AN EXAMINATION OF COGNITIVE COMPLEXITY AND SELF-DIRECTED LEARNER READINESS OF TRADITIONAL AND NONTRADITIONAL UNDERGRADUATE STUDENTS

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AN EXAMINATION OF COGNITIVE COMPLEXITY AND SELF-DIRECTED LEARNER READINESS OF TRADITIONAL AND NONTRADITIONAL UNDERGRADUATE STUDENTS

Tami McCray Olds

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AN EXAMINATION OF COGNITIVE COMPLEXITY AND SELF-DIRECTED LEARNER READINESS OF TRADITIONAL AND NONTRADITIONAL UNDERGRADUATE STUDENTS

Tami McCray Olds

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VITA

Tami McCray Olds, daughter of William and Phyllis Blackwell and Edwin and Peggy McCray, was born August 10, 1965, in Gainesville, Florida. She graduated from Troy State University with a Bachelor of Science in Broadcast Journalism and Speech Communication in 1987. She received a Master of Arts in College Teaching in Speech Communication from Auburn University in 1988. She has been teaching as an Instructor of Communication for over 18 years at various universities in Alabama, Nebraska, and Virginia. She is currently an Assistant Professor and the Program Coordinator of Communication Studies at Huntingdon College in Montgomery, Alabama. There, she received the Julia Lightfoot Sellers Award for Faculty Excellence in May 2005. She is married to Colonel-select Don I. Olds, Jr., and they have two daughters, Tera and Emily.

DISSERTATION ABSTRACT

AN EXAMINATION OF COGNITIVE COMPLEXITY AND SELF-DIRECTED LEARNER READINESS OF TRADITIONAL AND NONTRADITIONAL UNDERGRADUATE STUDENTS

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With the demand for higher education, many nontraditional students are returning to school. There have been differences concerning age and sex, with an increase in adult females comprising the new undergraduate population. Institutions of higher learning are prompted to understand how nontraditional students learn. This study examined differences and relationships among age, sex, cognitive complexity, and self-directed learning readiness. Cognitive complexity (field dependence-independence) was measured to determine whether relationships existed with age and/or sex. Further, relationships were investigated between age and self-directed learning readiness.

The following questions were investigated: (1) What differences, if any, exist between traditional and non-traditional college students and levels of field dependence-independence?; (2) What differences, if any, exist between male and female college students and levels of field dependence-independence?; (3) What differences, if any, exist between traditional and non-traditional college students and levels of self-directed learning readiness?; (4) What relationship, if any, exists between levels of field dependence-independence and levels of self-directed learning readiness?

Research questions were investigated using Analyses of Variance and Pearson Product Moment Correlation Coefficients. One-hundred seventeen undergraduates were administered the Group Embedded Figures Test (GEFT) and a demographic questionnaire, exploring age, sex, ethnicity, educational level, and discipline. Participants were provided the Self-Directed Learning Readiness Scale (SDLRS); forty-one returned it. Results indicated no significant relationship between age, sex, educational level, or discipline and levels of field dependence-independence. Results did indicate a significant relationship between ethnicity and levels of field dependence-independence ($p < .001$), revealing higher levels of field independence in the majority ethnic group (White) than in the minority ethnic group (Asian, Black, Hispanic, and Native American). A higher level of self-directed learner readiness was indicated among nontraditional students, but the effect size was small. The correlation analysis indicated no significant relationship between levels of field dependence-independence and self-directed learner readiness.

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Quoting Albert Schweitzer, “At times our own light goes out and is rekindled by a spark from another person. Each of us has cause to think with deep gratitude of those who have lighted the flame within us.” It is with much gratitude that I acknowledge the many people who have “lighted the flame” within me throughout this journey. First, I want to thank my wonderful husband and best friend, Don. You are always my source of strength. You have celebrated my highs and picked me up from my lows. This would not have been possible without you by my side. Secondly, I want to thank my two wonderful daughters, Tera and Emily. You have endured my absences without judgment, cheering me on every step of the way. You always make me proud! Next, I am extremely grateful to my committee members. Dr. James Witte, a “thank you” seems so small. You always gave me perspective and made me feel better having you in my corner, taking the load when I was too tired to carry it. “Dr. Maria” Witte, your cheerful demeanor was just what I needed, exactly when I needed it. Thanks for being my “balcony person.” Dr. Margaret Ross, I don’t think I’ll ever forget what you taught me in statistics, no matter how much I would like! You have been a terrific mentor and friend. Finally, I want to thank my mother, who always taught me to value education and to love “school,” a place where I have always felt comfortable, empowered, and encouraged. With all of you, I gladly share this achievement. Thanks for continually lighting my flame.

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CHAPTER I

INTRODUCTION

In recognizing differences between traditional and nontraditional-aged learners, Malcolm Knowles (1970) introduced the concept of andragogy, the art and science of helping adults learn. Knowles asserted that adults are essentially self-directed learners and have a need to know how learning will affect or impact their lives if they are to become motivated to learn new material. Further research documents a correlation between andragogy and preferences for certain teaching methods. Davenport and Davenport (1986) studied the relationship between student-centered and teacher-centered students, suggesting the former preferred interactive games, while the latter preferred lecture. Echoing Knowles' view of adult learners as self-directed and internally motivated, Boggs (1981) stated that instruction promoting self-actualization, critical thinking, application to life, and problem-solving seemed most beneficial to adult learners. Adult learning involves lifelong learning, whether it occurs in a personal or professional sense, and this lifelong learning can occur in a variety of environments. Institutions of higher learning are environments which have the ability to encourage lifelong learning. As academic institutions are in the business of attracting students and retaining them, information on how students learn is essential, whether those students be traditional or nontraditional-aged. Organizations which adapt to their ever-changing

environments are organizations which survive and thrive. Institutions of higher learning are no different. They are, in fact, in the business of education, and their customers are their students.

Statement of the Problem

With the growing demand for higher education, many students are returning to school, not fitting the demographics of the traditional eighteen to twenty-three year old. According to Galbraith (2004), adult learners are an extremely diverse group, with much more variability occurring over the life span than with younger individuals. Not only have there been differences concerning age, there have been differences concerning sex, with an increase in adult females comprising the new undergraduate population.

Among those numbers of increasing adult learners is a significant number of females over the age of thirty-five (Kasworm & Pike, 1994). The Chronicle of Higher Education (2001) reported female students comprise fifty-seven percent of college enrollments in the United States. With the growing demand of nontraditional-aged college students, institutions of higher learning are finding their viability dependent upon their ability to attract them. As a result, institutions of higher learning are prompted to understand how nontraditional students learn and what motivates them. As students change, classroom dynamics change, making it incumbent upon college educators to modify and vary their teaching methods.

Purpose of the Research

The purpose of this study was to investigate possible differences and/or relationships between age, sex, levels of cognitive complexity, and self-directed learning readiness. Much research on cognitive complexity and the variable sex has been conducted with children and adolescents, but is limited with regard to adult participants. Adult learner population demographics have shifted, prompting research combining the variables age and sex. To date, research utilizing both of these variables is limited. Cognitive complexity was measured by considering levels of field dependence-independence to determine whether relationships existed with regard to age and/or sex. Further, relationships were investigated between age and levels of self-directed learning readiness. Finally, relationships between levels of cognitive complexity and levels of self-directed learner readiness were also examined.

Instruments

Two instruments were used in this study. The first instrument was the Group Embedded Figures Test (GEFT), a perceptual test developed by Oltman, Raskin, and Witkin (1971) to measure levels of field dependence and independence. For each situation, participants are asked to locate a previously seen simple figure within a larger complex figure. The larger complex figure has been developed so that the previously seen simple figure is obscured or embedded within it. The GEFT is comprised of eighteen items, with scoring based on the number of correct responses. Higher scores indicate higher levels of field independence.

The second instrument used was the Self-Directed Learning Readiness Scale (SDLRS) developed by Guglielmino (1978) to measure self-directed learning readiness. The instrument is a 58 item Likert-type scale based on eight factors: 1) Attitude toward and joy of learning, 2) Self-confidence in abilities and skills for learning, 3) Complexity, adventure, and independence in learning, 4) Attraction to new and unusual situations, 5) Openness to learning situations, 6) Internal control, 7) Self understanding, and 8) Responsibility for one's learning. Higher scores on this instrument indicate more readiness for self-directed learning.

Research Questions

The following research questions were used in this study:

1. What differences, if any, exist between traditional and nontraditional college students and levels of field dependence-independence?
2. What differences, if any, exist between male and female college students and levels of field dependence-independence?
3. What differences, if any, exist between traditional and nontraditional college students and levels of self-directed learning readiness?
4. What relationship, if any, exists between levels of field dependence-independence and levels of self-directed learning readiness?

Significance of the Study

Institutions of higher learning are economically viable only if they are able to sustain their enrollments. Because undergraduate students today are demographically different than undergraduate students of the past, it is important for institutions to

understand what will attract the needs of adult learners. Results of studies have found different preferences for teaching and learning environments between traditional-aged and nontraditional-aged students, as well as between males and females (Belenky, Clinchy, Goldberger, & Tarule, 1986; Boggs, 1981; Davenport & Davenport, 1986; MacGillivary, 1999; Mocker & Spear, 1982; Truluck & Courtenay, 1999).

Houle (1961) and Cross (1981) proposed a need for educational research to focus upon understanding the needs of adult learners, as well as understanding the diversity within the adult learner population. Delahaye and Smith (1995) considered an essential role for adult educators is to acknowledge and understand these differences through the administration and interpretation of diagnostic tests and assessments designed to uncover such information. This research study was designed to reveal such necessary information.

The results of this study have implications for adult educators, administrators, program coordinators, trainers, and facilitators. This research will assist educators of adult learners in modifying their teaching to meet the learning styles of this new student demographic. Understanding the needs of adult learners and their various diverse differences will further impact the ability of higher institutions to market themselves and tailor their offerings to this ever-increasing undergraduate population.

The investigation of any such differences and/or relationships provided further information for the fields of adult education and educational psychology. Possible correlations between the factors included in these constructs provided knowledge into the dimensions of the two instruments used for measurement, the Group Embedded Figures Test and the Self-Directed Learning Readiness Scale. This research provides useful

information for educators of adult students, challenging them to adopt more varied and flexible approaches to teaching.

Assumptions of the Study

Several assumptions were made for this study:

1. The testing administrator performed in a manner so as not to bias the results of the study.
2. Participants' responded to the test items truthfully.
3. The sample used in this study represented a normal distribution.
4. The sample used in this study was random and independent.
5. The administration of the test was consistent among groups.
6. Results from the instruments reflect individuals' levels of field dependence-independence and readiness for self-directed learning.

Limitations of the Study

1. The sample was a convenience sample of participating instructors' classes.
2. The generalizability of the results was limited due to the sample being from a single institution.
3. The Group Embedded Figures Test is a timed test, thus potentially impacting the results from nontraditional students.
4. The Self-Directed Learning Readiness Scale is a self-reported instrument.

Definition of Terms

For the purpose of this study, the following definitions were used:

1. *Traditional Student.* A traditional student will be defined as an undergraduate student between the ages of eighteen and twenty-three. While the term traditional student may have expanded parameters in other settings, this study will consider age as the only distinction.
2. *Nontraditional Student*. A nontraditional student will be identified as an undergraduate student over the maximum age of a traditional student. This term was considered as synonymous with the term Adult Learner.
3. *Sex*. The term sex shall refer to the biological categories of male or female.
4. *Cognitive Style*. Cognitive style involves characteristic modes of information processing, involving perception, recall, thinking, problem solving, and decision making, within personality trends and not with intelligence (Messick, 1984).
5. *Field Dependence*. The dimension of cognitive style in which patterns are perceived and analyzed holistically is termed field dependence.
6. *Field Independence.* The dimension of cognitive style in which separate parts of patterns are perceived and analyzed is termed field independence.
7. *Group Embedded Figures Test (GEFT).* The Group Embedded Figures Test is a group administered perceptual test measuring levels of field dependence-independence (Witkin, Oltman, Raskin, & Karp, 1971).
8. *Self-Directed Learning*. Self-directed learning is a process whereby individuals take the initiative to determine and develop their own learning needs, learning goals,

learning resources, and learning strategies, having the desire and ability to evaluate their own learning outcomes, with or without the help of others (Knowles, 1975).

9. *Self-Directed Learning Readiness*. Self-directed learning readiness will be measured by means of the Self-Directed Learning Readiness Scale (SDLRS). Eight factors relate to the SDLRS (Guglielmino, 1978):
    a. Attitude toward and joy of learning: Individuals scoring high on love of learning describe themselves as enjoying learning.
    b. Self-confidence in abilities and skills for learning: Individuals scoring high on the ability to use basic study skills and problem-solving skills describe themselves as possessing problem-solving skills and study skills.
    c. Complexity, adventure, and independence in learning: Individuals who describe themselves scoring high on creativity describe themselves as risk-takers and having the ability to think of creative solutions.
    d. Attraction to new and unusual situations: Individuals scoring high on positive orientation to the future describe themselves as lifelong learners.
    e. Openness to learning situations: Individuals scoring high on openness to learning describe themselves as attracted to opportunities to learn.
    f. Internal control: Individuals scoring high on initiative and independence in learning describe themselves as having the ability to initiate their learning projects, plan their learning projects, and follow through on their plans for their learning projects.
    g. Self understanding: Individuals scoring high on self-concept as an effective learner perceive themselves as having the necessary skills to learning effectively.

h. Responsibility for one's learning: Individuals scoring high on informed acceptance of responsibility for one's learning describe themselves as intelligent, having a desire to study, and feeling they are ultimately responsible for their learning or lack of learning.

Organization of the Study

Chapter I introduced the problem to be studied. This chapter addressed the statement of the problem, purpose of the research, research questions, significance of the study, assumptions of the study, limitations of the study, and definition of terms. Chapter II provides a review of related literature. This chapter reviews literature related to cognitive style, field dependence-independence, sex and learning, the Group Embedded Figures Test, adult learning, self-directed learning, and the Self-Directed Learning Readiness Scale. Chapter III presents the procedures of the study. This chapter addresses the design of the research, research questions, sample, instrumentation, data collection, and data analysis. Chapter IV provides a presentation of the findings of the study and an interpretation of the data. Demographic data of the participants will be addressed, as well as a documentation of the analytical and statistical procedures. Finally, Chapter V presents a summary of findings, conclusions, implications, and recommendations for practice and further research.

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to investigate possible differences and/or relationships between age, sex, levels of cognitive complexity, and self-directed learning readiness. Cognitive complexity was measured by considering levels of field dependence-independence to determine whether relationships existed with regard to age and/or sex. Further, relationships were investigated between age and levels of self-directed learning readiness. Levels of field dependence-independence were measured using the Group Embedded Figures Test (GEFT). Readiness for self-directed learning was measured using the Self-Directed Learning Readiness Scale (SDLRS). This chapter provides historical overviews of cognitive styles and the cognitive style dimensions of field dependence-independence. Additionally, this chapter investigates differences between the males and females and learning. The chapter provides information on the development of the Group Embedded Figures Test. Further, it considers the characteristics of adult learners and self-directed learning. Finally, this chapter addresses the development, supporters, and dissenters of the Self-Directed Learning Readiness Scale.

Cognitive Style

In the 1960s, Witkin introduced the concept of cognitive style, describing it as pertaining to individuals who exhibit preferences in how they organize stimuli and construct meanings from their experiences (Ayersman & Minden, 1995). Armstrong and Priola (2001) suggested a relationship between analytic cognitive styles and collaborative group work, finding that these individuals were often group leaders, having the ability to influence other members in their groups. The study assembled self-managing work teams to determine whether relationships existed between decision-making effectiveness and the personalities of team members. Differences and similarities in analytic and intuitive cognitive styles were examined, as well as the task and relational behaviors of group members. Intuitive individuals were, not only found to initiate more social or relational acts with other group members, they also engaged in more task-oriented behaviors than analytic individuals. Interestingly, those selected as leaders, having the most influence on group members, were often intuitive individuals rather than analytic individuals.

Piaget (1971) developed the cognitive development theory, identifying various stages of cognitive development, dependent largely upon the age of individuals. He suggested the ability to process information is different between children and adults; that thinking considered simple by adults is more difficult for children. Piaget identified four ways in which humans try to make sense of the world: biological maturation, activity, social experiences, and equilibration (Piaget, 1970). Maturation involves genetically programmed biological changes over time. Activity involves one's ability to behave within the environment and to learn from those experiences. Piaget indicated that cognitive development is further influenced by our social experiences with others.

Changes in thinking occur through the process of equilibration, “the act of searching for balance” (Woolfolk, 2004, p. 31). Disequilibrium is uncomfortable; therefore, individuals constantly access their thinking abilities, seeking solutions and modifications which will help them achieve equilibration (Woolfolk, 2004).

Piaget (1970) hypothesized that there are four stages of cognitive development: the sensorimotor stage, the preoperational stage, the concrete-operational stage, and the formal operational stage. The sensorimotor stage occurs in infancy, when thinking is connected to the senses. During this stage, children develop object permanence, the understanding that objects may be present even when they cannot be seen; and goal-directed behavior, deliberate actions to reach particular goals. The preoperational stage is the next stage, occurring in early childhood. During this stage, children develop the semiotic function, reversible thinking, conservation, decentering, egocentricism, and the ability to participate in collective monologues. The semiotic function is the ability to mentally represent objects with symbols. Reversible thinking is the ability the think in reverse, while conservation is the ability to recognize an amount is the same even with reconfiguration. Children in the preoperational stage also become able to decenter, developing the ability to focus on more than one aspect of a situation at the same time. Piaget indicated that preoperational children are egocentric, understanding the world from only their individual perspectives. This egocentrism leads to a child’s ability to engage in collective monologues, having conversational interactions with one’s self.

The third stage of cognitive development, according to Piaget (1970), is the concrete-operational stage. At this stage, occurring around the middle school years, children develop full understanding of identity, compensation, reversibility,

classification, and seriation. Identity is the recognition that, if nothing is added or removed, material stays the same. Compensation relates to the concept that a change in one direction can be compensated for by a change in the opposite direction (Woolfolk, 2004). Like reversible thinking in the preoperational stage, reversibility is the ability to think in reverse. During the concrete-operational stage, children have a higher level of reversible thinking, being able to think through more of a series of steps in reverse, than during the preoperational stage. Classification involves the ability to group items by similar characteristics, while seriation is the ability the sequence items.

The last stage, the formal operational stage, involves the ability to use hypothetico-deductive reasoning and is characterized by adolescent egocentrism (Woolfolk, 2004). Hypothetico-deductive reasoning is the ability to identify multiple factors affecting a problem and being able to logically deduce plausible solutions to that problem. Individuals with adolescent egocentrism perceive others as sharing their same thoughts, beliefs, feelings, and concerns. Initially, Piaget suggested the final formal operational stage could be achieved between the ages of twelve to fifteen years. Later, he raised the attainment age of this abstract thinking ability to twenty years (Piaget, 1972).

A study by Arlin (1975) challenged Piaget's theory of the attainment of formal operational thinking when several adult participants failed to meet the criteria for formal operational thinking. Chiapetta (1975) repeated these failed results when a similar study was conducted on adult female schoolteachers. Fifty-three percent of her sample failed to operate at the formal operational level. Chiapetta concluded that most adolescents and young adults actually function at the concrete-operational rather than formal operational level, and that many of the American adult population never advance much beyond

concrete-operational thinking. Psychologists agree the formal operational stage is much more complex than the concrete-operational stage and have debated whether the attainment of this stage is as universal as Piaget suggests (Neimark, 1975; Woolfolk, 2004).

Bandura (1977) developed the concept of social learning theory. This theory suggests that learning occurs through observations of the behaviors of others. Later, Bandura expanded his views to include social cognitive theory, involving enactive and vicarious learning. Enactive learning is learning through experiences and the consequences of one's behaviors, while vicarious learning is learning from the consequences of another's behaviors. One factor involved in vicarious, or observational learning, is the concept of self-efficacy. Bandura (1977) explained self-efficacy as having the belief that one is capable of performing actions necessary to achieve a desired goal, or at least the belief in one's ability to learn how to do so. An important element involved in self-efficacy is self-motivation. Bandura's social cognitive theory identifies persons high in self-efficacy as organized, proactive, and self-regulatory. These individuals are more intrinsically motivated than affected by situations external to them. In an attempt to meet their goals, they are actually able to exercise control over their external environments. Because of Bandura's initial research in this area, several researchers have studied the relationship between self-perception and academic performance and suggest a causal relationship, indicating self-efficacy beliefs seem to influence academic performance (Bandura, 1977; Pajares, 1997; Zimmerman, 1989).

Pajares (1997) indicated that self-efficacy, unlike self-concept, is a future-oriented assessment of whether one has the competence necessary to perform a specific task in a

specific context. A leading researcher in the area of self-regulated learning, Pajares (2002) examined the significance of students' self-efficacy beliefs and their performances in the classroom. According to Pajares, a student high in self-efficacy will put forth more effort and have greater resilience. Further, a correlation has been documented between self-efficacy and levels of student anxiety (Bandura, 1977; Pajares, 2002). Those who are more confident seem to have less stress and anxiety when performing tasks. Students who have high self-efficacy seem to engage in higher cognitive skills and more self-regulatory strategies.

Zimmerman (1989) studied the correlation between self-efficacy and self-regulatory learning practices and students' motivational beliefs and academic successes. Defining self-regulation as the process used to "activate and sustain our thoughts, behaviors, and emotions in order to reach our goals," Zimmerman (2002, p. 64) indicated that students high in self-efficacy exhibit self-regulation through the setting of goals, the ability to self-monitor, and the ability to self-evaluate. Self-regulated learners have the ability to transform their mental abilities into academic skills necessary to succeed. Self-regulated learning involves three factors: knowledge, motivation, and volition (Woolfolk, 2004). Woolfolk (2004) explained that knowledge involves knowing, not only about the subject at hand, but also about one's ability as the learner, the strategies necessary for learning, and the contexts in which the learning may be applied. Motivation to learn is also a key factor for self-regulated learning. Even if motivation is not intrinsic, self-regulated learners know why they are learning, what the expected benefits will be. Self-discipline, or volition, is the third necessary factor for

self-regulatory learning. These types of learners know how, when, and where to study to prevent distraction (Woolfolk, 2004).

Ausebel (1982) introduced the use of advance organizers in teaching. Advance organizers are a form of expository teaching whereby the instructor previews information to follow in a presentation or lecture. Research conducted on the use of advance organizers concludes that they do help students learn and are highly beneficial when the subject matter is unfamiliar or complex (Corkill, 1992; Mayer, 1984; Morin & Miller, 1998). Russell (1991) studied adult nursing students, measuring retention and the use of advance organizers. Russell's study considered the usefulness of advance organizers in helping adult nursing students retain information. Further, correlations were drawn between the usefulness of advance organizers and levels of field dependence-independence, suggesting a positive correlation between scores on the Group Embedded Figures Test (GEFT) and test achievement and retention. Low to moderate field dependent individuals benefited from the use of advance organizers. A curvilinear relationship was found between field independent individuals and the use of advance organizers, suggesting advance organizers as counterproductive to them. Russell reasoned that field independent individuals may see advance organizers as external referents for structuring learning material.

