The Relationship Between Creativity and Learning Style Preference, Age, and Educational Achievement

by

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Abstract

This study investigated the relationship between creativity and learning style preference, age, and educational achievement. One hundred adult graduate students from the departments of Adult Education and Higher Education Administration completed the Abbreviated Torrance Test for Adults (ATTA) and the Gregorc Style Delineator. The ATTA measured creativity and the Gregorc Style Delineator measured learning style preference. Age and educational achievement were self-reported by participants. Pearson product-moment correlation and ANOVA revealed no statistically significant relationship between creativity and stated variables. A marginal relationship was found between Creativity Index scores and age. Creativity Index scores of younger participants reflected a wide range of scores. Score range narrowed as participants' age increased. This finding indicated the possibility of a regression toward the mean with stabilization of creativity scores in middle age. More research is suggested to determine the validity of this finding.

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CHAPTER 1

INTRODUCTION

"Adult education presumes that the creative spark may be kept alive throughout life, and moreover, that it may be rekindled in those adults who are willing to devote a portion of their energies to the process of becoming intelligent" (Lindeman, 1989, p. 55). Eduard Lindeman, a pioneering figure in adult education, posits in this quote that creativity is a vital element for human growth and development throughout the life cycle. By linking creativity to the learning process, Lindeman highlights the importance of creativity as a necessity for change in both the individual, and, by extension, society at large.

"Creativity is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context" (Plucker, Beghetto, & Dow, 2004, p. 1). Creativity is a primary force in the human experience - a necessary component of humankind's quest for survival and growth. Creative acts have impacted human existence throughout the history of mankind. From the highest achievements in the arts and sciences, to the day-to-day decisions of the average person, creativity may be a motivating factor. The force of creativity has allowed a continued growth in realms ranging from the mundane to the profound (Csikszentmihalyi, 2013). From the wheel to the most advanced mode of space exploration, creativity has pushed the envelope of innovation. Shakespeare, Mozart, and Picasso, are viewed as figures of seminal change and accomplishment. Bill Gates and Mark Zuckerberg changed the sphere of human communication. Jane Addams,

George Washington Carver, Marie Curie, Sigmund Freud, Mahatma Gandhi, Margaret Mead and countless others contributed in major ways to their respective disciplines. Each of these figures, through activity motivated by the act of creative inquiry, expanded the understanding of selected areas of knowledge. Without established acts of creativity, human existence as it is known today would not be possible (Csikszentmihalyi, 1996/2013).

While creativity may be acknowledged as a catalyst for growth and change, the study of creativity is relatively new. The modern investigation of creativity was, arguably, initiated with the influential words of J. P. Guilford in 1950. Guilford delivered the opening presidential address to the American Psychological Association at Pennsylvania State College on September 5th of that year. In this speech, Guilford stated, "The neglect of this subject [creativity] by psychologists is appalling" (Guilford, 1950, p. 445). As evidence, Guilford indicated that less than two-tenths of one per cent of the books and articles found in the *Abstracts* from approximately 1925 - 1950 emphasized creativity in any significant way. In this landmark presentation, Guilford cited several reasons for this neglect. Among the reasons cited were: the subjective nature of defining creative acts, the emphasis in learning research on lower animals, and the lack of a proper methodology for the study of creativity (1950). Guilford's work helped draw attention to the need for a greater emphasis on creativity as a research topic as well as the need for more stringent, scientifically based instruments for the assessment of creativity. Guilford recognized that creativity must be studied to find ways to identify, measure, encourage, and nurture the trait for both individual and societal gain. With an academic regimen applied to the study of creativity, the mystery of this illusive topic could be revealed.

Learning styles refers to "the preference or predisposition of an individual to perceive and process information in a particular way or combination of ways" (Sarasin, 2006, p. 4). People learn in different ways. Findings indicate that a person's preferred learning style impacts the manner in which the individual assimilates new knowledge (Dunn & Dunn, 1978b; Gregorc, 1979; Kolb, 1978). According to Sarasin (2006), individuals have a well-developed learning style preference by adulthood even though they may not understand this preference adequately enough to use the knowledge efficiently for more effective learning. The subject of learning styles has been an area of relative recent interest to many researchers. The acknowledgement of individual learning style preferences has led to a significant number of different thoughts and theories about the learning process. The area of preferred learning style is recognized as an important facet of the learning process and "has the potential to make a big impact on what happens in classrooms."(Pritchard, 2009, p. 4)

Dr. Anthony Gregorc recognized these learning differences and established a system of thought regarding learning style. Gregorc focused on two primary components: the manner in which an individual perceives the world and the manner in which order is established within these perceptual perspectives (Allen, Scheve, & Nieter, 2011). Within perceptual perspective, Gregorc established individual distinctions of concrete and abstract. "Concrete individuals relate the world to their physical and active "self," while abstract thinkers focus on their feelings, relationships, and ideas" (Allen et al., 2011, p. 15). Gregorc used the terms sequential and random to indicate the individual's preferred manner of ordering information. Sequential thinkers tend to follow an orderly, step- by- step process of thought, while random thinkers tend to follow a less restrictive train of thought that is comprised of groupings of ideas that may notbe processed in any particular order. Based on these concepts, Gregorc established four learning types: Concrete Sequential (CS), Concrete Random (CR), Abstract Sequential (AS), and Abstract

Random (AR). Within this framework, Gregorc created a model for distinguishing individual learning style preferences.

This study of creativity and learning style preference, coupled with an investigation of descriptive measures of age and formal education achievement, sought answers to these questions through the use of two established assessment instruments. The Abbreviated Torrance Test for Adults was used for measurement of creativity as manifested through prescribed divergent thinking tasks. The Gregorc Style Delineator was used for the measurement of learning style preference.

Statement of the Problem

Research investigating the relationship between creativity as measured by the Abbreviated Torrance Test for Adults and learning style preference as measured by the Gregorc Style Delineator is limited and narrow in focus. This study sought to add to the body of research that would allow insights into the correlation (or lack there of) between creativity and learning style preference as well as provide further evidence of the relationship of creativity to age and achieved educational level. Creativity has been identified as a necessary characteristic for success in a fast-paced, changing world (Gardner, 2008). Insight into the identification of this vital component of human growth warrants investigation. Additionally, for some time, educators have acknowledged the importance of identifying learning style preference as a means for developing successful individual learning models. Knowledge of the interplay of creativity and learning style preference may be essential for increasing the effectiveness of learning situations for adults. Those who are involved in the creation, development, planning, and implementation of curricular activities for a variety of situations and age groups will find the information garnered from a study of this sort valuable. Further, the consideration of age and achieved

educational level in relation to these measured findings may provide useful information for those charged with the design of education programs.

Purpose of the Study

The purpose of this study was to collect and compare information related to how creativity and learning style preference interact in individuals of adult status (18 years of age and older). The study also examined the relationship between creativity and age as well as creativity and completed formal education. The measurement of creativity was determined through the use of the Abbreviated Torrance Test for Adults. The Abbreviated Torrance Test for Adults provides a Creativity Index for each participant based on ratings established in a series of activities designed to measure individual divergent thinking abilities.

Divergent thinking has been an area of interest to researchers of creativity since Guilford initiated his work on creativity. Guilford stated, "Most of our problem solving in everyday life involves divergent thinking" ((Guilford, 1968, p. 8). 'Divergent thinking is clearly the backbone of creativity assessment and has held this key position for many decades" (Kaufman, Plucker, & Baer, 2008, p. 14). Divergent thinking testing represents the largest category of assessments for creativity (Hocevar, 1981). Over the years, a wide battery of instruments that measure divergent thinking as an indicator of creativity have been devised, tested, and revised. These instruments are founded on the central idea that diversity of answers to a proposed question is an indicator of creativity.

Scholars have identified four aspects of divergent thinking that enable creativity. They are fluency, originality, flexibility, and elaboration (Guilford, 1967). Fluency refers to the number of answers supplied by the participant to a given question. Originality refers to the unique quality of the participant's answers. Flexibility refers to the number and uniqueness of categories of answers supplied by the participant. Elaboration refers to the level of detail

provided in the participant's response. Divergent thinking tests focus on the measurement of these four aspects (in part or in total) of divergent thinking.

The measurement of learning style preference was determined through the use of the Gregorc Style Delineator. Gregorc's work of 1982 was centered on the concept of how the individual's preferred manner of learning impacted the actual learning process (Silver, Strong, & Perini, 2000). As a result of his research, Gregorc developed the Gregorc Style Delineator to measure and identify cognitive qualities. The Gregorc Style Delineator is designed to identify both perceptual and ordering abilities. As a result of findings on the completed Gregorc Style Delineator, learning style preference for the individual is assigned one of the following four style designations: Concrete Sequential (CS), Concrete Random (CR), Abstract Sequential (AS), or Abstract Random (AR). Each learning styles designation indicates a set of characteristics for the learner that identifies the learner's preferred mode of gathering, assessing, and retaining information. Further, this study explored the relationship between creativity and age as well as the relationship between creativity and achieved educational level as provided by the study's participants.

The objectives of this study were: 1) to determine the age and achieved educational level of each participant; 2) to determine the Creativity Index of each participant as measured by the Abbreviated Torrance Test for Adults; 3) to determine the learning style preference of each participant as measured by the Gregorc Style Delineator; 4) to determine the correlation of Creativity Index and learning style preference for each participant; 5) to determine the relationship between creativity and age for each participant; 6) to determine the relationship between creativity and achieved educational level for each participant.

The following questions were used in this study:

1. What is the relationship between creativity and learning style preference?

2. What is the relationship between creativity and age?
3. What is the relationship between creativity and achieved educational level?

Significance of Study

This study addresses the need for more research into the relationship between creativity and learning style preference, age, and achieved educational level. Insights gained from this study may enable adult educators to improve existing learning situations as well as develop new, more effective programs for adult learners. Through a deeper understanding of the relationship between creativity and age, educators may find ways to target specific age groups more effectively in the design of new learning models. Knowledge of the relationship between creativity and achieved educational level may provide those who work with individuals of a specific educational background an understanding of the creative potential for said group. In general, this study allows additional information on the nature of creativity and specific relational qualities necessary for the identification of creativity in individuals. This research may provide information that could be useful to a wide variety of research on various aspects of creativity.

Assumptions of the Study

The following assumptions were made for the purpose of this study:

1. The Abbreviated Torrance Test for Adults was a valid instrument to examine creativity in adults of a wide range of ages.
2. The Abbreviated Torrance Test for Adults accurately assessed divergent thinking abilities as a measure of creativity of the individual.
3. The Gregorc Style Delineator was a valid instrument to examine the learning style preference of adults of a variety of ages.
4. The participants provided honest and accurate information to all requested items.

Limitations of the Study

Several limitations were identified in relation to this study. The Abbreviated Torrance Test for Adults was used to measure creativity. This test is designed to psychometrically measure divergent thinking abilities as an indicator of the presence of creativity. Plucker and Makel (2003, p. 51) stated the following:

> Researchers have used psychometric measures of creative process extensively for decades, and they remain a popular measure of creative process and potential. Nevertheless, a majority of criticisms and adverse reactions directed at creativity measures are primarily (but not exclusively) directed at "creativity tests."

Kaufman, Plucker, and Baer (2008) identified several limitations of divergent thinking tests. Among the limitations indicated were: administrative effects on testing outcomes; training effects on testing outcomes; and the overgeneralization of divergent thinking test scores to other components of creativity.

Dr. Paul Torrance, author of the Abbreviated Torrance Test for Adults (ATTA) and the Torrance Tests of Creative Thinking (TTCT) on which the ATTA is based, acknowledged that the TTCT (and other creativity tests) were limited to a rational-thinking view of creativity ((Raina, 2006). Torrance did not intend for the TTCT to be a comprehensive measurement of creativity (Torrance, 1974). He concluded that a high score on TTCT would not guarantee creative behavior.

Gregorc (1985) cited several points to consider when using the Gregorc Style Delineator. Gregorc acknowledged that the Style Delineator is a self-assessment tool that is designed to provide insight into the inner workings of the individual. Gregorc identified two types of people who may have difficulty taking the Style Delineator (Gregorc, 1985) in the following statement:

> I find they tend to fall into several categories. The first category consists of people who address the Delineator's word as non-personal descriptors. They look at a word and say to themselves, "Yes, that's *like* me," rather than, "Yes, I am that." The second category

> consists of individuals who become angry because their logic is frustrated by the word design. (p. 156)

Participation in this study was voluntary. Participants were graduate students in the Adult Education and Higher Education Administration departments of one of the largest universities in the Southeast. Generalizability of the findings to other regions of the country is not recommended as a result of what may be considered a convenience sample. The sample selection was limited to 100 participants.

Definition of Terms

The following terms used with specific definitions were significant in the course of this study.

1. Abstract Random and Abstract Sequential – Gregorc determined that Abstract Random learners prefer to have options in the learning environment. They "like experiences that are subjective, affective, and abstract" ((Gregorc, 1985, p. 188). According to Gregorc, the Abstract Sequential learner "prefer to deal with abstractions via models, ideas, concepts, and symbols … Words are their tools for manipulating, creating, and dealing with the world. … AS learners prefer techniques and activities which are sequential, substantive, logical, serious, and structured" ((Gregorc, 1985, p. 189).
2. Concrete Random and Concrete Sequential Learners - Gregorc explained that Concrete Random learners utilize experimentation in the learning process. "Dominant Concrete Random learners prefer concrete applications of ideas through example and practice …. CR's are problem solving, application-oriented, experiential learners" (Gregorc, 1985, p. 190). Concrete Sequential learners "prefer concrete examples and objects to theories and abstractions" (Gregorc, 1985, p. 187). Gregorc further states that CS learners "have a concern for precision, exactness, and in some cases, perfection" (Gregorc, 1985, p. 187).

3. Creativity – This term has been defined in different ways by different researchers ((Torrance, 1995). "In general, creativity has been seen as contributing original ideas, different points of view, and new ways of looking at problems" ((Torrance, 1995, p. 67). "…. it seems inevitable to me that a thorough understanding of creativity must involve the study of all four aspects of creativity (person, process, product, and press) .... As the focus of thinking, I have chosen a process definition….If we define creativity as a process, we can then ask what kind of person one must be in order to engage most successfully in the process, what kinds of environment on needs in order to function most successfully, and what kinds of products result from the process" (Torrance, 1995, p. 72).
4. Creativity Index – Torrance defined the creativity index as "a composite of all individually assessed creative abilities (fluency, originality, elaboration, flexibility" plus the creative indicators (Goff & Torrance, 2002, p. 29).
5. Elaboration – Torrance defined elaboration as "the ability to embellish ideas with details" (Goff & Torrance, 2002, p. 2).
6. Flexibility – Torrance defined flexibility as "the ability to process information or objects in different ways, given the same stimulus" (Goff & Torrance, 2002, p. 2).
7. Fluency – Torrance defined fluency as "the ability to produce quantities of ideas which are relevant to the task instruction" (Goff & Torrance, 2002, p. 1).
8. Originality – Torrance defined originality as "the ability to produce uncommon ideas or ideas that are totally new or unique" ((Goff & Torrance, 2002, p. 1).
9. Learning Styles – Gregorc defined learning styles as "behaviors, characteristics, and mannerisms which are symptoms of mental qualities used for gathering data from the environment" (Gregorc, 1985, p. 179).

Organization of the Study

An introduction to this research study was provided in this chapter. It addressed the statement of the problem, purpose of the study, research questions, significance and limitations of the study and the definitions of the terms used in this study. A review of the related literature for this study is provided in Chapter II. It addresses the historical overview of adult education, creativity, and learning styles. It also addresses previous research on creativity and learning styles as well as the assessment of creativity and learning styles. Substantive background information is provided on the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator.

Chapter III describes the methods used for this study. It includes the design of the study, research questions, variables – the independent and dependent variables, and the instruments – the Abbreviated Torrance Test for Adults and the Gregorc Style Deleniator. Reliability and validity of the two instruments, population sample, data collection, procedure and analysis, results and a summary are also provided. Chapter IV presents the findings of the study and describes the participants' demographic characteristics and the analytical and statistical procedures. Chapter V summarizes the findings of the study and includes suggestions for future research.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The first chapter described the purpose, statement of the problem, research questions, definitions of terms, significance, assumptions, limitations and the organization of the study. The second chapter – literature review – discusses the selective history, concepts and figures of importance in adult education and adult learning, historical review and background of creativity research, the assessment of creativity, historical review and background of learning styles research, the assessment of learning styles including an overview of the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator, and research relating to the combined topics of creativity and learning styles.

Contextual review of adult education and adult learning is helpful in understanding creativity and its relationship to learning style preference in adults. Creativity has been recognized as a topic that is significant to numerous fields of study. Researchers in education, psychology, business, and the arts, among others, have conducted research projects reflecting this sensibility. Robinson (2011) acknowledged a changing world in need of creative individuals to direct and manage this change. Learning styles has been an interest of researchers who have sought to establish a deeper understanding of adult learning. Sternberg (1997) indicated the importance of understanding learning style preference to encourage the most successful means of navigating life situations including work and relationships. Upon review of the literature on the measurement of creativity and learning style preference, it was understood how salient assessment is to both fields. Further review of the literature, indicated that creativity and

learning style preference could be investigated together. Through the combination of the two topics, it became clear that investigation of this sort could hold importance in the identification of individual creativity as well as predictive power for the presence of creativity. Through the insights gained in studies of this sort, more effective opportunities may be developed to encourage the identification, development and use of creativity. Additionally, the identification of the presence of creativity and its link to learning style preference may lead to optimal use and encouragement of individual abilities within a variety of settings.

