significant

differences in the learning styles of African Americans compared to Caucasians, and that the

observed results actually reflect the characteristics of the participants and are not due to a

sampling error (Wiersma, & Jurs, 2009). The learning style preferences were more evenly

spread with Caucasian participants than with African American participants; however, Concrete

Sequential was the preferred learning style for each group. Table 4 presents the counts and

expected counts by Caucasian and African American participants for each learning style

construct of the Gregorc Learning Style Delineator.

Table 4

Gregorc Learning Style Delineator Results by Race

Race	Count	Learning Styles			
		CS	AS	AR	CR
Caucasian	Count	25	12	13	17
	Expected Count	29.7	10.7	13.7	12.9
African American	Count	14	2	5	0
	Expected Count	9.3	3.3	4.3	4.1

Chi Square Tests

The chi square results, as presented in Table 5 yielded values of: age X^2 =.760, sex = .579

and race at X^2 =.026. These values were compared to the alpha level of < 0.05 and with a chi

square of .026 only the African American and Caucasian groups reached statistically significant

values in this study of differences in learning styles using the Gregorc Learning Style Delineator.

Table 5

Chi Square Values of Age, Sex, and Race

		Value	df	Asymptomatic Significance (2-sided)
Age	Pearson Chi Square	1.173	3	.760
Sex	Pearson Chi Square	1.967	3	.579
Race	Pearson Chi Square	9.295	3	.026

Phi Coefficients

The Phi coefficient is a measure of association between nominal variables. Table 6 presents a comparison of Phi coefficients with the chi square analyses which were all of equal values; however; none reached statistical significance (p <.05) except the chi square for race at .026. The Phi coefficients for age at .760 and sex at .579 indicated a relatively weak and weak positive association respectively. Only the African American and Caucasian groups reached statistically significant values in this study of differences in learning styles using the Gregorc Learning Style Delineator. Therefore, the differences in learning styles between African Americans and Caucasians must be considered in multi-racial learning environments.

Table 6

Measures of Association of Chi Squares and Phi Coefficients

	Phi Coefficients	Chi Squares	Phi Values
Age	.760	.760	.115
Sex	.579	.579	.150
Race	.026	.026	.325

Results

To determine the differences in the learning style preferences of the variables age, sex, and race, three two-sample chi square analyses were conducted on the three independent samples. Each variable had two levels: sixty-five to seventy-five years of age, and over seventy-five years of age, male/female, and African American/Caucasian. An alpha level of < 0.05 was used to determine statistical significance as is standard for research in the social sciences, and three degrees of freedom (df) were used for each chi square analysis.

Summary

In this research study the statistical analysis clearly indicated that there was no difference in learning styles in regard to age or sex. In answer to question one, "What are the learning styles of older adults in relation to age?" There was no statistically significant difference in the learning styles of young-older adults aged 65 to 75 and old-older adults aged 76 and above at $X^2 = .760$. In answer to question two, "What are the learning styles of older adults in relation to sex?" There was no statistically significant difference in learning styles in relation to male or female at X^2

=.579. In answer to question three, "What are the learning styles of older adults in relation to race?" There was a statistically significant difference between African Americans and Caucasian older adults at X^2=.026. The chi square analysis for race did reach statistical significance suggesting that Caucasian and African American participants differed in learning style preferences. A deeper analysis of the findings and a detailed summary will be discussed further in Chapter 5 with implications of the results and recommendations for future research.

Chapter 5: Summary, Conclusions. Implications,

and Recommendations for Future Research

Research Questions

The following research questions were used in this study:

1. What are the learning styles of older adults in relation to age?

2. What are the learning styles of older adults in relation to sex?

3. What are the learning styles of older adults in relation to race?

Summary

Learning Styles of Older Adults in Educational Settings is an examination into the learning styles of the baby boomer generation who are now entering retirement. With typical retirement at 65 years of age and life expectancy now 80 to 85 years of age, millions of retirees will have fifteen to twenty years of healthy retirement to fill. This change has created a new demographic of older adults--baby boomers. Today's seniors want to be productive during retirement and many plan to use those years to fulfill dreams and goals postponed during child rearing years, or when careers took priority. The activities seniors want to pursue will require further education, training, or new learning and millions of older adults will be entering learning environments to acquire the skills necessary to remain active and engaged during the retirement years (Narushima, Liu, & Diestelkamp, 2013; Parks, Evans, & Getcg, 2013).