Other individuals (Dewey, 1966; Jung, 1926) have suggested a relationship between individual differences and learning styles preferences. Jung (1926) focused on theories of personality. He sought to understand elements of the unconscious and its connection to human behavior. A great contribution was his view of the collective unconscious, a kind of knowledge with which persons are born, but of which they are not

directly conscious. The contents of the collective unconscious are called archetypes. An archetype is an unlearned tendency to experience things in a certain way. Jung developed a personality typology, which later impacted the development of the Myers-Briggs Typology Indicator (MBTI). Jung wrote that individuals have preferences for how they should interact in their world, suggesting four basic functions. Sensing involves getting information by means of the senses. A sensing person observes and listens and relies more on perception than information. Thinking individuals evaluate information or ideas logically. Thinkers make decisions rationally rather than simply taking in information. Intuitive persons rely upon perceptions outside the usual conscious processes. Intuitive persons may at times seem irrational, but their decision-making comes from the complex integration of large amounts of information, rather than simply seeing or hearing. Feelers evaluate information by weighing one's overall emotional response. From Jung's physiological perspective, individuals are born with a certain structure for how they perceive, process information, and behave.

Dewey (1966) explained the importance of inquiry learning, a format he first described in 1910. Inquiry learning involves the teacher presenting a puzzling situation; then encouraging students to solve the problem by gathering data and testing conclusions. Dewey was a strong advocate for the importance of creating student interest in learning. Inquiry learning is a student-centered approach to learning that actually pre-dates many traditional forms of instruction. Careful to make a distinction between learning as fun versus learning as interesting, Dewey (1913) asserted students should desire to know more about the subject because of this developed interest; developed interest in the subject matter will motivate the student to want the information. Research (Corno &

Snow, 1986; Slavin, Karweit, & Madden, 1989) has shown that lower-ability students do not perform as well with this approach, but that students with better abilities to self-regulate do well with inquiry learning. Corno and Snow (1986) suggested other indicators may explain this outcome, including lower-quality instruction, increased student behavioral problems, increased teacher stress, and negative attitudes of teachers, as these are also characteristics often present in the classrooms of lower-ability students. Slavin (1987) indicated segregation of students by ability is beneficial to higher-ability students but is a disadvantage to lower-ability students.

Research has shown important implications for learning and the dimensions of cognitive simplicity and complexity (Harvey, Hunt, & Schroder, 1961; Schroder, Driver, & Streufert, 1967). Cognitive development theorists focus on how people think rather than what they think, and suggest cognitive types exist on continuums ranging from least complex thinking to most complex thinking. Harvey, Hunt, and Schroder (1961) made several assumptions concerning the cognitive style dimensions of simplicity and complexity. One assumption is that, even though an individual may make different choices based on varying situations, the logic used to make those choices remains consistent. Harvey, Hunt, and Schroder (1961) also assumed the stages of cognitive development follow a set order, and that individuals cannot skip stages during the progression of development. Further, it is assumed that these stages become more complex as individuals progress through the development and each stage is, not only based on the previous stage, but its achievement is necessary for progression to the subsequent stage. Schroder, Driver, and Streufert (1967) explained that cognitive learning theories attempt to explain learning by considering the changes within

individuals' abilities to acquire knowledge and process information. They proposed individuals' abilities to process information occur at various levels of complexity, and that changes in levels of information processing can be observed and analyzed. Individuals using simple conceptual systems seem to be more dependent on external stimuli for behavioral cues (Schroder, Driver, & Streufert, 1967). Those using more complex conceptual systems are not as easily influenced by highly salient information, seeing themselves as in control of their own behaviors.

Riding and Cheema (1991) reviewed over thirty methods of defining cognitive style, identifying two basic dimensions: Wholist-Analytic and Verbal-Imagery. The Wholist-Analytic dimension identifies whether a person comprehends situations holistically or in parts. Persons' Verbal-Imagery dimension identifies how they convey information during their thought processes, whether they see information verbally or pictorially. Riding and Grimley (1999) studied these dimensions of cognitive style with eighty eleven-year-old boys and girls and their science performance utilizing various teaching methods. They compared science performance to traditional teaching methods and teaching methods incorporating the use of multi-media materials. This study suggested differences in cognitive styles by dimensions. Analytics learned better using the traditional style over the incorporation of multi-media, while the reverse was true for Wholists. Verbalizers worked better with verbal information, and Imagers worked better with visual and spatial information (Riding & Mathias, 1991; Riding & Watts, 1997).

Evans (2004) conducted a study on the relationship between cognitive style and teaching style, using eighty-four trainee teachers. Participants' cognitive styles were evaluated, and significant differences were identified. Overall, Evans concluded that

Wholists seemed more sensitive to extrinsic factors than Analytics, such as the culture of the school, the support received from mentors, and their ability to accept criticism. Evans concluded that universities should adopt more varied teaching styles to accommodate the multitude of variations in cognitive styles and dimensions.

Field Dependence-Independence

One aspect of cognitive style exists with regard to field dependence and field independence. Field dependence-independence reflects one's method of perceiving, remembering, and thinking and has broad application to the study of education (Messick, 1976). The concept of the field dependence-independence cognitive style emerged as a result of Werner's (1948) organismic theory of development and the work of Witkin (1962). Werner's theory evolved when the field of psychology began to explore the concept of behaviorism. Included in this exploration was the exploration of perception. Werner had an organismic view of language acquisition and cognitive development. Development, according to Werner, is a value concept, distinguished as something achieved and that individuals assist others in achieving. Werner's organismic approach suggests humans operate in contexts to achieve certain goals, and that norms of perfection are used to evaluate whether these performances of self and others are considered primitive or advanced.

How people separate factors from total visual fields prompted Witkin's research on the cognitive style dimensions of field dependence and independence (Witkin, Moore, Goodenough, & Cox, 1977). Witkin, Moore, Goodenough, and Cox (1977) concluded that the characteristics of cognitive style within an individual remain consistent over

time. They investigated differences in sex, age, and race as they relate to field dependent and independent cognitive style, concluding that differences in cognitive style existed between people of different cultures, sex, and age. Additionally, they researched the analytic dimension of cognitive style, investigating a wide range of human activity from basic perception to career choice and concluded field independent individuals are better at analytic activity compared with field dependent individuals. Field dependent individuals performed better in situations where learning was structured and analyzed for them, while field independent individuals would impose structure to unstructured situations. Field dependent individuals preferred to operate from external frames of reference, while field independent individuals operated from internal frames of reference.

Field dependence-independence is measured on a continuum. Field dependent individuals tend to merge individual segments within a visual field, not viewing individual components separately, while field independent persons analyze organized stimuli and provide their own structure to stimuli lacking organization (Jonassen & Grabowski, 1993). Witkin, Oltman, Raskin, and Karp (1971) explained that field independence suggests a more complex cognitive style of thinking. Most studies indicate stronger performances by field independent students than field dependent students (Canelos, Taylor, & Gates, 1980; Witkin, Moore, Goodenough, & Cox, 1977). Field dependent individuals perceive patterns holistically. They have difficulty selecting individual elements from a situation and evaluating those elements separately. Field dependent individuals tend to be successful with collaborative group work, are often social-oriented beings who remember social information well, and have preferences for verbal subjects like literature and history. Field independent people, on the other hand,

are involved in more self-monitoring of their information processing. They can separate parts of a whole picture, isolating and analyzing each according to its components. Field independent individuals are not inclined to social relationships, but tend to be successful with analytic subjects like math and science.

Canelos, Taylor, and Gates (1980) studied the effects of three levels of visual stimulus complexity on the information processing of field dependent and field independent individuals, indicating field dependent individuals perform better when given more time to process information. In their study, information was presented relating to the learning objectives of the course in which students were enrolled. The task required recall of the functions of parts of the human heart. An instructional slide-tape program was presented providing information about the parts and functions of the human heart using various levels of visual stimulus complexity. Three levels were presented; a simple line drawing with a color background, an artistic illustration in color, and a realistic color photograph. The study considered the effects of visual stimulus complexity upon the information processing of field dependent and independent participants. Performance considered three types of learning tasks: a list learning task, a spatial information learning task, and a conceptual learning task. Results of the study suggested field dependent individuals had more difficulty comprehending relevant information needed for performance on more difficult learning outcomes, but did suggest that when field dependent individuals received training in complexity, they were able to improve their learning behavior.

Witkin and Goodenough (1981) described how the field dependence-independence construct has modified over time to include a perceptual-analytic ability.

They explained that a strong relationship exists between competence at perceptual disembedding and the ability to disembed in non-perceptual problem-solving. Later, the construct became more comprehensive, with additional evidence on self-consistency, body concept, sense of self, and controls and defenses. Out of their research on perception emerged information on cognitive styles, identifying the dimensions of field dependence-independence. Field dependence-independence tendencies have been measured using the Rod and Frame Test (RFT) and the Embedded Figures Test (EFT). All of these measures involve the disembedding of a shape from its surrounding field. Goodenough, Oltman, and Cox (1987) conducted a study to determine whether differences in perception orientation could be related to the Embedded Figures Test and other spatial-visual abilities. Participants included females between the ages of eighteen and fifty. Twelve spatial-visual tests were used, including the Embedded Figures Test (EFT) and the Rod and Frame Test (RFT). The study concluded that field independence was a function of individual differences in spatial-visual orientation and ability.

Witkin, Moore, Goodenough, and Cox (1977) studied the relationship between field dependence-independence and teaching styles. Field dependent teachers differed from field independent teachers in a variety of ways (Gordon & Gross, 1978; Witkin et al., 1977). Field dependent teachers were not as comfortable expressing critical feedback. They were more interested in creating positive attitudes and a positive classroom environment. Witkin, Moore, Goodenough, and Cox (1977) stated field independent teachers seem to be perceived by learners as encouraging them to apply principles, while field dependent teachers were seen as simply providing facts. This study suggested field independent teachers prefer more formal approaches, while field

dependent teachers prefer interaction and discussion with learners. Witkin, Moore, Goodenough, and Cross (1977) and Gordon and Gross (1978) suggested differences in the way teachers organized subject matter and the sequencing of material depending on their levels of field dependence-independence. Field independent teachers tended to state their own standards and formulate their own principles when explaining subject matter, while field dependent teachers tended to involve learners in organizing content and sequencing subject matter. Field independent teachers were more inclined to correct learners and explain why they were incorrect. Moore (1973) suggested differences in the way field independent and field dependent teachers used questioning. Field independent teachers used questions as instructional tools, while field dependent teachers used questions to assess what had been learned.

While the impact of field dependence-independence cognitive style can be seen to affect teaching styles, studies have been conducted concerning effects to learning outcomes (Filsinger, 1979; Siebenman, 1984; Vitols, 1985; Witkin, Moore, Goodenough, & Cox, 1977). Witkin, Moore, Goodenough, and Cox (1977) have shown that field dependence-independence cognitive style affects preferences for different kinds of learning methods. Field independent learners are more likely to be self-directed and internally motivated, while field dependent learners require more extrinsic reinforcement and motivation. For example, relationships between field dependence-independence and preferences between group-oriented instruction and more autonomous learning have been suggested (Witkin, Moore, Goodenough, & Cox, 1977). Field dependent individuals prefer group interaction and discussion and learn as effectively from their interactions with classmates as with the teacher. Field independent learners, on the other hand,

respond better to more individualized approaches and one-on-one with the teacher. Field dependent individuals actually require more structure from the teacher and are more able to deal with impersonal situations than field independent learners. Field independent learners prefer to structure their own learning and require more interpersonal interactions than field dependent learners (Witkin, Moore, Goodenough, & Cox, 1977).

Vitols (1985) studied the cognitive styles and learning style preferences of traditional-aged and nontraditional-aged undergraduate females. Field dependence-independence was measured using the Group Embedded Figures Test. Cognitive complexity was measured using the *Modified This I Believe Test* (Filsinger, 1979). Results showed that cognitive styles between traditional-aged and nontraditional-aged undergraduate females were not significantly different. The two groups studied did differ significantly in learning styles, however. This study suggested traditional-aged undergraduate females preferred a pedagogical approach to teaching, taking objective examinations, completing regular class assignments, in a teacher-directed class. Nontraditional-aged undergraduate females, on the other hand, produced different results. While some of the nontraditional females preferred the pedagogical approach, all preferred an andragogical approach. Those preferring the pedagogical approach liked the teacher-directed classroom, objective examinations, and regular class assignments. Concerning andragogical style preferences, all nontraditional-aged undergraduate females preferred a discussion-oriented teaching style. Additionally, these students preferred assignments requiring original research. In this study, correlations were shown between cognitive styles and learning style preferences. Students who measured field independent and cognitively complex preferred an andragogical approach to learning, while students

who were both field dependent and cognitively simple showed mixed learning style preferences.

Contrary to other studies, Siebenman (1984) indicated no statistically significant difference between field dependence and field independence in nontraditional students in a college reading class. The study sought to determine whether a relationship existed between cognitive styles and learning styles, and whether students felt their learning styles were being met. The cognitive style dimensions of field dependence-independence were measured using the Group Embedded Figures Test (GEFT), and learning styles were measured using the Productivity Environmental Preference Survey (PEPS). Thirty adult college students were interviewed to determine whether they thought their preferred learning styles were being met in the college setting; and if so, how those learning styles were being met. The GEFT and PEPS were administered and scored. Relationships were found, but not at a statistically significant level. Recorded responses indicated some level of hostility from field independent individuals. Most individuals felt learning effectiveness was linked to instructor ability and student effort, but that a small classroom environment compensated for times when learning style preferences were not met. However, there did not seem to be significant differences in responses between field independent and field dependent individuals.

DeTure (2004) indicated that individuals high in self-efficacy were typically more field independent. The study sought to identify whether certain learner attributes can be used to predict student success in Web-based distance education settings. Participants included students enrolled in general education distance education courses at one community college. They were asked to complete the Group Embedded Figures Test

(GEFT) to determine levels of field dependence-independence. The Online Technologies Self-Efficacy Scale (OTSES) was administered to determine students' entry-level confidence with necessary computer skills for online learning. Results indicated that field independent students tended to have higher self-efficacy concerning online technology capabilities, but they did not receive higher grades than the field dependent students who had lower self-efficacy of their online technology capabilities. It was concluded that levels of field dependence-independence and online technology self-efficacy scores were poor predictors of student success in online distance education courses, but that there was a relationship between field independence and those who measured high in self-efficacy.

Tootle (1986) studied post-Master's degree military officers and looked at the correlation between higher-level thinking and field independence. Tootle's study investigated the dimensions of field dependence-independence and levels of learning as described in the cognitive domain of Bloom's (1956) Taxonomy of Educational Objectives. One-hundred ninety-nine United States Air Force officers were administered the Group Embedded Figures Test (GEFT) and grouped as field dependent or field independent. Participants were then subjected to five weeks of intensive teacher training where three measures of academic performance were administered: a knowledge-level test, a comprehension-level test, and an application-level test. Participants grouped as field independent scored significantly higher than the field dependent participants on the comprehension and application-level tests. There were no significant differences in scores on the knowledge-level test. Results concluded that field dependence affects learning at higher levels of information processing. Tootle suggested that, with adult

learners, as course content becomes more complex requiring higher levels of information processing, a field independent cognitive style may aid in the achievement of learning outcomes.

Differences in cognitive skills and personal characteristics suggest field-dependent persons may prefer and be adept at different occupations than field-independent persons. Several studies have been conducted on field dependence-independence with persons of various occupations (Barrett & Thornton, 1968; Crutchfield, Woodworth, & Albrecht, 1958). Barrett and Thornton (1968) found that engineers and technical personnel were less field dependent than other college males. They concluded engineers are typically field independent, are known for their ability to problem-solve, and their inability to work well with others. Engineers excel at disembedding figures from complex arrangements, preferring structured, predictable activities to those unstructured and unpredictable. Crutchfield, Woodworth, and Albrecht (1958) studied one hundred Air Force captains to determine whether a specific set of procedures could predict officers most effective in command and staff positions. Data were collected from ten perceptual tests included in the program. The purpose was to determine whether perceptual behavior to the assessment helped in the understanding of personality. Results indicated that perceptual tests were significantly related to intellect and cognitive flexibility. Relationships were found between the tests and emotional adjustment, social relations, and leadership. The researchers concluded that there was a relationship between perceptual and personality measures and styles of behavior.

Sex and Learning

Research has suggested differences in the cognitive style dimensions of field dependence and independence between males and females, with males being reported as more field independent and females more field dependent (Witkin, 1971). A study by Vaught (1965) considered the gender dimensions of masculinity and femininity, indicating that individuals high in masculinity and high ego strength were more field independent regardless of biological sex. Vaught concluded that cognitive style differences should not be explained by biological sex alone.

Wood (2004) and MacGillivary (1999) suggested gender socialization has impacted differences between males and females with regard to field dependence-independence and learning differences. Wood (2005) stated that preferences for instructional styles vary between males and females due to the speech communities in which each is socialized. Speech communities develop as a result of persons' shared understandings about their goals of communication, the strategies to bring about those goals, and the ways in which they interpret communication (Wood, 2005). MacGillivary (1999) administered the Cognitive Style Index to undergraduates taking courses in Tourism and Hospitality Management. Cognitive styles were defined, as well as programs of study preferred by the various cognitive styles. There were differences in cognitive style between males and females. Males scored as more analytical, while females scored as more intuitive. Other studies of gender and communication (Campbell, 1973; Coates, 1986, 1997; Coates & Cameron, 1988; Jamieson, 1995; Johnson, 2000; Treichler & Kramarae, 1983) have supported the contention that males and females have been socialized into different speech communities; with females typically using more

feminine speech patterns than males and males typically using more masculine speech patterns than females.

Campbell (1973) has argued that females' speech has been affected by experience, and those experiences have limited their voice in the public forum. Coates (1986, 1997) and Coates and Cameron (1988) have researched whether sociolinguistics account for differences between male and female speech, indicating culture plays more of a part in the differences between masculine and feminine speech than does biological sex. Jamieson (1995) and Johnson (2000) supported the view of culture affecting differences between male and female speech patterns. Both studies contended that feminine speech was more inductive and personal than masculine speech. Feminine speech was supported by the inclusion of examples from personal experiences. Treichler and Kramarae (1983) contend that women's speech patterns are characterized as relational, that it is used to establish and maintain relationships.

Masculine socialization promotes communication that emphasizes autonomy and competition; it is assertive speech, designed to achieve some goal, and is used to attract and maintain an audience (Wood, 2005). Feminine speech socialization encourages collaboration, affiliation, cooperation, inclusion, and sensitivity. As a result of this socialization, research suggests males and females often prefer different instructional styles; with males preferring more autonomy, individuality, and competition in the classroom, and females preferring more interaction and collaboration (Belenky, Clinchy, Goldberger, & Tarule, 1986).

Belenky, Clinchy, Goldberger, and Tarule (1986) interviewed one-hundred thirty-five American women from varying backgrounds between the late seventies and early

eighties. Samples were taken from colleges and universities, as well as from family service agencies. Participants were asked questions concerning their backgrounds, gender, relationships, and intellectual/ethical development. The interviews were categorized by the women's perspectives on their methods of knowing. Five major epistemological groups were used for categorization: silence, received knowledge, subjective knowledge, procedural knowledge, and constructed knowledge. Those grouped in the silence category were the youngest and most dependent of those interviewed. These participants indicated feeling dumb, disconnected, and obedient, describing themselves in an extremely stereotypical manner. Those grouped in the received knowledge category were more often mothers, identifying their primary means of knowing as language use and listening. Their ethical judgments were determined by societal expectations, and they defined themselves by their roles and how others viewed them. The subjective knowledge group indicated a more intrinsic, intuitive means of knowing, relying on listening to the voice within self. Half of the participants were in this category, and there was no distinction based on age, ethnicity, educational level, or social class (Belenky, Clinchy, Goldberger, & Tarule, 1986). A common link between the women in this category was their upbringing, with many having grown up in disadvantaged, unstructured families. Most of the women received the message they were stupid and helpless; most indicated no significant, positive male authority; and most conceded there were patterns of sexual and physical abuse. The majority of the women in the procedural knowledge category were undergraduate students or students who had recently graduated. They used reasoning and reflection to acquire information. They were careful in their responses, usually responding only after reflection. They also used

what the authors referred to as connected knowing, knowledge based upon personal experiences and relationships. Participants in the constructed knowledge category integrated what they knew with knowledge they had acquired from others. They practiced combined rational and emotive thought, had a high tolerance for ambiguity, relied on contextual cues, and were empathic.

Belenky, Clinchy, Goldberger, and Tarule (1986) expanded on their concept of connected knowing as a mode of learning, asserting that education should incorporate more methods of connected knowing in their instructional methods. According to the authors, connected teaching is learner-oriented, tailoring instruction to the needs of the student. It is often group-oriented and designed to foster a sense of community. Belenky, Clinchy, Goldberger, and Tarule (1986) characterized females as collaborative and empathic, reportedly viewing collaborative learning as more appropriate to them than the competitive, individualistic style associated with males. A study by Ryan and David (2003) further supported this conclusion of females as more oriented to connected knowing than males, and males as more oriented to separate knowing than females. As a result, females are thought to prefer solving problems in groups, while males are seen as preferring independent problem solving. Some recommendations for learning programs for females suggest they should promote collaboration, support, and affiliation, rather than the autonomy and competition promoted in current education practices (Flannery, 1994).

Studies on differences between boys and girls in the classroom have also been conducted (Goldstein & Puntambekar, 2004; Martin, 2004). Goldstein and Puntambekar (2004) conducted a study to consider the influence of sex in technology classes. They

studied middle school students' perceptions and attitudes about exploring science through technology versus through hands-on investigations. Collaborative learning was encouraged in both instances. The study suggested boys and girls had similar attitudes about computers and group work, but that girls participated more actively in learning during the collaborative learning activities.

Martin (2004) studied differences in motivation to learn between boys and girls. Two-thousand nine-hundred twenty-seven Australian high school students participated in the study and were administered the Student Motivation Scale. Data showed differences between the degrees of motivation between boys and girls, but the effect sizes were small. The results of the study revealed that girls had statistically significant higher scores in learning focus, organization, study skills, and persistence than boys. The study also showed evidence of higher levels of anxiety in these girls versus the levels of anxiety in the boys. Bandura (1977) has suggested a negative correlation between levels of anxiety and actual learning outcomes. He indicated that students who do not feel affirmed experience higher levels of anxiety, as well as diminished learning ability.

Researchers have suggested a relationship between gender-based learning differences and the biological differences between males and females (Gurian & Stevens, 2004; Moir & Jessel, 1989; Rich, 2000). Gurian and Stevens (2004) conducted research on differences between male and female brains and their learning needs. Positron emission tomography (PET) scans of boys' and girls' brains were used to provide evidence of learning differences. The authors suggested gender differences in the brain were consistent among males and females, regardless of culture.

Female brains were identified as having a larger corpus collosum, the tissue connecting the brain's left and right hemispheres, than male brains, allowing for more interaction between the two hemispheres (Gurian & Stevens, 2004). Additionally, PET scans suggested female brains as having a larger hippocampus and stronger neural connectors in the temporal lobes than male brains (Gurian & Stevens, 2004). These portions of the brain account for one's ability to remember details and listen better than an individual with a smaller hippocampus and weaker neural connectors in the temporal lobes. Gurian and Stevens (2004) suggested this may affect females' abilities to perform better in reading and incorporate more detail in writing than males. Further, PET scans show that the cortical areas of female brains are used more often than in male brains, accounting for strength in verbal and emotive functioning. Because females use the verbal-emotive portion of their cortical brain much more than males, scans indicate they do not use the portion for abstract and physical-spatial functions as much (Moir & Jessel, 1989; Rich, 2000).