Purpose of the Study

The purpose of this study was to examine the relationship between creativity and learning style preference in adults in the Adult Education and Higher Education Administration departments of a major southern university as measured by the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator. The study also examined the relationship of between creativity and age and level of completed formal education.

Research Questions

This study was guided by the following research questions:

1. What is the relationship between creativity and learning style preference?
2. What is the relationship between creativity and age?
3. What is the relationship between creativity and achieved educational level?

ADULT EDUCATION AND ADULT LEARNING

The study of the relationship between creativity and learning style preference in adults mandates an understanding of the foundational principles of adult learning and the manner in which learning has been encouraged. Additionally, a concise and selective historical overview may give perspective to certain aspects of how creativity and adult learning may be linked,

encouraged and nurtured through the educational process. Value may also be found in the exposition of important theories and concepts that have been developed relating to the study of both creativity and learning styles.

Education is considered an important facet of many societies. Most societies have some form of education in which the main components of that society are taught and passed on. Whether it is the hunting skills in a tribal culture or a literature course in a university setting, education is a factor that allows a culture to sustain. Children must gain knowledge from their parents or other significant others, skills which will allow them to be safe and grow into functioning, contributing, and self-sustaining adults. Without these skills, people cannot succeed.

The education of adults has varied over time and from one culture to another. Adult education is an integral part of any advancing society. As societies evolve, the skills required for success may change. Often, that means that adults must learn new adaptive abilities. Education is the means by which these skills are learned. Educational opportunities for adults may be found in a number of different settings. Colleges and universities, community programs, libraries, museums, churches, business and industry, the military, along with many other organizations, all provide learning opportunities for adults (Witte & Witte, 2009). By taking advantage of these educational opportunities, adults may grow and adjust in ways that lead to satisfaction in both the eyes of the individual and society. The concept of lifelong learning is a phenomenon that shapes many cultures and promotes advancement of the individual within the societal framework (Lindeman, 1989). Through the choices made as regards the education of adults, one can see how a society regulates its' value system (Freire, 2009). Societies that are driven to prosper and grow need and provide educational opportunities for its adults. Without

growth opportunities for adults, stagnation sets in for the individual, the community, and the society.

Adult education as a discipline has historical roots and developments, as well as significant figures that have made contributions to the field. Historically, adult education has been influenced by the culture at hand and can be traced to antiquity. Medieval Europe and later, colonial America, cultivated a hierarchical learning system that related to the various trades that were in practice at the time. As workers developed their skills and levels of creativity, they were able to advance through the system. This system had three levels reflecting an increasing advancement of trade skill. Within this system, the initial level was known as the Apprentice level, followed by the Journeyman and Master levels. The Master level indicated that the individual had mastery of the trade and, as a result, more status within the community. The term masterpiece is associated with the process of completing a work of recognized creativity and originality. Further, the Master level tradesman owned his own shop and tools. In these cultures, the acquisition of knowledge and skill within a trade allowed for greater financial reward and more job security because it limited the number of individuals who reached this level of achievement (Gray & Herr, 1998; Reich, 2001).

The 18th century saw Benjamin Franklin, acknowledged for his wide range of creative endeavors, introduce one of the earliest examples of structured adult education in the United States. Located in Philadelphia, PA, Franklin invited community members from a variety of backgrounds to come together, read, and discuss various ideas. This process is found today in some approaches to the development of individual creativity (De Bono, 1985/1999). The thought was that through liberal education, the individual achieved self-improvement and, in turn, the community at large would be improved. This organization was called Junto (Elias & Merriam, 2005). As time progressed, additional organizations were founded in the United States

that were dedicated to educational opportunities for adults. Creative endeavors were often found to be important in these organizations in both structure and content. Two examples were the American Lyceum Society and Chautauqua.

Lyceum refers to an educational movement for adults that flourished during the mid-1800s. The name is taken from Aristotle's school in ancient Greece. Josiah Holbrook is credited with having initiated the American Lyceum Society in 1826 in Millbury, Massachusetts (Duggan, 2009). Holbrook's concept of the lyceum was dedicated to upgrading the basic quality of life through knowledge (Gutek, 1991). Lyceums were, in essence, educational study groups, developed by and for members across the social strata. This included women and African-Americans. Topical focus was selected by the participants based on interest and served as a valuable source of information on a wide range of educational and social issues (Duggan, 2009). The lecture format was a primary means of communicating ideas. Holbrook's organization coordinated lecture series around the country and often featured important artists and writers of the time (Gutek, 1991). Lyceums continued to exist through the early twentieth century (Duggan, 2009).

Chautauqua was another important source of adult education in the United States. Lewis Miller, an industrialist, and a Methodist bishop, John Vincent, initiated a church-related educational opportunity for adults on Chautauqua Lake in western New York in the 1870's. In 1878, the Chautauqua Literary and Scientific Circle (CLSC) was announced as a four-year home reading course for the study of a variety of subjects, both sacred and secular. The program, as described by Vincent, was particularly for those who had had limited educational opportunities as well as those who had leisure time and wanted to engage the mind (Simpson, 1999). According to Vincent, Chautauqua was built on the following assumptions, among others, "those who receive no cultural education early in life desire it more avidly later in life; the intellect is to

be developed through reading, reflection and production: the intellectual powers of adults need direction, assistance, and encouragement;" (Elias & Merriam, 2005, p. 23). The Chautauqua Institution, a physical entity on the lake, also developed during this time as a summer vacation spot for those seeking educational opportunities in both formal and informal settings. Courses could be taken in a variety of subjects and often dealt with social, political, and theological issues of the day. Attendees could also partake of a variety of arts related activities such as painting, sculpture, drama, and music. Music was an important part of Chautauqua. The Chautauqua School of Music, which began in 1889 under the leadership of William Sherwood, provided training and programs in the classics. Eventually, professional musical organizations such as the New York Symphony brought regular first-class performances to Chautauqua (Simpson, 1999). Chautauqua continues today as an educational community with a summer program that continues to offer "fine and performing arts, lectures, interfaith worship and programs, and recreational activities" (www.ciweb.org/).

In the 19th century, the Industrial Revolution transformed Western culture. A move away from an agrarian lifestyle prompted growth of cities and towns. It also mandated the learning of new skills. As people began working in factories and other developing urban businesses, workers had to learn specific task-oriented skills. Education was directly related to the task with which one was engaged. The narrowing of the educational perspective shifted the focus, for many, away from a broad, academically oriented approach, to what might be termed, job training. This phenomenon impacted both Europe and, ultimately, the United States, particularly the North East, where most of the factories were located (Gray & Herr, 1998).

Between the Civil War and World War I, vocational training developed. This was a work- based educational approach and promoted skills which furthered the needs of industry and, to a degree, the worker, because through training, employment was possible. Over time, training

programs became more systematized and by the end of the 19th century, education was an expected part of most jobs. Factory schools became more common. Workers hoping to enter and progress within a company relied on industry-based training programs to acquire the necessary skills for advancement. Education for workers had become a societal expectation (Gray & Herr, 1998).

The direct link between cultural need and the societal roles that are cultivated can be seen in the role of women in the workforce during World War I. Many of the young males in the states had gone off to war and women were forced to move into the workforce in new proportions to assist the war effort. Job-related training assisted in this transition. Many women remained in the workforce after the war ended thus gaining a newfound financial freedom (Gutek, 1991). During World War II, training was to reach a new level of dispersal in the United States due to the needs of U.S. involvement in the war. New technologies demanded new worker skills. Trainers were needed to prepare workers to meet this need. Effective and efficient methods for the training of trainers became a necessity. The title, training director, was first used during this time. This led to the first serious discussion and development of work-related training methods (Gray & Herr, 1998).

With the need for adult education established, various modes of dispersal have been developed and explored. Technology has been a primary force for change in the field. Treffinger, Schoonover, & Selby (2013) see technology as a means to enhance creativity in the learning environment. "Computer technology can facilitate creativity, connections, and collaborations from teacher to teacher, teacher to student, and student to student- and from school to home and vice versa" (Treffinger et al., 2013, p. 256-257). Distance education has been an important means of dissemination of learning materials. "In today's learning environment, technology has drastically changed the features of distance education. As

telecommunications systems become more advanced distance education increasingly has the ability to extend education beyond the walls of the traditional classroom levels"(Borel, 2009, p. 152). As technology progresses, it is clear that its impact on learners is substantial. "While some of us are inclined to think of these communication media as 'mere tools,' they can have a transformative effect" (Gardner & Davis, 2013, p. 21). Technology in the educational process allows for the manifestation of creativity on two levels. The technology itself has a foundation of creativity in its invention. Additionally, the content introduced in the learning opportunity for learners may be presented in new and innovative ways that connect with a variety of different learning styles.

The field of adult education has many contributors who have helped define, develop, and further the discipline through academically rigid methods. In order to gain insight into the scope and significance of adult education and its link to creativity and learning styles, a brief overview of some important figures and their contributions is necessary.

"The whole of life is learning, therefore education can have no endings. This new venture is called *adult education* - not because it is confined to adults but because adulthood, maturity, defines its limits" (Lindeman, 1989, p. 5). Eduard C. Lindeman is often credited with initiating the adult education movement in the United States. Lindeman promoted the idea that "in adult education the curriculum is built around the student's needs and interests" (Lindeman, 1989, p. 6).

Malcolm Knowles (1913-1997) is recognized as a pioneering figure in the field of adult education. Knowles introduced andragogy into the United States in the 1970's and is referred to as the Father of Andragogy (Knowles, Holton III, & Swanson, 2005). Knowles defines andragogy as "the art and science of helping adults learn." (Knowles, 1977, p. 38) Partly through his efforts, andragogy has become a recognized, viable, and theoretically based,

academic discipline. Knowles furthered the idea that adults learn differently from children. "Skillful adult educators have known for a long time that they cannot teach adults as children have traditionally been taught" (Knowles, 1977, p. 38). Knowles identified six core adult learning assumptions of andragogy. They are stated in the book, *The Adult Learner* ((Knowles, Holton III, & Swanson, 2005) as:

1. The learners' need to learn.
2. The learners' self-concept.
3. The role of the learners' experiences.
4. The learners' readiness to learn.
5. The learners' orientation to learning.
6. The learners' motivation for learning.

Each of these assumptions adds to the understanding of adult learning as an andragological phenomenon.

Knowles considered it important that adult learners know why they need to learn something. Having an understanding of why something is important helps provide the adult learner with the incentive to pursue the learning process. It also gives the learner a perspective on how the newly acquired knowledge will potentially improve the learners' quality of life. Knowles indicated that adult learners have a sense of responsibility, or self-concept, for how their lives are maintained. Taking responsibility for the educational process in a self-directed manner is a move toward a life of fulfillment. Knowles acknowledged that adults come to the learning process with life experiences that can influence the learners' ability to learn. Knowles cited background experiences as important tools for learning enhancement that should be acknowledged by the teacher and facilitator of adults. Readiness to learn allows adults the ability to move through the developmental aspects of the learning process in a more efficient

manner than might be seen in young learners. Knowles indicated that readiness to learn governs the timing of the introduction of education materials. Knowles suggested that adults are oriented toward learning that will assist them in life goals. Orientation for the adult learner centers on the importance of the new material for navigating more successfully through the activities of life. Finally, Knowles introduced the idea that motivation for adults may be both external and internal. External motivators would include job promotion and acquisition of wealth. Internal motivators would include satisfaction acquired through self-improvement, greater job satisfaction, and a general improvement of one's quality of life (Knowles et al., 2005).

Knowles championed the concept of the self-directed learner. He contrasted self-directed learning with teacher-directed learning. Teacher-directed learning assumes that the learner does not have the capacity to direct the learning experience. This would be commonly perceived as a feature of the educational process for children. According to Knowles' self-directed learning model, adults should be credited with having the maturity and life experience to have input in the learning process. Self-directed learning seeks to nurture the adult's ability to become an independent learner (Knowles, 1975).

Knowles created a system for the implementation of the principles of andragogy. Seven phases were identified as necessary for use in both the planning of adult education programs and the management of specific learning experiences. They are (Knowles, 1977, p. 54):

1. The establishment of a climate conducive to adult learning.
2. The creation of an organizational structure for participative planning.
3. The diagnosis of needs for learning.
4. The formulation of directions of learning (objectives).
5. The development of a design of activities.
6. The operation of the activities.

7. The re-diagnosis of needs for learning (evaluation).

Cyril O. Houle (1912-1998) made significant contributions to the field of adult education. Houle served as Knowles' advisor at the University of Chicago. Knowles acknowledged Houle as being a major influence on his understanding of the principles of adult education. The book, *The Inquiring Mind* (Houle, 1961), is credited by Knowles as important to his understanding of self-directed learning. In this book, Houle establishes what has come to be known as Houle's Typology. It consists of the identification of three types of adult learners. The first is the goal-oriented learner. This type of learner undertakes learning to achieve some type of goal such as the completion of a training program that may enhance job prospects. The second type of learner identified by Houle was the activity-oriented learner. This type of learner seeks to have an experience beyond the content of the learning material encountered. Social concerns may be present as a motivator for this type of learner. The third type of learner is the learning-oriented individual. This learner seeks knowledge for its own sake. It is helpful to understand that adult learners may be identified as more than one learner type depending on the particular situation at hand. Houle presents seven principles to effective learning in his book *Continuing Your Education* (1964). The seven principles as presented by Houle are:

1. Act as though you are certain to learn
2. Set realistic goals – and measure their accomplishment
3. Remember the strength of your own point of view
4. Actively fit new ideas and new facts into context
5. Seek help and support when you need it
6. Learn beyond the point necessary for immediate recall
7. Use psychological as well as logical practices

Houle (1964) supported the concept of the individualistic learning process. By knowing one's learning strengths and exercising them in a variety of ways, Houle supported the idea that adult learning is a viable vehicle for personal growth.

Allen Tough (1936-2012) is yet another figure of note in the realm of adult education. Tough presented research-based conclusions as to why adults engage in the learning process in his book *The Adult's Learning Project* (1979). Tough developed a theory based on what he called the learning project. A learning project is defined as "a series of related episodes, adding up to at least seven hours" (Tough, 1979, p. 7). That adults take deliberate action in creating meaningful learning experiences is central to Tough's theory. Tough further indicates that it is important that the learner have options on how to learn. "I have found that students with freedom in how to learn are very creative in their choice of methods" (Tough, 1979, p. 152). Tough advocates for the idea that creative approaches in the classroom may increase the success rate of learning amongst adult learners.

Adult education experienced the influence of concepts found in humanistic psychology (Knowles et al., 2005; Tough, 1979). Abraham Maslow's concept of self-actualization has been particularly influential (Maslow, 1954/1970). This concept centers on the idea that there is a hierarchy of needs that humans must contend with. The most basic needs are the physiological needs such as food, warmth, sleep, and sex, among others. If these needs are not met, growth is limited. If physiological needs are met, safety needs comprise the next level of Maslow's hierarchy. Safety needs include stability, security, and a basic freedom from fear. Fulfillment of safety needs leads to belongingness and love needs. People need to feel a sense of being part of the family structure with the experience of being loved to actualize at higher levels. The next level of the hierarchy focuses on the issue of esteem. Individuals with a strong sense of self have the confidence to make significant contributions in life. Self-actualization represents the highest

level of growth in the human experience. The self-actualized individual has a sense of satisfaction with their place in the world. Self-actualization represents the satisfactory internalization of all levels of the hierarchy. Adult education is often viewed as a vehicle for growth and betterment of the life-experience. Maslow also addressed the topic of creativity (Maslow, 1968; 1954/1970). Maslow identified creativeness as a "universal characteristic" (1954/1970, p. 170). Maslow's observations led him to the belief that creative individuals are less inhibited and more spontaneous than others.

CREATIVITY: RESEARCH AND ASSESSMENT

"*Creativity is notoriously difficult to define and measure. This is probably because it is complex, with various forms of expression, and because it is overdetermined, with multiple influences.*" (Runco, 2006, p. 21)

RESEARCH

J. P. Guilford (1950) challenged the scientific community to undertake a rigorous campaign to gain insights and knowledge in the field of creativity. Guilford's work, along with the work of many others, has helped draw attention to the need for a greater emphasis on creativity as a research topic as well as the need for more stringent, scientifically based instruments for the assessment of creativity. Notable educational model, Bloom's Taxonomy, was revised to reflect the importance of creativity by placing creating in the highest position of educational objectives (Anderson, Krathwohl, & Bloom, 2001). The field of creativity continues to grow as researchers develop new tools for the assessment and understanding of creativity (Kaufman, Plucker, & Baer, 2008).