Studies reveal that remaining actively involved in life and pursuing new learning experiences promotes not only a longer life but, a healthier, more fulfilling, and meaningful life in the senior years, reducing the dependency on social services and thus taxpayers (Pew Research Center, 2009). Universities, community colleges, technical, and trade schools, as well as civic organizations, government agencies, and non-profit organizations must be prepared to meet the learning needs of this new demographic of older adults who will be entering retirement and seeking educational opportunities that will allow them to fully participate in a healthy lifestyle, both mentally and physically. This study was conducted to determine the learning style preferences of older adults, and will provide information for educators and instructors to adapt to the needs of this new demographic of learners. Participants were surveyed by age, race, and sex using the four constructs of the Gregorc Learning Style Delineator: Concrete Sequential, Abstract Sequential, Concrete Random and Abstract Random.

Three chi square analyses were conducted to assess the learning preference of each of the participants according to each category of age, sex, and race with results indicating categorical preferences. Learning style preferences showed no statistical significance between different ages and sexes. However, the difference between the learning style preferences by race was statistically significant. Individual characteristics vary, but this research provides generalizations as a guideline to assess learner needs and will be of vital importance to the success of new learning for our older adult population especially in racially diverse learning environments.

Conclusions

The number of older Americans is increasing exponentially and the US must contend with numerous challenges in meeting the learning needs of this diverse group of seniors.

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Strategic planning and implementation of learning strategies specifically for older learners is of major concern to educators and integral to the success of the older learner in educational settings.

The Gregorc Learning Style Delineator was selected as the instrument to conduct this study of the learning style preferences of older adults by sex, age, and race. However, the statistical results of this study indicated no statistically significant differences between participants of different sexes or ages. A statistically significant learning style difference between African American and Caucasian participants was found. The differences or lack of differences in learning styles among these groups of participants could be attributed to the limitations of this study, or any number of other factors beyond the scope of this research.

However, a similar study by Truluck and Courtenay (1999), also found no statistical significance in learning style preference between older adults in regard to sex or age groups. Using Kolb's (1985) Learning Style Inventory, and 172 participants, the researchers divided the older adults into three age groups: 55 to 65 years old, 66 to 74 years old and over 75 years old. A chi-square analysis of the association between sex and learning style revealed no statistical significance; moreover, each of the three age groups did differ in their learning style preference, though not at statistically significant levels. The 55 to 65-year-old age group preferred Kolb's Accommodator learning style, the 66 to 74-year-old group preferred the Diverger learning style, and the 75 and over age group preferred the Assimilator learning style (Truluck & Courtenay, 1999). Although Truluck and Courtenay used a different learning style instrument, a similar population, and data analysis revealed similar results: no statistical significance in regard to sex or age. Race was not considered in Truluck and Courtenay's research, but speculation would lead

to an assumption that a statistical significance between races could have been reached as was the case in this researcher's findings.

<div align="center">**Implications**</div>

Educator Implications

In this study the results from the Gregorc Learning Style Delineator identified the learning style preferences of participants in regard to sex, age, and race and will allow educators and instructors to develop a broader understanding of learning style needs. These learning styles needs could be incorporated into the Needs Assessment phase of the generic instructional design model, ADDIE (Assess needs, Design lessons, Develop classes, Implement lessons, and Evaluate classes). Participants in this study were considerably more Concrete Sequential (n =39). Abstract Random had the next greatest frequency (n=18), Concrete Random was less frequent (n =17), and Abstract Sequential was the least frequent (n =14).