Males, on the other hand, use portions of the cortical areas necessary for spatial and mechanical functioning, thus minimizing their use of the cortical areas dedicated to verbal-emotive functioning (Moir & Jessel, 1989; Rich, 2000). This might provide an explanation of why males seem to be more interested in learning involving objects in space and mechanical knowledge than females (Blum, 1997; Moir & Jessel, 1989). Gurian (2001) indicated that male brains are more receptive to teaching that involves less verbal usage and more usage of symbols and spatial objects than female brains.

Further, findings have indicated differences between the demographics of sex and age; suggesting males and older undergraduate students as more field independent

(Murphy & Doucette, 1997). Murphy and Doucette (1997) conducted a study on eighty-nine male and female business students. Participants were administered the Group Embedded Figures Test. Males scored higher levels of field independence than females; and older students scored higher than younger students, indicating that students in this discipline became more field independent and analytical as they progressed through their course of study. The researchers suggested an increase in field independence and analytical skill would be an expectation of further educational study, though this evidence did contradict Witkin's (1971) view that field dependence-independence remained relatively stable after the teenage years.

Studies on adults have suggested cognitive style differences between males and females (Chao & Huang, 1997; Murphy & MacGillivary, 1999). Chao and Huang (1997) conducted a study between secondary school teachers and undergraduate students and suggested a difference between males and females in different age groups. Female teachers in the study scored a higher level of field independence than their male counterparts, while the reverse outcome was shown with the younger student groups. Chinese and American students were participants in the study, and both groups produced similar results with regard to field independence. Murphy and MacGillivary (1999) conducted a study with undergraduate business students, exploring the importance of cognitive styles in business education, and did suggest differences with regard to cognitive style and biological sex.

Other researchers have been unable to substantiate differences between males and females (Murphy & Casey, 1997; Tanova, 2003). Murphy and Casey (1997) and Tanova (2003) conducted studies on undergraduate male and female students, with neither study

supporting its hypothesis regarding differences between men and women. Tanova (2003) conducted a study on one-hundred twenty-seven undergraduate business students from Turkey. Cognitive style and learning preferences were measured using the Cognitive Style Index, and the research suggested students with analytical cognitive styles more often preferred teacher-dependent and collaborative learning situations than individuals with verbal cognitive styles. The hypothesis regarding differences between scores of men and women was not supported however. Murphy and Casey (1997) conducted a study measuring cognitive style and sex. The Group Embedded Figures Test was administered to sixty-three graduates of a Bachelor of Arts in Information Management program. In both of these studies, factors concerning the length of time students had been in their degree programs and the disciplines studied seemed to be more significant than biological sex, suggesting age and/or subject matter as potentially important determinants of cognitive style and learning preferences.

Sizoo, Mahotra, and Bearson (2003) also examined sex differences in traditional and nontraditional-aged business students to determine whether differences in learning preferences existed. Weinstein, Palmer and Schultze's (1987) Learning and Study Strategies Inventory (LASSI) was administered to a sample of undergraduate business students. The LASSI is designed to measure attitude motivation, time management, anxiety, concentration, information processing, selecting main ideas, use of study aids, self testing, and testing strategies. Learning differences between traditional males and females were greater than differences between nontraditional males and females. Adult learners did, however, differed significantly in one area: motivation. Differences in motivation were shown with female adult students having more motivation than their

male counterparts or traditional-aged males and females. Although adult females seemed to have more motivation than adult males, they also experienced greater anxiety, potentially negatively affecting their ability to be academically successful. This echoed Martin's (2004) study on high school students discussed earlier.

Other studies (Fraser, Lytle, & Stolle, 1978; Sandler-Smith, Allison, & Hayes, 2000; Tyson, 1989) have been conducted on adult business students. Fraser, Lytle, and Stolle (1978) and Tyson (1989) suggested male and female business students did not differ in their levels of extrinsic motivation, but did have significant differences in their levels of intrinsic motivation. These two studies compared the performances of male and female business students in upper-level accounting courses, concluding that the female students consistently performed better than the male students. Some suggested reasons for this performance difference included the assertion that the females seemed to be more success-oriented and more career motivated than the male students. Sandler-Smith, Allison, and Hayes (2000) conducted a study, concluding that most adult business students are females over the age of twenty-five. They explored sex-based learning differences in the areas of motivation and quantitative skills and suggested age as more of a factor in learning preference differences than biological sex.

Several studies (Bandura, 1986; Pajares, 1997, 2002; Pajares, Miller, & Johnson, 1999; Zimmerman, 2002; Zimmerman & Martinez-Pons, 1990) have been conducted on sex, gender, self-efficacy, and self-regulated learning. Bandura's (1986) social cognitive theory suggests a strong correlation among students' self-efficacy, academic motivation, and self-regulatory behaviors used in school. In studies on young people, Bandura concluded that those with a higher sense of self-efficacy are more successful because

they set more challenging goals and persevere through failures. Youths high in self-efficacy accept mistakes as part of the learning process and focus more on their own personal abilities than the abilities of others. Pajares, Miller, and Johnson (1999) indicated that elementary girls expressed greater self-efficacy than older girls. Zimmerman (2002) indicated youths high in self-efficacy have a greater ability to self-monitor. Various conclusions have been drawn about reasons for differences between males and females.

Zimmerman and Martinez-Pons (1990) conducted studies on 5th, 8th, and 11th grade students to determine whether sex differences existed with regard to self-efficacy and self-regulated learning. They concluded that more self-regulatory strategies were incorporated as students were promoted to higher grades, and that females more often practiced self-monitoring. Some researchers have suggested differences in levels of self-efficacy and self-regulatory behavior may be attributed to stereotypical beliefs about gender, rather than biological sex (Eisenberg, Martin, & Fabes, 1996). Eisenberg, Martin, and Fabes (1996) indicated socialization affects gendered behavior, and that this socialization is, in large part, affected by parental influence. Their study concluded that mothers are more likely to talk about emotions and relational matters with their daughters than with their sons, and that girls are often socialized to assume nurturing roles, even if they plan for other employment opportunities. This may account for differences occurring as girls and boys age and their confidence beliefs concerning certain courses and career choices. Society's stereotypical beliefs about gender suggest mathematics and science as male domains (Meece & Courtney, 1992); and as girls enter middle school, this perception seems to affect their interest levels in these subjects.

Junge and Dretzke (1995) indicated that girls often judge their self-efficacy lower than boys in occupations requiring quantitative skills. Their study investigated gifted and talented adolescents and sought to determine whether the self-efficacy theory applied to the behavior of these students in the domain of mathematics. Participants were asked to complete the Mathematical Self-Efficacy Scale to measure their degrees of confidence on the completion of everyday mathematical tasks. Significant gender differences in self-efficacy ratings were found. Junge and Dretzke (1995) found that these differences actually disappear when self-efficacy judgments for the quantitative activities are presented as stereotypically feminine tasks.

Wigfield, Wilde, Baker, Fernandez-Fein, and Scher (1996) conducted a study on six-hundred fifth and sixth grade students, using the Motivations for Reading Questionnaire (MRQ). They studied the relationship between participants' reading motivations to their reported reading frequency and reading performance. Reading performance was measured using the Gates-MacGintie Reading Test. The study found that males tend to be more self-confident about their abilities and skills, while females tend to be more modest. As a result, differences suggested in levels of self-efficacy may be affected by response bias on self-reporting instruments.

Group Embedded Figures Test

The Group Embedded Figures Test (GEFT) is a modification of the original Embedded Figures Test (EFT), developed twenty years earlier by Witkin (1950). The concept of using simple and complex figures in the EFT and GEFT was motivated by Gottschaldt's work on perception (Gottschaldt, 1926). Gottschaldt's work used simple

figures incorporated, but obscured, into complex figures. Performance on the EFT relates to perceptual functioning and one's level of competence with perceptual embedding.

Psychological research has supported the contention that understanding one's perceptual functioning ability can allow for inferential conclusions about personality. Several studies (Witkin, 1950; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962; Witkin, Lewis, Hertzman, Machover, Meissner, & Wapner, 1954) have been conducted to determine whether conclusions drawn on this test can be applied to other aspects of perceptual functioning. These studies have suggested a correlation between perceptual functioning ability and psychological activity. Witkin, Dyk, Faterson, Goodenough, and Karp (1962) addressed the lack of discussion on the relationship between personality and cognitive style. The authors reviewed perspectives on trait psychology, cognitive social learning, field dependence-independence cognitive styles, and the relationship among these perspectives. Rationale for the lack of overlap between the fields of personality and cognition were presented, as well as proposals on how to integrate them. As a result, implications about the EFT's ability to infer about psychological and personality characteristics have been made. These results allowed for the formulation of the perceptual construct field dependence-independence. This construct was later broadened to include perceptual and intellectual activities, once it could be demonstrated that competence at perceptual disembedding was strongly related to non-perceptual disembedding (Witkin, Oltman, Raskin, & Karp, 1971).

Studies by Witkin, Oltman, Raskin, and Karp (1971) indicated that individuals having difficulty disembedding simple figures from complex designs in the EFT also have difficulty solving problems requiring the isolation of elements from larger contexts.

These individuals also have problems applying these conclusions to other contexts. Therefore, inferences drawn from performance on the EFT could be applied, not only to one's perceptual functioning abilities, but to his/her cognitive style as well (Witkin, Oltman, Raskin, & Karp, 1971). A study by Karp (1963) indicated that scores revealing competence in the EFT, not only required the ability of individuals to discriminate parts of one field from another; or to discriminate between conflicting stimuli, but also required the individual's ability to disseminate parts of an organized field in order to separate and remove parts from it.

Relationships have been sought between cognitive style and body concept, and conclusions have indicated that persons with more cognitive complexity have a strong sense of self as separate from others. These individuals are able to self-monitor well, having a heightened awareness of their needs, feelings, and attributes (Crutchfield, Woodworth, & Albrecht, 1958; Konstadt & Forman, 1965; Messick & Damarin, 1964). These studies have indicated that, although field dependent persons are less cognitively complex, they are more social and attentive to others. Crutchfield, Woodworth, and Albrecht's (1958) study on Air Force captains further indicated relationships between cognitive complexity and sense of self. Numerous significant relationships were found between cognitive complexity, emotional adjustment, social relations, and leadership capability. Konstadt and Forman (1965) sought to determine whether a relationship existed between social environment and cognitive complexity, concluding that individuals less cognitively complex demonstrated more external directedness. Messick and Damarin (1964) indicated field dependent individuals as more socially motivated. As a result, they reasoned field dependent persons were better able to process and retain

socially significant stimuli such as faces. In their study, field dependent individuals were more attentive to the faces of others and better able to remember faces than field independent persons.

Performance on the EFT has been compared to performance on other perceptual tests, one of which is the Rod-and-Frame Test (RFT). The RFT requires a participant to be seated in a dark room, while being asked to adjust a tilted luminous rod upright from its centered position within a tilted luminous frame (Witkin, 1948; Witkin & Asch, 1948). Both perceptual tests ask participants to view parts within an immediate surrounding field. Conclusions discovered that persons taking a long time to identify simple figures within complex figures in the EFT were also likely to overcompensate and tilt the rod farther toward the tilted frame, as well as his/her own body farther toward the tilted room, in the RFT. In both of these perceptual tests, the construct involved is field dependence-independence.

The original EFT was designed to be individually administered, making group administration difficult. As a result, the Group Embedded Figures Test (GEFT), developed by Oltman, Raskin, and Witkin (1971), was designed to allow for group testing. Testing can be done with large groups in the span of about twenty minutes. The presentation and format is very similar to the original EFT, with seventeen of the eighteen complex figures actually coming from the original EFT. The GEFT has been used in many studies to draw conclusions about levels of field dependence-independence, cognitive style, and personality. Several studies have been conducted using adult learners as participants (Brosnan, Demetre, Hamill, Robson, Shepherd, & Cody, 2002; Czarnecki, 1980; Meng & Patty; 1991; Rupert, 1987; Siebenman, 1984).

Brosnan, Demetre, Hamill, Robson, Shepherd, and Cody (2002) used the Group Embedded Figures Test to explore the performances of developmentally dyslexic children and adults. Both age groups underperformed on the test. The weakness in performance with visual–spatial tasks was not used as an explanation since dyslexics performed normally on a range of other non-verbal assessments. Findings suggested dyslexics have difficulties processing information within surrounding contexts, relating to their inhibition of distractors and to the sequencing of events.

Czarnecki (1980) used the Group Embedded Figures Test to measure cognitive style of adult learners and scores on the Test of General Education Development (GED). The study examined a correlation between performance on the GED and cognitive style as measured by the GEFT. Czarnecki considered the cognitive dimensions of Wholist-Analytical and Verbal-Imagery, concluding that the dimension of Wholist-Analytical shared characteristics with higher levels of field independence.

Rupert (1987) also studied field dependent and independent adult students and their scores on the GED. They sought to identify a correlation between field independence and self-directed behavior by investigating the relationship between cognitive style and academic performance. Levels of field dependence-independence were measured using the Group Embedded Figures Test (GEFT), and academic achievement was measured using the General Educational Performance Index (GEPI). Sixty-five adults participating in the Home Study General Educational Development (GED) test preparation program were used in this study. Researchers hypothesized that field independent students would benefit more from the home study test preparation program than field dependent students as indicated by better scores on the GEPI.

Participants were administered the GEFT and categorized as field dependent or field independent. A GEPI pre-test was administered at the beginning of the program, and a post-test was administered at the end of the program. Results indicated that cognitive style is significantly related to achievement of adult learners in the Home Study GED test preparation program, with field independent students scoring higher on the GEPI.

Witkin, Dyk, Faterson, Goodenough, and Karp (1962) indicated that field dependence-independence is represented on a continuum, rather than categorized as distinct types. Meng and Patty (1991) used this continuum when they conducted a study with participants grouped into three cognitive style groups. Individuals were categorized as field dependent, field intermediate, or field independent, based on scores on the Group Embedded Figures Test. Participants scoring within one half standard deviation of the mean were considered to be field intermediate. Participants with higher scores for field independence performed better on mathematical and analytical tasks than those who scored as strongly field dependent.

Another use of the Group Embedded Figures Test included Siebenman's study (1984). This study on nontraditional-aged undergraduates sought relationships between cognitive styles and learning styles. Field dependence-independence was measured using the GEFT. Relationships were found between levels of field dependence-independence and learning style preference scores, but not at a statistically significant level. Attitudes of field independent individuals suggested levels of hostility toward their college experiences, indicating beliefs that learning effectiveness was connected to instructors and student effort. A limitation to this study involved its small number of only thirty participants.

Adult Learners

Evidence suggests a consistent increase in field independence between the ages of eight and fifteen years (Witkin, Goodenough, & Karp, 1967). Witkin, Goodenough, and Karp (1967) suggest that, after the age of fifteen, the increase slows down and plateaus in early adulthood. With the elderly, there is a consistent marked return to field dependence (Comalli, 1965; Schwartz & Karp, 1967). Comalli (1965) and Schwartz and Karp (1967) found that, after the late thirties, individuals tend to become increasingly more field dependent. Witkin, Goodenough, and Karp (1967) contended there was little evidence documenting field dependence-independence between the ages of twenty-four and geriatric age, though they conceded that some studies suggest this decline begins during the late thirties.

Later research disputed this finding, when the GEFT was used with older females (Panek, 1982). Panek (1982) investigated the relationship between field dependence-independence and personality in older females. The Group Embedded Figures Test and the Hand Test (Wagner, 1962) were administered to sixty-four females between the ages of 60-81 living in a retirement community, with the mean age at sixty-nine years. Seven statistically significant correlations (Spearman rhos) were obtained between personality variables and the cognitive style dimensions of field dependence-independence. Findings were inconsistent with theoretical assumptions that suggest field dependence increases with age, but rather suggested that personality relationships appear to change with old age.

Vitols (1985) studied a correlation between andragogy, the art of helping adults learn; field independence and cognitive complexity between traditional-aged and

nontraditional-aged undergraduate females. The purpose of the study was to compare cognitive styles and learning styles of these two groups. Participants included one-hundred female undergraduates between the ages of 18-68 enrolled in degree programs at various educational institutions in Southern California. The cognitive style dimensions of simplicity/complexity and field dependence-independence were measured. Cognitive simplicity/complexity was measured using the *Modified This I Believe Test* (Filsinger, 1979), and field dependence-independence was measured using the Group Embedded Figures Test (Oltman, Raskin, & Witkin, 1971). Learning style preferences were measured using the College Student Questionnaires (Peterson, 1968). Vitols concluded that cognitive style did not significantly differ between traditional-aged and nontraditional-aged undergraduate females, but that learning style preferences did. Traditional-aged students preferred objective examinations and class assignments attributed to a pedagogical learning style. Nontraditional-aged students were evenly divided in their preferences for learner-centered and teacher-centered approaches, and both age groups preferred the discussion method, a style attributed to a more andragogical approach. Students who were more field independent and cognitively complex preferred the learner-centered approach. Sex and cognitive style appeared to play more of a significant role in the findings than age.

Evidence suggests adult students vary in their learning styles from their younger counterparts. Malcolm Knowles, considered the father of adult education, asserted that adult students were more self-directed learners and introduced the concept of andragogy (Knowles, 1970). Knowles emphasized the importance of learners formulating goals and knowing their desired outcomes of the learning. Brookfield (1983) stated that, while the

learner or educator may not define specific goals clearly, the process of learning is still deliberate. Adult learners are individuals seeking to acquire some knowledge. Adult education has developed as a separate discipline or field of study, with considerable research exploring why adults participate in learning, how they differ from younger learners, and the concept of self-directedness (Tough, 1979).

Knowles (1970) identified adult learners as proactive learners, taking initiative for their own learning. Brockett and Heimstra (1991) stated that proactive learners have greater motivation to learn than reactive learners, who wait passively for others to impart knowledge to them. Proactive learners take personal responsibility for their learning and assume ownership of their thoughts and actions. Brockett and Hiemstra concluded that this personal responsibility is essential to self-directed learning, a characteristic Knowles attributes to adult learners. Knowles (1970) further suggested that self-directed learning is a natural stage of psychological development, one which occurs more often with maturity. As persons take more control over and responsibility for their own lives, they become more self-directed. The term lifelong learning supports this view of learning as continuous. Further research documents a correlation between Knowles' concept of andragogy and preferences for certain teaching methods (Davenport & Davenport, 1986; Spear & Mocker, 1984; Truluck & Courtenay, 1999).

Davenport and Davenport (1986) studied the relationship between student-centered learners and teacher-centered learners, suggesting the former preferred interactive games, while the latter preferred lecture. The authors offered approaches whereby adult educators could determine the best instructional styles for various types of learners. They asserted that educators should be familiar with their own instructional

styles and receptive to adapting their teaching styles to the orientation of particular groups they may be teaching. While they indicated adult learners most often prefer student-centered learning, they concluded that the best instructional approach would involve a combination of both teaching styles.

Mocker and Spear (1982) suggested adult learning as much more extrinsically motivated than that of younger learners, stating participation as a key element to adults' academic success. They addressed the difference between non-formal and formal learning, indicating non-formal learning as more effective for adult learners. Non-formal learning is defined as learning outside a formal learning setting, characterized by voluntary participation of the learner. Formal learning is defined as learning where the objectives are defined by the educator or organization. Non-formal learning is a term often used for any method of learning that is nontraditional, where attendance and expectations are controlled by the learner. As a result, it seems synonymous with adult learning. According to Mocker and Spear, formal learning presents education from the institution's or teacher's perspective, while non-formal learning occurs when educators structure education based on what the learner wants or needs to know, which is more preferred by adult learners.

Truluck and Courtenay (1999) conducted a study on adult learners and their learning styles and suggested that, rather than preferring active, hands-on learning; as adults age, they have more of a tendency toward reflection and observation in their learning environments. Adult learning was researched utilizing one-hundred fifty-two adults, aged 55-85 years, using the Learning Style Inventory (Kolb, 1984). They concluded age related trends with regard to learning style preferences of adult learners.

Most participants aged 55-65 years preferred the Accommodator learning style, which involves learning by feeling and doing. The majority of participants aged 66-74 years preferred to learn by feeling and watching, utilizing the Diverger learning style. Most adults in the 75-older age group were Assimilator learners, preferring to learn by thinking and watching. Truluck and Courtenay (1999) concluded that as adults age, they become more reflective, observational learners.

Houle (1961), a leader in the study of adult learning, illustrated the diversity of adult learners, suggesting adults are motivated to participate in learning activities for several reasons: to accomplish specific goals, to seek knowledge for personal gratification, and/or for social gratification. He identified these learning motives as activity oriented, goal oriented, and learning oriented. He explained goal-oriented adult learners as those who use education as a means to achieve specific goals or objectives. Activity-oriented adult learners are those who participate in educational opportunities because of an attraction to the content or purpose of the learning. Houle identified learning-oriented adult learners as individuals who participate in learning for the sake of learning. Houle was interested in determining what motivated adults to learn, recognizing the subjective side of learning. He urged practitioners of adult learning to recognize the various causes and needs of the adult learner. Houle (1961) produced one of the first attempts to understand the individual learner rather than understanding adult education solely through a study of the institution. Long and Agyekum (1985) indicated Houle's study of adult education lead the way to further understanding of the adult learner as self-directed, prompting further research on other aspects of self-directness. Long (1985) stated that learning is increasingly important to adults. He suggested

learning was mainly a cognitive process, influenced by several factors, including the state of the learner, the prior knowledge held by the learner, and the attitudes and beliefs the learner holds toward the learning situation (Long, 1990). Long believed cognitive engagement is an important aspect to learning, and that self-regulated learning is a facilitative aspect of cognitive engagement.

Merriam and Caffarella (1999) agreed with Long's view of adult learners as autonomous individuals who choose to learn for reasons of personal growth. The authors addressed two major perspectives on adult learning: individual and contextual. They explained the individual perspective as following a psychological paradigm. The assumptions of this perspective include the belief that learning is internally motivated. This perspective does not consider context, those environmental factors such as a learner's background or life situation. The individual perspective involves the concepts of motivation, self-directed learning, andragogy, and transformational learning. The contextual perspective considers the impact of environmental factors like the learner's background or life situation on learning. Aspects of the contextual perspective include the learner's situation and the learning context. This perspective considers what the learner and/or the educator bring to the learning situation, to include experiential learning, situated cognition, and intellectual development. As a result, Merriam and Caffarella (1999) identified factors such as ethnicity, gender, and social class that should be considered in the learning process. The authors addressed the individual and contextual perspectives of adult learning, concluding that further research should include an integration of both perspectives.

Billington (1990) and Galbraith (1994) indicated that the use of a pedagogical approach may even leave adult learners feeling alienated in the classroom. They suggest an adult learner's feeling of being patronized is a stronger indicator of adult drop-out rates than the learner's actual lack of ability. Rather than receiving an enlightening learning experience, adult learners in these situations often complain they are patronized and treated as children (Billington, 1990; Galbraith, 1994). Billington (1989) asserted that adult educators should approach the adult learning situation with openness, respect, and unconditional acceptance of students. While these same qualities are also desirable for educators of younger students; when educators of adult students do not possess these qualities, the negative consequences are greater for older students than for younger students (Billington, 1990). Adult learning environments where non-authoritarian self-directed learning were used resulted in increased ego development and esteem in students which was a necessary catalyst to increased self-direction and internal motivation in learners (Billington, 1989; 1990).