Defining creativity presents challenges (Aleinikov, Kackmeister, & Koenig, 2000). Plucker, Beghetto, and Dow (2004) reviewed 90 scholarly articles on creativity and found that only 38 percent defined creativity in an explicit manner. Definitions for creativity run the gamut

from the vague, highly subjective definition to scholarly attempts to find a definition that takes into consideration a variety of points that vary from one study to another. In structuring an understanding of what creativity is, Guilford (1968) sought answers through the exploration of divergent thinking. Guilford's research methods represented an awareness of the distinction made between the processes relating to convergent and divergent thinking. Convergent thinking provides one correct answer for a problem. Divergent thinking allows multiple solutions to solve a problem. For many researchers, divergent thinking is viewed as a significant key to the understanding of what creativity is (Kaufman et al., 2008). Torrance continued the emphasis of divergent thinking as fundamental to the understanding of creativity. When asked to define creativity, Torrance stated:

> I thought that if I chose process as a focus, I could then ask what kind of person one must be to engage in the process successfully, what kinds of environments will facilitate it, and what kinds of products will result from successful operation of the process.
>
> I tried to describe creative thinking as the process of sensing difficulties, problems, gaps in information, missing elements, something askew; making guesses and formulating hypotheses about these deficiencies, evaluating and testing these guesses and hypotheses; possibly revising and retesting them; and finally communicating the results.
>
> I like this definition because it describes such a natural process.
>
> (Shaughnessy, 1998, p. 442)

With an emphasis on process, Torrance was able to examine how individuals engaged in creative activity, and by extension, he was able to consider the other approaches as well. Building on an extensive survey of the literature, Plucker et al. (2004) defined creativity as a product or idea that

is produced "that is both novel and useful" (p. 90). Originality and purpose are fundamental concepts for defining creativity found in the work of many researchers (Torrance, 1995; Plucker & Makel, 2003; Plucker et al., 2004).

Foundational to the study of creativity is the concept of approaches (Taylor & Barron, 1963; Rhodes, 1961). R. L. Mooney and M. Rhodes described four approaches to creativity. The four approaches are focus on person, focus on product, focus on process, and focus on environment (often described as press). These four approaches are often referred to as the Four P's of Creativity (Fox & Fox, 2004). Each approach has contributed to the growth of understanding in the field of creativity. Studies of creative people explore the uniqueness of the person in creative activity. These studies search for the qualities that set creative people apart from those that do not display a marked degree of creativity. Studies that examine product, investigate the results of creative activity. The end results of the creative process are the focus of these studies. Process studies seek to find the key to creativity through the action(s) taken by creative individuals. Studies of process seek to identify the manner of generating creativity with the hope that the process may be generalized. Press studies seek to examine how the environment affects creativity. These studies seek to identify environmental qualities that are conducive to the development and nurturance of creativity. With the understanding of these basic research approaches in place, insights may be gained into the nature of instruments created for the measurement of creativity (Fox & Fox, 2004).

Different theories of creativity have developed based on the Four P's. Researchers vary in the manner in which they emphasize the different facets of person, product, process, and press. Through these points of inquiry and differentiation, a body of information about creativity has developed that serves as a foundation to the understanding of creativity from a vantage point that crosses the lines of discipline. A brief categorical overview of some significant theories follows.

Theories that focus on the creative person emphasize the uniqueness of the individual. Puccio and Cabra (Puccio & Cabra, 2010) indicate that one of the most prolific areas of study within the field of creativity studies has been "the examination of the qualities, skills, traits, an other attributes that distinguish highly creative individuals from their less creative counterparts" (p. 149). Sawyer (2012) cites two primary means of studying the creative personality, traits and types. Traits refer to "the smallest units of individual variation that are consistent, reliable, and valid" (p. 63). Research that is type-oriented seeks to find the personality types that exemplify creative qualities. "It does make a great deal of sense to study creativity by going directly to the source. Only by studying creative people can we begin to understand creativity as an abstract idea" (Fox & Fox, 2004, p. 80). Fox and Fox (2004) cited four primary focal points for person-centered creativity research.

1. What individual traits do highly creative people have in common that are distinctly different from individuals who show less creativity?
2. Do highly creative people possess and use unique thinking skills or use patterns of thinking in different ways than the majority population?
3. Are highly creative people the same; do they exhibit creativity in similar or different ways?
4. Can the degree of knowledge, intelligence, and skill predict an individual's displayed level of creativity? (p. 80)

J. P. Guilford initiated a scientific study of creativity in the 1950's. Guilford focused on the attributes of the creative individual as central to his study of creativity. Guilford developed an approach to understanding intelligence and creativity in what he named the Structure-of-Intellect Model (SOI). Guilford posited that intelligence was "a collection of abilities or functions for processing information." (Guilford, 1975, p. 38) Within this model, Guilford

identified intellectual abilities that contributed to creative potential. Through the designated SOI categories of content, products, and operations, Guilford developed a theory of creativity that identified divergent production as significant in the display of creativity. Guilford also identified the ability to transform ideas as important to creative behavior. Other personality attributes that Guilford cited were motivation, high-energy levels, and effective work habits (1975).

In the 1970's, MacKinnon and Barron conducted person-oriented research at the Institute of Personality Assessment and Research (IPAR). Research at IPAR centered on the study of personality traits. MacKinnon studied individuals from a variety of backgrounds with an emphasis on the personality traits of creative people (MacKinnon, 1978). MacKinnon helped develop the foundation for the concept of creative style (Fox & Fox, 2004). Barron looked at the connection between IQ and creativity (Barron & Harrington, 1981). MacKinnon and Barron found that certain traits were present in highly creative types. The following traits were identified:

1. Above-average intelligence
2. Discernment
3. Openness to experience
4. Balanced personalities
5. A relative absence of repression and suppression mechanisms that control impulse and imagery.
6. Pleasant and materially comfortable childhoods, although they recalled their childhoods as not having been particularly happy.
7. A preference for complexity. (Sawyer, 2012, p. 64)

M. J. Kirton developed a personality-based model of creativity known as the Adaption-Innovation theory (Kirton, 1976; Kirton, 2003). While all people are involved in problem solving to some degree, Kirton determined that individuals have a creativity style that determines how they solve these problems. According to Kirton, individuals fall into two different creativity styles, innovators and adaptors. Innovators attempt to do things differently while adaptors attempt to do things better (Kirton, 2003). Kirton distinguished the two styles from the measured creativity. Kirton acknowledged that individuals could score high or low on creativity assessment regardless of stylistic preference. A primary point of Kirton's was that different cognitive styles were used in the process based on the individual's creativity style preference. Kirton developed a popular measurement tool known as the Kirton Adaptive Inventory (KAI). It has been used extensively in the field of business, particularly for the identification of management style. (Kirton, 2003)

In 1981, Dr. D. Perkins, of Harvard University, using the analogy of the six-sided snowflake, cited six traits that served as indicators of the presence of creative abilities (Perkins, 1981). While not all traits had to be present in the creative individual, the following traits were identified as links to the creative personality. The first trait, personal perspective, involved the manner that an individual dealt with complex and potentially ambiguous situations. The creative individual likes the challenge of these circumstances and is often able to find a means of simplifying the situation so that it is more manageable. Another trait, the ability to excel in defining problems, was cited as important from the vantage point that the creative individual is able to identify the problem and get to the core issue of a problem. Mental mobility, also a trait, allows an individual to have a unique perspective of a problem – to see things in a different way. Perkins indicated that the willingness to take risks was a trait often found in creative people. Pushing the envelope of a situation to the edge was found to be an indicator of creativity.

Objectivity was cited as a trait that allowed the creative individual the opportunity to explore and examine ideas while getting feedback from others. Rather than being isolated in their own thoughts, many creative individuals value the interaction with others to solve problems creatively. The sixth trait identified by Perkins was inner motivation. Internal motivations push the creative individual to find answers to problems by personal attachment. The problem and the solution to the problem become personal (Perkins, 1981).

Amabile (1983), reported finding that intrinsic motivation was often found in creative people. Amabile later cited three components that were necessary for creativity to be present in the individual (Amabile, 1989; Amabile, 1996). The three components of the componential framework are: domain-relevant skills; creativity-relevant skills; and task motivation. Domain-relevant skills involve the skills necessary to actively engage in a specific discipline. For instance, a visual artist must know how to manipulate selected materials for aesthetic appeal. Creativity-relevant skills involve ways of thinking creatively beyond a single discipline. Traits such as a high energy level and a non-conforming personality may be present in those deemed to be creative. Task-motivation refers to intrinsic motivation. Motivation beyond external stimulus was found to be a factor of individualistic creativity. "Each component is necessary, and none is sufficient for creativity in and of itself.…The levels of the three components for an individual's attempt at a given task determine that individual's overall level of creativity on that task" (Amabile, 1996, p. 95).

Gardner (1993) proposed the following definition of the creative individual. "The creative individual is a person who regularly solves problems, fashions products, or defines new questions in a domain in a way that is initially considered novel but that ultimately becomes accepted in a particular cultural setting" (Gardner, 1993, p. 35). Gardner proposed that in order to understand the creative individual, four levels of analysis were necessary. They are: the

Subpersonal, the Personal, the Impersonal, and the Multipersonal. Each level of analysis examines creativity from a different perspective. The Subpersonal level examines the influence of personal biology on the presence of individual creativity. The Subpersonal takes into account the genetics and neurobiology of the creative individual. The Personal level views creativity from the psychological perspective. "…there will be two major lines of investigation. One will focus on the cognitive processes that characterize creative individuals; a complementary tradition will focus on the personality, motivational, social, and affective aspects of creators" (Gardner, 1993, p. 36). The Impersonal analytical approach focuses on domain-specific contributions and the regard that philosophers, historians, and experts within the domain have for the creative achievement, with a particular emphasis on time. Historical placement, knowledge accrued to the specific time of achievement, and current practice, contribute to the acknowledgement of the act as creative. "Because the perspective represents an attempt to capture the nature of knowledge per se, I see it as primarily epistemological in nature" (Gardner, 1993, p. 37). The Multipersonal level deals with the direct assessment of a creative act. Experts within the field, including a whole host of evaluators with different roles and functions within the domain, make judgment on the contribution. Authoritative judgments guide the societal perspective of the contribution. Through this lens of perspective, Gardner turned his attention to the study of figures acknowledged as exceptional in their domains. Biographical study of these individuals allowed Gardner to develop criteria for the assessment of creativity.

Csikszentmihalyi (1990), investigated the creative personality from the perspective of what he called flow state. Flow state refers to the individual's total involvement in the life experience. Csikszentmihalyi observed that creativity and flow were indelibly linked. Those who are identified as creative are often able to access creativity through the state of flow. "Flow is the way people describe their state of mind when consciousness is harmoniously ordered, and

they want to pursue whatever they are doing for its own sake" (Csikszentmihalyi, 1990, p. 6). Csikszentmihalyi found that the following characteristics were important to the experience of heightened creativity:

1. Clear Goals
2. High degree of concentration on the task
3. A loss of self-consciousness
4. Distorted sense of time
5. Immediate feedback is continuous while engaged in the task
6. Balance between level of ability and the challenges of the task
7. A sense of personal control
8. The activity is intrinsically rewarding
9. A lack of awareness of bodily needs, such as hunger or fatigue
10. The focus of awareness is narrowed to the activity itself, so that action and awareness are merged. (Sawyer, 2012, p. 78)

Csikszentmihalyi also identified a list of traits associated with the creative individual. They are as follows: genetic predisposition, interest in the domain, access to a domain, and access to a field. Csikszentmihalyi further identified the creative personality as having ten dimensions of complexity that are based on antithetical traits.

1. Extreme physical energy/need for rest
2. Smart/naïve
3. Playfulness/discipline
4. Active imagination/ strong sense of reality
5. Extroversion/introversion
6. Humble/proud

7. Masculine/Feminine (escaping the rules of gender expectation)
8. Traditional/Rebellious
9. Passionate/objective
10. Pain/enjoyment

Sternberg and Lubart (1996) developed a theory known as the Investment Theory of Creativity . The theory promotes six variables as being necessary for creativity. The six variables are intelligence, knowledge, personality, environment, motivation, and thinking styles. In this model, intelligence is a subset of creativity. The goal of the creative person within this theory is to invest time and energy into ideas that will yield solutions and benefits later in time, hence the term investment. Kaufman, Plucker, and Baer, refer to this as buying low and selling high (2008).

While the study of the person in relation to creativity has been extensive, the study of creative product is another area that has yielded significant research attention. "Examination of the creative product generally focuses on the characteristics of the outcomes of ideas. Creative products are not limited to the arts, sciences, or marketplace" (Fox & Fox, 2004, p. 203). "Product creativity is almost always defined and evaluated using a sociocultural definition" (Sawyer, 2012, p. 11). O'Quin and Besemer (1999) cited four categories of research into product creativity: peer and teacher nominations, measures of eminence, self-reported creative activities and achievements, and global judgments.

Donald MacKinnon is credited with establishing the first set of criteria for the assessment of creative product (Fox & Fox, 2004). MacKinnon determined that there were three absolute criteria necessary for determining the value of a creative product. According to MacKinnon, a creative product must be new, useful, and produced. To be new, the product must be novel and original in some way. The creative product must be useful in a real sense. Without usefulness,

the product is not deemed to have creative value. Additionally, the creative product must become a reality beyond the idea alone. Without these three criteria, MacKinnon indicated that the product could not be represented as creative. Along with the three absolute criteria, MacKinnon also found two optional criteria to be present at times. The first optional criterion is that the product should be aesthetically pleasing. The second optional criterion is that the product may have transformational qualities that allow for a large change in the way life is experienced and understood (Mackinnon, 1978). Big-C products such as Einstein's Theory of Relativity and Edison's development of the light bulb fall into this category.

O'Quin and Besemer (1999) developed the Creative Product Semantic Scale to allow for the evaluation of product creativity. Three major scales are utilized in the Creative Product Semantic Scale. They are: novelty, problem resolution, and elaboration and synthesis. Subscales are found within each scale. Novelty includes the following points for consideration: originality, transformational, and germinal. Originality refers to the unique quality of the product. Transformational refers to the ability of the product to change the lives of many in a major way. Germinal refers to the power of the product to perpetuate new ideas. Problem resolution considers how successful the product is in realizing its stated goal. Logic, usefulness, and value, are all considerations within the scale of resolution. Elaboration and synthesis take into account how well crafted the product is. Is the product understandable? Does the product have elegance? Is the product likely to have the ability to rise to a substantial level of notice and attention? Fox and Fox (2004) stated, "Consider this tool a deliberate process for making a considered evaluation."

Amabile and Hennessey (1999) developed the Consensual Assessment Technique (CAT) to assess the creativity of a product. "The CAT is based on this idea that the best measure of the creativity of a work of art, a theory, or any other artifact is the combined assessment of experts in

that field" (Kaufman et al., 2008, p. 54). Amabile (1996) indicated five criteria for choosing judges:

1. Judges must be familiar with the selected domain.
2. Judges' assessments must be done independently from one another.
3. Judges must assess other dimensions of the product to allow for the level of creativity to be more clearly recognized.
4. Judges should not use an absolute standard that they may have established for their domain. This allows for the assessment of everyday creativity without being compared to the highest levels of achievement in the domain.
5. Judges should view the products in random order to avoid the influence of other judges' assessments.

Once a suitable panel of judges has been selected, the judges rate the product(s). An average rating is achieved by analyzing the judges' determinations. "As implied by the consensual definition of creativity, the most important criterion for this assessment procedure is that the ratings be reliable." (Amabile, p. 43) The CAT has been used in many different contexts and has been found to be a reliable means of assessing product creativity (Amabile, 1996; Sawyer, 2012).

Research into the effect of process as a vehicle for the development of creativity has been the emphasis of a number of important studies. Process has garnered attention as a means by which individual creativity may be increased. Fox and Fox (2004) identified three creative processes and included the following designations: cognitive, behavioral and affective. According to Fox and Fox, cognitive processes are teachable and learnable. "Behavioral processes are often a deliberate outgrowth of the thinking skills and practices associated with using the tools of creativity" (Fox & Fox, 2004, p. 145). Affective processes are rooted in the emotions.

While a number of different studies have been conducted to show the significance of process in the manifestation and enhancement of creativity, Sawyer (2012) found eight stages of creative process that were reflected in several of the more established approaches. Sawyer's study cited nine process-oriented models. They were as follows: Wallas (Wallas 1926), Creative Problem Solving (Isaksen, Dorval, & Treffinger, 2000; Isaksen & Treffinger, 1985)), IDEAL cycle (Bransford & Stein, 1984/1993), Robert Sternberg (Sternberg, 2006), Possibility thinking (Burnard, Craft, & Grainger, 2006), UK QCA (Qualifications and Curriculum Authority (QCA), 2005), Synectics (Gordon, 1961), Mumford's group (Scott, Leritz, & Mumford, 2004), and IDEO (Kelley, 2001). The eight stages that Sawyer (2012) identified were as follows:

1. Finding the problem
2. Acquiring knowledge
3. Gathering related information
4. Incubation
5. Generating ideas
6. Combining Ideas
7. Selecting the best ideas
8. Externalizing the idea

Each model surveyed had a developed terminology for the various stages that were ultimately shaped into an integrated framework by Sawyer. Additionally, not all models included all of the stages.