The results of this study indicate that most older learners of either sex and Caucasians or African Americans are Concrete Sequential learners which leads to a recommendation of teaching directed to the Concrete Sequential learning style. However, as evidenced-based teaching suggests a variety of teaching strategies incorporated into every learning experience will enhance the learning process for learners (Buskist & Groccia, 2011).

Being aware of the constructs of the Gregorc Learning Style Delineator will also allow educators and instructors to evaluate the learning characteristics of individual students and modify classroom structure and lessons to include learning strategies to best facilitate learning that includes different learning styles.. Figure 5.1 suggests teaching methods that match each of the four constructs of the Gregorc Learning Style Delineator.

Concrete Sequential

- Use models and drawings
- Use direction sheets
- Ordered presentations and lectures
- Workbooks and lab manuals
- Hands-on building projects
- Programed or computer assisted instruction
- Structured field trips

Abstract Sequential

- Reading assignments
- Well organized and meaningful lectures
- Audiotapes and CD,s
- Debates

Abstract Random

- Group discussion
- Short reading assignments followed by class activities
- Small group discussions
- Audiovisual programs
- Assignments that permit reflection and thinking time

Concrete Random

- Trial and error
- Games and simulations
- Independent study projects
- Optional reading assignments
- Mini-lectures that set up a problem situation

NACTA Journal, 2000.

Figure 5.1 Teaching Strategies to Match Gregorc Learning Styles

Source: National American Colleges and Teachers of Agriculture Journal, 2000.

Participant Implications

The different learning styles developed by Anthony Gregorc are intended to guide individuals in becoming more self-aware and thus enable the participant a better understanding of themselves, how they learn new information, and problem solve. This identification of a particular learning preference to gain new information and knowledge allows older adults to apply the characteristics of their dominant learning style to any type of learning environment. The participants also develop a more complete concept of themselves and their world view and are able to apply their individual learning style to any future endeavors in educational programs, classes, lessons, training, or any situation that requires new learning

Each participant was also allowed to retain their copy of the Gregorc Learning Style Delineator with a 14 item in-depth description of each learning style provided on the back of every survey for participants to review later and assess their score in-depth, thus allowing participants to fully benefit from the evaluation experience. The tri-fold Gregorc Learning Style Delineator also considerately provides a graph for participants to chart their scores for a visual representation of their learning style rather than a numeric rating. The graph provides a visual scale for the participants to determine how their dominant learning style aligns with the other learning styles. An awareness of their preferred learning style and the information included with the survey can build confidence and empower older adults to continue to contribute to society in a fulfilling and meaningful manner.

Recommendations for Future Research

The identification and familiarization of different learning styles will also allow educators to apply specific learning strategies to teaching practices. The information provided in

this study will not only assist learners and educators, but administrators, policy makers, community leaders, faith-based organizations, and non-profits will benefit from an understanding of different methods to develop class structure that accommodates the learning needs of older employees, volunteers, and students in a wide variety of learning environments.

In accordance with the findings of this research a deeper investigation into the results of this study would be invaluable in determining the rationale behind the similarities and dissimilarities in the groups of participants. For example, no statistical significance was found between the learning style preferences of older males and females, or between the young-old and the older-old participants. The inherent cognitive differences between men and women are well-documented and somewhat understood, yet the findings of this study revealed that learning style preferences are not dissimilar. Why? Further research could provide evidence of similar cognitive patterns in older men and women. The similarities between the two generations of baby boomers—the young-old and the older-old—are also recommended for further investigation. The "generation gap" is a well-known discrepancy between generations, yet this study found no significant differences in learning styles. Why? The conjecture that perhaps we are all more alike than different is a possibility, but requires more evidenced based inquiry.