Echoing the work of Billington, Galbraith (1994) revealed a relationship existed between learner-centered instructional styles and the development of self-esteem in adult learners. Galbraith's research asserted various factors as affecting adult learners' self esteem: the involvement of mentors, the credibility of instructors, the nature of the adult learner, the clarity of information and objectives for the course, and the value placed on learner's experiences. Galbraith (1990) identified six principles from Brookfield (1986) as essential for educators of adult students: 1) adults choose to participate in learning experiences voluntarily; 2) effectiveness is characterized by respect among participants; 3) facilitation should be collaborative; 4) praxis is necessary for effective facilitation;

"learners and facilitators are involved in a continual process of activity, reflection upon activity, collaborative analysis of activity, new activity, further reflection, and collaborative analysis, and so on" (Brookfield, 1986, p. 10); 5) facilitation should encourage the desire for critical reflection; and 6) the goal of facilitation should be the development of self-directed, empowered adults.

Schraw and Nietfeld (1998) predicted that, because of adult learners' abilities to self-monitor, they should be skilled learners. They found a correlation between motivation and actual performance, showing that students scoring high on motivation resulted in high graded performance. Their study tested the general monitoring skill hypothesis, which revealed that adult learners monitor their comprehension using domain-general metacognitive knowledge, as well as domain-specific knowledge. Attention given to the subject of monitoring has focused on three aspects: whether monitoring is accurate within a single domain, whether monitoring within a single domain remains consistently accurate over time, and whether monitoring across multiple domains is consistently accurate at a single time. Studies on adults and monitoring have indicated that adults monitor their performances with better than chance accuracy (Schraw & Nietfeld, 1998). Schraw and Nietfeld's (1998) study was conducted with one-hundred ninety-two undergraduate students enrolled in an introductory course at a large Midwestern university. Eight tests of fluid and crystallized ability were used to examine the dimensions of personality, confidence, bias, and accuracy scores. Fluid and crystallized tests were used because the former limits the use of prior knowledge and domain-specific strategies when monitoring, while the latter promotes the use of prior knowledge. The findings of the study supported two conclusions, that a correlation

existed among monitoring scores across multiple domains, and that individuals seemed to possess different general monitoring skills for various tasks.

Studies have been conducted with adult undergraduates to consider the correlation between motivation and concepts about one's ability to learn (Elliott & Church, 1997; Sachs, 2001). Elliott and Church (1997) suggested a relationship between one's competence expectations and achievement goals. The authors indicated a social-cognitive approach could be used to explain an individual's desire and motivation to achieve competence. Specific achievement goals help to create frameworks for how individuals determine their achievement pursuits. Elliott and Church identified two means by which competence is assessed by individuals: performance goals and mastery goals. Performance goals focus on one's demonstrated ability as compared to others, while mastery goals focus on task development and task mastery. Theorists indicate performance goals tend to produce vulnerability response patterns, to include preferences for simpler tasks, avoidance of tasks for fear of failure, and reduced task enjoyment. Mastery goals, on the other hand, often produce motivational response patterns like preferences for more difficult tasks, persistence in the face of failure, and increased task enjoyment (Elliot & Church, 1997). Elliot and Church (1997) explained the achievement motive as consisting of two components: the desire to excel and the desire to avoid failure. Performance and mastery goals are approach forms of motivation. Their approach contrasts with the theory of classic achievement motivation which indicates that achievement activity is oriented toward either success or the avoidance of failure (McClelland, Atkinson, Clark, and Lowell, 1953). Elliott and Church (1997) and Elliot, McGregor, and Gable (1999) proposed a three-fold approach to understanding

achievement motivation and the development of competence: the performance-approach goal, the performance-avoidance goal, and the mastery goal. Elliott and Church (1997) concluded that those with an approach toward mastery were positively correlated with those who engaged in deep information processing. These individuals developed more competence and utilized better organizational strategies for studying than those who utilized the performance-avoidance approach, suggesting that these individuals seemed to desire a complete understanding of subject matter.

Echoing Knowles' view of adult learners as self-directed and internally motivated, Boggs (1981) stipulated that instruction promoting self-actualization, critical thinking, application to life, and problem-solving seemed most beneficial to adult learners. Wolfgang and Dowling (1981) considered differences between traditional and nontraditional-aged undergraduates and their motivation for learning. They suggested older students as having more of an internal motivation for learning, while traditional-aged students relied more on external factors.

Cross (1981) indicated that about seventy percent of adult learning is self-directed. Cross conducted a comprehensive examination of adult learners, offering information on who they are, how they learn, what they want to learn, and why they participate in learning. Her text examined difficulties facing adult learners and offered recommendations for encouraging participation of adult learners. Cross explained two theoretical models for understanding the adult learner: the Chain of Response (COR) model and the Characteristics of Adult Learners (CAL) model. The COR model explains who participates in adult learning activities and why. The COR model is a seven stage process, with each stage affecting the next stage. According to Cross (1981),

"participation in a learning activity, whether in organized classes or self-directed, is not a single act but the result of a chain of responses, each based on an evaluation of the position of the individual in his or her environment" (p. 125). The stages are "a) self-evaluation, b) attitudes about education, c) the importance of goals and the expectations that these will be met, d) life transitions, e) opportunities and barriers, f) information on educational opportunities, and g) the decision to participate" (p. 127). "The more positive the learner's experience at each stage, the more likely he or she is to reach the last stage – the decision to participate" (McGivney, 1993, p. 27).

Cross' (1981) CAL model explains what and how adults learn. The CAL model attempts to integrate the major theoretical frameworks of andragogy, experiential learning, and lifespan psychology. The model involves two variables: personal characteristics and situational characteristics. Personal characteristics include aging, life phases, and developmental stages. Situational characteristics include whether the learner is engaged in full-time or part-time learning, as well as whether the learning is voluntary or mandatory. The model offers guidelines to educators of adult students, including recommendations that adult learning programs consider the experiential learning of adults, that these learning programs be adaptable and flexible to the needs to the adult learner, and that adult learning programs offer choices in availability and organization. Cross (1981) stated that programs should recognize adult learners as self-directed, asserting that 70% of adult learning is self-directed. Several studies support this correlation between adults and self-directed learning and explain a large part of the resistance to incorporating self-directed learning strategies occurs because many

educators simply do not know what it is or how to facilitate it (Brockett, 1985; Brockett & Hiemstra, 1991).

MacKinnon-Slaney (1994) agreed that adult learners were self-directed and pragmatic, suggesting adults consider learning as significant when it is valued and necessary for expanding skills and abilities. Sutherland (1995) felt this pragmatism was a result of adult learners' practical needs, including their job and family commitments. Braman (1998) suggested adult learners were individualistic, with primary objectives related to responsibility and workforce development and found a significant relationship between readiness to self-directed learning and individualism. Long and Morris (1996) showed a statistically significant, positive correlation between age and self-directed learning readiness.

Ponton (1999) identified adult learners as autonomous, exhibiting independence in learning activities, and correlated autonomy with self-directedness. Ponton identified several behaviors as important to the context of autonomous learning: goal-directedness, action-orientation, persistence in overcoming obstacles, active-approach to problem solving, and self-startedness. Ponton (1999) developed the Inventory of Learner Initiative (ILI) to measure an adult's intention to exhibit personal initiative in autonomous learning activities, assessing the five behaviors of goal-directedness, action-orientation, persistence in overcoming obstacles, active-approach to problem solving, and self-startedness. When the learner establishes learning goals and works to accomplish those goals, he/she is identified as possessing goal-directedness. A learner who is able to translate learning intentions into learning activities is identified as action-oriented. Persistence refers to continued participation in learning activities despite the presence of

obstacles or difficulties. An active-approach to problem solving occurs when the learner proactively develops solutions to problems or difficulties to learning rather than waiting for others to resolve the problems. Self-startedness occurs when the learner, on their own volition, begins participation in an intended learning activity.

Persons who satisfy their learning needs autonomously exhibit three components: personal initiative, resourcefulness, and persistence (Ponton, Carr, & Confessore, 2000). Ponton, Carr, and Confessore (2000) suggested academic curriculum which assists in the development of academic and cognitive learning skills facilitates lifelong learning. Ponton and Carr (2000) indicated that ability of learners' to show personal initiative is an essential component of lifelong learning, and that autonomous learning is an intentional activity, regardless of whether the learning situation occurs accidentally or is compulsory.

Ponton, Carr, and Confessore (2000) conducted an analysis of 909 adults to determine whether resourcefulness was a critical role in adult learning activities, indicating a strong correlation between resourcefulness and persistence. The study involved three groups of adults, each at differing levels of academic achievement, and sought to determine whether they exhibited differences in personal initiative in autonomous learning activities. The three levels of academic achievement were high school diploma, bachelor's degree, and graduate/professional degree. The results concluded that no statistical difference existed in the personal initiative exhibited with regard to participants' educational level. While the study sought to determine whether higher education was responsible for fostering the ability to exhibit personal initiative in autonomous learning activities, the authors suggested higher education may not be the facilitator of lifelong learning as has been asserted.

Defining persistence as exhibiting goal directedness and self-regulation in adults' autonomous learning, Derrick (2001) identified adult persistence as more related to the anticipation of future rewards of present learning than what may be involved at the immediate present. The researcher associated the concept of autonomous learning and self-directed learning, making only a distinction between behaviors and intentions. Derrick explained that behaviors were aspects of autonomous learning; while intentions were aspects of self-directed learning, but further asserted that intentions subsequently lead to behaviors. The author identified factors associated with persistence in autonomous learning: volition, self-regulation, and goal-maintenance. Volition is the strength of the desire to learn. The learner's commitment to a goal and his/her ability to self-regulate in order to achieve that goal is referred to as volitional control. Therefore, self-regulation necessary for goal attainment is contingent upon volition. Persistent learners who practice continual goal-maintenance learn throughout their lifespans, with or without the presence of a teacher. Derrick indicated that understanding persistence of learners is important to understanding autonomous learning, self-directedness, and attributes of lifelong learners.

Self-Directed Learning

According to Malcolm Knowles (1975), self-directed learning is a process whereby individuals take the initiative to determine and develop their own learning needs, learning goals, learning resources, and learning strategies, having the desire and ability to evaluate their own learning outcomes, with or without the help of others. Knowles (1975) offered several definitions for self-directed learning: self-directed

learners grow in their capacity to be self-directed; self-directed learners rely on their experiences as resources for learning; self-directed learners learn what is required for them to be able to perform necessary life tasks; adults are naturally oriented to self-directed learning, and self-directed learning is internally motivated.

Knowles (1975) offered three reasons for self-directed learning: First, proactive learners learn more and learn better than reactive learners. Second, self-directed learning is a natural process of psychological development and maturation. Third, new developments in education place a lot of responsibility on learners taking initiative for their own learning. He asserted that individuals who did not possess self-directedness would experience much frustration and anxiety in the classroom. Therefore, Knowles offered a five-step model educators could use to encourage self-direction. His five-step model offered recommendations to educators of adult students to assist with: 1) diagnosing learning needs, 2) formulating learning needs, 3) identifying material resources for learning, 4) choosing and implementing appropriate learning strategies, and 5) evaluating learning outcomes.

Tough (1966) conducted research on adult learners and self-directedness, prompting further research in the area. Tough (1967) initially described the process of self-directed learning as self-teaching. According to Tough, self-teaching occurs when learners assumed responsibility for planning and directing their course of study. Later, Tough elaborated on the concept of lifelong learning. Tough (1979) explained that self-directed learning takes place throughout an individual's lifetime and that adults who desire this form of informal learning will naturally apply it to formal learning situations.

Tough's (1979) research using interview schedules on adults suggested about ninety percent of adults engage in at least one self-directed learning project each year.

Mezirow (1985) explained self-directed learning as the ability adults have to be critically self-reflective in order to change their lives. Mezirow (1991) has described what he calls transformative learning to explain how adult learners make sense out of their experiences. Transformative learning, like emancipation, is the desire to discover how to perceive the world and feel the freedom to question previously held assumptions. This style of learning is reflective and involves critical thinking. Self-directed learners should have the primary responsibility for planning, implementing, and evaluating the effort (Hiemstra, 1994). Hiemstra identified several characteristics of self-directed learning: learners can be empowered to take more responsibility for their learning; self-directedness exists on a continuum, with individual learners possessing various degrees; self-directed learning allows for learning to be transferred from one situation to another; self-directed learning can and should utilize a variety of methods and resources; and finally, self-directed learning does not have to occur with the absence of other people. It is an internal motivation to acquire and assimilate new information; it requires learners to be proactive about their learning.

Brockett and Hiemstra (1991) and Brookfield (1985; 1993; 1994) have researched trends in adult education and have offered guidelines for incorporating strategies for self-directed learning in various settings. Brockett and Hiemstra (1991) identified three areas of research concerning self-directed learning: descriptive research, quantitative research, and qualitative research. Tough's (1979) interviews on adults is an example of descriptive research. Guglielmino's instrument, the Self-Directed Learning Readiness

Scale, has been the most widely used instrument to measure self-directed learning quantitatively (Brockett and Hiemstra, 1991; Long, 1988; McCune, 1989, Merriam & Caffarella, 1999). Qualitative research has been conducted with the use of naturalistic studies involving observation of behavior, much of it conducted by Brookfield, Mocker, and Spear (Brockett, 1985).

Kasworm (1988) investigated self-directed learning within the institutional setting. Two studies were conducted. In the first, Kasworm conducted descriptive research by conducting interviews with seven adults enrolled in graduate courses at a large metropolitan university. Kasworm concluded that the presence and potential of self-direction existed in the graduate classroom. Limitations to this study included the limited sample of the study, and that it was conducted solely on a graduate student population. As a result, Kasworm conducted a follow-up investigation using undergraduate students as participants. Ten individuals were randomly selected and interviewed. Of these individuals, 70% reported that "their re-entry into college was related to an expected delayed gratification that they projected would be fulfilled upon completion of the degree" (Kasworm, 1988, p. 9). Offering examples from the interviews, Kasworm suggested most respondents felt they had some degree of self-directedness and felt self-directed learning was desirable for most adults. In the interviews, four patterns of responses were identified. One pattern indicated a clear preference for an informal learning approach which encouraged self-direction over competitive, test-oriented learning. A second pattern involved a combination of self-directed and more structured approaches. Structured learning with clearly defined

expectations was a third pattern. A fourth pattern indicated a preference for structured learning with compliance just for the purpose of making it through the learning session.

Mocker and Spear (1982) found that self-directed learning is situational and dependent on who has control of the learning objectives and methods. They identified three forms of learning: formal, informal, and non-formal. Formal learning takes a more pedagogical approach, with the teacher and/or institution controlling both the learning objectives and means by which learning should take place. Informal learning occurs when the teacher/institution controls the learning objectives, but the learner controls the means. Non-formal learning, identified by Mocker and Spear (1985) as self-directed learning, occurs when the learner takes control of both the learning objectives and the means by which learning should occur. This research suggested self-directed learning, where control for learning and decision-making about the objectives and means of learning reside within the student, is a preferred learning method for the adult learner. Further, Mocker and Spear asserted that self-directed learning depends, not so much on subject matter or even instructional methods used, but rather on who is in charge of deciding what should be learned, who should learn it, what methods and resources should be used, and how the success of the effort should be measured. To the extent the learner makes those decisions, the learning is generally considered to be self-directed (Mocker & Spear, 1982).

Other studies have suggested that age is not the only factor determining whether or not persons will engage in self-directed learning (Fisher, 1988; Oddi, 1987). Fisher (1988) indicated self-affirmation, self-satisfaction, and pleasure as being important factors, and Oddi (1987) suggested a correlation between self-directedness and

self-actualization. Brockett and Hiemstra (1991) stated personal responsibility as an important element to self-directed learning. Personal responsibility involves taking ownership of one's thoughts and actions, as well as its consequences (Brockett & Heimstra, 1991). Additionally, studies have been conducted indicating the importance of environmental factors in promoting self-directed learning (Brockett & Hiemstra, 1991; Spear & Mocker, 1984).

Spear and Mocker (1984) suggested self-directed learners do not necessarily preplan their learning projects; rather, they make choices from alternatives presented within their environments, and from those alternatives, structure their learning projects. From their findings, Spear and Mocker have identified a typology of four patterns in which this organizing circumstance may exist: Single Event-Anticipated Learning, Single Event-Unanticipated Learning, Series of Events-Related Learning, and Series of Events-Unrelated Learning. Type I: Single Event-Anticipated Learning occurs when the adult learner becomes engaged in a learning activity they believe to be required, of which they have little knowledge of what should be learned or how to learn it. These learners have expectations that the knowledge about what should be learned and how it should be learned will be contained within the learning situation. Type II: Single Event-Unanticipated Learning occurs when the learner becomes involved in a repeated activity, but they do not consider themselves as participating in a learning process. Type III: Series of Events-Related Learning involves learning through a series of episodes that seem to be progressing toward some goal. Spear and Mocker considered that, while this form of learning appears to be occurring in a linear progression, events are actually built upon earlier events. Learners in this situation are unable to foresee this logical

progression. Type IV: Series of Events-Unrelated Learning occurs over a longer period of time than the series of events in Type III learning. These are events which are cumulative, unrelated learning experiences, which eventually culminate in a circumstance which unites the previously unrelated series of events. Spear and Mocker (1984) discovered that self-directed learners do not usually pre-plan their learning projects, but rather select learning opportunities from alternatives presented in their existing environments and construct their learning projects from those opportunities.

Candy (1991) stated that self-directed learners have a strong sense of personal autonomy, proposing the term autodidaxy to explain self-directed learning outside the formal classroom. According to Candy, this form of learning is where most self-directed learning actually occurs, and it is these experiences which can assist or constrain one's ability for self-directed learning. Candy explained that a review of literature on self-direction would address four areas: personal autonomy, self management, learner control, and autodidaxy.

Reio and Wiswell (2000) investigated the correlation between prior knowledge, curiosity, self-directed learning readiness, and performance in the college classroom. Male and female senior undergraduates were used; males scored higher self-directedness and learning performance than females. Prior knowledge had no correlation to any of the variables, except with regard to the ethnicity of the participants. The strongest indicator of learning performance was self-directed learning readiness. Reio and Wiswell explored the connection between curiosity and motivation to learn and suggested curiosity positively impacted learning performance in the classroom.

Delahaye and Smith (1995) studied the effect of personality on orientation to self-directed learning. Consulting the work of leading personality theorists Jung, Maslow, Cattel, and Rotter, various instruments were used to portray four major schools of thought with regard to personality. The Myers-Briggs Personality Type Indicator was used to explore Jung's psychoanalytic area; the Personal Orientation Questionnaire was used to explore Maslow's phenomenological area; the Sixteen Personality Factor questionnaire was used to explore Cattel's trait area, and Levinson's Locus of Control questionnaire was used to explore Rotter's social learning area. The study investigated the relationship between personality, as measured by these instruments, and self-directed learning. Self-directed learning was measured using the Student's Orientation Questionnaire. Implications suggested that personality of the learner did impact their preference for either an andragogical or pedagogical style of instruction. Those preferring an andragogical style were considered self-directed, while those preferring a pedagogical style preferred a more traditional approach. Individuals preferring an andragogical style desired learner-centered learning. Those preferring a pedagogical style desired a more teacher-centered approach. Those exhibiting a preference for self-directed learning were shown to be more analytical, more social, having high self-regard and high self-acceptance.

Motivation has also been linked to self-directed learning. Ponton and Carr (2000) and Derrick (2001) analyzed conative factors associated with autonomous learning. Conation refers to intentional, personal motivation of behavior. Miller (1991) suggested a connection between conation and human learning. Much of Bandura's (1991) focus has been on self-regulation, self-concept, self-esteem, self-reflection, and self-determination

as aspects of conation. Ponton and Carr (2000) addressed the relationship between four conative factors: desire, initiative, persistence, and resourcefulness. Brophy (1985) explained motivation using the expectancy value theory, suggesting individuals are motivated to engage in activities that will produce positive outcomes or will avoid negative ones. Ponton and Carr (2000) suggested individuals engage in self-directed learning to produce positive outcomes, thus following the expectancy value theory. Ponton (1999) further suggested autonomy as a component of self-directedness. Ponton and Carr (2000) and Derrick (2001) indicated persistence follows a path from desire to resourcefulness, then to initiative, and finally to persistence. This suggests desire has a minimal direct effect on persistence, but that resourcefulness has a much greater effect. Carr (1999) indicated a strong correlation between resourcefulness and motivation. Ponton and Carr (2000) and Derrick (2001) suggest this information may prove valuable for educators desiring to foster autonomy in their classrooms.

Some controversy has surrounded the concept of self-directed learning. A leading critic, Brookfield (1988), argued that adult educators have focused too much on self-directed learning, a concept he feels has an inadequate theoretical base. He asserts that researchers in the area of adult education have become so comfortable with the concept of self-directed learning as all encompassing and accommodating that it may actually have limited further critical study to expand understanding of the field of adult education. Brookfield (1993) challenged definitions of self-directed learning, believing that informed, reflective decisions about one's learning is true self-directedness. He argued this cannot truly occur when individuals are weighed down by life's day-to-day struggles, a common characteristic of the adult learner. Friere (1970) asserted that individuals

making decisions based on immediate need are not exhibiting self-directed behavior. Brookfield (1985) began by embracing the concept of self-directed learning, but has more recently become one of its toughest critics. Brookfield identified the following four criticisms of the research prior to 1983: 1) it was based predominantly on middle-class samples; 2) approaches to the research were mainly quantitative; 3) the individual dimension of the learner had been emphasized, with little consideration to the social contexts in which learning occurs; and 4) implications of research findings for questions of social and political change had not been considered.

Brockett and Hiemstra (1991) refuted Brookfield's assertions, stating participants outside the white, middle-class mainstream have been studied, and that a breadth of qualitative research has been presented via meetings of the annual International Symposium on Self-Directed Learning. Beginning research in this area in 1983, Brockett (1985) explored the relationship between life satisfaction and self-directed learning readiness. Brockett asserted that several studies had been conducted which refuted this claim (Baghi, 1979; Leean and Sisco, 1981; Umoren, 1978). Refuting the claim that research had predominantly been done quantitatively, with little qualitative research conducted, Brockett offered that "self-directed learning at this time is an excellent example of a research area where qualitative and quantitative approaches have been used to explore distinct pieces of the puzzle" (Brockett, 1985, p. 57). With the last two criticisms of Brookfield, Brockett seemed to agree. He felt the sociopolitical dimension of self-directed learning continued to be largely overlooked, stating that, while the concerns over predominant sampling of white middle-class samples and the overuse of

quantitative research had become less an issue than in 1985, the concerns over lack of consideration for social context and socio-political effects were still valid concerns.

Brookfield (1986) and Brockett and Hiemstra (1991) have expressed concerns with the humanistic psychology framework presented in research on self-directed learning. Brookfield (1994) indicated that the manner of one's learning is culturally formed and culture bound; the self is not free from cultural influences, and these influences affect instincts, values, needs, and beliefs. Brockett and Hiemstra (1991) agree that self-directed learning activities "cannot be divorced from the social context in which they occur because the social context provides the arena in which the activity of self-direction is played out" (p. 32). Brookfield, Brockett, and Hiemstra call for more attention to the effects of culture on development of self-directedness. Further, they offer that there is a difference between learner self-direction and self-directed learning. Learner self-direction refers to those characteristics within an individual "that predispose one toward taking primary responsibility for personal learning endeavors," and that adults prefer to take responsibility for their own learning if given opportunities (Brockett & Hiemstra, 1991, p. 29).