The Geneplore Model developed by Finke, Ward, and Smith (1992) emphasizes two phases, generative and exploratory. Generative processes include retrieval, association, synthesis, transformation, analogical transfer, and categorical reduction. The creator generates a plethora of ideas in this stage. Pre-inventive structures, referring to mental representations of

creative solutions, may be utilized during this stage. Exploratory processes include attribute finding, conceptual interpretation, functional inference, contextual shifting, hypothesis testing, and searching for limitations. This stage includes the evaluation and selection of options.

Edward de Bono conceived the Six Thinking Hats method (De Bono, 1985/1999). A process oriented approach to creativity, the Six Thinking Hats method emphasizes doing one type of thinking at a time in order to arrive at new and innovative solutions to a variety of problems and situations. Each hat represents a particular type of thought process. De Bono indicates that there are six hats, each of a different color. They are white, red, black, yellow, green, and blue. The white hat represents the objective: facts and figures. The red hat represents an emotional style of thinking. The black hat represents the need to be cautious in ones' decision- making. The yellow hat represents a positive perspective with an emphasis on optimism. The green hat represents growth and creativity. The blue hat represents organization of ideas. Participants seek to solve problems and develop new ideas by figuratively or literally applying the hat method. By focusing on one thinking process at a time, the ego becomes less engaged and allows the participant to potentially investigate ideas that are normally not considered. De Bono also popularized the concept of lateral thinking. De Bono distinguished between vertical thinking and lateral thinking. "With vertical thinking one uses information for its own sake in order to move forward to a solution. With lateral thinking one uses information not for its own sake but provocatively in order to bring about repatterning" (De Bono, 1970/1973, p. 45). De Bono's work has been used successfully in a number of different settings including education and business (De Bono, 1985/1999).

Also, relating to process has been the emphasis on divergent thinking. Divergent thinking refers to the process by which one provides as many answers to a problem as possible. Dr. J. P. Guilford (Guilford, 1959, 1967) developed the Structure-of-Intellect model of

personality. Included in this model was divergent production now known as divergent thinking. Fluency, Flexibility, Originality, and Elaboration, were cited as four abilities present in the process of divergent thinking. The concept of linking divergent thinking with creative abilities has had a formidable influence on the research and assessment of creativity and is still an influence on much of today's research. The TTCT developed by Dr. E. Paul Torrance is one example (Torrance, 1974).

The research of press or environment on creativity has been an area that has produced significant findings. Press refers to the environmental influences, both physical and psychological, on an individual. Fox and Fox (2004) identified press as "those things pressing on us that help or hinder our creativity" (p. 35). Csikszentmihalyi (2013) stated the following: "Even the most abstract mind is affected by the surroundings of the body. No one is immune to the impressions that impinge on the senses from the outside" (p. 127). Van Gundy (1984) used the following terms to further distinguish the influence of press: external environment, people motivators, individual creativity, and interpersonal relationships. The balance of environmental issues has been shown to influence the presence and level of individual creativity.

Csikszentmihalyi (2013) developed the Systems Model to show how the creator and the environment relate. In this model, creativity is viewed as the interaction of the domain, the field, and the person. Csikszentmihalyi further cites the importance of location in the ability to be creative. Where one lives influences the ability of one to access the domain that one wishes to work in. Also, novel stimulation is needed to encourage creativity and it is not found in all locations. Csikszentmihalyi found that "access to the field is not evenly distributed in space. The centers that facilitate the realization of novel ideas are not necessarily the ones where information is stored or where the stimulation is greatest" (2013, p. 130). Csikzentmihalyi indicated that beautiful and inspiring locations may also promote creativity.

Intrinsic motivation as a press on the creative individual was a topic of interest for Amabile (1996). Amabile's research indicates that passion for an activity may translate into being more creative. Amabile and Gryskiewicz (1989) found eight conditions of the work environment that needed to be present to encourage creativity. They were: adequate freedom, challenging work, appropriated resources, a supportive supervisor, diverse and communicative coworkers, recognition, a sense of cooperation, and an organization that supports creativity.

Press studies have also investigated a variety of life issues that influence the presence or lack thereof of creativity. Sulloway (1996) studied birth order to find that first-born children tend toward greater success in life terms, prestige and power. Later- born children were found to be more open to new experiences that might tend toward the radical.

Age as an influence on the level of an individual's measurable creativity has been represented in several significant studies. Csikszentmihalyi (1996/2013) studied the presence of creativity at the various stages of an individual's life. While some acknowledged creative giants displayed exceptional talent within their domain of interest at an early age, many did not. Mozart, within the realm of music, would be an example of a child prodigy (Gardner, 1997). Mozart's talent for music was recognized early on by his father, also a musician. Leopold Mozart encouraged his son's talent by providing a comprehensive approach to his musical education. Gardner (1997) recognizes Mozart as a Master, one who strives for the mastery of one's chosen domain. The Master continues to build upon the foundation of knowledge that has been accumulated and creates works of exceptional mastery, some to be later acknowledged as masterpieces. Gardner (1993) found that it takes an average of ten years of concentrated work to master the technicalities of a domain. Einstein, another figure acknowledged as a figure of exceptional importance within his domain of science, did not display recognizably exceptional talent as a youngster (Gardner, 1997). His abilities were developed over a longer period of time

and eventually lead to a change in the way that physics is viewed. Curiosity from an early age served as a strong motivator as well as enhancer to Einstein's development as a creative thinker. For this reason, Gardner referred to Einstein as "The Perennial Child" (1993). Csikszentmihalyi (1996/2013) found that an exceptional level of curiosity in one's early years was necessary for the later development of creativity. Csikszentmihalyi also found through interviewing exceptional achievers that self-respect and discipline, often instilled by parents, were foundational to the later attribute of creativity. Additionally, Cskszentmihalyi examined the manner in which perceptions of childhood impacted later creatives. Cskszentmihalyi states:

> "The issue does not seem to be what were the objective facts involved. What matters more is what the children make of these facts, how they interpret them, what meaning and strength they extract from them – and how they make sense of their memories in terms of the events they encounter later in life" (Csikszentmihalyi, 1996/2013, p. 173).

A well-documented finding in the literature concerning creativity and its relationship to the developmental stages of the individual is the phenomenon of the fourth-grade slump (Torrance, 1968). Torrance found that there was a consistent drop in divergent thinking test scores by as much as 60%. Torrance concluded that schools were to blame for the drop in the scores. Runco (2007) questioned the validity of Torrance's findings. Further testing has failed to confirm the results of Torrance as regards the stated drop in creativity scores (Lau & Cheung, 2010).

Age was also studied by Lehman (1953) and its' link to creativity. Lehmen considered outstanding achievers in a variety of disciplines. By noting the age at which recognized achievements were made, Lehman determined that different disciplines have different peak ages of performance. Physicists tend to peak in their 20s or 30s while social scientists peak in their 40s. Writers were found to peak throughout the lifespans of their careers. Other researchers

have explored the link of age and creativity and have had differing results. Roskos-Ewoldsen, Black, and McCowen (2008) conducted a study that utilized a creative invention task in addition to the Torrance Tests. Younger adults, aged 18-22, did better on this portion of the study than older adults who were 61-86 years of age. No difference was found for the Torrance scores. McCrae, Arenberg, and Costa (1987) conducted a longitudinal study of over 800 men. Using divergent thinking tests to measure creativity, they found that creativity increased to age 40 and declined thereafter. Simonton (1984,1999) utilized the approach known as historiometry. Focusing on the creative lives of eminent historical figures, Simonton (1994) presents evidence that there is a productivity curve to creativity that corresponds to the following age pattern. Productivity begins in the twenties, peaks quickly to an optimum point near the age of 40, and declines thereafter more slowly than seen in the ascent. As a result, productivity may continue to old age. Old age as a factor of creative performance has been a topic considered by researchers. Torrance (1995) recognized the value of creativity as a necessity for the elderly to lead fulfilling lives. "There is considerable evidence that there is a decline in creativity in the later years…. However, little is known about the everyday creativity of elderly people in the general population" (Torrance, 1995, p. 103). Torrance goes on to recognize that older individuals, because of changes in their life situations, may actually have the opportunity to be more creative than at earlier points in life. One study examined age and job performance with creativity as one dimension considered (Ng & Feldman, 2008). No evidence indicated that age and creativity were related.

Creativity and education, particularly formal education, have been addressed in several studies. "No one can be creative without first internalizing the domain, and this is why scientists now believe that formal schooling is essential to creativity" (Sawyer, 2012, p. 94). Simonton (1984,1999) conducted a study that was based on data collected by Catherine Cox. Cox (1926)

determined the IQ scores of 301 figures deemed genius. Educational background data was collected in this study. Simonton, using these data, found that creative eminence benefited from some formal education. Beyond a certain point, formal education indicated a restriction of achieved eminence. "Curiously, creators with doctorates tend to be slightly less eminent than those with little formal education. The peak of the eminence curve falls at 1.85 on the education scale, a value which translates as a college education just shy of a bachelor's degree" (Simonton, 1984,1999, p. 66). Simonton postulates that increased specialization through formal education may restrict creative achievement. Simonton (1994) observes that within the scientific disciplines, particularly in modern times, a greater level of education is expected and required as a result of the complexity of the material to be mastered. Csikszentmihalyi (1996/2013) found that college teachers served two important purposes in the creative success of their students. First, they strongly motivate the student within the student's realm of interest. Second, they can often insure that the student is recognized by those considered significant in the discipline. Self-education and mentoring by experts have also been viewed as important avenues for development toward enhanced individual creativity (Simonton, 1999).

ASSESSMENT

With growth of discipline and traditions established for the study of creativity, as well as varied foci in evidence, new approaches to the measurement of creativity have been developed. Kaufman, Plucker, and Baer (2008), identified four primary assessment and evaluative categories of tests that have developed for the testing of creativity. The four categories are: divergent thinking tests, the consensual creative product assessment, assessment by others, and self-assessment. Each category represents a different approach to the assessment of creativity.

Divergent thinking tests are founded, in part, on concepts introduced and developed by Guilford (Guilford, 1967). Divergent thinking tests measure the four aspects of divergent

thinking, fluency, flexibility, originality, and elaboration. Guilford's Structure of the Intellect Model was an important early model that proposed 24 different types of divergent thinking. Through combinations of content and product, Guilford created a large number of tests (several dozen) that would identify various types of divergent thinking. Guilford's work has remained foundational to research in creativity (Kaufman, 2008).

Building on Guilford's work, E. Paul Torrance, known as the "Father of Creativity" (Kim, 2006, p. 3), developed one of the single most referenced creativity assessment instruments in use today, the Torrance Tests of Creative Thinking (Torrance & Presbury, 1984). His research transformed the study of creativity, in part, through his voluminous work including over 40 books and over 1500 journal articles (Shaughnessy, 1998). According to Garnet W. Millar in the book, "E. Paul Torrance: The Creativity Man", Torrance met Guilford on several occasions and "corresponded with him regularly" (Millar, 1995, p. 46). It would be an understatement to say that Torrance had simply met the challenge presented by Guilford. Torrance took up the study of creativity and developed a body of knowledge on the subject that is still referenced as foundational and significant to this day.

Ellis Paul Torrance was born on October 8, 1915 in Milledgeville, GA. Torrance received his college education at the Georgia Military College, Mercer University (AB, 1940), University of Minnesota (MA, 1944), and the University of Michigan (Ph.D., 1951). Torrance focused on psychology in graduate work and was particularly drawn to the psychological facets of the discipline of education (Millar, 1995). His dissertation was entitled, "Self-Concepts and Their Significance in the Learning and Adjustment of College Freshmen". Upon graduation with his doctorate, Torrance took a position in research with the Air Force. He served as director of a field unit in the survival training school. The original research that he developed in this capacity served as a foundation for his interest and methods of the study of creativity. In 1958, Torrance

accepted a position at the University of Georgia and would remain there on faculty until 1984. This decision allowed Torrance to be closer to family and put Torrance in an academic position that permitted the further development of his ideas relating to the research of creativity. One of many high points during his tenure at the University of Georgia occurred in 1982 when the Torrance Center for Creative Studies was established (Millar, 1995).

> While at the University of Georgia, the Torrance Tests of Creative Thinking came into being. The Minnesota Tests of Creative Thinking were designed to be used for research and exploratory studies in the area of creativity. At about the time Paul arrived at the University of Georgia, research editions of the tests were published by Personnel Press, a division of Ginn and company in Princeton, New Jersey. They were called the Torrance Tests of Creative Thinking (TTCT) (Millar, 1995, p.119).

The TTCT is one of the most widely administered creativity instruments available (Davis, 1997). It has been translated into more than 35 languages (Millar, 2002) and it is also one of the most cited creativity assessment instruments in use today (Lissitz & Willhoft, 1985; Torrance & Presbury, 1984). This battery of tests measures creativity through the measurement of the divergent thinking capacity of the individual taking the test (as reflected by testing results).

The TTCT was a major component of Torrance's arsenal of process-oriented research approaches. The TTCT has been used with a variety of participant-types, including gifted children. Focusing on divergent thinking abilities, the TTCT utilizes two categories of tests, Verbal and Figural. The Verbal section assesses creative thinking with words while the Figural section assesses creative thinking with images. There are seven subtests that make up the Verbal section and three subtests which make up the Figural section. There are two forms of each category of tests. They are known as Form A and form B and may be used alternately. Torrance

recommended that the administration, scoring, and interpretation of the TTCT be done by trained personnel (Kaufman, Plucker, & Baer, 2008). The TTCT has been evaluated and revised over the years since its inception in 1966, including a major revision in 1984. At this time, flexibility was removed from the Figural section of the test and was replaced with two new tests, Resistance to Premature Closure and Abstractness of Titles. This revision was referred to by Torrance as Streamlined Scoring (Torrance & Ball, 1984). Recognizing that the TTCT was not a comprehensive measurement of creativity, Torrance stated that his goal "was to provide instruments to evaluate training programs, to understand the creative person and to illuminate the creative process and creative teaching" (Raina, 2006, p. 111).

Many researchers have scrutinized and investigated the merits and possible weaknesses of the TTCT (Feldhusen & Goh, 1995; Kim, 2006). Torrance, himself, continually sought for accuracy of measurement in the results generated by the TTCT (Torrance & Wu, 1981). Norms are provided by manuals that accompany each version of the TTCT. The norms are derived by nationality and reflect the norms for each sampled country. This information provides an understanding of the TTCT as relates cultural differences that may impact TTT results. The United States has the largest sampling of participants to date (Kim, 2006). Further investigation has been made by researchers to test the content and construct validity of the scoring variables found in the TTCT. A variety of such tests include "a factor-analytic study (Mourad, 1976), a comparative study (Rungsinan, 1977), a developmental study (Ali-el-din, 1978; 1982), and Torrance's *The Search for Satori and Creativity* (1979)" (Kim, 2006, p. 5) which have been conducted over the years. Many more tests have been conducted to determine the reliability and validity of the TTCT, with mixed results. One study, by Treffinger (1985), concluded that the TTCT may be viewed as a reasonable means of assessing creative thinking for research purposes. Other studies have directed criticism toward the TTCT regarding methods of

measurement issues (Hocevar & Michael, 1979; Runco & Mraz, 1992). Heausler and Thompson (1998) argued that correlations between subscales could not possibly measure substantially different information because the scores were too high. These studies are just a few of the many research projects which have been conducted regarding the importance of the TTCT as a tool for measuring divergent thinking and creativity. Torrance also submitted the TTCT to ongoing scrutiny to ensure that the greatest levels of reliability and validity achievable were obtained. With millions of participants having taken the TTCT, a tremendous amount of data is available for consideration. Ongoing research will continue to draw new conclusions from this significant bounty of material.

The Abbreviated Torrance Test for Adults (ATTA) is an instrument conceived to measure creativity through the measured evidence of divergent thinking abilities in adults. The test is based on Torrance's TTCT and utilizes the same basic concepts that are found in this instrument. Because the TTCT requires considerable time to administer, a shortened version was created to accommodate greater convenience for adult participants. "Torrance, Wu, and Ando created the *Demonstration Form of the Torrance Tests* (D-TTCT) in 1980. The D-TTCT consisted of activities utilizing the same rationale as activities in the original TTCT, but it did so in an abbreviated form requiring considerably less testing time. The success of a shortened form when working with adults led to the current development of the *Abbreviated Torrance Test for Adults* (ATTA)" (Goff & Torrance, 2002, p. 1). Torrance and Goff published the *Brief Demonstrator of the Torrance Tests of Creative Thinking: Training/Teaching Manual for Adults with Norm-Technical Data* in 2000. In 2002, this work was converted to the Abbreviated Torrance Test for Adults. While the original instrument contained 19 creativity indicators, the ATTA was reduced to 15. The ATTA was built on the results of testing that was done with 249

adults prior to 2000. The age range of participants spanned from 19 to 89 and included adults from a variety of backgrounds (Goff & Torrance, 2002).