Future research could also expand on this study by increasing the sample size, extending the geographical area to urban areas, or other regions of the United States and diversifying the racial composition. African Americans and Caucasians participated in this study, but additional Asian, Hispanic, and other minority populations would further enhance an understanding of the possible racial differences in learning styles. Also, as an expansion of the findings in this study a focus on the learning preferences of older Americans would broaden the scope of the

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investigation of learning styles and lead to more successful teaching modalities that could better adapt to our aging population. Therefore, an investigation into the factors that underlie the results of this study would be recommended for future research.

Another recommendation worthy of investigation is research into the learning styles of marginalized groups of our aging society. Trans-gender, gay, and lesbian individuals, new immigrants, nursing home residents, frail or physically challenged individuals, and the incarcerated would all benefit from an assessment of their learning style while adding to the scientific body of knowledge on older learners and their impact on our future.

Evidence exists that individuals of certain occupations have similar learning styles (Wenham & Alie, 1992). Future studies of the learning styles of older adults by occupation or previous job should reveal an association between job and learning style. Ginsberg (2002) included marital status and education level in her study of learning styles and older adults using Kolb's Learning Style Inventory Version 3 and phenomenological methods. Future studies using the more definitive Gregorc Learning Style Delineator and older participants grouped by educational level could reveal significant differences.

As Erik Erikson so succinctly expressed in his 1986 book, *Vital Involvement in Old Age,* "Can we now progress to a genuine valuing of old age with rights and responsibilities appropriate to the summing up of a life-time" (p. 305)? Indeed, these words although expressed 30 years ago resound today. Perhaps, as baby boomers change our conception of old age, as they have for each life stage that they have transitioned through and redefined by their sheer numbers, a new paradigm for the last stage of life will come into existence.

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Appendix A

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details.
See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:**   Judy Heenan (ID: 4221599)
- **Email:**   jah0086@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:**   ESL
- **Phone:**   334-734-4662

- **Curriculum Group:**   IRB # 2 Social and Behavioral Emphasis - AU Personnel (Blue) - Basic/Refresher
- **Course Learner Group:**   Same as Curriculum Group
- **Stage:**   Stage 1 - Basic Course
- **Description:**   Choose this group to satisfy CITI training requirements for investigators and staff involved primarily in
                               Social/Behavioral Research with human subjects.

- **Report ID:**   13313851
- **Completion Date:**   06/23/2014
- **Expiration Date:**   06/23/2017
- **Minimum Passing:**   80
- **Reported Score*:**   93

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
The Federal Regulations - SBE	06/23/14	5/5 (100%)
Assessing Risk - SBE	06/23/14	5/5 (100%)
Informed Consent - SBE	06/21/14	5/5 (100%)
Privacy and Confidentiality - SBE	06/21/14	5/5 (100%)
Students in Research	06/22/14	8/10 (80%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research	06/23/14	3/3 (100%)
Belmont Report and CITI Course Introduction	06/21/14	3/3 (100%)
Internet-Based Research - SBE	06/23/14	5/5 (100%)
Records-Based Research	06/23/14	1/2 (50%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution
identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details.
See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:**   Judy Heenan (ID: 4221599)
- **Email:**   jah0086@auburn.edu
- **Institution Affiliation:**   Auburn University (ID: 964)
- **Institution Unit:**   ESL
- **Phone:**   334-734-4662

- **Curriculum Group:**   IRB # 2 Social and Behavioral Emphasis - Non-AU Personnel (Blue)
- **Course Learner Group:** Same as Curriculum Group
- **Stage:**   Stage 1 - Basic Course
- **Description:**   Choose this group to satisfy CITI training requirements for investigators and staff involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:**   13303283
- **Completion Date:**   06/22/2014
- **Expiration Date:**   06/22/2017
- **Minimum Passing:**   80
- **Reported Score*:**   91

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction	06/21/14	3/3 (100%)
Informed Consent - SBE	06/21/14	5/5 (100%)
Privacy and Confidentiality - SBE	06/21/14	5/5 (100%)
Students in Research	06/22/14	8/10 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Judy Heenan (ID: 4221599)
- **Email:** jah0086@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 564)
- **Institution Unit:** ESL
- **Phone:** 334-734-4562