Echoing the complaints of Brookfield, Merriam and Caffarella (1999) argued that there has been a predominant use of quantitative research in the area of self-directed learning and feel it is such a multifaceted concept that should be researched using many different research paradigms. They asserted that much of the research has represented the understanding of self-directed learning as a linear process; they suggest that much research indicates adults do not necessarily follow a defined set of steps. According to them, any life circumstance can trigger a learning experience. Changing life experiences

can provide opportunities for learning. Merriam and Cafferella argued "that self-directed learning probably occurs both by design and by chance depending on the interests, experiences, and actions of individuals and the circumstances in which they find themselves" (p. 50).

Self-Directed Learning Readiness Scale

Another researcher who has contributed research and writing to self-directed learning is Lucie Guglielmino, developing an instrument to assess readiness for self-directed learning, the Self-Directed Learning Readiness Scale (1977; 1978). McCune (1989) identified variables associated with self-directed learning and indicated one of the most frequently used instruments for measuring self-directed learning as Guglielmino's Self-Directed Learning Readiness Scale (SDLRS). The SDLRS is a 58-item Likert-type scale self-reporting instrument that yields scores between 58 and 260, with higher scores indicating more readiness for self-directed learning. According to Guglielmino (1978), there are eight factors related to self-directed learning readiness: "love of learning, self-concept as an independent learner, ability to handle risk, ambiguity, and complexity in learning, creativity, seeing learning as an ongoing lifelong process, taking the initiative in learning, understanding one's self, and being responsible for one's learning. These factors suggest that some personality factors may relate to self-directed learning" (Ware, 2003, p. 56). In 1991, Guglielmino and Guglielmino designed a self-scoring format for the instrument.

McCune, Guglielmino, and Garcia (1990) indicated that many validation studies of the SDLRS have been conducted, with most researchers reporting range of scores

approximating the desired bell shaped curve. McCune, Guglielmino, and Garcia conducted a meta-analytic investigation of ten years of research using the SDLRS on various adult learner populations and found "a mean of 227.7 and range of 62 points from low to high scores (n = 4,596)" (p. 145). Higher scores have been reported when the instrument was used on populations in adult professional education programs.

While many researchers taut the validity and reliability of the SDLRS, it has not been without its controversy. Bonham (1991) challenged the construct validity of the instrument, questioning whether low scoring measured a student as not ready for self-directed learning or not reading for any type of learning, other-directed or self-directed. Other critics include Field (1989) and Brookfield (1993), believing the SDLRS to be inappropriately validated and conceptually flawed.

Field (1989) investigated the structure, validity, and reliability of the instrument, with findings reporting high reliability coefficients. An item analysis produced different results, revealing that some items did not correlate with total SDLRS scores and suggesting problems with certain items on the scale. Field (1989) charged several problems exist with the SDLRS: the use of the Delphi technique to develop items, the use of negatively phrased items, unclear definitions of concepts, and the addition of invalidated items to the original instrument. Field even strongly advocated that the instrument should no longer be used. Field stated that the instrument did not necessarily measure readiness for self-directed learning, but may measure enthusiasm or love for learning instead. Guglielmino, Long, and McCune (1989) responded to these charges, indicating a misrepresentation of the facts. They argued that the Delphi technique was not used to select items, that concepts were adequately defined, that reverse scoring was

necessary to minimize response set by participants not fully reading items, and that validation had not occurred prior to the inclusion of additional items. Long (1989) and McCune (1989) supported Guglielmino, stating that Field took much information out of context.

Brockett (1985) expressed concerns about the generalizability of the instrument, indicating some difficulties when the instrument was administered to individuals with little or no formal education. As addressed earlier, a primary criticism of Brockett was that sampling had been done predominantly with white middle-class groups. Agreeing with Brockett (1985), Leean and Sisco (1981) found similar difficulty with this demographic, finding the reverse-scoring and response choices difficult to understand. These criticisms have been refuted by Guglielmino, Long, and McCune (1989). Guglielmino (1977) defended the reliability and validity of the instrument, as have others providing additional validation studies for the instrument (Finestone, 1984; Long, 1987; Long & Agyekum, 1988; Reynolds, 1986) through item-to-total correlations for each of the 58 SDLRS items. Finestone (1984) did not find significant differences in scores or difficulty based on participants' level of formal schooling. In response to this concern, Guglielmino developed another version of the SDLRS for adults with lower reading and/or English proficiency levels (Brockett, 1985; Brookfield, 1984).

Candy (1991), another dissenter, indicated that an individual's desire to participate in self-directed learning is largely determined by their self-concepts as self-directed learners. Candy suggested a correlation between higher scores on the instrument and strength of one's self-concept and level of autonomy, as a result, having issues with it as a self-reporting instrument. Kreber (1998) and Guglielmino, Long, and McCune

(1989) responded to both Field's and Candy's complaints, stating that these conclusions did not weaken the instrument, since persons' perceptions and attitudes about their skills and capabilities were necessary components of self-directed learning.

Another instrument designed to measure self-directed learning is the Oddi Continuing Learning Inventory (OCLI). Landers (1989) compared the SDLRS and the OCLI. Landers found a significant correlation between scores on the two instruments, found that internal reliability was high, and advocated the SDLRS as the better of the two instruments for measuring self-directed learning in adult students. The Self-Directed Learning Readiness Scale has contributed much to the quantitative research on self-directed learning. Although the instrument has certain limitations with regard to measuring personality characteristics and with participants having little experience with formal schooling, it still remains the most widely used and supported instrument for measuring self-directed learning readiness.

Summary

The review of literature has addressed cognitive styles and the cognitive style dimensions of field dependence-independence. Further, it has investigated learning differences between males and females. This chapter has discussed the development of the Group Embedded Figures Test. It has provided an overview of how adults learn, as well as self-directed learning. Lastly, this chapter has provided information on the development, support, and dissent of the Self-Directed Learning Readiness Scale. As some indications seemed to provide conflicting data, further research was necessary to determine whether correlations with any of these factors exist.

CHAPTER III

METHODS

Introduction

The purpose of this study was to investigate possible differences and/or relationships between age, sex, levels of cognitive complexity, and self-directed learning readiness. Cognitive complexity was measured by considering levels of field dependence-independence to determine whether relationships existed with regard to age and/or sex. Further, relationships were investigated between age and levels of self-directed learning readiness. Correlations were sought between levels of field dependence-independence, as measured by the Group Embedded Figures Test (GEFT), and levels of self-directed learning readiness, as measured by the Self-Directed Learning Readiness Scale (SDLRS). This chapter contains five sections. The purpose and design of the study is explained in the first section. The second section describes the population and sample selection of the study. Instrument validity and reliability is discussed in the third section. The fourth section offers details about data collection. Finally, the fifth section explains how data were analyzed.

Purpose and Design of the Study

The following research questions were used in this study:

1. What differences, if any, exist between traditional and nontraditional college students and levels of field dependence-independence?
2. What differences, if any, exist between male and female college students and levels of field dependence-independence?
3. What differences, if any, exist between traditional and nontraditional college students and levels of self-directed learning readiness?
4. What relationship, if any, exists between levels of field dependence-independence and levels of self-directed learning readiness?

For this study, two one-way analyses of variance (ANOVA) were used, as well as a Pearson Product Moment Correlation Technique. The independent variable was undergraduate students (considering age and sex). The dependent variables were levels of field dependence-independence and readiness for self-directed learning. A one-way analysis of variance was conducted to examine differences among age, sex, and cognitive complexity. A second one-way analysis of variance was conducted to determine differences among age, sex, and readiness for self-directed learning. Further, relationships were sought between the two instruments used and the independent variable. Therefore, a correlation analysis was conducted to determine whether a relationship existed between levels of field dependence-independence and levels of readiness for self-directed learning.

The analysis of variance (ANOVA) is a method of analysis which separates an existing variation into independent components (Hayslett, 2001). These components are

then analyzed to determine whether differences exist across groups based on means. ANOVAs allow for comparison of two or more independent variables, whose means may or may not be different (Hayslett, 2001). The one-way ANOVA is used when there is only one independent variable, with two or more groups, and one dependent variable. The independent variable can have multiple levels/groups (i.e. age categories / sex categories). It is used when the researcher wants to determine whether a statistical significance exists across groups considering the population mean or grand mean. The one-way ANOVA produces the same results as the independent samples t-test; with the only difference being that the ANOVA produces an F statistic, while the t-test produces a t-statistic (the square root of the F-statistic) (Hayslett, 2001). Use of the ANOVA considers whether the group mean is a better predictor of an individual's score or if the grand mean is an equally good predictor. Two one-way ANOVAs were conducted to determine the variances of each independent variable's various groups with regard to each dependent variable.

Another form of analysis used was the Pearson Product Moment Correlation Technique. This form of analysis allows for the determination of relationships between variables. In a random sample size, there exists pairs of observations for each member of the sample, two attributes of interest that can be measured (Hayslett, 2001). The value indicated for the sample correlation coefficient is inferred to the population correlation coefficient, which is indicated by p (Hayslett, 2001). The value of p (rho) is always between -1 and +1. A value of $r = -1$ indicates a negative correlation, while $r = +1$ indicates a positive correlation. Both are equally strong correlations. Each suggests a perfect linear relationship between sample values of x and y. A negative correlation

exists when the value of *y* decreases as the value of *x* increases. The larger *x* becomes, the smaller *y* becomes; and the smaller *x* becomes, the larger *y* becomes. A positive correlation indicates that the value of *y* increases as *x* increases. Larger values of *y* are associated with larger values of *x*; and smaller values of *y* are associated with smaller values of *x*. The closer the values are to -1 or +1 indicates the strength of the correlation. When the *r* has a value near zero, there is a weak or no linear relationship between the samples of *x* and *y*. This study considered the scores on each instrument to determine whether a correlation existed between levels of cognitive complexity and levels of self-directed learning readiness.

Population Sample

The population included traditional-aged (nineteen to twenty-three years) and nontraditional-aged (over twenty-three years) male and female undergraduate students. The sample was taken from the population of students enrolled within the Schools of Education, Liberal Arts, and Nursing at a four-year university in the southeastern part of the United States. The sample consisted of a convenience sample of classes within the Departments of Communication and Dramatic Arts; Education Foundations, Secondary and Physical Education; International Studies; and Nursing. After data collection, the sample was separated into four groups of traditional-aged males, traditional-aged females, nontraditional-aged males, and nontraditional-aged females. The 117 participants in this study consisted of males and females between the ages of nineteen and fifty-three years. The participants included fifteen traditional-aged males (12.8%),

thirteen nontraditional-aged males (11.1%), fifty-three traditional-aged females (45.3%), and thirty-six nontraditional-aged females (30.8%).

One-hundred seventeen participants completed the first instrument, the Group Embedded Figures Test. Of the 117 participants who received the second instrument, the Self-Directed Learning Readiness Scale, forty-one completed and returned it. This produced a response rate of 35%. Completed instruments were grouped according to age and sex. Of the 117 participants receiving both instruments, sixty-eight were traditional-aged students (58.1%), while forty-nine were nontraditional-aged students (41.9%). Twenty-eight were males (23.9%), while eighty-nine were females (76.1%). The sample included three Asians (2.6%), thirty-six Blacks (30.8%), one Hispanic (.9%), seventy-six Whites (65%), and one Other, identified as American Indian (.9%). Additionally, the demographic questionnaire requested each participant's educational level and discipline of study. Participants completing the GEFT consisted of seven freshmen (6%), nineteen sophomores (16.2%), sixty-nine juniors (59%), twenty-one seniors (17.9%), and one Unclassified (.9%).

Of the forty-one participants completing and returning the SDLRS, twenty-three (56.1%) were traditional-aged and eighteen (43.9%) were nontraditional-aged. Concerning sex, five (12.2%) of the forty-one participants completing and returning the SDLRS were male and thirty-six (87.8%) were female. Ethnicity figures indicated one (2.4%) Asian, eight (19.5%) Blacks, no (0%) Hispanics, thirty-two (78.1%) Whites, and no (0%) indication of Other. With regard to educational level, one participant was a freshman (2.4%), five were sophomores (12.2%), twenty-eight were juniors (68.3%), and seven were seniors (17.1%).

Disciplines of study were categorized as Business, Education, Liberal Arts, Nursing, Science, and Other/Undecided. Fields of study were categorized within these disciplines. Within the School of Business, fields of study included Accounting, Economics, Information Systems, Management, and Marketing. The School of Education included the fields of Counseling, Leadership, and Special Education; Early Childhood, Elementary and Reading Education; and Foundations, Secondary and Physical Education. The School of Liberal Arts housed fields of study in Communication and Dramatic Arts, English and Philosophy, Fine Arts, History, International Studies, and Sociology. The School of Nursing focused solely on the field of Nursing. Fields of study in the School of Sciences included Biology, Justice and Public Safety, Mathematics, Physical Science, Political Science and Public Administration, and Psychology.

Within this sample of participants, various fields of study were identified. Data collected from the GEFT identified sixteen Business (13.7%), fourteen Education (12%), fifteen Liberal Arts (12.8%), sixty-one Nursing (52.1%), ten Sciences (8.5%), and one Other/Undecided (.9%). Of the forty-one participants returning the SDLRS, six indicated their discipline of study as Business (14.6%), four as Education (9.8%), three as Liberal Arts (7.3%), twenty-six as Nursing (64.4%), two as Sciences (4.9%), and none as Other/Undecided (0%).

The sample was compared to the reported population demographics for the semester of data collection. The Office of Institutional Research Summary of Enrollments indicated that 2520 undergraduates were enrolled, and data were categorized by sex, age, ethnicity, educational level, and disciplines of study (Auburn University-Montgomery, 2005). Males numbered 856 (34%), and females numbered 1663 (66%).

Data were age-based categorized as traditional-aged or nontraditional-aged. Of the 2520 total undergraduates enrolled, 1675 (64.5%) were traditional-aged, and 845 were nontraditional-aged (35.5%).

Nineteen participants (.8%) self-reported their ethnicity as American Indian/Alaskan, 53 (2.1%) as Asian/Pacific Islander, 852 (33.8%) undergraduates identified their ethnicity as Black, 25 (1%) as Hispanic, 1511 (60%) as White, 8 (.3%) as Non-Resident Alien, and 52 (2.1%) as Other/Unknown. The demographic questionnaire provided to participants in this study did not request information concerning citizenship; therefore, there was no way to determine whether non-resident aliens participated in this study. Concerning the demographic questionnaire provided to participants, categories provided included Asian, Black, Hispanic, White, and Other. Therefore, the figures for American Indian/Alaskan and Other/Unknown were combined, indicating a total of 71 (2.9%).

Data also reflected educational levels and disciplines of study. Regarding educational level, of the 2520 enrolled undergraduate students, 601 (28.3%) were freshmen, 363 (14.4%) were sophomores, 390 (15.5%) were juniors, 859 (34.1%) were seniors, and 307 (12.2%) were unknown or unclassified. Concerning disciplines of study, statistics indicated that 738 (29.3%) were Business, 370 (14.7%) were Education, 310 (12.3%) were Liberal Arts, 276 (11%) were Nursing, 517 (20.5%) were Science, and 309 (12.3%) were Other/Undecided.

Validity and Reliability

Scores from research instruments must have strong validity and reliability. Validity determines whether the instrument's scores measure what is intended (Benson, 1998). Benson (1998) explained various forms of measuring the validity of an instrument's scores. Content validity is concerned with the test's ability to represent all of the content of a particular construct. Content validity is domain-centered and can be estimated by using expert opinion. Construct validity pertains to causes and effects. Generalizations are made from the operation's construct. Construct validity is attribute centered. Construct validity can be measured by item inter-correlations, as well as correlations with other tests measuring the same constructs. Benson (1998) identified three stages of validity: the substantive stage, the structural stage, and the external stage. The substantive stage of testing validity is theory-based and content-related. The structural stage involves the use of intercorrelations, factor analyses, generalizability, and/or a multitrait-multimethod matrix to measure validity. The external stage utilizes a multitrait-multimethod, group differentiation, and/or correlations with other tests.

Testing the reliability of an instrument's scores is equally important. Reliability determines the consistency of the scores, or the degree to which the instrument measures the same way each time it is used under the same conditions, with the same subjects/participants. Like validity, there are several methods for assessing reliability (Thorndike, Cunningham, Thorndike, & Hagen, 2001). Test-Retest Reliability refers to the test's consistency among different administrations. The same test is given to a group of subjects on at least two separate occasions to determine if scores are similar. This method seeks a high positive correlation between test administrations. Equivalent Forms

Reliability involves using pre-tests and post-tests. These tests are different, but must be equivalent in what they measure. Scores from two measures of the same group of subjects/participants are calculated to determine a high positive correlation. Split-half Reliability takes the total number of indicants and divides them into two halves. The two halves are correlated by using an appropriate measure of association. Inter-rater Reliability, though not viewed as effective as other methods, involves two raters scoring the items on the instrument, a researcher and a rater not connected with the study. Cronbach's Alpha is used to compute or correlate reliability by splitting instrument questions every possible way to compute correlation values for all questions. Cronbach's alpha, set at .70 or higher, assesses reliability and measures internal consistency (Thorndike, Cunningham, Thorndike, & Hagen, 2001).

Instrumentation

Two instruments and a demographic questionnaire were used in this study. The first instrument was the Group Embedded Figures Test (GEFT) developed by Oltman, Raskin, and Witkin (1971) to measure levels of field dependence and independence. The second instrument used was the Self-Directed Learning Readiness Scale (SDLRS) developed by Guglielmino (1978) to measure readiness for self-directed learning. A five-question demographic questionnaire was designed by the researcher to describe the sample. Testing was completed with seven undergraduate classes in twenty-minute sessions at one southeastern four-year university. The researcher administered the instruments during summer semester 2005. Both instruments have been examined for validity and reliability.

Group Embedded Figures Test

The Group Embedded Figures Test (GEFT) is a perceptual test, comprised of eighteen items. Participants are asked to locate and trace simple figures within complex figures, receiving one point for every correct answer. Scores of 0-9 suggest field dependence, while scores of 10-18 suggest field independence. Higher scores suggest higher levels of field independence and lower levels of field dependence. Several studies have been conducted to test the validity and reliability scores from the GEFT, which is a modified version of the Embedded Figures Test (EFT) (Witkin, Oltman, Raskin, & Karp, 1971).

One criterion for measuring the validity of the GEFT involved using the original EFT. Participants of one group were administered the second section of the GEFT in its group-administered form and the third section of the EFT in its individually-administered form. Another group was given the second section of the GEFT in an individually-administered form and the third section of the EFT in a group-administered form. Validity coefficients indicated male undergraduates measured .82 (N = 73), and female undergraduates measured .63 (N = 68) (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962).

Because seventeen of the eighteen items on the GEFT were taken from the original EFT, construct validity of the EFT scores is a strong indicator of the GEFT's score validity. Construct validity has also been measured using other instruments designed to measure the same constructs, including the Portable Rod-and-Frame Test (PRFT) and the Body Adjustment Test (BAT). Consistent correlations among these tests and the constructs of field dependence-independence have been evidenced through a

variety of studies (Gardner, 1957, 1961; Jackson, 1955, 1958; Newbigging, 1954; Perez, 1955).

Validity has also been estimated by assessing the relationship between the PRFT and the GEFT. Participants were administered the GEFT, then subsequently administered the PRFT. Reverse scoring was used, resulting in a $r = .39$ for male undergraduates ($N = 55$), and $r = .34$ ($N = 68$) for female undergraduates (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962). The validity of the GEFT scores was also evaluated in its relationship to another measure of psychological differentiation, the degree of articulation of the body concept (ABC). In this study, the validity coefficients were $r = .71$ for male undergraduates ($N = 55$), and $r = .55$ for female undergraduates ($N = 68$) (Faterson & Witkin, 1970; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962).

Further, factor-analytic approaches have been conducted, suggesting similarities between the dimensions of field dependence-independence and Guilford's adaptive flexibility (Guilford, 1952, 1957) and between these dimensions and Thurstone's flexibility-of-closure (Gardner, Jackson, & Messick, 1960; Thurstone, 1944; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962). Karp's (1963) factor-analytic study indicated that various tasks requiring disembedding loaded on the same factor. Cohen (1957, 1959) also conducted factor-analytic studies, identifying three main factor components in the Wechsler Adult Intelligence Scale (WAIS) and the Wechsler Intelligence Scale for Children (WISC). Supporting the analyses by Cohen (1957, 1959) with the WAIS and WISC, other studies obtained similar results with regard to the factors of block design, object assembly, and picture completion (Goodenough & Karp, 1961; Pascual-Leone, 1969; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962). Other

correlational and factor-analytic studies have provided evidence that performance on the EFT is related to performance on a variety of perceptual tests involving the ability to overcome embedding contexts (Gardner, 1961; Gardner, Jackson, & Messick, 1960; Goodenough & Karp, 1961; Pascual-Leone, 1969; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962).

Psychological differentiation refers to the relationship between one's tendency to perceive items as dominated by surrounding contexts and how that perceptual tendency relates to one's sense of self as separate from its context. Several studies have suggested the same results with the EFT and other psychological tests measuring this same construct (Bell, 1955; Crandall & Sinkeldam, 1964; Linton & Graham, 1959; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962; Zuckerman, 1968). Body concept, in this respect, refers only to one's ability to show more or less articulated body concept as assessed from human drawings. Various studies indicated that individuals scoring higher on the EFT and other tests measuring this construct show more articulated body concepts than field dependent individuals (Dershowitz, 1966; Karp, Silberman & Winters, 1969). Studies have considered whether experiences affect one's ability to self-differentiate; that persons scoring higher on the EFT have had experiences which have encouraged their development of self-differentiation (Berry, 1967; Dawson, 1967; Dershowitz, 1966; Dyk & Witkin, 1965; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962). Other studies on children produced similar results, suggesting the child-rearing experiences of field dependent children were those which hindered their development of self-differentiation (Dyk and Witkin, 1965; Seder, 1957; Witkin, Dyk, Faterson, Goodenough, and Karp, 1962).

Split-half internal consistency was assessed by Panek, Funk, and Nelson (1980). Additionally, scores on the GEFT and original EFT were correlated (Witkin, Oltman, Raskin, & Karp, 1971), and a reliability estimate of .82 for subjects of both sexes was found. As the GEFT is a timed test, correlations estimating reliability have been sought using other parallel formed tests, with identical time limits. The Spearman-Brown prophecy formula was used to compute reliability, producing a reliability estimate of .82 for both male ($N = 80$) and female ($N = 97$) undergraduates. These reliability estimates compare favorably with those of the EFT.

Reliability of the GEFT scores has been measured using undergraduate males and females as participants. Based on sex, men have been shown to perform slightly, but significantly, better than women ($p < .005$). The EFT produced sex differences consistent with the GEFT. On average, males scored 12.0 ($N = 155$), with a standard deviation of 4.1, while the mean for females was 10.8 ($N = 242$), with a standard deviation of 4.2 (Witkin, Oltman, Raskin, & Karp, 1971). Reliability of the EFT scores has been measured much more extensively. Data has shown sex differences throughout the age range of 10 years through college age, yielding reliability coefficients ranging from .61 to .92 for males and from .61 to .86 for females, with scores dependent on the age of participants (Karp, 1963; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962; Witkin, Lewis, Hertzman, Machover, Meissner, & Wapner, 1954). Many studies (Bell, 1955; Crandall & Sinkeldam; Dyk & Witkin, 1965; Linton & Graham, 1959; Witkin, Dyk, Goodenough, & Karp, 1962; Zuckerman, 1968) have been conducted on the GEFT and the original EFT supporting this instrument's scores as valid and reliable.