E. Paul Torrance added to the understanding of creativity. Torrance also sought to contribute to the body of applied techniques that could be utilized for the enhanced development of personal creativity. Torrance saw creativity as a means to a more fulfilling and satisfactory life. To this end, he devoted his life to the understanding, encouragement, and dissemination of a body of work centered on creativity as a way of life for everyone (Millar, 1995).

> Perhaps Paul Torrance's greatest achievements will be measured by the many disciples he has created through the years who are influencing millions of people all over the world. He has disseminated the germ of creativity through his work and through his person, and the effects have been felt far and wide and have been deep and lasting (Millar, 1995, p. 237).

Other researchers have also developed divergent thinking tests. The Profile of Creative Abilities was an instrument developed by Ryser in 2007. It focuses on real-world contexts and allows the participant to provide answers that may be more relevant to life-experience (Ryser, 2007). Another test based on divergent thinking is the Remote Associates Test (Mednick, 1968). This test presents the participant with a series of three-word groupings. The participant is to provide a fourth word that ties the three given words together in a meaningful link. The thought behind this test is that the more creative a person is, the greater the ability to associate separate terms of meaning. Numerous divergent thinking tests have been developed, most with direct links to the work of Guilford and Torrance ((Kaufman, Plucker, & Baer, 2008).

With divergent thinking tests making up the largest group of tests associated with measurement of creative thinking abilities, their importance in the solidification of the study of creativity cannot be underestimated. While there is valid criticism that has been directed toward

the role of divergent thinking as a predictive power of creativity, many scholars and researchers have accepted it as an area of interest and importance to be considered in the study of creativity.

As a means of overcoming some of the criticisms directed at divergent thinking tests, other types of creativity tests have been developed. One important category of tests to consider is consensual creative product assessment. Creative product assessments rely on the evaluation of product (usually by experts) as a means of assessing creativity. This method of evaluation has been adopted by scholars who determined that there is a correlation between product and creative abilities (Mackinnon, 1978; Bessemer & Treffinger, 1981; Ghiselin, 1963; Wallach, 1976). Scholars have also adopted this method of evaluation as a means of overcoming some of the shortfalls of divergent thinking tests (Kaufman, Plucker, & Baer, 2008). Runco (1989) addresses the inconsistent psychometric quality of divergent thinking tests in an article in "Child Study Journal". Runco posits that the study of product may help overcome this issue. Consensual creative product assessment provides an external means of evaluating creativity. This may provide an opportunity for comparison between measurement methods (Kaufman, Plucker, & Baer, 2008).

In the comparison of a number of consensual creative product assessment instruments, Kaufman, Plucker, and Baer (2008) cite a variety of rating mechanisms that may be utilized in this type of study. Parents, teachers, and acknowledged experts in a given domain, may be called on to assess the value of a given product. The consensual creative product assessment instrument that has received the most recognition is the Consensual Assessment Technique developed by Terese Amabile (Amabile, 1982). Kaufman, Plucker, and Baer outline the basic components of Amabile's Consensual Assessment Technique:

Is based on the ways creativity is judged in the real world

Expert judges compare actual products created by subjects

Can only be used for comparisons within the group of artifacts judged by one group of judges

No standardized scores, only comparative scoring

Used widely in creativity research, less widely in school settings (Kaufman, Plucker, & Baer, 2008, p. 57)

Four steps are involved in administering the Consensual Assessment Technique. The first is that an appropriate task must be chosen. The artifacts are then collected. A panel of experts is brought together to assess the artifacts. The final step involves the analysis and organization of the experts' assessments. This instrument has been used extensively in the assessment of creativity. Because it is designed for group comparisons, while not appropriate for individual assessments, it has been used in classroom settings to determine students with comparative creative strengths (Amabile, 1996).

Two additional approaches to the assessment of creativity are the assessment of person by others and self-assessment. Assessment of the creativity of a person by others (peers, parents, and teachers) has found a significant place in creativity research. Instruments of this type rely on assessment being carried out by individuals who know the participant who is being assessed. This approach emphasizes the intimate knowledge that a parent, peer, or teacher may have of the participant. Traits and personal qualities of the assessed individual are points of focus for this type of study. Product is not evaluated. Tests of this approach often utilize character checklists as a means of determining the creative abilities of the assessed. The Likert scale may be used in this type of instrument to measure a particular characteristic. As a result of the assessor's prior knowledge for the assessed, bias may be an issue of concern. Validity is also difficult to determine for this type of instrument. The Scales for Rating the Behavioral Characteristics of Superior Students, the Williams Scale of the Creativity Assessment Packet, and the Torrance

ideal Child Checklist, are examples of instruments designed to allow assessment of an individual by a known other (Kaufman, Plucker, & Baer, 2008).

Self-assessment instruments can be helpful in determining an individual's self-perception of their creative abilities. Self-reports are often found in personality inventories (Kaufman, Plucker, & Baer, 2008). Self-assessment is also found in instruments designed to measure creativity styles. The Creativity Styles Questionnaire – Revised (Kumar, Kemmler, & Holman, 1997) and the Kirton Adaption-Innovation Inventory (Kirton, 1999) are examples of this use. Studies in the validity of self-assessments for creativity have been inconclusive. Furnham, Zhang, & Chamorro-Premuzic, 2006, found that psychometric and self-assessed creativity may be interrelated. Others, such as Lee, Day, Meara, & Maxwell, 2002, found only small relation amongst their measurements. The obvious advantages to the use of self-assessment instruments to measure creativity are efficiency, convenience, and lack of expense in administering the test (Kaufman, Plucker, & Baer, 2008).

Since Guilford presented his important challenge to psychologists in 1950, researchers have worked to develop accurate, scientifically based instruments for the assessment of creativity. Four basic approaches to creativity test have developed: divergent thinking tests, consensual creative product assessments, assessment by others, and self-assessment. Each approach has identified strengths and weaknesses. Each approach also has researchers who are committed to improving the methods of their chosen approach. With continued evaluation and revision of existing tests, as well as the development of new instruments, the study of creativity will continue to strengthen as a research-based discipline.

LEARNING STYLES: RESEARCH AND ASSESSMENT

RESEARCH

Learning styles is a topic that has received attention in educational circles. Many educators have acknowledged that knowledge of learning styles may be helpful in creating an environment that is conducive to more effective learning for students of all ages. Administrators, teachers, parents, and students, may all benefit by having an understanding of the impact of learning styles on the educational process. Additionally, an understanding of the relationship between learning styles and creativity may allow further development of more effective learning models that encourage creativity in the learning process. Gregorc states, "Every thing has style…. By studying the products of our minds and psyches, we can learn about the mysteries within us that are appearing at the surface. We can begin to glean knowledge about universal energies and the nature and meaning of life" (Gregorc, 2001, p. 2).

The term, learning styles, refers to the manner in which people most effectively process information and deal with task-oriented situations. The core of understanding this term rests in the idea that people learn in different ways. While the term, learning styles, has achieved some popularity in the literature, the concept of individualized learning-related styles is referred to by a variety of names. Zhang and Sternberg (2005) cite seven style terms found in the literature. They are learning style, cognitive style, thinking style, mind style, mode of thinking, teaching style, and intellectual style.

As to where and when the concept of learning style was introduced has been debated by many. Jung (1923) refers to psychological types in the 1923 book of the same name, *Psychological Types*. Allport (1937) refers to style in relation to cognition and creativity in 1937. Sternberg and Grigorenko (2001) determined that Riessman (1962) was the first to use the term, learning style, in 1962. Since the 1960's, learning styles has had a presence in scholarly

literature as a research topic. The 1960s and 1970s were perceived by some to be peak periods of interest and activity in the study of learning styles with a decline thereafter. Nielsen (2012) established this as a fallacy.

> The number of articles on learning style has almost doubled in the decades following the 1980s, while articles with thinking style in the title have multiplied in the last decade. Unless the search strategy employed has failed to discover many hundreds of articles on styles from the 1960s and 1970s, there appears to be no grounds for the claim that these two decades were the most active in the history of the styles field. Quite the contrary, the activity of the field appears to be growing steadily (Nielsen, 2012, p. 27).

Nielsen further investigated three areas of emphasis in the styles literature. Nielsen (2012) examined the literature that focused on styles in relation to abilities, personality, and the quality-of-style measurement. Nielsen indicates that the literature that examined styles in relation to abilities determined that styles and abilities were distinctly different from one another. "…. abilities are concerned with the level of being able to do something, while styles are concerned with how the individual prefers to utilize her abilities" (Nielsen, 2012, p. 34). Nielsen found that there were four areas of topical emphasis in the articles that dealt with styles and personality. The represented views were:

1. Personality is viewed as styles and incorporated into larger frameworks with other types of styles
2. Personality is indirectly viewed as different from styles through the discussion of relationship between specific styles and personality traits
3. Personality consists of several components, one of which is style in specific conceptualizations

4. Personality and styles – The relationship unresolved (Nielsen, 2012, p. 35-36)

Nielsen determined that the majority of articles on learning styles and quality-of-style measurement were concerned with the quality of specific instruments.

A number of different theories, concepts, and ideas about learning styles have been developed. Researchers have formulated a variety of learning style models that seek to answer various questions regarding the learning process. Hall and Moseley (2005) devised a system to examine learning style models. Their approach took into account factors such as validity, reliability and practical application. Hall and Moseley (2005) determined that there were thirteen "potentially influential" (p. 247) learning models.

Among these were the following: Dunn and Dunn's Learning Style Model; Kolb's Learning Styles Inventory; Honey and Mumford's Learning Styles Questionnaire; Sternberg's Thinking Styles; and Gregorc's Mind Styles Delineator.

Dunn and Dunn established the Dunn and Dunn Learning Styles Model in 1977 (Dunn & Dunn, 1978a). "This model is quite possibly the most widely used and researched learning-styles model in the history of American education" (Allen et al., 2011, p. 35). Sternberg and Grigorenko (2001) acknowledged the wide use of the Dunn and Dunn model in educational environments. Allen, Scheve, and Nieter (p. 35) indicated that the Dunn and Dunn model "was one of the first models to emphasize identifying a student's learning style through a diagnostic inventory." Five categories of learning style stimuli are considered in this model (Dunn, Dunn, & Price, 1989). They are: environmental; emotional; sociological; physical; and psychological. Within each category of learning style stimuli, considerations are given to elements that impact the learner. Environmental elements include sound, light, temperature, and room design. Emotional elements include motivation, persistence, responsibility, and structure. Sociological elements include working alone, in pairs, with peers, with a teacher, and in various situations.

Physiological elements include perception, intake while learning, time, and mobility. Psychological elements include global/analytic, hemisphericity, and impulsive/reflective. Learning style profiles are derived from the self-reported findings for recommendations in practical settings.

Kolb (1984) proposes a learning style model that identifies four types of learning styles. They are converging, diverging, assimilating, and accommodating. The Experiential Learning Theory served as the basis for his approach. Concrete Experience and Abstract Conceptualization are identified as the ways of understanding experience. Reflective Observation and Active Experimentation are identified as ways of transforming experience. Kolb conceptualized that individuals tend to rely on one approach of understanding and one approach of transforming. The learning styles proposed by Kolb are the result of how these approaches manifest themselves in combination and to what degree in the individual. The *Learning Style Inventory*, developed by Kolb, determines the learning style preference. The Converger prefers active experimentation motivated through abstract conceptualization. Deductive reasoning is a trait of the Converger. The Diverger uses concrete experience and reflective observation to gain an understanding of situations. Emotions and people inform their experiences while imaginative thinking is often in evidence. The Assimilator prefers abstract conceptualization and reflective observation. Inductive reasoning is used to bring disparate elements together. People are less interesting to assimilators than abstractions. The Accomodator make use of concrete experience and active experimentation to solve problems.

While Kolb's model has found use in schools (Sternberg & Grigorenko, 2001), Honey and Mumford's model, an adaptation of Kolb's model, was originally designed for use in business settings (Honey & Mumford, 1986). Rooted in Kolb's experiential learning model, Honey and Mumford's construct utilized style concepts related to Kolb's. Their model is built on

the findings of the instrument called the *Learning Styles Questionnaire*. There are four learning styles represented. They are the Activist, the Reflector, the Theorist, and the Pragmatist. These terms correspond to the Kolb model as follows: Activist – Active Experimentation; Reflector – Reflective Observation; Theorist – Abstract Conceptualization; and Pragmatist – Concrete Experience. The Honey-Mumford model emphasized the ability to strengthen measured weaknesses to obtain skills necessary to handle work-related situations (Honey & Mumford, 1992).

Sternberg's Thinking Style Model distinguishes between style and ability. "A style is a preferred way of thinking. It is not an ability, but rather how we use the abilities we have" (Sternberg, 1997, p. 19). Sternberg stresses that for individuals to achieve optimum success in a variety of situations, including work, that style and abilities must fit the task that is involved. Sternberg proposes the theory of mental self-government. Sternberg likens mental self-government to societal government.

> For one thing, just as society needs to govern itself, so do we need to govern ourselves. We need to decide on priorities, as does a government. We need to allocate our resources, just as does a government. We need to be responsive to changes in the world, as does government. And just as there are obstacles to change in government, so are there obstacles to change within ourselves. (Sternberg, 1997, p. 20)

Sternberg's theory identifies three forms of self-governing behaviors for people that may be identified in societal governing terms. They are Legislative, Executive, and Judicial. People may be identified by one of these terms based on the natural proclivities of the individual. Legislative people are independent thinkers who devise their own way of doing things. They may be particularly creative and do well in activities that allow them to exercise their sense of

individuality. Executive people like to do things in an orderly, structured manner. They follow rules well and measure success in how well they adhered to the rules. Judicial people are analytical in nature. They tend to gravitate toward activities that allow them to evaluate situation and express an opinion about the matter. Sternberg further elaborates that there are four forms of mental self-government. They are monarchic, hierarchic, oligarchic, and anarchic. "Each form results in a different way of approaching the world and its problems" (Sternberg, 1997, p. 22). Monarchic people are driven to solve problems. They tend to set their mind to a task and work until they have completed it. They can be demanding in relationships with other people. Hierarchic people view problems from a variety of angles in order to get a full picture of the issue. They set priorities based on the recognition that all goals may not be met. Their idea of what establishes an issue as a priority directs their behavior. Oligarchic people may perceive several problems simultaneously and assign equal importance to each. This may cause some tension in getting problems solved in a timely manner. They may experience some doubt in how to approach matters at hand. With guidance, they can be highly effective. Anarchic people have a need to do things their own way. The anarchic person will often reject established protocols in favor of their own way of doing things. Often, their actions are perceived as random. With self-discipline, anarchic individuals may prosper where others fail. Sternberg additionally addresses levels, scope, and leanings of mental self-government. Sternberg identifies two levels, global and local; two terms of scope, internal and external; and two leanings, liberal and conservative. Global individuals are not detail oriented. They prefer to look at the larger issues. Local individuals are detail oriented. Those who are of an internal scope are introverted with a preference to turn inward for reflection. They tend to want to work alone. External scope refers to those who like to work with people. They are often extroverted and socially sensitive. The individual with a liberal leaning likes change and devising a unique way of doing things. They

may get bored easily. Those with a conservative leaning like to work with existing rules and usually do not favor major overhauls of systems. The terms, liberal and conservative, do not necessarily imply political preferences.

"The mind and its processes are of such infinite complexity that they can be observed and studied from a great many viewpoints" (Gregorc, 1982, p. 67). Gregorc (1985) expressed the idea that style is important for self-knowledge. According to Gregorc, "Style is the outward product of the mind and the psyche" (1985, p. 7). Gregorc began work in 1970 that would lead to the Mind Styles Model. The Mind Styles name was adopted in 1984 (Gregorc, 1998/2004). The Gregorc model consists of two types of mediation abilities. They are perception and ordering. Perception refers to how one comes to understand information. There are two qualities that are characteristic of perception. They are abstractness and concreteness. Abstractness is rooted in reason. The quality of abstractness allows the individual to "grasp, conceive, and mentally visualize data through the faculty of reason and to emotionally and intuitively register and deal with inner and subjective thoughts, ideas, concepts, feelings, drives, desires, and spiritual experiences" (Gregorc, 1982, p. 5). Concreteness emphasizes the process of grasping information through the senses. Gregorc identified ordering as "the ways in which you authoritatively arrange, systematize, reference, and dispose of information" (1982, p. 5). Sequence and randomness are the two qualities associated with ordering. The quality of sequence manifests itself in the preference of an individual to understand and structure information in an orderly, predetermined manner. Ideas are better grasped in the sequencing learner if the information is presented methodically in a linear manner. The random learner is able to grasp information that is presented in a non-sequential fashion. Information is internalized in large blocks and retained for later use. There may be no perceived structure to the ordering of information. Gregorc coupled these qualities to derive the following transaction

ability channels: Concrete/Sequential (CS), Abstract/ Sequential (AS), Abstract/Random (AR), and Concrete/Random (CR). Each designated channel has distinct characteristics that make that channel or learning style unique. Gregorc developed the Gregorc Style Delineator to measure and determine individual learning style preferences.