- **Curriculum Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel (Blue) - Basic/Refresher
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for investigators and staff involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 13313851
- **Report Date:** 01/30/2015
- **Current Score**: 93

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Students in Research	06/22/14	8/10 (80%)
Belmont Report and CITI Course Introduction	06/21/14	3/3 (100%)
Records-Based Research	06/23/14	1/2 (50%)
The Federal Regulations - SBE	06/23/14	5/5 (100%)
Assessing Risk - SBE	06/23/14	5/5 (100%)
Informed Consent - SBE	06/21/14	5/5 (100%)
Privacy and Confidentiality - SBE	06/21/14	5/5 (100%)
Research with Prisoners - SBE	06/22/14	No Quiz
Internet-Based Research - SBE	06/23/14	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research	06/23/14	3/3 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
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Phone: 305-243-7970
Web: https://www.citiprogram.org

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details.
See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Judy Heenan (ID: 4221599)
- **Email:** jah0096@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** FSI.
- **Phone:** 334-734-4652

- **Curriculum Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel (Blue) - Basic/Refresher
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 13313851
- **Completion Date:** 06/23/2014
- **Expiration Date:** 06/23/2017
- **Minimum Passing:** 80
- **Reported Score*:** 93

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
The Federal Regulations - SBE	06/23/14	5/5 (100%)
Assessing Risk - SBE	05/23/14	5/5 (100%)
Informed Consent - SBE	06/21/14	5/5 (100%)
Privacy and Confidentiality - SBE	06/21/14	5/5 (100%)
Students in Research	06/22/14	8/10 (80%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research	06/23/14	3/3 (100%)
Belmont Report and CITI Course Introduction	06/21/14	3/3 (100%)
Internet-Based Research - SBE	06/23/14	5/5 (100%)
Records-Based Research	06/23/14	1/2 (50%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing Institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)
COURSE IN THE PROTECTION HUMAN SUBJECTS CURRICULUM COMPLETION REPORT
Printed on 09/12/2014

LEARNER	Maria Witte (ID: 1023258) 4036 Haley Center Auburn University AL 36849 USA
DEPARTMENT	Educational Foundations Leadership and Technology
PHONE	334-844-3078
INSTITUTION	Auburn University
EXPIRATION DATE	09/11/2019

SOCIAL/BEHAVIORAL RESEARCH COURSE : Choose this group to satisfy CITI training requirements for investigators and staff involved primarily in biomedical research with human subjects.

COURSE/STAGE:	Refresher Course/2
PASSED ON:	09/12/2014
REFERENCE ID:	11547857

REQUIRED MODULES	DATE COMPLETED	SCORE
SBE Refresher 1 – Defining Research with Human Subjects	09/12/14	2/2 (100%)
SBE Refresher 1 – Privacy and Confidentiality	09/12/14	2/2 (100%)
SBE Refresher 1 – Assessing Risk	09/12/14	2/2 (100%)
SBE Refresher 1 – Research with Children	09/12/14	2/2 (100%)
SBE Refresher 1 – International Research	09/12/14	2/2 (100%)
Biomed Refresher 2 - Instructions	09/12/14	No Quiz
SBE Refresher 1 – History and Ethical Principles	09/12/14	2/2 (100%)
SBE Refresher 1 – Federal Regulations for Protecting Research Subjects	09/12/14	2/2 (100%)
SBE Refresher 1 – Informed Consent	09/12/14	2/2 (100%)
SBE Refresher 1 – Research with Prisoners	09/12/14	2/2 (100%)
SBE Refresher 1 – Research in Educational Settings	09/12/14	2/2 (100%)
SBE Refresher 1 – Instructions	09/12/14	No Quiz
Biomed Refresher 2 – History and Ethical Principles	09/12/14	3/3 (100%)
Biomed Refresher 2 – Regulations and Process	09/12/14	2/2 (100%)
Biomed Refresher 2 – Informed Consent	09/12/14	3/3 (100%)
Biomed Refresher 2 – SBR Methodologies in Biomedical Research	09/12/14	4/4 (100%)
Biomed Refresher 2 – Genetics Research	09/12/14	2/2 (100%)
Biomed Refresher 2 – Records-Based Research	09/12/14	3/3 (100%)
Biomed Refresher 2 - Populations in Research Requiring Additional Considerations and/or Protections	09/12/14	1/1 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Prisoners	09/12/14	2/2 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Children	09/12/14	3/3 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Pregnant Women, Human Fetuses, Neonates	09/12/14	2/2 (100%)
Biomed Refresher 2 – Conflicts of Interest in Research Involving Human Subjects	09/12/14	3/3 (100%)
Auburn University	09/12/14	No Quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid Independent Learner. Falsified information and unauthorized use of the CITI Program course site is unethical, and may be considered research misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Program Course Coordinator