Self-Directed Learning Readiness Scale

The SDLRS is a self-report instrument that measures what individuals perceive about their skills and attitudes associated with self-directed learning. The instrument is a 58-item Likert-type scale that yields a total score for readiness for self-directed learning between 58 and 290, with higher scores indicating more readiness for self-directed learning. The instrument is based on eight factors: 1) Attitude toward and joy of learning, 2) Self-confidence in abilities and skills for learning, 3) Complexity, adventure, and independence in learning, 4) Attraction to new and unusual situations, 5) Openness to learning situations, 6) Internal control, 7) Self understanding, and 8) Responsibility for one's learning. Responses to each statement range from 1) almost never true of me, 2) not often true of me, 3) sometimes true of me, 4) usually true of me, or 5) almost always true of me. Respondents can circle only one response for each statement.

Content validity can be assessed through the use of a Delphi study, whereby experts review and make recommendations on the content of particular constructs the instrument is designed to measure. The SDLRS was developed through a three-round Delphi survey of fourteen individuals considered to be experts in the area of self-directed learning (Guglielmino, 1978). From this administration, additional revisions of the scale were made and a reliability coefficient of .87 was estimated (Brockett, 1985).

Several studies (Long, 1987; Long & Agyekum, 1988; Reynolds, 1986) have been conducted to measure the construct validity of scores from the SDLRS, including intercorrelational studies, factor analyses, and multitrait-multimethod matrixes. Internal consistency of the 58 items on the SDLRS scale has also been assessed (Long, 1987; Reynolds, 1986). Item-to-total correlations were sought, and results indicated that 21%

of the instrument's questions (12 of 58) did not correlate significantly with the total scale. Two related concerns emerged. First, of these 12 items, nine were among 17 items on the scale written to be scored in reverse. Adding to this confusion is that many of the reverse-scoring items were written using double negatives. Second, many of the respondents were confused by the wording of some of the response choices on the SDLRS. Long (1987) conducted an item-to-total analysis of the SDLRS based on a sample of 117 college students. Three of the 58 items did not correlate with the total instrument. Long's sample included students older than those used in Guglielmino's original study, and his study suggested that age correlated significantly with 12 of the 58 items. Long and Agyekum (1988) conducted a multifactor study, supporting the SDLRS constructs.

In addition to internal correlational studies, external correlational studies have been conducted between the SDLRS and other tests measuring the same constructs. Studies have compared the SDLRS and the Oddi Continuing Learning Inventory (OCLI) (Landers, 1989; West & Bentley, 1991). Landers concluded that all eight factors of the OCLI correlated significantly to total scores on the SDLRS and only found six items on the SDLRS to be statistically weak. Even with this, internal reliability coefficients were found to be very high. West and Bentley's (1991) item-to-total analysis echoed the results of Long (1987).

Many studies support the high level of validity and reliability of scores from the SDLRS (Guglielmino, 1978; Landers, 1989; Long & Agyekum, 1988; Torrance & Mourad, 1978). Long (1993) compiled several validation studies of the SDLRS into a book. The text included Jones (1992) and Morris (1997) studies. Jones (1992) conducted a validation study of the SDLRS with a sample of adult visual art students, and Morris

(1997) conducted a study measuring internal consistency. Both studies supported the validity of scores from the instrument.

At least seventeen studies have been conducted specifically to examine the validity of scores from the SDLRS (McCune, Guglielmino, & Garcia, 1990). McCune, Guglielmino, and Garcia (1990) conducted a meta-analysis of 29 studies using the scale, and positive correlations were found with self-directed learning activity (.27), autonomy (.22), and growth orientation (.22). A negative correlation was found with regard to dependence (-.12).

Finestone (1984) investigated 77 union members and supported claims of construct validity of scores from the SDLRS. Instructor observations and participants' levels of self-directed learning were statistically significantly correlated ($p < .05$) with the SDLRS scores. Skaggs (1981) collected data from a random sample of 200 registered nurses using the Self-Directed Learning Readiness Scale and the Self-Directed Learning Activity Survey and found that hours devoted to self-directed learning directly correlated ($p = .008$) with scores on the SDLRS. Delahaye and Smith (1995) also measured validity of scores from the Learning Preference Assessment (LPA), also known as the SDLRS, on 448 individuals between the ages of seventeen and twenty-four, all seeking Vocational Education and Training degrees or certificates. The results of this study provided evidence of high levels of validity and reliability for the instrument.

Previous to Landers' (1989) study supporting appropriate levels of internal reliability for the SDLRS, Guglielmino's (1977) original study was conducted to establish reliability. Guglielmino's study yielded a reliability coefficient of .87, suggesting high generalizability to similar populations. In spite of strong suggestions of

validity and reliability, the SDLRS has not been without its skeptics, the most noted criticism coming from Field (1989).

Field's study involved 244 students enrolled at the Institute of Technical and Adult Teacher Education in Sydney, Australia. Supporting results of others (Brockett, 1985; Guglielmino, 1977), Field's analysis yielded a reliability coefficient of .89. Field questioned the instrument's construct validity. Twelve items did not correlate significantly with the total score of the SDLRS. Other studies reinforced Field's concerns with the instrument's construct validity, indicating these same 12 items as not correlating significantly with the instrument's total score (Brockett, 1985; Long, 1987). Another critic, Bonham (1991), had concerns about the construct validity of the SDLRS and questioned whether a low score on the test indicated that students are not capable of self-directed learning. Bonham asserted that a low score on the instrument could indicate that students are simply not ready for any learning, self-directed or otherwise.

The SDLRS has not been without its critics and, as a result, has undergone much scrutiny. After reviewing the body of literature available, the majority of research does support the adequacy of validity and reliability scores from this instrument. Considering other tests which are designed to measure the same constructs of readiness for self-directed learning, this instrument seems to provide the most accurate assessment (Landers, 1989; West & Bentley, 1991).

Split-half reliability was assessed on the GEFT with this sample. The total number of indicants was divided into two halves by separating the odd-numbered items from the even-numbered ones. Internal consistency of the SDLRS was tested with this sample, using Cronbach's alpha set at .70. Further, to address reliability of ratings, two

raters scored the items, a researcher and a rater not connected with the study. Both raters concluded the same results.

Data Collection and Procedure

Permission to administer the instruments was provided by the participating university's Institutional Review Board; the Department Chairs of Education Foundations, Secondary and Physical Education; Communication and Dramatic Arts; International Studies; and Nursing; as well as participating instructors. Participants were approached in various classes during the summer semester of 2005. Participating classes were determined by department chairs and instructor volunteers. To minimize the risk of coercion, instructors were asked to leave the room during test administration.

Participants were informed that the purpose of the study was to evaluate levels of cognitive complexity and preferences for learning. Participants were further advised that results would be used only in an aggregate manner and that individual responses would not be identifiable. An informed consent letter (see Appendix B) was provided to them to read and sign, and instruments were administered to participating volunteers.

Students were first asked to complete a five-question demographic questionnaire (see Appendix C), then provided both instruments. Both instruments were coded anonymously, matching them to the appropriate demographic questionnaire. The first test to be administered was the Group Embedded Figures Test, which was timed for twenty minutes. After the completion of this instrument, participants were provided instructions for the completion and return of the Self-Directed Learning Readiness Scale. Due to time constraints, the second instrument was not administered in class. Self-

addressed stamped envelopes were provided to participants, and they were instructed to return the survey by mail.

Summary

This chapter addressed the purpose of this study, identified the research questions, explained the purpose and design, described the population and sample, informed about the data collection, and provided an explanation of the procedures used. Validity and reliability of the Group Embedded Figures Test and the Self-Directed Learning Readiness Scale were addressed. Data were collected in accordance with research guidelines established by the Auburn University Institutional Research Board. Collection of the data was outlined. Statistical procedures for data analysis included two one-way Analyses of Variance and Pearson Product Moment Correlation coefficients.

CHAPTER IV

RESULTS

Introduction

The purpose of this study was to investigate possible differences and/or relationships between age, sex, levels of cognitive complexity, and self-directed learning readiness. Cognitive complexity was measured by considering levels of field dependence-independence to determine whether relationships existed with regard to age and/or sex. Further, relationships were investigated between age and levels of self-directed learning readiness. Chapter IV explains the analysis of data obtained from the Group Embedded Figures Test (GEFT) and the Self-Directed Learning Readiness Scale (SDLRS), as well as the Demographic Questionnaire. The following research questions were used in this study:

1. What differences, if any, exist between traditional and nontraditional college students and levels of field dependence-independence?
2. What differences, if any, exist between male and female college students and levels of field dependence-independence?
3. What differences, if any, exist between traditional and nontraditional college students and levels of self-directed learning readiness?
4. What relationship, if any, exists between levels of field dependence/independence and levels of self-directed learning readiness?

Statistical procedures included two one-way Analyses of Variance (ANOVA) and Pearson Product Moment Correlation coefficients. Descriptive statistics in this study involved means and standard deviations. Analysis of the data was conducted using the Statistical Package for the Social Sciences (SPSS).

Descriptive results of each group included the number of participants, the group mean, and the standard deviation. Groups were divided by age, sex, ethnicity, level of education, and field of discipline. Age was represented by two groups, traditional-aged and nontraditional-aged students. Sex was represented by two groups, males and females. Due to the low numbers of participants of some ethnic groups, ethnicity was represented by two groups, majority and minority grouping. Level of education was represented by five groups: Freshman, Sophomore, Junior, Senior, and Unclassified. Fields of discipline represented six groups: Business, Education, Liberal Arts, Nursing, Sciences, and Undecided.

Data were collected on 117 undergraduate college students in the summer semester 2005. Participation in the study was voluntary, using no incentives or consequences. Two instruments were used, the Group Embedded Figures Test (GEFT) and the Self-Directed Learning Readiness Scale (SDLRS).

Group Embedded Figures Test

The Group Embedded Figures Test (GEFT) is an eighteen-item perceptual test, designed to measure levels of field dependence-independence. Participants are asked to disembed simple figures from complex figures, with scores of 0-9 suggesting field

dependence and 10-18 suggesting field independence. Higher scores suggest higher levels of field independence and lower levels of field dependence.

Of the 117 participants completing the GEFT, scores ranged from 0 to 18. The mean of the GEFT was 8.09, with a standard deviation of 5.21. For males, the mean was 8.07, with a standard deviation was of 5.75. For females, the mean was 8.10, with a standard deviation of 5.07. Witkin, Oltman, Raskin, and Karp (1971), the developers of the test, indicated the mean for males as 12.0, with a standard deviation of 4.1. The mean indicated for females is 10.8, with a standard deviation 4.2. Clearly, the participants in this study scored lower than the reported norms.

Self-Directed Learning Readiness Scale

The SDLRS is a survey that measures individuals' perceptions about their skills and attitudes concerning self-directed learning. The instrument contains 58 items, with higher scores suggesting more readiness for self-directed learning. Responses vary between 1 and 5, ranging from: 1) almost never true of me, 2) not often true of me, 3) sometimes true of me, 4) usually true of me, or 5) almost always true of me.

One-hundred seventeen participants were provided the SDLRS. Forty-one (35%) completed and returned it, with scores ranging from 164 to 278. The mean score was 222.28, with a standard deviation of 23.79. Guglielmino (1996), the developer of the instrument, reported 214 as the national norm for adults completing the SDLRS. The findings in this study were higher than the reported national norm.

Demographic Profile

The sample for this study included 117 male and female undergraduate students enrolled in the summer semester of 2005 at a four-year university located in the southeastern part of the United States. The population included traditional-aged (nineteen to twenty-three years) and nontraditional-aged (over twenty-three years) male and female undergraduate students. The sample was taken from the population of students enrolled within the Schools of Education, Liberal Arts, and Nursing. A convenience sample of classes was used from within the Departments of Communication and Dramatic Arts; Education Foundations, Secondary and Physical Education; International Studies; and Nursing. After data collection, the sample was separated into four groups of traditional-aged males, traditional-aged females, nontraditional-aged males, and nontraditional-aged females. The 117 participants in this study consisted of males and females between the ages of nineteen and fifty-three years. The participants included fifteen traditional-aged males (12.8%), thirteen nontraditional-aged males (11.1%), fifty-three traditional-aged females (45.3%), and thirty-six nontraditional-aged females (30.8%).

One-hundred seventeen participants completed the first instrument, the Group Embedded Figures Test. Of the 117 participants who received the second instrument, the Self-Directed Learning Readiness Scale, forty-one completed and returned it. A demographic questionnaire (see Appendix C) was completed, in addition to the two instruments. Five questions were presented to gather information on age, sex, ethnicity, educational level, and discipline of study. Based on the sample utilized, the population was represented closely with regard to age, sex, and ethnicity. The sample did not

adequately represent the population with regard to educational level or fields of study. This was due, in part, to the enormity of the upper level Nursing class sizes.

Age

Participants in this study ranged from 19 to 53 years of age, with a mean age of 26.02. Sixty-eight participants receiving both instruments were traditional-aged (58.1%), while forty-nine were nontraditional-aged (41.9%) (see Table 1). Of the forty-one participants completing and returning the SDLRS, twenty-three (56.1%) were traditional-aged and eighteen (43.9%) were nontraditional-aged (see Table 2). The Group Embedded Figures Test means and standard deviations by age are provided in Table 3. The Self-Directed Learning Readiness Scale means and standard deviations by age are provided in Table 4.

Table 1

Distribution of Study Participants by Age/GEFT

Age	*n*	%
Traditional	68	58.1
Nontraditional	49	41.9

N=117

Table 2

Distribution of Study Participants by Age/SDLRS

Age	*n*	%
Traditional	23	56.1
Nontraditional	18	43.9

N=41

Table 3

Means and Standard Deviations for the Group Embedded Figures Test by Age (T=Traditional; NT=Nontraditional)

Cognitive Complexity	*M*		*SD*	
	T (*n*=68)	NT (*n*=49)	T (*n*=68)	NT (*n*=49)
Field Dependence (*n*=70)	4.25	4.80	2.91	2.78
Field Independence (*n*=47)	13.46	13.47	2.65	2.75

N=117

Table 4

Means and Standard Deviations for the Self-Directed Learner Readiness Scale by Age (T=Traditional; NT=Nontraditional)

Self-Directed Learner Readiness	*M*		*SD*	
	T (*n*=23)	NT (*n*=18)	T (*n*=23)	NT (*n*=18)
Low (*n*=2)	167.00	N/A	4.24	N/A
Below Average (*n*=4)	187.75	N/A	4.92	N/A
Average (*n*=15)	215.66	220.16	6.80	3.31
Above Average (*n*=14)	241.66	236.87	7.94	6.83
High (*n*=6)	271.50	248.00	9.19	14.76

N=41

Sex

Twenty-eight (23.9%) of the 117 participants completing the GEFT were males, while eighty-nine (76.1%) were females (see Table 5). Five (12.5%) of the forty-one participants completing and returning the SDLRS were male and thirty-six (87.5%) were female (see Table 6). The Group Embedded Figures Test means and standard deviations by sex are provided in Table 7. The Self-Directed Learning Readiness Scale means and standard deviations by sex are provided in Table 8.

Table 5

Distribution of Study Participants by Sex/GEFT

Sex	*n*	%
Male	28	23.9
Female	89	76.1

N=117

Table 6

Distribution of Study Participants by Sex/SDLRS

Sex	*n*	%
Male	5	12.2
Female	36	87.8

N=41

Table 7

Means and Standard Deviations for the Group Embedded Figures Test by Sex (T=Traditional; NT=Nontraditional)

	M		*SD*	
Cognitive Complexity	Male (*n*=28)	Female (*n*=89)	Male (*n*=28)	Female (*n*=89)
Field Dependence (*n*=70)	4.17	4.58	2.42	2.98
Field Independence (*n*=47)	14.70	13.13	2.79	2.57

N=117

Table 8

Means and Standard Deviations for the Self-Directed Learner Readiness Scale by Sex (T=Traditional; NT=Nontraditional)

Self-Directed	*M*		*SD*	
Learner Readiness	Male (*n*=5)	Female (*n*=36)	Male (*n*=5)	Female (*n*=36)
Low (*n*=2)	170.00	164.00	0.00	0.00
Below Average (*n*=4)	184.00	189.00	0.00	5.19
Average (*n*=15)	214.50	217.92	12.02	5.26
Above Average (*n*=14)	239.00	238.92	0.00	7.75
High (*n*=6)	N/A	255.83	N/A	17.17

N=41

Ethnicity

Those completing the GEFT included three Asians (2.6%), thirty-six Blacks (30.8%), one Hispanic (.9%), seventy-six Whites (65%), and one Other, identified as American Indian (.9%) (see Table 9). Participants completing and returning the SDLRS indicated that one (2.4%) was Asian, eight (19.5%) were Black, none (0%) were Hispanic, thirty-two (78.1%) were White, and none (0%) indicated Other (see Table 10). Because of the low representation of some ethnic groups, ethnicity was further categorized by majority and minority ethnic groups (see Table 11). The majority ethnic group was White, with 76 participants (65%) completing the GEFT and thirty-two (78.1%) completing and returning the SDLRS. The minority ethnic groups comprised Asian, Black, Hispanic, and Native American. Forty-one participants (35%) in the minority ethnic group completed the GEFT, while nine (21.9%) completed and returned the SDLRS. The Group Embedded Figures Test means and standard deviations by

ethnicity are provided in Tables 12 and 13. The Self-Directed Learning Readiness Scale means and standard deviations by ethnicity are provided in Tables 14 and 15.

Table 9

Distribution of Study Participants by Ethnicity/GEFT

Ethnicity	*n*	%
Asian	3	2.6
Black	36	30.8
Hispanic	1	0.9
White	76	65.0
Other	1	0.9

N=117

Table 10

Distribution of Study Participants by Ethnicity/SDLRS

Ethnicity	*n*	%
Asian	1	2.4
Black	8	19.5
Hispanic	0	0.0
White	32	78.1
Other	0	0.0

N=41

Table 11

Distribution of Study Participants by Majority/Minority Ethnicity/GEFT

Ethnicity	*n*	%
Majority	76	77.5
Minority	41	22.5

N=117

Table 12

Distribution of Study Participants by Majority/Minority Ethnicity/SDLRS

Ethnicity	*n*	%
Majority	32	78.1
Minority	9	21.9

N=41

Table 13

Means and Standard Deviations for the Group Embedded Figures Test by Ethnicity (A=Asian; B=Black; H=Hispanic; W=White; O=Other)

	M					*SD*				
Cognitive Complexity	A (*n*=3)	B (*n*=36)	H (*n*=1)	W (*n*=76)	O (*n*=1)	A (*n*=3)	B (*n*=36)	H (*n*=1)	W (*n*=76)	O (*n*=1)
Field Dep	6.00	3.87	2.00	5.08	5.00	0.00	2.93	0.00	2.76	0.00
Field Ind	17.50	10.66	N/A	13.47	N/A	0.70	1.15	N/A	2.55	N/A

N=117

Table 14

Means and Standard Deviations for the Group Embedded Figures Test by Majority/Minority Ethnicity

	M		*SD*	
Cognitive Complexity	Majority (*n*=76)	Minority (*n*=41)	Majority (*n*=76)	Minority (*n*=41)
Field Dep	5.08	3.91	2.76	2.85
Field Ind	13.47	13.40	2.55	3.84

N=117

Table 15

Means and Standard Deviations for the Self-Directed Learner Readiness Scale by Ethnicity
(A=Asian; B=Black; W=White)

Self-Directed	*M*			*SD*		
Learner	A	B	W	A	B	W
Readiness	(*n*=1)	(*n*=8)	(*n*=32)	(*n*=1)	(*n*=8)	(*n*=32)
Low	N/A	170.00	164.00	N/A	0.00	0.00
Below Avg	184.00	186.00	190.50	0.00	0.00	6.36
Average	N/A	217.25	217.54	N/A	7.27	5.82
Above Avg	N/A	238.50	239.00	N/A	6.36	7.86
High	N/A	N/A	255.83	N/A	N/A	17.17

N=41

Table 16

Means and Standard Deviations for the Self-Directed Learner Readiness Scale by Majority/Minority Ethnicity

Self-Directed	*M*		*SD*	
Learner	Majority	Minority	Majority	Minority
Readiness	(*n*=32)	(*n*=9)	(*n*=32)	(*n*=9)
Low	164.00	170.00	0.00	0.00
Below Avg	190.50	185.00	6.36	1.41
Average	217.54	217.25	5.82	7.27
Above Avg	239.00	238.50	7.86	6.36
High	255.83	N/A	17.17	N/A

N=41

Educational Level

Participants completing the GEFT consisted of seven freshmen (6%), nineteen sophomores (16.2%), sixty-nine juniors (59%), twenty-one seniors (17.9%), and one unclassified (.9%) (see Table 17). Of the forty-one participants completing and returning the SDLRS, one was a freshman (2.4%), five were sophomores (12.2%), twenty-eight

were juniors (68.3%), and seven were seniors (17.1%) (see Table 18). The Group Embedded Figures Test means and standard deviations by educational level are provided in Table 19. The Self-Directed Learning Readiness Scale means and standard deviations by educational level are provided in Table 20.

Table 17

Distribution of Study Participants by Educational Level/GEFT

Education	*n*	%
Freshman	7	6.0
Sophomore	19	16.2
Junior	69	59.0
Senior	21	17.9
Unclassified	1	0.9

N=117

Table 18

Distribution of Study Participants by Educational Level/SDLRS

Education	*n*	%
Freshman	1	2.4
Sophomore	5	12.2
Junior	28	68.3
Senior	7	17.1
Unclassified	N/A	N/A

N=41

Table 19

Means and Standard Deviations for the Group Embedded Figures Test by Educational Level (Fr=Freshman; So=Sophomore; Jr=Junior; Sr=Senior; Un=Unclassified)

	M					*SD*				
Cognitive Complexity	Fr (*n*=7)	So (*n*=19)	Jr (*n*=69)	Sr (*n*=21)	Un (*n*=1)	Fr (*n*=7)	So (*n*=19)	Jr (*n*=69)	Sr (*n*=21)	Un (*n*=1)
Field Dep	3.40	4.06	4.57	5.27	N/A	3.04	3.19	2.87	2.24	2.85
Field Ind	11.00	12.66	13.80	13.50	10.00	1.41	2.88	2.50	3.17	0.00

N=117

Table 20

Means and Standard Deviations for the Self-Directed Learner Readiness Scale by Educational Level
(Fr=Freshman; So=Sophomore; Jr=Junior; Sr=Senior)

Self-Directed	*M*				*SD*			
Learner Readiness	Fr (*n*=1)	So (*n*=5)	Jr (*n*=28)	Sr (*n*=7)	Fr (*n*=1)	So (*n*=5)	Jr (*n*=28)	Sr (*n*=7)
Low	N/A	170.00	164.00	N/A	N/A	0.00	0.00	N/A
Below Avg	N/A	N/A	187.75	N/A	N/A	N/A	4.92	N/A
Average	N/A	219.50	218.80	211.66	N/A	3.53	5.75	5.50
Above Avg	245.00	246.00	236.80	243.00	0.00	0.00	7.62	5.65
High	N/A	265.00	245.33	267.00	N/A	0.00	16.86	15.55

N=41

Major Field of Study

Disciplines of study were categorized as Business, Education, Liberal Arts, Nursing, Sciences, and Other/Undecided. Fields of study were categorized within these disciplines. Within the School of Business, fields of study included Accounting, Economics, Information Systems, Management, and Marketing. The School of Education included the fields of Counseling, Leadership, and Special Education; Early

Childhood, Elementary and Reading Education; and Foundations, Secondary and Physical Education. The School of Liberal Arts housed fields of study in Communication and Dramatic Arts, English and Philosophy, Fine Arts, History, International Studies, and Sociology. The School of Nursing focused solely on the field of Nursing. Fields of study in the School of Sciences included Biology, Justice and Public Safety, Mathematics, Physical Science, Political Science and Public Administration, and Psychology.