The CS individual prefers structure in the world. Information is perceived and understood through the senses. Logical structuring of information allows the CS individual to grasp new ideas by linking smaller pieces of information in a chain-like manner. Each piece of information has a place and order that must be adhered to in order to make sense. The CS individual may be perceived as functioning in a formulaic manner when dealing with the world. Precision is a hallmark trait of the CS individual. On the negative side, the CS individual may be recognized as rigid and unwilling to work with others in situations that require flexibility. AS individuals maneuver through the world in abstract thoughts and mental constructs. The intellect is of great importance to the AS individual. This type of learner builds an understanding of complex ideas by developing a core of information that serves as a base for other ideas to grow from and link to. Analytical faculties allow data to be conceptualized, manipulated, and synthesized in new ways with a solid fact-based foundation. AS individuals value ideas that have marked clarity. Unclear thought processes may be a source of frustration for the AS individual. As a result, AS individuals may be intolerant of those who do not display the same stylistic approach that they do. AR individuals perceive the world through feelings and emotions. The imagination figures prominently in the AR individuals' way of processing and coping with the challenges of existence. Non-linear, multi-dimensional ordering of information is the norm for the AR learner. Subjective experiences inform the AR learners' understanding of what is valid in the world. This type of learner often experiences the emotions at extreme levels. The thoughts held most dear to the AR learner are usually reserved for only the closest of friends

and family. AR learners may have trouble when it comes to dealing with real-world matters such as meeting obligations in a timely manner and acknowledging that others have needs that deserve as much attention as their own. CR individuals recognize the physical world as a reality that can be changed by unexpected happenings. Intuition, instinct, and the ability to think independently, help the CR learner come to terms with a world that is in a state of flux. This allows the CR individual to see the concrete existence of life while sensing that something of importance may be found below the surface. Process and methods inform the CR individual in learning matters. Ideals may be more important than material elements in life. CR individuals value their independence and need time and space to themselves. Change is normally tolerated well by the CR individual. At times, they may initiate change themselves. This promotes a level of confidence that helps the CR individual remain engaged and motivated in a variety of situations. The CR individual has low tolerance for bland and uninteresting environments. CR individuals may be identified as difficult to individuals who value consistency and order at the expense of freedom of action. Gregorc recognized that individuals could have more then one learning style preference. The primary aim of this model is for the individual to gain insight into their stylistic preferences so that they may have a more fulfilling life (Gregorc, 1982).

Other models have been developed, created, and revised over time. A listing with a brief description of select models follows.

Fleming conceptualized the VARK Learning Style model in 1987 (Allen et al., 2011). While VARK is not a learning style per se, it focuses on the preference of mode in learning (Fleming, 2012). Each of the letters in VARK represents a different learning style preference. V stands for visual learning. The letter A stands for aural learning. R stands for reading-writing learning. The letter K stands for kinesthetic learning. Fleming identified some learners as

multimodal. This type of learner may draw from different modalities in different situations (Fleming & Mills, 1992).

Schmeck's research focused on the manner in which quality of thinking may impact learning. Schmeck developed a model that emphasized information processing and how learning is achieved (Schmeck, Ribich, & Ramaniah, 1977). Schmeck (1988) indicated that the global/sequential dichotomy was important to understanding the learning process. The Revised Inventory of Learning Processes was created with the following four subscales: synthesis-analysis; elaborative processing; fact retention; and study methods (Schmeck, Geisler-Brenstein, & Cercey, 1991).

The Felder-Silverman Learning Style Model has five dual classifications of learner types. They are sensing/intuitive, visual/verbal, inductive/deductive, active/reflective, and sequential/global. Those who have taken the ILS are classified into one of the style preferences for each classification (Felder, 1996). Felder and Silverman developed this model in 1988. Three years later, the Felder-Soloman Index of Learning Styles (ILS) was created (Zywno, 2003). The ILS classified students into four of the five categories of learning style found in the Felder-Silverman Model. The inductive/deductive classification was not included. The ILS was originally administered to engineering students, though it has been applied extensively beyond this population (Felder, 1996).

Additional models and approaches that have been mentioned in review papers (James & Blank, 1993; Cassidy, 2004; Hall & Moseley, 2005), while not an all-inclusive listing, include the following:

1. Witkin's Field-Dependence/Field-Independence Model (Witkin & Goodenough, 1981)
2. Kagan's Impulsivity-Reflexivity Model (Kagan, 1965)

3. Pask's Holist-Serialist Style (Pask, 1976)
4. Pavio's Verbaliser-Visualiser Cognitive Style (Pavio, 1971)
5. Kaufmann's Assimilator-Explorer Style (Kaufmann & Martinsen, 1991)
6. Allinson and Hayes' Intuition-Analysis Style (Allinson & Hayes, 1996)
7. Riechmann and Grasha's Style of Learning Interaction Model (Reichman & Grasha, 1974)
8. Letteri's Learner Types (Letteri, 1980)
9. Apter's Motivational Style Profile (Apter & Carter, 2002)
10. Gardner's Multiple Intelligences (Gardner, 2006)

Research into learning styles has been extensive and on going. In many educational centers, the investigation into style preferences has become an important aspect of both research and practical application. In support of the various theories and approaches that have developed, measuring instruments were developed to assist in investigation. Many learning style models, by necessity of their unique style construct, emphasis, and terminology, required new means of assessment and evaluation. The instruments created have, in many cases, become an integral part of the particulars of a style model. An understanding of important issues relating to measuring instruments for learning styles and their use in assessment and evaluation is relevant to this study. An overview of conceptual concerns of assessment, development methods for evaluation, and instruments relating to learning styles that are recognized as significant follows.

ASSESSMENT

The use of measurement to help identify learning styles has a long-standing tradition. For those who defend learning styles as a significant aspect of the learning process, measurement is recognized as a necessity. Instruments of assessment are designed to give insights into

learning style preferences. Through these findings, more successful learning situations may be created. Sarasin (2006) indicates that assessments should include three areas of emphasis. They are "learning outcomes, teaching strategies, and student needs" (p. 101). Many of those involved with established learning style models and approaches have spent a sizeable portion of time dedicated to developing, establishing, studying, and revising measuring instruments – sometimes years. At times, the very model or approach itself may be dependent upon the direct results of a corresponding instrument with the instrument necessary for confirming the attributes of the foundational theory. The topic of measurement and assessment in learning styles includes several important points to consider.

Learning style instruments reflect dimension. The question of how dimension is reflected in an instrument is significant when considering the wide array of instruments available (James & Blank, 1993). James and Blank (1993) cited three dimensions. They were information processing, perceptual modality, and personality. Keefe (1987) described cognitive styles, affective styles, and physiological styles, as three dimensions of learning style. Cognitive styles deal with information processing. Affective styles involve personality and emotion. Physiological styles take into account elements such as age, how one responds to a particular environment, and gender. Cassidy (2012) listing domains of intellectual style listed the three dimensions of Keefe and added two additional terms, psychological and sociological. Instruments may measure one or more dimensions. The type of information being sought would influence selection of the most appropriate measuring instrument to be used (James & Blank, 1993).

James and Blank (1993) recommend using three major points for consideration when choosing an instrument, conceptual base, research data, and practical consideration. "An instrument's conceptual or theoretical base can be determined by a careful examination of its

title, stated purpose, subscale titles, and intended audience" (p. 48). Research data considers validity, reliability, and norms. Each facet of data may allow insight into the usefulness of the instrument. Validity involves how appropriate or useful a test is for the measurement of the desired information. Reliability is determined by the consistency of test results over multiple examinations. "In the literature, test/retest and internal consistency are the most often cited measures of reliability of learning-style instruments" (p. 49). Norms, once established for an instrument, allow an individual score to be compared to others for similarities and differences. According to James and Blank (1993), practical considerations include physical characteristics of the instrument, cost of the instrument, and how the instrument is administered, scored, and interpreted. Additionally, the thoroughness of the accompanying documentation for the instrument is cited as an important consideration for instrument viability.

Hawk and Shah (2007) recommend five propositions for the use of learning style instruments (pp. 14-15).

1. Diagnostic use of one or more learning style instruments and the subsequent use of matching learning activities should result in higher levels of adult student satisfaction with the learning in a course.
2. Diagnostic use of one or more learning style instruments and the subsequent use of matching learning activities should result in higher levels of academic performance by adult students in a course.
3. Diagnostic use of one or more learning style instruments and the subsequent use of matching learning activities should result in deeper, more lasting adult student learning in a course and beyond the course.

4. Diagnostic use of one or more learning style instruments and the subsequent use of matching learning activities should result in an increase in the ability of adult students to learn in different ways in a course and beyond the course.
5. Diagnostic use of two or more learning style instruments and the subsequent use of matching learning activities should result in higher levels of academic performance for the adult students than the diagnostic use of just one learning style instrument.

James and Blank (1993) and Cassidy (2004) conducted reviews of styles research. Between the two reviews, 38 style models/instruments were considered. Among the major instruments listed in both surveys were the following:

1. Gregorc Style Delineator – identified by Cassidy (2004) as a cognitive-centered approach / cognitive personality style; identified by James and Blank (1993) as information processing centered; developed for adult usage
2. Kolb's Learning Styles Inventory – identified by Cassidy (2004) as a learning-centered processed-based approach/ information processing style; identified by James and Blank (1993) as information processing centered; developed for adult usage
3. Schmeck's Inventory of Learning Processes – identified by Cassidy (2004) as a learning-centered process-based approach/ information processing style; identified by James and Blank (1993) as information processing centered; developed for adult usage
4. Honey and Mumford's Learning Styles Questionnaire – identified by Cassidy (2004) as a learning-centered processed-based approach/ information processing style; identified by James and Blank (1993) as information processing centered; developed for adult usage

Cassidy (2004) also lists among others the following:

5. Kirton Adaptor-Innovator Inventory – identified as wholist-analytic style family/ cognitive approach/ cognitive personality style; developed for adult usage
6. Dunn, Dunn and Prices' Learning Style Inventory – identified as a learning-centered preference-based approach/ instructional preference/ social interaction; multiple versions available for children and adults
7. Entwistle, Hanley, and Hounsel Approaches to Study Inventory – identified as a learning-centered process-based approach/ information processing style; developed for student purposes
8. Vermunt's Learning Styles Inventory – identified as a learning-centered processed-based approach/ information processing style; developed for adult usage

James and Blank (1993) also lists among others the following:

9. Dunn, Dunn, and Prices' Productivity Environmental Preference Survey – identified as centered in three dimensions, information processing, perceptual modality, and personality; developed for adult usage
10. Barbe/ Milone Find Your Learning Styles – identified as information processing centered; developed for adult usage
11. Myers-Briggs Type Indicator – identified as centered in two dimensions, information processing and personality; developed for adult usage
12. Sternberg's Thinking Styles Questionnaire – identified as information processing centered; developed for adult usage

Other instruments include:

13. Felder-Soloman Index of Learning Styles (Litzinger, Lee, Wise, & Felder, 2005) – information processing centered; developed for adult usage

14. Fleming Learning Style Assessment Questionnaire (Fleming, 2012) – information processing centered; multiple versions available for different age groups

Learning style models/ instruments have faced criticism (Coffield, Moseley, Hall, & Ecclestone, 2004; Pashler, McDaniel, Rohrer, & Bjork, 2008; Scott, 2010). These studies cited the lack of independently derived scientific evidence supporting styles theory as a reason to question the validity of styles models and instruments. None-the-less, learning styles has been incorporated into many learning environments. O'Neil (1990) suggests that the utilization of styles awareness in the classroom creates a positive learning environment. Student strengths, rather than weaknesses, are accentuated. Scott (2010) observed that individualism has been a driving force in the culture at large and in education. Learning styles recognizes these individual differences.

Learning styles is a field of study that continues to develop with ever increasing avenues for exploration. Nielsen (2012) found 1,198 articles with the term *learning styles* in the title. As the study of learning styles has progressed, styles investigation has broadened to involve other areas of study. An investigation of studies involving the linkage of creativity and learning styles follows.

CREATIVITY AND LEARNING STYLES

"Clearly, the interaction of creativity and intellectual styles has a place in both research and practice in a variety of fields" (Hartley & Plucker, 2012, p. 194). The study of the relationship between creativity and learning style preference has a rich, though limited, history. The idea that creativity is a worthwhile trait to have has been stated numerous times (Gardner, 2008; Simonton, 2000). Understanding the relationship between creativity and learning style preference may provide insights that would be beneficial to many. Participating parties in educational environments, business settings, and a wide variety of social activities where

creativity is deemed important, could benefit by an understanding of the identified strengths of those involved.

> If creativity is whatever people have that leads to creative results, it might include many things. Creative abilities would be abilities that make a person's thinking creative. A creative style of thinking might be a style which gives novel ideas a chance by not rejecting them out of hand. (Perkins, 1981, p. 245)

Perkins (1981, p. 270) further states, "Some patterns of thinking promote creativity." In a recent study, style was ranked as an important indicator in identifying creativity (Zhang & Sternberg, 2011). The task of finding a link between creativity and learning styles has led several researchers to explore the topic extensively.

M. J. Kirton has included both creativity and learning styles as a defining feature of his work. The Kirton Adaptive Inventory (1976) includes features of both as a means of determining the creativity style of an individual.

> The Adaption-Innovation Theory (A-I theory) is founded on the assumption that all people solve problems and are creative – both are outcomes of the same brain function. The theory sharply distinguishes between level and style of creativity, problem solving, and decision-making and is concerned only with style. The theory states that people differ in the cognitive style in which they are creative, solve problems, and make decisions. These style differences, which lie on a normally distributed continuum, range from high adaption to high innovation (Kirton, 2003, p. 47).

Kirton defines two types of creativity styles, adaptors and innovators. Adaptors tend to utilize pre-existing concepts as a means for improvement and prefer to work within defined structures. Innovators prefer to develop new ways of doing things and are more comfortable working with the redefined structures of their own making. Kirton viewed both adaptors and innovators as

potentially creative. Kirton viewed cognitive style as a relatively stable feature of how a person solves problems and assimilates new information. This concept is an important aspect of his understanding of creative style. The manner in which creativity manifests itself depends on the type of core style preference found within the individual. Kirton's work originated as a means of studying decision-making styles of management. A particular interest was how groups in the work place could work most efficiently together. A study based on Kirton's work was devised at the Creative Studies Department at Buffalo State College (Fox & Fox, 2004). Three groups were assembled based on the participants' creative styles. One group consisted of all adaptors. One group consisted of all innovators. The third group was made up of both adaptors and innovators. The most successful group was the mixed styles group. By working together and drawing on the strengths of the two stylistic preferences, they were able to create the most ideas as well as the most successful ideas. This kind of research has been valuable in helping with the understanding of how important diversity is in the work environment. A variety of follow-up studies have been done using the Kirton Adaptive Inventory. Isaksen and Puccio (1988) indicated that scores on the TTCT and the KAI correlated to suggest that innovators were more creative than adaptors.

Amabile (1996) defines three components of creativity performance. The components are domain-relevant skills, creativity-relevant skills, and task motivation. Within creativity-relevant skills, Amabile lists appropriate cognitive style as a significant factor for creative performance. Amabile (1996) goes on to indicate nine features that make cognitive style important for the presence of creativity. Amabile's features are:

1. Breaking perceptual set (p. 88) – being able to look beyond the obvious function of an object or idea
2. Breaking cognitive set (p. 88) – realizing that previous approaches will not work and finding new solutions

3. Understanding complexities (p. 88) – select domains require the creative abilities to understand and work with the complexities of the domain
4. Keeping response options open as long as possible (p. 88) – the ability to approach problems with an open mind
5. Suspending judgment (p. 88) – allowing all ideas to be considered
6. Using wide categories (p. 88) – the ability to store and connect diverse concepts
7. Remembering accurately (p. 89) – creativity may be aided by the ability to recall large amounts of information
8. Breaking out of performance scripts (p. 89) – the ability to critically evaluate domain-specific procedures and alter where appropriate and effective
9. Perceiving creatively (p. 89) – the ability to perceive things in a unique way

Amabile also found knowledge of heuristics and work style to be important in the creativity-relevant skills component. Heuristics refers to "a general rule that can be of aid in approaching problems or tasks" (Amabile, 1996, p. 89). Work style refers to the manner in which one carries out creative exploration. Elements such as a high energy level, the ability to overcome difficulties, the ability to focus, and the ability to find new means of exploration when an approach is ineffective are cited by Amabile as being important for creative productivity (1996).

Robert J. Sternberg has researched creativity and styles, among other topics, for more than two decades. His work is often cited as important to the understanding of both topics as well as the two topics combined. Much of his work has been in collaboration with others.

Sternberg's (1985; 1988) triarchic theory of human intelligence indicates that there are three aspects to human intelligence. Analytical, creative, and practical are identified as three types of behavior required for human intelligence. Analytical skills allow one to assess, compare, and contrast ideas. Creative skills allow one to generate new ideas. Practical skills

allow an individual to actualize ideas in an appropriate manner for the situation at hand. Individuals have varying degrees of natural ability in each of these categories.