Appendix B

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS
REQUEST FOR EXEMPT CATEGORY RESEARCH

For Information or help completing this form, contact: **THE OFFICE OF RESEARCH COMPLIANCE**, 115 Ramsay Hall
Phone: 334-844-5966   **e-mail:** IRBAdmin@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs/index.htm

Revised 2/1/2014 **Submit completed form to IRBsubmit@auburn.edu or 115 Ramsay Hall, Auburn University 36849.**
Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.
Project activities may not begin until you have received approval from the Auburn University IRB.

1. **PROJECT PERSONNEL & TRAINING**

   PRINCIPAL INVESTIGATOR (PI):

   Name Judith A. Heenan   **Title** Doctoral Candidate   **Dept./School** Education EFLT

   Address 1900 Wire Rd #8 Auburn AL 38632   **AU Email** jah0086@auburn.edu

   Phone 334-734-4662   **Dept. Head** Sherida Downer

   FACULTY ADVISOR (if applicable):

   Name Dr J. Witte   **Title** Professor   **Dept./School** Education-EFLT

   Address 4036 Haley Center, Auburn AL 36849

   Phone 334-844-3054   **AU Email** witteje@auburn.edu

   KEY PERSONNEL: List Key Personnel (other than PI and FA). Additional personnel may be listed in an attachment.

Name	Title	Institution	Responsibilities
Maria M. Witte	Professor	Auburn University	Assist with documentation

   KEY PERSONNEL TRAINING: Have all Key Personnel completed CITI Human Research Training (including elective modules related to this research) within the last 3 years?   ☑ YES   ☐ NO
   TRAINING CERTIFICATES: Please attach CITI completion certificates for all Key Personnel.

2. **PROJECT INFORMATION**

   Title: Learning Styles of Older Adults in Educational Settings

   Source of Funding: ☑ Investigator   ☐ Internal   ☐ External

   List External Agency & Grant Number: _____

   List any contractors, sub-contractors, or other entities associate with this project.

   List any other IRBs associated with this project (including those involved with reviewing, deferring, or determinations).

FOR ORC OFFICE USE ONLY	
DATE RECEIVED IN ORC: _____ by _____	**APPROVAL #** _____
DATE OF IRB REVIEW: _____ by _____	**APPROVAL CATEGORY:** _____
DATE OF ORC REVIEW: _____ by _____	**INTERVAL FOR CONTINUING REVIEW:** _____
DATE OF APPROVAL: _____ by _____	
COMMENTS:	

1 of 3

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3. **PROJECT SUMMARY**
   a. Does the research involve any special populations?

   ☐ YES ☑ NO   **Minors (under age 19)**

   ☐ YES ☑ NO   **Pregnant women, fetuses, or any products of conception**

   ☐ YES ☑ NO   **Prisoners or Wards**

   ☐ YES ☑ NO   **Individuals with compromised autonomy and/or decisional capacity**

   b. Does the research pose more than minimal risk to participants?   ☐ YES   ☑ NO

   Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

   c. Does the study involve any of the following?