Within this sample of participants, various fields of study were identified. Data collected from the GEFT identified sixteen Business (13.7%), fourteen Education (12%), fifteen Liberal Arts (12.8%), sixty-one Nursing (52.1%), ten Sciences (8.5%), and one Other/Undecided (.9%) (see Table 21). Of the forty-one participants returning the SDLRS, six indicated their discipline of study as Business (14.6%), four as Education (9.8%), three as Liberal Arts (7.3%), twenty-six as Nursing (64.4%), two as Sciences (4.9%), and none as Other/Undecided (0%) (see Table 22). The Group Embedded Figures Test means and standard deviations by discipline are provided in Table 23. The Self-Directed Learning Readiness Scale means and standard deviations by discipline are provided in Table 24.

Table 21

Distribution of Study Participants by Field of Discipline/GEFT

Discipline	*n*	%
Business	16	13.7
Education	14	12.0
Liberal Arts	15	12.8
Nursing	61	52.1
Sciences	10	8.5
Other/Undecided	1	0.9

N=117

Table 22

Distribution of Study Participants by Field of Discipline/SDLRS

Discipline	*n*	%
Business	6	14.6
Education	4	9.8
Liberal Arts	3	7.3
Nursing	26	64.4
Sciences	2	4.9
Other/Undecided	N/A	N/A

N=41

Table 23

Means and Standard Deviations for the Group Embedded Figures Test by Field of Discipline (BS=Business; ED=Education; LA=Liberal Arts; NU=Nursing; SC=Sciences; OT=Other/Undecided)

	M						*SD*					
Cognitive Complexity	BS (*n*=16)	ED (*n*=14)	LA (*n*=15)	NU (*n*=61)	SC (*n*=10)	OT (*n*=1)	BS (*n*=16)	ED (*n*=14)	LA (*n*=15)	NU (*n*=61)	SC (*n*=10)	OT (*n*=1)
Field Dep	3.27	5.25	4.00	5.15	3.00	6.00	2.14	3.32	3.08	2.93	2.00	0.00
Field Ind	14.80	11.33	13.66	13.82	11.00	N/A	2.28	1.03	3.26	2.68	1.41	N/A

N=117

Table 24

Means and Standard Deviations for the Self-Directed Learner Readiness Scale by Field of Discipline (BS=Business; ED=Education; LA=Liberal Arts; NU=Nursing; SC=Sciences)

Self-Directed	*M*					*SD*				
Learner Readiness	BS (*n*=6)	ED (*n*=4)	LA (*n*=3)	NU (*n*=26)	SC (*n*=2)	BS (*n*=6)	ED (*n*=4)	LA (*n*=3)	NU (*n*=26)	SC (*n*=2)
Low	N/A	N/A	N/A	164.00	170.00	N/A	N/A	N/A	0.00	0.00
Below Avg	184.00	N/A	186.00	195.00	N/A	0.00	N/A	0.00	0.00	N/A
Average	223.50	217.00	N/A	218.10	208.50	0.70	0.00	N/A	5.36	0.70
Above Ave	247.00	242.33	239.00	236.88	N/A	0.00	5.50	0.00	8.08	N/A
High	265.00	N/A	N/A	254.00	N/A	0.00	N/A	N/A	18.53	N/A

N=41

Analyses of Variance

For this study, two one-way analyses of variance (ANOVA) were used. The independent variable was undergraduate students, traditional-aged and nontraditional-aged. The dependent variables were levels of field dependence-independence and readiness for self-directed learning. Two one-way ANOVAs were conducted to determine the variances of each independent variable's various groups with regard to each dependent variable. A one-way analysis of variance was conducted to examine differences among age and cognitive complexity. A second one-way analysis of variance was conducted to determine differences among age and readiness for self-directed learning. A demographic analysis provided additional information on the demographics age, ethnicity, level of education, and field of discipline. The ANOVA considers whether the group mean is a better predictor of an individual's score or if the grand mean is an equally good predictor (Hayslett, 2001).

Between the two age groups completing the GEFT, the traditional-aged group had a lower group mean ($\bar{x}$ = 8.04, s =.649) than the nontraditional-aged group ($\bar{x}$ = 8.16, s =.725). Males had a lower group mean ($\bar{x}$ = 8.07, s = 1.10) than females ($\bar{x}$ = 8.10, s =.535). The group mean for the minority ethnic group mean was lower ($\bar{x}$ = 5.07, s =.671) than the majority ethnic group ($\bar{x}$ = 9.72, s =.568). The lowest group mean between levels of education was the freshman group ($\bar{x}$ = 5.57, s = 1.70); next was the sophomore group ($\bar{x}$ = 5.42, s = 1.02); followed by the junior group ($\bar{x}$ = 8.72, s =.644); and finally the senior group ($\bar{x}$ = 9.19, s = 1.08). Unclassified was not reported as there was only one participant in that group. Fields of discipline indicated the lowest group mean in the Sciences ($\bar{x}$ = 4.60, s = 1.210); followed by Business ($\bar{x}$ = 6.87, s = 1.47);

then Liberal Arts ($\bar{x}$ = 7.86, s = 1.48); and finally Nursing ($\bar{x}$ = 9.13, s =.663). Undecided was not reported as there was only one participant in that group.

A one-way Analysis of Variance (ANOVA) was performed with a statistical significance set at 0.05. Considering the variable age, the effect was not statistically significant. Considering the variable sex, the effect was not statistically significant. The variable ethnicity did produce a statistically significant effect, yielding a statistical significance of F = 25.65, p < .001. The variable level of education did not produce a statistically significant effect, nor did the variable field of discipline (see Table 25).

Table 25

ANOVA of GEFT/Majority and Minority Ethnic Groups

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	575.988	1	575.988	25.654	<.001
Within Groups	2581.978	115	22.452		
Total	3157.966	116			

The effect size was also calculated for the above variables with participants completing the GEFT. Results revealed an eta square value of .004 for the variable age, indicating a small effect size. The variable sex resulted in an eta square value of .001, indicating a small effect size. The variable ethnicity resulted in an eta square value of .182, indicating a large effect size. Level of education and field of discipline also resulted in small effect sizes with eta square values of .009 and .040 respectively. Effect size results supported the ANOVA analysis on the GEFT revealing statistical significance

for the variable ethnicity ($p < .001$).

Concerning variance and scores on the GEFT, Levene's test of equality of error variance indicated that group variance with regard to age was $p = .489$ (see Table 26). With regard to the variable sex, the equality of error variance was $p = .252$ (see Table 27). Therefore, the assumption of homogeneity and equality of variance with regard to these variables has not been violated. With regard to the variables ethnicity, level of education, and field of discipline, Levene's test of equality of error variance was $p < .001$ with each variable. The assumption of homogeneity and equality of variance with regard to these variables has been violated. Therefore, caution should be exercised when interpreting the results regarding these variables.

Table 26

Test of Homogeneity of Variances with GEFT and Age

	Levene Statistic	*df1*	*df2*	Sig.
Score on GEFT	.482	1	115	.489

Table 27

Test of Homogeneity of Variances with GEFT and Sex

	Levene Statistic	*df1*	*df2*	Sig.
GEFT	1.325	1	115	.252

Between the two age groups completing the SDLRS, the traditional-aged group had a lower group mean ($\bar{x}$ = 218.21, s = 6.10) than the nontraditional-aged group ($\bar{x}$ = 233.77, s=3.14). Males had a lower group mean ($\bar{x}$ = 204.40, s = 12.54) than females ($\bar{x}$ = 227.91, s = 3.85). The group mean for the minority ethnic group mean was lower ($\bar{x}$ = 209.55, s = 8.23) than the majority ethnic group ($\bar{x}$ = 229.40, s = 4.10). The lowest group mean between levels of education was the junior group ($\bar{x}$ = 221.67, s = 4.21); next was the sophomore group ($\bar{x}$ = 224.00, s = 16.02); and finally the senior group ($\bar{x}$ = 236.42, s = 9.91). The freshman and unclassified groups were not reported as there was only one participant in the freshman group and none in the unclassified group. Fields of discipline indicated the lowest group mean in the Sciences ($\bar{x}$ = 195.66, s = 12.83); followed by Liberal Arts ($\bar{x}$ = 203.66, s = 17.66); then Nursing ($\bar{x}$ = 228.53, s = 4.36); and finally Business ($\bar{x}$ = 228.60, s = 13.61). Undecided was not reported as there was no one in this group.

A second one-way Analysis of Variance (ANOVA) was performed with a statistical significance set at 0.05. Considering the variable age, the effect was statistically significant (F = 4.36, p =.043) (see Table 28). Considering the variable sex, the effect was also statistically significant (F = 4.32, p =.044) (see Table 29). Ethnicity produced a statistically significant effect (F = 5.06, p =.031) (see Table 30). The variable level of education did not produce a statistically significant effect, nor did the variable field of discipline.

Table 28

ANOVA of SDLRS/Age

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	2444.878	1	2444.878	4.356	.043
Within Groups	21889.024	39	561.257		
Total	24333.902	40			

Table 29

ANOVA of SDLRS/Sex

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	2427.952	1	2427.952	4.323	.044
Within Groups	21905.950	39	561.691		
Total	24333.902	40			

Table 30

ANOVA of SDLRS/Majority and Minority Ethnic Groups

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	2767.961	1	2767.961	5.006	.031
Within Groups	21565.941	39	552.973		
Total	24333.902	40			

The effect size was also calculated for the above variables with participants completing the GEFT. Results revealed an eta square value of .039 for the variable age,

indicating a small effect size. The variable sex resulted in an eta square value of in .012, indicating a small effect size. The variable ethnicity resulted in an eta square value of .040, indicating a small effect size. Level of education and field of discipline resulted in large effect sizes with eta square values of .251 and .278 respectively. Effect size results did not support the ANOVA analysis on the SDLRS, as there was no statistical significance for the variables level of education or field of discipline.

Concerning variance and scores on the SDLRS, Levene's test of equality of error variance indicated that group variance with regard to age was p =.012. Therefore, the assumption of homogeneity and equality of variance with regard to the variable age has been violated. Caution should be exercised when interpreting the results of these variables. With regard to the variables sex, ethnicity, level of education, and field of discipline, p values were above .05. Therefore, the assumption of homogeneity and equality of variance with regard to these variables has not been violated. Levene's test of equality of error variance indicated that group variance with regard to sex was p =.528; with regard to ethnicity, it was p =.642, with regard to level of education, it was p =.442, and with regard to field of discipline, it was p =.671 (see Tables 31-34).

Table 31

Test of Homogeneity of Variances/SDLRS and Sex

	Levene Statistic	*df1*	*df2*	Sig.
SDLRS	.405	1	39	.528

Table 32

Test of Homogeneity of Variances/SDLRS and Ethnicity

	Levene Statistic	*df1*	*df2*	Sig.
SDLRS	.219	1	39	.642

Table 33

Test of Homogeneity of Variances/SDLRS and Educational Level

	Levene Statistic	*df1*	*df2*	Sig.
SDLRS	.836	2	37	.442

Table 34

Test of Homogeneity of Variances/SDLRS and Field of Discipline

	Levene Statistic	*df1*	*df2*	Sig.
SDLRS	.591	4	36	.671

Correlation Results

A Pearson Product Moment Correlation was used to examine whether a relationship existed between scores on the GEFT and scores on the SDLRS. This analysis sought to determine whether a relationship existed between levels of field dependence-independence and levels of readiness for self-directed learning. Findings did not indicate a statistically significant relationship between scores on the two instruments.

Research Questions

The following questions were investigated:

1. What differences, if any, exist between traditional and nontraditional college students and levels of field dependence-independence? This question was answered using an Analysis of Variance. Results indicated no statistically significant relationship between age and the cognitive complexity dimensions of field dependence-independence as measured by the Group Embedded Figures Test.

2. What differences, if any, exist between male and female college students and levels of field dependence-independence? This question was answered using an Analysis of Variance. Results indicated no statistically significant relationship between sex and the cognitive complexity dimensions of field dependence-independence as measured by the Group Embedded Figures Test.

Other demographics included educational level and field of discipline. Neither variable indicated statistically significant differences with regard to the cognitive complexity dimensions of field dependence-independence. While educational level did suggest, as students progress through their undergraduate education, they become more cognitively complex, results were not at a statistically significant level.

While no statistically significant differences existed between the variables age, sex, educational level, and field of discipline with regard to the cognitive complexity dimensions of field dependence-independence, results did indicate some significance with regard to the variable ethnicity. Participants within the majority ethnic group, represented as White, measured as more field independent than participants within

minority ethnic group, represented as Asian, Black, Hispanic, and Native American. Significance was at $p < .001$ level.

3. What differences, if any, exist between traditional and nontraditional college students and levels of self-directed learning readiness? A second Analysis of Variance answered this question. Findings indicated a higher level of self-directed learner readiness among nontraditional-aged students than with traditional-aged students. The effect size, however, was small.

4. What relationship, if any, exists between levels of field dependence-independence and levels of self-directed learning readiness? The Pearson Product Moment Correlation coefficient was conducted to answer this question. No relationship was found between scores on the two instruments, indicating no statistically significant relationship between levels of field dependence-independence and levels of self-directed learning readiness.

Summary

The purpose of this study was to investigate possible differences in cognitive complexity and self-directed learning readiness between traditional-aged and nontraditional-aged undergraduate college students. Further, differences between males and females were considered, as well as correlations between levels of field dependence-independence and levels of self-directed learning readiness. Chapter IV explained the analysis of data obtained from the Group Embedded Figures Test (GEFT), the Self-directed Learning Readiness Scale (SDLRS), and the Demographic Questionnaire. Data collection included the participant's age, sex, ethnicity, level of education, field of discipline and scores on the Group Embedded Figures Test and the Self-Directed Learner

Readiness Scale. Two one-way Analyses of Variance were conducted, as well as Pearson Product Moment Correlations. Results indicated no statistically significant relationship between the variables age, sex, educational level, or field of discipline and the cognitive complexity dimensions of field dependence-independence. The variable ethnicity, however, did provide significant findings, with majority ethnic members scoring as more field independent than members of minority ethnic groups. While higher levels of self-directed learning readiness were suggested with nontraditional students, the effect size was small. Further, results indicated no significant relationship between levels of field dependence-independence and levels of self-directed learning readiness.

CHAPTER V

CONCLUSIONS, DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

Conclusions

This study was designed to investigate possible differences in cognitive complexity and self-directed learning readiness between traditional and nontraditional-aged undergraduate college students. Further, differences between males and females were considered, as well as correlations between levels of field dependence-independence and levels of self-directed learning readiness. Chapter I introduced the study. Chapter II reviewed the literature related to cognitive complexity, field dependence-independence, sex and learning, the Group Embedded Figures Test, adult learners, self-directed learning, and the Self-Directed Learning Readiness Scale. Chapter III addressed the design of the study, the population and sample selection, the instruments and procedures incorporated, and data collection. Chapter IV explained the results of data obtained from the Group Embedded Figures Test (GEFT) and the Self-Directed Learning Readiness Scale (SDLRS), as well as the Demographic Questionnaire. This chapter will present a summary of the study, as well as recommendations for future research.

The purpose of this study was to investigate possible differences in cognitive complexity and self-directed learning readiness between traditional-aged and

nontraditional-aged undergraduate males and females. The sample for this study consisted of 117 undergraduate college students enrolled at one southeastern university during the summer semester 2005. The instruments used included the Group Embedded Figures Test (Witkin, 1971) and the Self-Directed Learning Readiness Scale (Guglielmino, 1978). A five-question demographic questionnaire was administered to gather information on age, sex, ethnicity, educational level, and field of discipline. The participants included fifteen traditional-aged males (12.8%), thirteen nontraditional-aged males (11.1%), fifty-three traditional-aged females (45.3%), and thirty-six nontraditional-aged females (30.8%).

One hundred seventeen participants completed the first instrument, the Group Embedded Figures Test. Sixty-eight were traditional-aged students (58.1%), while forty-nine were nontraditional-aged students (41.9%). Twenty-eight were males (23.9%), while eighty-nine were females (76.1%). The sample included three Asians (2.6%), thirty-six Blacks (30.8%), one Hispanic (.9%), seventy-six Whites (65%), and one Other, identified as American Indian (.9%). Additionally, the demographic questionnaire requested each participant's educational level and discipline of study. Participants completing the GEFT consisted of seven freshmen (6%), nineteen sophomores (16.2%), sixty-nine juniors (59%), twenty-one seniors (17.9%), and one Unclassified (.9%). Data collected from the GEFT identified sixteen Business (13.7%), fourteen Education (12%), fifteen Liberal Arts (12.8%), sixty-one Nursing (52.1%), ten Sciences (8.5%), and one Other/Undecided (.9%).

Of the 117 participants who received the second instrument, the Self-Directed Learning Readiness Scale, forty-one completed and returned it. Twenty-three (56.1%)

were traditional-aged and eighteen (43.9%) were nontraditional-aged. Concerning sex, five (12.2%) of the forty-one participants completing and returning the SDLRS were male and thirty-six (87.8%) were female. Ethnicity figures indicated one (2.4%) Asian, eight (19.5%) Blacks, no (0%) Hispanics, thirty-two (78.1%) Whites, and no (0%) indication of Other. With regard to educational level, one participant was a freshman (2.4%), five were sophomores (12.2%), twenty-eight were juniors (68.3%), and seven were seniors (17.1%). Of the forty-one participants returning the SDLRS, six indicated their discipline of study as Business (14.6%), four as Education (9.8%), three as Liberal Arts (7.3%), twenty-six as Nursing (64.4%), two as Sciences (4.9%), and none as Other/Undecided (0%).

The sample was compared to the reported population demographics for the semester of data collection (Auburn University-Montgomery, 2005). Females enrolled at the university in which the study was conducted represented 66% of the population, while 34% were male. Of the total undergraduates enrolled, 64.5% were traditional-aged, and 35.5% were nontraditional-aged. Concerning the ethnicity of students enrolled, .8% was American Indian/Alaskan, 2.1% were Asian/Pacific Islander, 33.8% were Black, 1% was Hispanic, 60% were White, .3% was Non-Resident Alien, and 2.1% were reported as Other/Unknown. The demographic questionnaire provided to participants in this study did not request information concerning citizenship; therefore, there was no way to determine whether non-resident aliens participated in this study. Concerning the demographic questionnaire provided to participants, categories provided included Asian, Black, Hispanic, White, and Other. Therefore, the figures for American Indian/Alaskan and Other/Unknown were combined, indicating a total 2.9%. Regarding educational

level of those enrolled, 28.3% were freshmen, 14.4% were sophomores, 15.5% were juniors, 34.1% were seniors, and 12.2% were unknown or unclassified. Disciplines of study of enrolled students indicated that 29.3% were Business, 14.7% were Education, 12.3% were Liberal Arts, 11% were Nursing, 20.5% were Sciences, and 12.3% were Other/Undecided.

Discussion

The findings of this study suggest that age and sex are not variables affecting levels of cognitive complexity as measured by field dependence-independence. Ethnicity, however, did produce statistically significant findings, suggesting this variable as having an effect on levels of field dependence-independence. Participants within the majority ethnic group, represented as White, measured as more field independent than participants within minority ethnic groups, represented as Asian, Black, Hispanic, and Native American. Significance was at $p < .001$ level.

The study also found a statistically significant finding with regard to age and levels of self-directed learning readiness. This finding supports research suggesting older students exhibit higher levels of self-directed learner readiness (Brockett, 1985; Brockett and Hiemstra, 1991; Guglielmino, 1978; Knowles, 1970; Long & Morris, 1996). Significance was at the .043 level. The variables sex and ethnicity showed levels of significance, indicating females and majority ethnic members reporting higher levels of self-directed learner readiness. Significance was at .044 and .031 levels respectively, but power was small with regard to these variables, thus making it difficult to draw conclusions for the general population. Considering power and Levene's statistic

regarding some variables, caution should be exercised when interpreting results of the Analyses of Variance.

Pearson Product Moment Correlation coefficients revealed no statistically significant relationship between scores on the Group Embedded Figures Test and the Self-Directed Learner Readiness Scale. This suggested there was no correlation between levels of field dependence-independence and levels of self-directed learner readiness.

Implications

The results of this study have implications for adult educators, administrators, program coordinators, trainers, and facilitators. This research will assist educators of adult learners in modifying their teaching to meet the learning styles of this new student demographic. Understanding the needs of adult learners and their various diverse differences will further impact the ability of higher institutions to market themselves and tailor their offerings to this ever-increasing undergraduate population.

The investigation of any such differences and/or relationships provided further information for the fields of adult education and educational psychology. Relationships between the factors included in these constructs provided knowledge into the dimensions of the two instruments used for measurement, the Group Embedded Figures Test and the Self-Directed Learning Readiness Scale. This research provides useful information for educators of adult students, challenging them to adopt more varied and flexible approaches to teaching.

Recommendations

Because there were several limitations to this study, some recommendations for further research are asserted. Threats to internal validity included the self-report test and the varying times of day the test was administered. Students in morning classes could have performed better than those at the end of the day. Classroom dynamics, as well as differing instructors' attitudes, could have influenced the seriousness given to the test. Although the sample size was 117, the sample did not reflect the responses of all undergraduate students. Threats to external validity included the use of only one university, in one specific region of the United States. Additionally, there was not an equal distribution of undergraduates from various disciplines, and not all disciplines were represented. The results concerning ethnicity could have been affected by the region in which the study was done, the southeastern portion of the United States. A better indicator of the results concerning the variable ethnicity and levels of cognitive complexity may have been socioeconomic status. Participants' socioeconomic status was not asked on the demographic questionnaire.

As a result of these limitations to the study, further research is recommended. Based on the findings from this study, recommendations are that future research should:

1. Conduct similar studies in other regions at other academic institutions, which may yield further information and better understanding of sex and age related learning differences in the American university setting;
2. Expand the demographic questionnaire to include socioeconomic factors other than ethnicity, which may expand understanding of the educational opportunities and advantages afforded some demographic groups;

3. Enlarge the number of participants, encouraging completion of instruments within the same time and setting, which may yield higher response rates;
4. Conduct a stratified sampling of all academic disciplines, which could yield understanding of cognitive complexity and self-directed learning readiness as it relates to fields of study.

As more nontraditional-aged students are present in college and university classrooms, it becomes essential for educators to understand their learning style preferences. Malcolm Knowles addressed the issue of self-directed learning, realizing that students develop more cognitive complexity as they age. This realization should affect educators' teaching methods. While socialization may impact differences in levels of field dependence-independence, more data is necessary to fully comprehend what those variables of socialization may be. This research suggests external factors may be as important to determining levels of cognitive complexity as internal; perhaps even more so. This data affirms earlier research that, as adults age, they become more self-directed in their learning. Institutions of higher learning have a responsibility to meet the needs of their learners and, as they are in the business of attracting and keeping students, it is incumbent upon them to understand as much as possible about this new population of adult learners.