> According to the triarchic theory of human intelligence, contextually intelligent people are ones who capitalize on their strengths and who either remediate or compensate for their weaknesses. A major part of capitalization and compensation would seem to be finding harmony between one's abilities and one's preferred styles. (Sternberg, 1997, pp. 107-108)

Sternberg and Lubart (1991) developed the investment theory of creativity that was founded on the idea that creative people are able to recognize potential in ideas that may not be valued by others. The investment theory of creativity includes six resources that are distinct, yet must merge in some fashion. They are: styles of thinking, motivation, environment, intellectual abilities, personality and knowledge. Lubart (1994) postulated that creative production was dependent on motives, personality, and intellectual styles. Sternberg and Lubart (1995) went on to state that these predictors, in conjunction with others, could potentially indicate the presence of creativity. The traits identified, such as openness to new experiences, tolerance for ambiguity, and the willingness to take risks, among others, could be used to predict styles that may have a propensity for being identified as creative. Within Sternberg's model of styles that includes legislative, executive, and judicial styles, the legislative style is "particularly conducive to creativity, because creative people need not only the ability to come up with new ideas, but also the desire to" (1997, p. 20). Zhang and Sternberg (2005) developed a threefold model that used the term, intellectual styles, as a generic term to encompass all existing styles approaches. The terms, Type I, Type II, and Type III, were used as identifiers.

> Type I styles tend to be more creativity generating and denote higher levels of cognitive complexity. Type II styles suggest a norm-favoring tendency and denote lower

> levels of cognitive complexity. Type III styles may manifest the characteristics of either Type I or Type II styles, depending upon the stylistic demands of the specific task being dealt with. (Zhang, Sternberg, & Rayner, 2012, p. 12)

The work of Sternberg and others has provided a strong foundation for the use of styles as a predictor and indicator of creative abilities. Several other studies have continued the exploration of the relationship between creativity and learning style preference.

Isaksen, Lauer, and Wilson (2003) conducted a study using the Myers-Briggs Type Indicator (MBTI) and the Kirton Adaption-Innovation Inventory (KAI) to determine the relationship between personality type and cognitive style. Both instruments have been used extensively in the study of creativity. The findings indicated that the correlation between the two instruments was statistically significant. Additionally, the MBTI intuitors were found to have a strong correlation with the KAI innovators in their emphasis on possibilities and original ideation.

Wechsler, Vendramini, and Oakland (2012) conducted a study of two parts that considered the issue of validity. The study utilized the Styles of Thinking and Creating (STC), the Survey of Creative Achievements, and the Torrance Figural and Verbal Creativity Tests. The findings indicated that, "Styles were found to have predictive and constructive validity for creativity" (Wechsler et al., 2012, p. 235).

Tsai and Shirley (2013) developed a study that set out to determine the relationship between learning styles and creativity in math students. Creativity was measured using the Remote Associates Test (RAT). Learning styles preference was measured using The Index of Learning Styles (ILS). No significant relationship was found. The study cited several limitations. The sample size was small, n = 88. Additionally, there was a language barrier for

some of the students. This had a negative effect on their RAT scores. The researchers advise that additional attention should be given to the topic.

Salient to the present study is a study that was conducted by Friedel and Rudd (2006). Investigating the relationship between creativity and learning styles of undergraduate agriculture students, Friedel and Rudd utilized the Torrance Test of Creative Thinking to measure creativity and the Gregorc Style Delineator to measure learning style preference.

The specific objectives of this study were to:

1. Determine selected demographic information;
2. Determine student level of creative thinking;
3. Determine student learning styles, and;
4. Compare student learning styles, student level of creative thinking, and selected student demographic information. (Friedel & Rudd, 2006, p. 105)

110 students participated in this study. Findings indicated that students scored in the 99th percentile in the creativity construct of elaboration. The only creativity construct to score below the 75th percentile was originality. Overall, no significant relationship was found between creativity scores and learning style preferences. The one exception to this was Abstract Random learners who scored lower in fluency and elaboration. Friedel and Rudd raised questions about the predictive power of the Gregorc instrument. Witte's (1999) research indicated that the Gregorc Style Delineator accomplished its goal for measurement. Friedel and Rudd (2006) recommended that more research be carried out concerning the relationship between creativity and learning styles.

Summary

This chapter addressed adult education, adult learning, creativity and it's assessment, learning styles and it's assessment, and an overview of research that combined the topics of

creativity and learning styles. A selective historical review and background of adult education and adult learning included important contributing figures and concepts. Important research relating to creativity included a definition and theories and figures of importance. Important research relating to learning styles included foundational materials and concepts, as well as figures of importance. Styles of assessment for creativity and learning styles included basic principles as well as established models and their developers. The discussion of assessment included an overview of the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator. Research indicated that creativity and its relationship to learning style preference could hold the potential for correlation at some significant level. The literature review indicated that the relationship could also hold predictive powers for the presence of creativity.

CHAPTER 3

METHODS

Introduction

As creativity continues to be recognized as a necessity for personal, economic, and societal growth, research designs of a multi-faceted nature are required. Research regarding the relationship between creativity and learning styles preference is an area of study that warrants serious investigation.

The purpose, statement of the problem, research questions, definition of terms, significance, assumptions, limitations, and the organization of the study were addressed in the first chapter. The literature review discussed adult education, adult learning, creativity and it's assessment, learning styles and it's assessment, and an overview of research that combined the topics of creativity and learning styles. A selective historical review and background of adult education and adult learning included important contributing figures and concepts. Important research relating to creativity included a definition and theories and figures of importance. Important research relating to learning styles included foundational materials and concepts, as well as figures of importance. Styles of assessment for creativity and learning styles included basic principles as well as established models and their developers. The discussion of assessment included an overview of the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator.

This chapter describes the design of the study, variables, the reliability and validity of the instrument, the sample, data collection, procedure and analysis.

Purpose of the Study

The purpose of this study was to examine the relationship between creativity and learning style preference in adults in the Adult Education and Higher Education Departments of a major southern university as measured by the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator. The study also examined the relationship between creativity and age as well as creativity and completed formal education.

Research Questions

This study was guided by the following three research questions:

1. What is the relationship between creativity and learning style preference?
2. What is the relationship between creativity and age?
3. What is the relationship between creativity and achieved educational level?

Design of the Study

This study used the Abbreviated Torrance Test for Adults (ATTA) and the Gregorc Style Delineator as part of its research design. The ATTA was developed by E. Paul Torrance and Kathy Goff and is based on the Torrance Tests of Creative Thinking (TTCT). The ATTA is designed to measure creativity through measured divergent thinking abilities. The Gregorc Style Delineator originated as a self-analysis tool by Anthony Gregorc. The Gregorc Style Delineator was created to measure learning style preference. The two instruments were administered at the end of class sessions to students enrolled in Adult Education and Higher Education Administration classes at a large major university in the southeast. The ATTA with three timed activities and the Gregorc Style Delineator with one timed activity, along with a demographic survey of two questions, were included in the collection of data. Individual responses were confidential and numbered for the assurance of anonymity. The study was conducted after permission was granted by the University's Institutional Review Board (IRB) for the use of

human subjects for research. The requested consent detailed the abstract, purpose, participants, selection of participation, methods to collect, analyze, and security of the data. Once consent was approved and permission granted to collect data, participants were recruited. Students in select classes of Adult Education and Higher Education Administration departments were notified by their instructor in advance that a data collection opportunity for a student research project would be made available to them. At the approved time for data collection, the test administrator distributed the information letter regarding the project to each participant. Participants were given the opportunity to read the letter and ask questions concerning the study. Students were advised that participation was on a volunteer basis and that no monetary exchange would take place. Benefits were also addressed. Once this process was completed, the administration of testing commenced. As participant anonymity was desired, each participant received one of each instrument with a matching number on each. The two instruments were coded numerically to assure identifiable alignment between the two. Participant names were not known. The prescribed directions were read aloud by the test administrator to participants before each of the four timed activities. When the testing process was completed, instruments were collected for assessment.

Sample

The participants for this study consisted of graduate students in the Adult Education and Higher Education Administration departments of a large university in the southeast. It was required that participants be at least 18 years of age. Data collection took place over two semesters, Spring 2015 and Summer 2015.

Instrumentation

The Abbreviated Torrance Test for Adults (ATTA) was used to measure creativity based on divergent thinking performance of graduate students enrolled in Adult Education and Higher

Education Administration classes at a large southeastern university. The Gregorc Style Delineator was used to identify the preferred learning style of the same population. Both instruments were of pencil and paper format and were administered to selected classes with professorial permission.

The ATTA is based on the larger battery of tests developed by Torrance that is known as the Torrance Tests of Creative Thinking (TTCT). As one of the most popular creativity instruments, the TTCT has been recognized as a solid tool for the measurement, encouragement, and enhancement of creativity (Kim, 2006). Torrance and Goff (2002) developed the ATTA as an instrument to meet the needs for a shorter version of the TTCT that could be successfully administered to adults. "Because all scoring and analyses of the creativity abilities assessed are consistent with the original TTCT, this instrument is essentially an alternate form of the TTCT, though in an abbreviated context combining both Verbal and Figural activities" (Goff & Torrance, 2002, p. 1). The ATTA is based on the measurement of divergent thinking abilities in relation to three timed activities. Each activity is three minutes in duration. The first activity requires verbal responses to a question of a fanciful nature. The two remaining activities are figural in design. The two figural activities require the participant to add elements to an image provided in the test by drawing imagery based on a prompt. The ATTA is designed to measure four abilities associated with creative responses. The four abilities are fluency, originality, elaboration, and flexibility. Raw scores are assigned for each of these abilities based on response. These norm-referenced measures are translated into scaled scores. Additionally, 15 criterion-referenced creativity indicators are measured. From the addition of the derived sums of the total scaled score and the total indicator score, a creativity index (CI) was derived. The CI is used to interpret the performance in relation to the percentage of adults who fall within that scale

range. Higher CIs are considered indicative of more creative responses on the ATTA (Goff & Torrance, 2002).

Gregorc developed the Gregorc Style Delineator based on the principles of phenomenological philosophy (Gregorc, 1985). Foundational to the understanding of Gregorc's work is his model, the ORGANON System (Gregorc, 1985). "The ORGANON System views the human mind as an instrument of thought that determines the ways realization and actualization will be achieved" (Gregorc, 1985, p. 45). The instrument was designed as a tool for self-analysis as regards personal learning style. Insights gained from the results of the test are intended to provide a means for self-awareness and ultimately, self-improvement (1985). Originating from earlier work starting in 1970, the Gregorc Style Delineator took its name in 1982 (Gregorc, 1982). Gregorc (1985, p. 156) stated that the Gregorc Style Delineator measured "the perceptual qualities of concreteness and abstractness, and the ordering qualities of sequentialness and randomness in their compounded forms of CS [Concrete Sequential], AS [Abstract Sequential], AR [Abstract Random], and CR [Concrete Random]." The instrument consists of ten sets of words which are to be ranked in order from the word that most describes the test-taker to the word that is least like the test-taker. There are four words per set and the number 4 represents the strongest relationship while the number 1 represents the weakest relationship. The test is timed at three minutes. Once completed, a style profile is determined by adding together the numbered responses. A score of 27-40 represents a dominant style. Sixteen through twenty-six represents one's intermediate style. Ten through fifteen represents a low representation in one's profile. Participants may have more than one dominant style. Participants may also determine that they do not have a dominant style. Gregorc allows for variability from one testing session to another while maintaining the concept that style is deep-set and not easily changed (1985).

For this study, participants were also asked to identify demographics relating to age and formal level of education as indicated by the last degree awarded. Once this information had been provided, the ATTA was administered followed by the Gregorc Style Delineator. Upon completion of testing, materials were collected and later analyzed.

Reliability and Validity

Reliability and validity have been topics of interest, concern, and at times, disagreement, in the research of both creativity and learning styles (Cassidy, 2004; Coffield et al., 2004; Feldhusen & Goh, 1995; Goff & Torrance, 2002; Gregorc, 1982/1984; Hocevar, 1981; Houtz & Krug, 1995; James & Blank, 1993; Kaufman & Baer, 2006; Kaufman et al., 2008; Raina, 2006; Scott, 2010; Soriano de Alencar, De Souza Fleith, & De Fatima Bruno-Faria, 2014). Ross and Shannon (2008/2011) stated that validity is an indicator of how well an instrument measures what it is expected to measure. Wiersma and Jurs (2009) further stated that validity involves the concepts of internal and external validity. Wiersma and Jurs (2009) indicated that, "Internal validity is the extent to which the results of a research study can be interpreted accurately with no plausible explanations" (p. 7). Results must be generalizable to the appropriate population and conditions to contain external validity. Ross and Shannon (2008/2011) offered that reliability refers to the ability of an instrument to produce consistent results with minimal error. Wiersma and Jurs (2009) added that reliability could be distinguished as one of two types, internal and external. "*Internal reliability* refers to the extent that data collection analysis, and interpretations are consistent given the same conditions" (p. 9). As to external reliability, Wiersma and Jurs concluded that it "deals with the issue of whether or not independent researchers can replicate studies in the same or similar settings" (p. 9).

Validity and reliability in the measurement of creativity has received attention from various sources (Kaufman et al., 2008; Soriano de Alencar et al., 2014). The TTCT developed

by E. Paul Torrance "is the most widely used and most researched creativity test, with over 2000 studies reporting its usage" (Goff & Torrance, 2002, p. 36). The TTCT has been subjected to several hundred validity studies. Houtz and Krug stated, "The Torrance Tests offer more evidence for validity and generally more research data than any other creativity test" (p. 275). Two longitudinal studies, one initiated in 1958, the other 1959, were conducted that Torrance considered important as regards validity. "These longitudinal studies with real-life criteria seem to offer the strongest link to test behavior of creative achievement" (p. 36). Plucker (1999), in his study of Torrance's longitudinal studies, determined that the Creative Index was a valid means of predicting creative achievement by adults. Kim (2006) concluded that, "the TTCT appears to be a good measure, not only for identifying and educating the gifted but also for discovering and encouraging everyday life creativity in the general population" (p. 11). Treffinger (1985) determined that the TTCT was reasonably reliable for research projects. Goff and Torrance (2002) indicated that the ATTA was successfully designed as an alternate form of the TTCT in abbreviated form with a designated participant base consisting of adults.

"Anyone who thoughtfully examines the learning process – particularly in adults – would conclude that it is, indeed, an extremely complex process" (James & Blank, 1993, p. 47). Learning style instruments, including the Gregorc Style Delineator, have been questioned as to validity and reliability (Cassidy, 2004; Coffield et al., 2004; James & Blank, 1993; Scott, 2010). With well over a decade of research on styles and the development of the Gregorc Style Delineator, Gregorc acknowledged that instruments have their issues. "By nature, instruments are restrictive and reflect the bias of their creator" (Gregorc, 1985, p. 45). Gregorc offered his findings concerning the validity and reliability of the Gregorc Style Delineator in the *GREGORC STYLE DELINEATOR: Development, Technical and Administration Manual* (1982/1984). Alpha coefficients for validity ranged from 0.55 to 0.76. Reliability coefficients ranged from 0.89 to

0.93 for the four scales – Concrete Sequential, Abstract Sequential, Abstract Random, and Concrete Random – and their level of internal consistency. Correlation coefficients for predictive reliability ranged from 0.85 to 0.88. Gregorc reported that 89% of participants in his study – 424 out of 475 participants – agreed or strongly agreed that the style that was identified by instrument accurately identified their preference. "The reliability and validity of the **Gregorc Style Delineator** (1982), in its present form can be characterized as strong based on the alpha coefficients…." (Gregorc, 1982/1984, p. 28). While questions have been raised about Gregorc's findings (Friedel & Rudd, 2006), the Gregorc Style Delineator has continued to be included in major reviews of the styles literature.

Data Collection

The ATTA and the Gregorc Style Delineator were administered in pre-approved class settings using pencil and paper format. Participants were provided information about the study, allowed the opportunity to ask questions about the study, and given instruction for each of the activities required by the instrument in use at the time. The data were collected upon completion. The two instruments were numbered for test alignment between the two instruments and to secure confidentiality. Participants were not identified by name at any point of the study. Tests were scored according to instructions provided in the manuals for the two instruments. Analysis of data was accomplished through the use of the statistical software, Statistical Program for Social Science (SPSS). Demographics were collected and subjected to descriptive statistical methods. Participants were graduate students in Adult Education and Higher Education Administration classes at a large university in the southeast. All participants were required to be at least 18 years of age, the Alabama age of consent at the time of this study.

Data Analysis

The participants consisted of 100 graduate students enrolled in six courses that were being offered through the Adult Education and Higher Education Departments of a large public university in the southeast. Data collection took place over the course of two terms – Spring/Summer, 2015. Participants were asked to identify their age and last college degree obtained. This demographic information was recorded on the front cover of the ATTA. Creativity was measured using the Abbreviated Torrance Test for Adults consisting of three timed activities – one verbal and two figural. ATTA scores were determined by the researcher strictly adhering to the guidelines set forward in the ATTA Manual (2002) provided by Scholastic Testing Service, Incorporated. Learning styles preference was identified using the Gregorc Style Delineator that consisted of a word-association exercise. Scoring was accomplished using the directions provided with the Gregorc Style Delineator.