   ☐ YES ☑ NO   **Procedures subject to FDA Regulation** Ex. Drugs, biological products, medical devices, etc.

   ☐ YES ☑ NO   **Use of school records of identifiable students or information from instructors about specific students**

   ☐ YES ☑ NO   **Protected health or medical information when there is a direct or indirect link that could identify the participant**

   ☐ YES ☑ NO   **Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or use of alcohol**

   ☐ YES ☑ NO   **Deception of participants**

   If you checked "YES" to any response in Question #3 STOP. It is likely that your study does not meet the "EXEMPT" requirements. Please complete a PROTOCOL FORM for Expedited or Full Board Review. You may contact IRB Administration for more information. (Phone: 334-844-5966 or Email: IRBAdmin@auburn.edu)

4. **PROJECT DESCRIPTION**
   a. **Subject Population** (Describe, include age, special population characteristics, etc.)

   The participants for this study will consist of adults 65 years of age and older who will be identified by age, sex, and race only. The participants are parishoners at a church in the southeastern region of the United States, members of an Osher Lifelong Learning Institution, and members of senior centers at a county Area Agency on Aging. There are no risks associated with participation in this study.

   b. Describe, <u>step by step</u>, all procedures and methods that will be used to <u>consent</u> participants.

   ☐ **N/A (Existing data will be used)**

   Permission has been received to collect data from the Unitarian Universalist Fellowship church, Director of the Area Agency on Aging, and Director of the Osher Lifelong Learning Institution. Individuals will be invited to participate in the study after a regularly scheduled session and will receive an information letter, demographic questionnarie, and Gregorc Style Delineator instrument. Instructions will be provided on how to respond to the instrument. Participants will return the demographic questionnaire in a box at the back of the room.

c. **Brief summary of project.** (Include the research question(s) and a brief description of the methodology, including recruitment and how data will be collected and protected.)

The purpose of this study is to identify the specific learning styles of older adults through the use of the Gregorc Style Delineator. This study will explore the relationships between age, sex, and race, and the four categories of the Delineator: Concrete Sequential, Concrete Random, Abstract Random and Abstract Sequential.

Research Questions:

1. What are the learning styles of adult learners 65 to 75 years of age and those over 75 years of age?
2. What is the relationship between the learning styles of older adult learners in regard to age?
2. What is the relationship between the learning styles of older adult learners in regard to sex?
3. What is the relationship between the learning styles of older adults and race?

Method

A demographic questionnaire and the Gregorc Style Delineator instrument will be administered for data collection. The Gregorc Style Delineator identifies the preferred learning style(s). Participants will be asked to transfer their learning styles scores onto the demographic questionnaire. Confidentiality will be maintained for all responses and the data collected will remain anonymous. The information will be recorded in a manner in which participants cannot be identified. The principal investigator will oversee data collection and protection throughout this study.

d. **Waivers. Check any waivers that apply and describe how the project meets the criteria for the waiver.**

- ☐ Waiver of Consent (Including existing de-identified data)
- ☑ Waiver of Documentation of Consent (Use of Information Letter)
- ☐ Waiver of Parental Permission (for college students)

An Information Letter will be used as a waiver of consent. Consent would be granted if the participants complete and return the demographic questionnaire.

e. **Attachments. Please attach Informed Consents, Information Letters, data collection instrument(s), advertisements/recruiting materials, or permission letters/site authorizations as appropriate.**

Signature of Investigator Judith A. Heenan   Date 4/25/2015

Signature of Faculty Advisor Maria M. Witte   Date 4/26/2015

Signature of Department Head Sherida Downer   Date 4/27/2015

Demographic Questionnaire

Research Study: Learning Styles of Older Adults in Educational Settings

Sex:

☐ Male
☐ Female

Age: _____

Race:

☐ White/Caucasian
☐ Black/African American
☐ Other:_____

Please transfer your scores from the Gregorc Style Delineator instrument:

Total of Above ☐ ☐ ☐ ☐
CS AS AR CR

Appendix D

AUBURN UNIVERSITY

UNIVERSITY OUTREACH

February 24, 2015

Auburn University Institutional Review Board
Office of Research Compliance
115 Ramsay Hall
Auburn AL 36849

Dear Review Board Members,

Judith A. Heenan, Auburn University Ph.D. candidate, has the permission of the Osher Lifelong
Learning Institute at Auburn University (OLLI at Auburn) has permission to conduct research for
her study, "Learning Styles of Older Adults: Retirees in Educational Settings." Research may be
conducted the meeting place of OLLI at Auburn, which is the Clarion Inn & Suites, 1577 South
College Street in Auburn, Alabama.

Ms. Heenan will recruit members at OLLI at Auburn events. The exact dates will be determined
at a later time. The Gregorc Learning Style Delineator will be explained and administered to the
volunteers. The results will be then be compiled by Ms. Heenan and any participants who
would like an interpretation of their individual scores will be provided with an explanation by
Ms Heenan. The on-site research activities will be finished by June of 2015.

Ms. Heenan has agreed to provide to my office with a copy of the Auburn University IRB
approved, stamped consent document before she recruits participants at our organization, and
will also provide a copy of any aggregate results.

If there are any questions please contact my office at 334/844-3105. For more information
about OLLI at Auburn, please visit our website at www.olliatauburn.org.

Sincerely,

Linda Shook

Linda Shook, M.Ed., Director

Unitarian Universalist Fellowship of Montgomery

| Reverend C. Lynn Hopkins | Courtney McKenny |
| Minister | Director, Religious Education |

January 14, 2015

Auburn University Institutional Review Board

c/o Office of Research Compliance

115 Ramsay Hall

Auburn AL 36849

Please note that Judith A. Heenan AU Graduate Student, has the permission of the Unitarian Universalist Fellowship of Montgomery to conduct research at our Montgomery facility for her study, "Learning Styles of Older Adults: Retirees in Educational Settings".

Ms Heenan will recruit parishioners by approaching them at the end of a regular Sunday service. The exact date will later be determined. The Gregorc Learning Style Inventory will be then be explained and administered to the volunteers. The results will be then be compiled by Ms Heenan and any participants who would like an interpretation of their individual scores will be provided with an explanation by Ms Heenan. The on-site research activities will be finished by June of 2015.

Ms Heenan has agreed to provide to my office with a copy of the Auburn University IRB approved, stamped consent document before she recruits participants in our church, and will also provide a copy of any aggregate results.

If there are any questions please contact my office at 334-279-9517.

Sincerely,

Reverend C. Lynn Hopkins

Appendix F

LRC LEE-RUSSELL
COUNCIL OF GOVERNMENTS
AREA AGENCY ON AGING

Mayor Eddie Lowe
Chairman

Suzanne C. Burnette
Executive Director

February 20, 2015

Auburn University Institutional Review Board
c/o Office of Research Compliance
115 Ramsay Hall
Auburn AL 36849

Please note that Judith A. Heenan, Auburn University PhD candidate, has the permission of the Lee-Russell Council of Governments Area Agency on Aging to conduct research at our facilities for her study, "Learning Styles of Older Adults: Retirees in Educational Settings."

Ms Heenan will recruit members at upcoming Area Agency on Aging events. The exact dates will be determined at a later time. The Gregorc Learning Style Delineator will be explained and administered to the volunteers. The results will be then be compiled by Ms Heenan and any participants who would like an interpretation of their individual scores will be provided with an explanation by Ms Heenan. The on-site research activities will be finished by June of 2015.

Ms Heenan has agreed to provide to my office with a copy of the Auburn University IRB approved, stamped consent document before she recruits participants at our organization, and will also provide a copy of any aggregate results.

If there are any questions please contact my office at 334-749-5264.

Sincerely,

Jackie Pinkard, Director
Area Agency on Aging

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