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APPENDICES

APPENDIX A

INFORMED CONSENT LETTER

INFORMED CONSENT LETTER

for Research Study Entitled
Field Dependent-Independent Cognitive Style and Learner Readiness
of Traditional and Non-traditional Undergraduate Students

You are invited to participate in a research study investigating the differences in how information is processed and readiness to learn between traditional aged and non-traditional aged undergraduate students. This study is being conducted by Tami Olds, a doctoral student at Auburn University, under the supervision of Dr. James E. Witte. I hope to learn whether differences in cognitive complexity and learner readiness exist between traditional and non-traditional undergraduate students. You were selected as a possible participant because you are an undergraduate student, over the age of nineteen, at Auburn University-Montgomery, enrolled in one of the participating classes.

Your professor has given permission for me to request your participation. If you decide to participate, we will administer two instruments to you. The first test will be completed in class and will take approximately 20 minutes to complete. The second instrument, a survey, will be sent home with you, to be completed within two weeks of receiving the survey.

I estimate there will be no risks to you for participating in this study. All data collected will be anonymous and will remain confidential.

While there is no direct benefit to your participation in this study, indirect benefits to your participation include the hope that this information will lead to a deeper understanding of the various learning styles of adult students. It will hopefully motivate educators of adult students to adopt more flexible and varied approaches to teaching. I cannot promise you that you will receive any or all of the benefits described.

Any information obtained in connection with this study will remain anonymous and confidential. Information collected through your participation may be used to fulfill an educational requirement for doctoral study, published in a professional journal, and/or presented at a professional meeting. As a participant, you may withdraw from participation at any time without penalty; however, after they have provided anonymous information, they will be unable to withdraw their data after participation since there will be no way to identify individual information.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University, the Adult Education department, or Auburn University-Montgomery.

If you have questions, I invite you to ask them now. If you have questions later, Tami Olds by phone at (334) 833-4583 or e-mail at oldstam@auburn.edu, and Dr. James E. Witte by phone at (334) 844-3054 or e-mail at witteje@auburn.edu, will be happy to answer them.

For more information regarding your rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone at (334) 844-5966 or email at hsubjec@auburn.edu or IRBChair@auburn.edu .

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, PLEASE INDICATE YOUR CONSENT BY SIGNING BELOW.
Thank you for your time.

Investigator's signature Date

Participant's signature Date

APPENDIX B

INSTITUTIONAL REVIEW BOARD

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS

RESEARCH PROTOCOL REVIEW FORM

For information or help completing this form, contact: **THE OFFICE OF HUMAN SUBJECTS RESEARCH**, 307 Samford Hall,
Phone: 334-844-5966 **e-mail:** hsubjec@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs/index.htm

Complete this form using Adobe Acrobat Writer (versions 5.0 and greater).

1. **PROPOSED DATES OF STUDY:** FROM: 06/20/2005 TO: 09/30/2005

REVIEW TYPE (Check one): ☐ FULL BOARD ☐ EXPEDITED ☑ EXEMPT

2. **PROJECT TITLE:** An Investigation of Cognitive Complexity Levels of Field Dependence / Independence and Learning Readiness Between Traditional and Non-traditional Undergraduate Students

3.

Tami McCray Olds	Graduate Student	ADED	3342803513	oldstam@auburn.edu
PRINCIPAL INVESTIGATOR	TITLE	DEPT	PHONE	E-MAIL

3566 Edgefield Road, Montgomery, Alabama 36111 — ADDRESS FOR CORRESPONDENCE
3342803513 — FAX

4. **SOURCE OF FUNDING SUPPORT:** ☑ Not Applicable ☐ Internal ☐ External (External Agency): _____

5. **STATUS OF FUNDING SUPPORT:** ☑ Not Applicable ☐ Approved ☐ Pending ☐ Received

6. **GENERAL RESEARCH PROJECT CHARACTERISTICS**

A. Research Content Area

Please check all descriptors that best apply to this proposed research project.

- ☐ Anthropology
- ☐ Anthropometry
- ☐ Biological Sciences
- ☐ Behavioral Sciences
- ☑ Education
- ☐ English
- ☐ History
- ☐ Journalism
- ☐ Medical
- ☐ Physiology
- ☐ Other (Please list:) _____

Please list 3 or 4 keywords to identify this research project: Cognitive Complexity, Learning Readiness

B. Research Methodology

Please check all descriptors that best apply to the research methodology.

Data collection will be: ☑ Prospective ☐ Retrospective ☐ Both

Data will be recorded so that participants can be directly or indirectly identified: ☐ Yes ☑ No

Data collection will involve the use of:

- ☑ Educational Tests (cognitive, diagnostic, aptitude, achievement)
- ☑ Surveys / Questionnaires
- ☐ Private Records / Files
- ☐ Interview / Observation
- ☐ Audiotaping and / or Videotaping
- ☐ Physical / Physiologic Measurements or Specimens

C. Participant Information

Please check all descriptors that apply to the participant population.

- ☑ Males
- ☑ Females

Vulnerable Populations

- ☐ Pregnant Women
- ☐ Children
- ☐ Prisoners
- ☐ Adolescents
- ☐ Elderly
- ☐ Physically Challenged
- ☐ Economically Challenged
- ☐ Mentally Challenged

Do you plan to recruit Auburn University Students? ☐ Yes ☑ No

Do you plan to compensate your participants? ☐ Yes ☑ No

D. Risks to Participants

Please identify all risks that may reasonably be expected as a result of participating in this research.

- ☐ Breach of Confidentiality
- ☐ Coercion
- ☐ Deception
- ☐ Physical
- ☐ Psychological
- ☐ Social
- ☑ None
- ☐ Other (please list):

For OHSR Office Use Only

DATE RECEIVED IN OHSR: 6/27/05 by CL
DATE OF OHSR CONTENT REVIEW: _____ by _____
DATE OF IRB REVIEW: 7/5/05 by PWG
INTERVAL FOR CONTINUING REVIEW: _____

PROTOCOL # 05-144
DATE ASSIGNED IRB REVIEW: _____ by _____
DATE IRB APPROVAL: 7/26/05 by PWG

7. PROJECT ASSURANCES

PROJECT TITLE: An Investigation of Cognitive Complexity Levels of Field Dependence / Independence and Learning Readiness Between Traditional and Non-traditional Undergraduate Students

A. PRINCIPAL INVESTIGATOR'S ASSSURANCE

1. I certify that all information provided in this application is complete and correct.
2. I understand that, as Principal Investigator, I have ultimate responsibility for the conduct of this study, the ethical performance this project, the protection of the rights and welfare of human subjects, and strict adherence to any stipulations imposed by the Auburn University IRB.
3. I certify that all individuals involved with the conduct of this project are qualified to carry out their specified roles and responsibilities and are in compliance with Auburn University policies regarding the collection and analysis of the research data.
4. I agree to comply with all Auburn policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection of human subjects, including, but not limited to the following:
   a. Conducting the project by qualified personnel according to the approved protocol
   b. Implementing no changes in the approved protocol or consent form without prior approval from the Office of Human Subjects Research (except in an emergency, if necessary to safeguard the well-being of human subjects)
   c. Obtaining the legally effective informed consent from each participant or their legally responsible representative prior to their participation in this project using only the currently approved, stamped consent form
   d. Promptly reporting significant adverse events and/or effects to the Office of Human Subjects Research in writing within 5 working days of the occurrence.
5. If I will be unavailable to direct this research personally, I will arrange for a co-investigator to assume direct responsibility in my absence. This person has been named as co-investigator in this application, or I will advise OHSR, by letter, in advance of such arrangements.
6. I agree to conduct this study only during the period approved by the Auburn University IRB.
7. I will prepare and submit a renewal request and supply all supporting documents to the Office of Human Subjects Research before the approval period has expired if it is necessary to continue the research project beyond the time period approved by the Auburn University IRB.
8. I will prepare and submit a final report upon completion of this research project.

Tami McCray Olds		6/20/05
Principal Investigator (Please Print)	**Principal Investigator's Signature**	**Date**

B. FACULTY SPONSOR'S ASSSURANCE

1. By my signature as sponsor on this research application, I certify that the student or guest investigator is knowledgeable about the regulations and policies governing research with human subjects and has sufficient training and experience to conduct this particular study in accord with the approved protocol.
2. I certify that the project will be performed by qualified personnel according to the approved protocol using conventional or experimental methodology.
3. I agree to meet with the investigator on a regular basis to monitor study progress.
4. Should problems arise during the course of the study, I agree to be available, personally, to supervise the investigator in solving them.
5. I assure that the investigator will promptly report significant adverse events and/or effects to the OHSR in writing within 5 working days of the occurrence.
6. If I will be unavailable, I will arrange for an alternate faculty sponsor to assume responsibility during my absence, and I will advise the OHSR by letter of such arrangements.
7. I have read the protocol submitted for this project for content, clarity, and methodology.

Dr. James E. Witte		6/23/05
Faculty Sponsor (Please Print)	**Faculty Sponsor's Signature**	**Date**

C. DEPARTMENT HEAD'S ASSSURANCE

By my signature as department head, I certify that every member of my department involved with the conduct of this research project will abide by all Auburn University policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection and ethical treatment of human participants.

Dr. William Spencer		6/27/05
Department Head (Please Print)	**Department Head's Signature**	**Date**

8. **PROJECT ABSTRACT: Prepare an abstract (400-word maximum) that includes: I.) A summary of relevant research findings leading to this research proposal; II.) A concise purpose statement; III.) A brief description of the methodology; IV.) Expected and/or possible outcomes, and V.) A statement regarding the potential significance of this research project. *Please cite relevant sources and include a "Reference List" as Appendix A.***

The purpose of this study is to compare cognitive complexity, as measured by levels of field dependence / independence, and self-directed learning readiness among traditional aged and non-traditional aged males and females. Subjects will be undergraduate students enrolled in public, four-year universities in the southeastern part of the United States. Four equally stratified groups of traditional aged males, non-traditional aged males, traditional aged females, and non-traditional aged females will be used. Traditional aged subjects will be between the ages of nineteen and twenty-three. Non-traditional aged subjects will be over the age of twenty-three. Instrument measurements will include the Group Embedded Figures Test (Oltman, Raskin, and Witkin, 1971) and the Self-Directed Learning Readiness Scale (Guglielmino, 1978).

Evidence suggests adult students vary in their learning ability from younger students. Malcolm Knowles (1970) asserted adult students are more self-directed learners, introducing the concept of andragogy. Spear and Mocker (1981) suggested learning as much more extrinsically motivated than that of younger learners, stating participation as a key element to adults' academic success. Piaget (1971) developed the cognitive development theory, identifying various stages of cognitive development, largely dependent on age. One aspect of cognitive thinking exists with regard to field dependence/independence. Field dependence/independence reflects one's method of perceiving, remembering, and thinking (Messick, 1976). Field dependent individuals view the world holistically, while field independent individuals perceive the world in parts (Witkin, Oltman, Raskin, and Karp, 1971). Field independence suggests more cognitive complexity.

Findings have indicated differences between gender and age, suggesting males and older individuals as more field independent (Murphy and Doucette, 1997). Vitols (1985) studied the correlation between andragogy, field independence and cognitive complexity between traditional and non-traditional undergraduate females. Rupert (1987) looked at the correlation between field independence and self-directed behavior. Tanova (2003) suggested students with more cognitive complexity more often preferred teacher-dependent and collaborative learning situations.

The number of adult learners is increasing; effects to the economy, employment, governmental policies, and educational programs and practices have been evidenced (Cross and McCarten, 1984). The purpose of this study is to determine whether age transcends other demographics with regard to levels of field dependence/independence and learning readiness, and whether correlations exist between age, cognitive complexity, and learning readiness. Research suggests adults learn differently, but society consistently accepts a pedagogical stance to teaching at all levels of education. Hopefully, this research will provide useful information for educators, challenging them to adopt more varied and flexible approaches to teaching.

9. **PURPOSE & SIGNIFICANCE.**

a. **Clearly state all of the objectives, goals, or aims of this project.**

The purpose of this study is to investigate possible relationships between age, levels of cognitive complexity, and self-directed learning readiness. Cogntive complexity will be measured by considering levels of field dependence/independence to determine whether correlations exist with regard to age and gender. Further, relationships between age and learning readiness will also be investigated. The investigation of such relationships will add to current bodies of knowledge in the fields of adult education and educational psychology. Possible correlations between factors included in these constructs will provide knowledge into the dimensions of the two instruments used for measurement, the Group Embedded Figures Test and the Self-Directed Learning Readiness Scale. As more adult students are entering the college classroom, it is essential that educators understand their learning preferences and needs. Hopefully, this information will challenge educators to adopt more varied and flexible approaches to teaching in the college classroom.

b. **How will the results of this project be used? (e.g., Presentation? Publication? Thesis? Dissertation?)**

The results of this project will be used to complete a dissertation, perhaps in making presentations, and possibly publication in a scholarly journal.

10. **KEY PERSONNEL INVOLVED WITH DATA COLLECTION. Identify each individual involved with the conduct of this project and describe his or her roles and responsibilities related to this project. Be as specific as possible.**

Individual: Tami McCray Olds **Title:** Ms. **Dept/ Affiliation:** ADED
Roles / Responsibilities:

As researcher, Ms. Olds' responsibilities include: gaining permission from participating instructors, explaining the purpose of the study to participating instructors and potential subjects, reading and providing information letters to interested subjects, administering both instruments, collecting data from both instruments. The Group Embedded Figures Test will be administered and data will be collected the same day. The Self-Directed Learning Readiness Scale will be provided to interested subjects with a self-addressed stamped envelope and will be returned to the researcher by mail.

Individual: Dr. James E. Witte **Title:** Professor **Dept/ Affiliation:** ADED
Roles / Responsibilities:

As the reseacher's major professor, Dr. Witte will be apprised of all steps involved in data collection, will be aware of the data collected, and will be guiding the data analysis.

Individual: _____ **Title:** _____ **Dept/ Affiliation:** _____
Roles / Responsibilities:

Individual: _____ **Title:** _____ **Dept/ Affiliation:** _____
Roles / Responsibilities:

Individual: _____ **Title:** _____ **Dept/ Affiliation:** _____
Roles / Responsibilities:

11. **LOCATION OF RESEARCH. List all locations where data collection will take place. Be as specific as possible.**

Various undergraduate classes in the departments of Foreign Language, Education, Communication and Theatre, and Nursing at Auburn University-Montgomery, Montgomery, Alabama

12. PARTICIPANTS.

a. Describe the participant population you have chosen for this project.

The population includes traditional aged (nineteen to twenty-three years) and non-traditional aged (over twenty-three years) male and female undergraduate students. Sampling will be taken from the population of students enrolled at a four-year university in the southeastern part of the United States. The sample plan consists of a convenience sample of various undergraduate classes. The sample will then be stratified to include four groups of traditional aged males, non-traditional aged males, traditional aged females, and non-traditional aged females.

What is the minimum number of participants you need to validate the study? 100

What is the maximum number of participants you will include in the study? 400

b. Describe the criteria established for participant selection. (If the participants can be classified as a "vulnerable" population, please describe additional safeguards that you will use to assure the ethical treatment of these individuals.)

A convenience sample of undergraduate students in various classes will be used, determined by department chairs, at a four-year university in the southeastern part of the United States. Various classes will come from the departments of Communication and Theatre, Languages, Nursing, and Education. Permission to recruit students will be sought from the department chairs and participating instructors. Subjects will be over the age of nineteen and enrolled as students in these various classes. To minimize the risk of coercion, instruments will be administered at the end of class time to interested participants. Prior to request for participation, instructors will be asked to leave the classroom. After the collection of data, using demographic indicators of age and gender, the sample will be stratified.

c. Describe all procedures you will use to recruit participants. ***Please include a copy of all flyers, advertisements, and scripts and label as Appendix B.***

Permission to recruit students has been secured from the participating university, participating department chairs, and participating instructors. The researcher will visit each participating class room, and the instructor will be asked to leave. An informed consent letter will be provided to participants; the researcher will read the informed consent document as a script to recruit students, explaining the purpose of the study. Those wishing to participate will be provided the instruments, a timed test and a take-home survey.

What is the maximum number of potential participants you plan to recruit? 400

d. Describe how you will determine group assignments (e.g., random assignment, independent characteristics, etc.).

The sample will be a convenience sample of undergraduate classes preapproved for data collection. The sample will then be catagorized based on the age and gender of participants.

e. Describe the type and amount and method of compensation for participants.

No compensation will be provided.

13. **PROJECT DESIGN & METHODS. Describe the procedures you will plan to use in order to address the aims of this study. (NOTE: Use language that would be understandable to a layperson. Without a complete description of all procedures, the Auburn University IRB will not be able to review protocol. If additional space is needed for #13, part b, save the information as a .pdf file and insert after page 6 of this form.)**

a. **Project overview. (Briefly describe the scientific design.)**

Participants will be asked to complete a demographic questionnaire prior to administration. Instruments will accompany questionnaires, each carrying the same anonymous code. The GEFT will be administered first and timed for twenty minutes. Participants will then be asked to take home the SDLRS survey, provided with self-addressed stamped envelopes, and asked to return this data by mail. After data collection, the sample will be catagorized into four groups based on age and gender of participants. Data will be entered into SPSS; two Analyses of Variance will be conducted to determine whether correlations exist among age, gender, cognitive complexity, and self-directed learning readiness.

b. **Describe all procedures and methods used to address the purpose.**

1. Permission will be sought from the Auburn University-Montgomery Institutional Review Board, as well as departmental chairs, and participating instructors.
2. Permission will be conveyed by departmental chairs via letters on AUM letterhead and/or email from AUM addresses.
3. Department chairs will approve acceptable dates of administration, and the researcher will conduct the administration of the instruments each time to participating classes.
4. Administration will be conducted at the end of class time.
5. After introduction of the researcher, instructors will leave the class rooms.
6. Participants will be told the purpose of the study by the researcher and provided informed consent documents.
7. After listening to and reading the informed consent documents, those wishing to participate will be asked to complete a demographic questionnaire. Those not willing or unable to participate will be free to leave the class room.
8. The participants will be provided the Group Embedded Figures Test and the Self-Directed Learning Readiness Scale, carrying the same anonymous code as their demographic questionnaire.
9. The GEFT will be administered first and timed for twenty minutes. Directions will be provided to those participating.
10. Data from this instrument will be collected by the researcher.
11. Participants will then be asked to take home the SDLRS survey, provided self-addressed stamped envelopes, and asked to return this data by mail.
12. Each set of data will be grouped by age and gender to produce four groups of traditional aged males, non-traditional aged males, traditional aged females, and non-traditional aged females.
13. Converting the independent variables to numerals, traditional aged participants will be indicated by 1. Non-traditional aged participants will be indicated by 2. Gender will also be identified numerically; with males indicated by 1, and females indicated by 2.
14. Using the data obtained from each instrument, two Analyses of Variance will be conducted using SPSS. Correlations will be sought among age, gender, cognitive complexity, and self-directed learning readiness.

c. **List all instruments used in data collection. (e.g., surveys, questionnaires, educational tests, data collection sheets, outline of interviews, scripts, audio and/or video methods etc.)** ***Please include a copy of all data collection instruments that will be used in this project and label as Appendix C.***

1. a demographic questionnaire (the same questionnaire will be attached to each instrument)
2. the Group Embedded Figures Test
3. the Self-Directed Learning Readiness Scale

d. **Data Analysis: Explain how the data will be analyzed.**

Levels of field dependence/independence will be determined based on scores from the Group Embedded Figures Test . This instrument measures field depednence with scores 0-9, while 10-18 measures field independence. The Self-Directed Learning Readiness Scale is a 58 item Likert-type scale. The scales range from 1-7, with higher scores indicating more readiness for self-directed learning. Converting the independent variables to numerals, traditional aged subjects will be indicated as 1. Nontraditional aged subjects will be indicated with 2. Concerning gender, males will be indicated as 1, while females will be indicated as 2. Two ANOVAS will be conducted using SPSS, using the scores obtained with each instrument.

14. **RISKS & DISCOMFORTS: List and describe all of the reasonable risks that participants might encounter if they decide to participate in this research.** ***If you are using deception in this study, please justify the use of deception and be sure to attach a copy of the debriefing form you plan to use and label as Appendix D.***

It is anticipated that there will be no risks to participants involved in this study. Every effort will be made to protect the anonymity of the subjects. All information will be collected anonymously.

15. **PRECAUTIONS. Describe all precautions you have taken to eliminate or reduce risks that were listed in #14.**

Anonymous data collection will be conducted. Participants will not be asked to provide their names. Anonymous demographic questionnaires will be completed for research purposes only, and no other identifying characteristics will be asked of participants. Participants will be asked to return data from the Group Embedded Figures Test in blank manila envelopes. When provided the Self-Directed Learning Readiness Scale, participants will be provided with like manila enveloped, stamped with like stamps. Envelopes will be addressed to the researcher in like type and font. The return address on each envelope will also contain the researcher's addres. Data collected will be secured in a locked file cabinet at the researcher's place of residence.

16. **BENEFITS.**

a. **List all realistic benefits participants can expect by participating in this study.**

There will be no direct benefit to participants.

b. **List all realistic benefits for the general population that may be generated from this study.**

The general population will benefit from educators' understanding of various learning preferences of traditional aged and nontraditonal aged undergraduate students.
The general population will benefit from an improvement in teaching styles and strategies, leading to more effective learning by undergraduate students.
The general population will benefit from a more effective learning environment for undergraduate students, leading to increased retention in colleges and universities.

17. **PROTECTION OF DATA.**

a. **Will data be collected as anonymous?** ☑ Yes ☐ No *If "YES", go to part "g".*

b. **Will data be collected as confidential?** ☐ Yes ☐ No

c. **If data is collected as confidential, how will the participants' data be coded or linked to identifying information?**

d. **Justify your need to code participants' data or link the data with identifying information.**

e. **Where will code lists be stored?**

f. **Will data collected as "confidential" be recorded and analyzed as "anonymous"?** ☐ Yes ☐ No

g. **Describe how the data will be stored (e.g., hard copy, audio cassette, electronic data, etc.), where the data will be stored, and how the location where data is stored will be secured in your absence.**

Data will be stored in hard copy, hard drive on the researcher's personal computer, and saved on disk. All data will be located securely in the office of the researcher's residence. Hard copies will be secured in a locked file cabinet.

h. **Who will have access to participants' data?**

Researcher, Tami McCray Olds
Major Professor, Dr. James E. Witte, Ph.D
Committee Members, Dr. Maria M. Witte, Ed.D and Dr. Margaret E. Ross, Ph.D

i. **When is the latest date that the data will be retained?**

Anonymous data will be retained.

j. **How will the data be destroyed? (NOTE: Data recorded and analyzed as "anonymous" may be retained indefinitely.)**

Anonymous data will be retained.

APPENDIX C

DEMOGRAPHIC QUESTIONNAIRE

DEMOGRAPHIC QUESTIONNAIRE

Thank you for your willingness to participate in this study. You are asked to provide the following demographic information. This information is for research purposes only. ***DO NOT DETACH THIS FORM FROM YOUR TEST INSTRUMENT.*** Thank you for your assistance.

Sincerely,

Tami McCray Olds, Researcher
Doctoral Candidate
Department of Educational Foundations, Leadership & Technology
Auburn University
Auburn, AL 36849

Section A: ***For each item, please circle the correct response.***

1. *Gender:*

   Male **Female**

2. *Ethnicity/Race:*

   Asian **Black** **Hispanic** **White** **Other:_____**

3. *Educational Level:*

   Freshman **Sophomore** **Junior** **Senior**

Section B: ***For each item, please indicate the correct response.***

4. *Age:* _____

5. *Major/Field of Study:* _____

Thank you!