To address the research questions for this study, data were analyzed using descriptive statistics, including the correlation coefficient known as the Pearson product-moment. Wiersma and Jurs identified descriptive statistics as, "That part of statistical procedures that deals with describing distributions of data and relationships between variables" (2009, p. 476). "The correlation between two continuous variables basically assesses how well the variables correspond in terms of high and low values… A correlation is considered a descriptive statistic and a measure of the strength of association between the two variables" (Ross & Shannon, 2008/2011, p. 133). Relationships were determined through the use of the Pearson's correlation coefficient. Wiersma and Jurs (2009) indicated that the Pearson product-moment requires, at a minimum, both variables on interval scales. Additionally, a one-way ANOVA was used to identify group differences. Wiersma and Jurs state that, "ANOVA tests the null hypothesis that two or more population means are equal" (p. 416).

Summary

This chapter described the purpose and design of the study, instrumentation – Abbreviated Torrance Test for Adults and Gregorc Style Delineator – reliability and validity, the sample for the study, data collection, and analysis. Data were collected in compliance with the Institutional Review Board at the University.

CHAPTER 4

RESULTS

This chapter presents the results of the analyzed data associated with each of the research questions. The demographic profile of the sample population and the analysis of the data collected from the Abbreviated Torrance Test for Adults (ATTA) and the Gregorc Style Delineator are also discussed. To analyze data, the Statistical Program for Social Science (SPSS) software was used.

Purpose of the Study

The purpose of this study was to examine the relationship between creativity and learning style preference in adults in the Adult Education and Higher Education Departments of a major southern university as measured by the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator. The study also examined the relationship between creativity and age as well as creativity and completed formal education.

Research Questions

This study was guided by the following three research questions:

1. What is the relationship between creativity and learning style preference?
2. What is the relationship between creativity and age?
3. What is the relationship between creativity and achieved educational level?

Instrument I – Abbreviated Torrance Test for Adults (ATTA)

The Abbreviated Torrance Test for Adults (ATTA) was used to measure creativity. The ATTA consists of three timed activities that are designed to indicate divergent thinking skills.

Activity #1 is verbal in design. The participant is given a question based on a fanciful scenario. The question is open-ended and promotes multiple answers. Activity #1 is assessed based on the two creative abilities of fluency and originality. Assessment continues with five criterion-referenced creativity indicators. The five indicators are:

1. Richness and Colorfulness of Imagery
2. Emotions/Feelings
3. Future Orientation
4. Humor: Conceptual Incongruity
5. Provocative Questions

Activity #2 is figural in design. The participant is required to complete two incomplete images by drawing in additional imagery. The participant is further asked to provide a title for each of the drawings. Bonus points may be awarded for additional drawings based on the incomplete figures. Activity #2 is assessed based on the three creative abilities of fluency, originality, and elaboration. Activity #3 is also figural in design. The participant is asked to draw pictures based on nine shape-based images that are provided. The participant may explore the imagery by incorporating multiple visual prompts into one image or by using each image as the foundation for an individual picture. For Activities #2 and #3, ten additional criterion-referenced creativity indicators are also considered in scoring. They are as follows:

1. Openness: Resistance to Premature Closure
2. Unusual Visualization, Different Perspective
3. Movement and/or Sound
4. Richness and/or Colorfulness of Imagery
5. Abstractness of Titles
6. Articulateness of Telling Story

7. Combination/Synthesis of Two of More Figures
8. Internal Visual Perspective
9. Expressions of Feelings and Emotions
10. Fantasy

Based on the results of the scoring procedure, a composite measure known as a Creativity Index (CI) is determined. The following scale is used to indicate the strength of measured creativity as well as creativity level:

1. 1-50 = Minimal
2. 51-59 = Low
3. 60-67 = Below Average
4. 68-73 = Average
5. 74-77 = Above Average
6. 78-84 = High
7. 85+ = Substantial

Instrument II – Gregorc Style Delineator

The Gregorc Style Delineator was used to determine learning style preference. The Gregorc Style Delineator is a word association instrument that consists of ten columns containing four words in each. The participant is asked to place a number from one to four beside each word in a column. The number four represents the word that the participant feels most strongly associated with. The number one represents the word that the participant feels least strongly associated with. The numbers 2 and 3 represent associations that are stronger than one and weaker than four. Through a mathematical procedure described by instruction, learning style preference is determined. With a scale ranging from 10-40, 27 and above indicates a

participant's dominant learning style. The Gregorc Style Delineator identifies four primary learning styles. They are as follows:

1. Concrete Sequential
2. Abstract Sequential
3. Abstract Random
4. Concrete Random

The Gregorc Style Delineator allows for multiple dominant learning style preferences. In these cases, this study considered the strongest dominant learning style preference for computation. In the case of a tie, the participant's style was identified as Multiple.

DESCRIPTIVE RESULTS

The total number of participants was 100 (*N*). All participants were identified as adults based on the demographic information provided. The youngest participant was 21 years of age. Participants completed two surveys and provided demographic information for three questions relating to age, gender, and level of formal education completed.

Results Relating to Creativity Index Scores and Creativity Level

Creativity was identified through the use Creativity Index (CI) scores. From these scores, a creativity level was determined. Out of the 100 participants, 3 participants had CI scores of 1-50 and were identified with a creativity level of Minimal. 6 participants had CI scores of 51-59 and were identified with a creativity level of Low. 26 participants scored between 60 and 67 for a creativity level of Below Average. 18 participants scored between 68 and 73 for a creativity level of Average. 18 participants had CI assessments between 74 and 77 with a creativity level of Above Average. 20 participants scored between 78 and 84 to achieve a creativity level of

High. 9 participants scored at the highest level of Substantial with CI scores 85 and above (see Table 1).

Table 1

Distribution and Percentages of Creativity Levels/Defining Range

Creativity Level/Defining Range	*n*	%
Minimal (1-50)	3	3%
Low (51-59)	6	6%
Below Average (60-67)	26	26%
Average (68-73)	18	18%
Above Average (74-77)	18	18%
High (78-84)	20	20%
Substantial (85+)	9	9%

N=100

The data revealed that 35 participants were identified as Below Average or lower while 47 were identified as Above Average or higher. 18 received scores of Average (see Table 2).

Table 2

Distribution and percentages of scores recorded levels above and below Average

Creativity Level	*n*	*%*
Above Average and Higher	47	47%
Average	18	18%
Below Average and Lower	35	35%

N=100

Results Relating to Creativity and Gender

There were 55 female participants in this study and 45 males. Gender and creativity related in the following ways for females. One female scored at the Minimal level. 4 females scored at the Low level. 14 females were identified as Below Average. 8 females were recognized as Average. 11 female participants had a CI in the Above Average level. 13 females achieved a level of High. Four females were identified as Substantial. Males were represented with the following distribution of creativity levels. 2 males were identified at the Minimal level. 2 males scored at the level of Low. 12 males made CI scores in the Below Average level. 10 males were scored as Average. 7 males received scores in the Above Average level. 7 males also scored at the High level. 5 males were identified in the Substantial level (see Table 3).

Table 3

Distribution and Percentages of Participants by Gender and Creativity Level

	Female		Male	
Creativity Level	*n*	%	*n*	%
Minimal	1	1%	2	2%
Low	4	4%	2	2%
Below Average	14	14%	12	12%
Average	8	8%	10	10%
Above Average	11	11%	7	7%
High	13	13%	7	7%
Substantial	4	4%	5	5%

N=100

Results Relating to Creativity and Age

Participants in this study ranged in age from 21 to 76 with an average of 38.36 and a standard deviation of 12.85. The distribution by participant age is presented in the Table 4.

Table 4

Distribution of Participants by Age

Age	*n*	%
21	1	1%
22	2	2%
23	2	2%
24	6	6%
25	5	5%
26	2	2%
27	4	4%
28	4	4%
29	5	5%
30	6	6%
31	2	2%
32	4	4%
33	3	3%
34	4	4%
35	4	4%
36	4	4%
37	1	1%

Table 4. Distribution of Participants by Age Table (continued)

Age	*n*	%
38	2	2%
40	2	2%
41	1	1%
44	1	1%
45	4	4%
46	5	5%
47	1	1%
48	2	2%
49	2	2%
50	2	2%
51	2	2%
53	2	2%
54	2	2%
55	1	1%
56	2	2%
58	2	2%
59	1	1%
61	1	1%
62	2	2%
63	1	1%
65	1	1%

Table 4. Distribution of Participants by Age Table (continued)

Age	*n*	%
74	1	1%
76	1	1%

N=100

Table 5 indicates the distribution and percentages of participant ages by decade.

Table 5

Distribution and Percentages of Participants by Decade of Age

Age by Decade	*n*	*%*
Participants Aged 20-29	31	31%
Participants Aged 30-39	30	30%
Participants Aged 40-49	18	18%
Participants Aged 50-59	14	14%
Participants Aged 60-69	5	5%
Participants Aged 70-79	2	2%

N=100

Table 6 presents the Creativity Index mean scores and creativity levels by age group. The means for all groups were found to be very close to one another in range with the lowest mean score being 69 and the highest mean score being 76. Five groups scored in the low to mid-70's and one group scored 69. Four groups scored in the creativity level of Average. Two groups scored in the creativity level of Above Average (see Table 6). The data revealed that the highest CI score in the study was achieved by the youngest participant who was a 21 years old female.

Additionally, the data revealed that participants who were aged 20-29 measured the lowest group mean score of 69.

Table 6

CI Mean Scores and Creativity Levels by Age Group

Age Group by Decade	CI Mean Score	Creativity Level
Participants Aged 20-29	69	Average
Participants Aged 30-39	71	Average
Participants Aged 40-49	76	Above Average
Participants Aged 50-59	74	Above Average
Participants Aged 60-69	73	Average
Participants Aged 70-79	71	Average

Note. CI Mean Score = Creativity Index Mean Score.

Results Relating to Creativity and Educational Level

The participants in this study were students in graduate classes in Adult Education and Higher Education Administration classes at a large southern university. Upper-level undergraduates may take some graduate classes by permission. The distribution of the highest level of formal academic achievement by diploma or degree for the 100 participants of this study was as follows: 4 High School Diplomas, 35 Bachelor Degrees, 52 Masters Degrees, and 9 Doctoral Degrees. The data also revealed that the group mean scores for creativity were close to one another ranging from 70.2 to 79.5. The highest mean score was found to be the group with only a high school diploma. The lowest mean score was determined to be the group with Bachelors level attainment (see Table 7).

Table 7

Distribution, Percentages, and CI Mean Scores of Participants by Educational Level

Educational Level	*n*	%	CI Mean Score
High School Diploma	4	4%	79.5
Bachelors	35	35%	70.2
Masters	52	52%	73.2
Doctoral	9	9%	70.8

Notes. CI Mean Score = Creativity Index Score.

The results revealed the following distribution of creativity levels amongst the various educational levels (see Table 8).

Table 8

Distribution of Creativity Levels by Educational Level

Educational Level	High School (*n*=4)	Bachelors (*n*=35)	Masters (*n*=52)	Doctoral (*n*=9)
Minimal	0	3	0	0
Low	0	4	2	0
Below Average	0	7	15	3
Average	2	6	6	4
Above Average	1	5	12	0
High	0	6	12	2
Substantial	1	4	5	0

N=100

Results Relating to Creativity and Learning Style Preference

Of the 100 participants in this study, 38 participants were identified as Concrete Sequential learners. This was the largest learning style group in the study. The smallest group of learners was identified as Abstract Sequential with 10 participants. Table 9 represents the distribution and percentages of the participants by learning style preference.

Table 9

Distribution and Percentages of Participants by Learning Style Preference

Learning Style Preference	*n*	%
Concrete Sequential	38	38%
Abstract Sequential	10	10%
Abstract Random	17	17%
Concrete Sequential	23	23%
Multiple Styles Preference	12	12%

N=100

The data indicated that the largest group of learners at 27 was identified with the creativity level of Below Average. The second highest count by level was High with 20 participants. The levels Average and Above Average had a participant count of 18 each. The level of Substantial had 9 participants. The lowest count was found in the levels Low with 5 participants and Minimal with 3 participants. Table 10 presents this data along with the total number of participants identified by creativity level.

Table 10

Distribution of Creativity Level and Learning Style Preference

Creativity Level	CS (*n*=38)	AS (*n*=10)	AR (*n*=17)	CR (*n*=22)	Multi. (*n*=12)	*Total* (*N*=100)
Minimal	2	0	1	0	0	3
Low	2	0	1	1	1	5
Below Average	12	4	2	5	4	27
Average	4	2	5	4	3	18
Above Average	8	1	2	7	0	18
High	7	2	5	4	2	20
Substantial	3	1	1	2	2	9

Note. CS = Concrete Sequential; AS = Abstract Sequential; AR = Abstract Random; CR = Concrete Random; Multi. = Multiple.

INFERENTIAL RESULTS

Results Relating to Creativity Index and Creativity Level

A Pearson product-moment correlation was used to confirm the relationship between Creativity Index (CI) scores and creativity levels. A large, positive, significant relationship (r = .965, $p < .001$) was found. As Creativity Index scores and creativity levels respectfully measure the same variable, this outcome was expected.

Results Relating to Creativity and Gender

A Pearson product- moment correlation was used to determine the relationship between Creativity Index and gender. No significant relationship was found between the CI score and gender (r = -.02, p = .89). A Pearson product-moment correlation was used to determine the

relationship between creativity level and gender. No significant relationship was found (r = -.04, p = .69). Table 11 summarizes these findings.

Table 11

Pearson Product-Moment Correlation Analysis for Creativity and Gender

Creativity Measurement	*r*	*p*
Creativity Index	-.02	.89
Creativity Level	-.04	.69

N=100, $p < .05$

Results Relating to Creativity and Age

A Pearson product-moment correlation was used to address the research question of the relationship between Creativity Index and age. No significant relationship was found (r = .16, p = .12). A Pearson product-moment correlation was used to determine the relationship between creativity level and age. No significant relationship was found (r = .19, p = .06). While not significant, a marginal relationship was observed between age and both CI (r = .16, p = .12) and creativity level (r = .19, p = .06). This marginal relationship coupled with the observance of the age differences between learning style preference groups as indicated in Table 12, led to age being included as a covariate in the final model.

Table 12

Means and Standard Deviations for Learning Style Preference Group by Age

Learning Style Preference Group	*n*	Mean	Standard Deviation
Concrete Sequential	38	35.7	11.7
Abstract Sequential	10	37.0	17.0
Abstract Random	17	43.1	12.3
Concrete Random	23	36.8	9.9
Multiple	12	44.3	16.1

N=100

Results Relating to Creativity and Educational Level

A Pearson product-moment correlation was used to address the research question of the relationship between Creativity Index and educational level. No statistical significance was found ($r = .03$, $p = .80$). A Pearson product-moment correlation was used to determine the relationship between creativity level and educational level ($r = 05$, $p = .69$).

Results Relating to Creativity and Learning Style Preference

An Analysis of Variance (ANOVA) was used to address the research question of the relationship between creativity and learning style preference (Concrete Sequential, Abstract Sequential, Abstract Random, Concrete Random, and Multiple). Because the measurements determined by the Creativity Index and the creativity level were so highly correlated, the CI, a truly continuous variable, was chosen to measure this relationship, thereby meeting the requirements for ANOVA. Two statistical models were used to determine the relationship of CI and learning style preference. The first model, referred to as the simplified model, utilized only learning style groups and CI scores to determine potential differences. The simplified model

found no statistically significant differences ($F_{(4,95)} = .357$, $p = .838$, $r^2 = .015$). The full model that included the covariate of age found no statistically significant differences ($F_{(5, 94)} = .757$, $p = .583$, $r^2 = .039$).

Table 13

Summary Table: Means (Standard Deviations) of Age and Creativity Index; Frequencies of Creativity Level, Education Level, and Gender, As Differentiated by Learning Style Preference (N = 100).

	CS (*n*=38)	AS (*n*=10)	AR (*n*=17)	CR (*n*=23)	Multi. (*n*=12)	Total (*N*=100)
Age	35.7 (11.7)	37.0 (17.0)	43.1 (12.3)	36.8 (9.9)	44.3 (16.1)	38.4 (12.8)
CI	70.7 (10.1)	71.7 (10.5)	72.4 (9.9)	73.9 (9.0)	71.7 (11.4)	72.0 (9.9)
CL						
Minimal	2	0	1	0	0	3
Low	2	1	1	1	1	6
Below AVG.	12	3	2	5	4	26
AVG.	4	2	5	4	3	18
Above AVG.	8	1	2	7	0	18
High	7	2	5	4	2	20
Substantial	3	1	1	2	2	9
	(*n*=38)	(*n*=10)	(*n*=17)	(*n*=23)	(*n*=12)	(*N*=100)

Summary Table (continued)

	CS (*n*=38)	AS (*n*=10)	AR (*n*=17)	CR (*n*=23)	Multi. (*n*=12)	Total (*N*=100)
Education						
HSD	0	1	1	1	1	4
Bachelors	10	5	9	8	3	35
Masters	24	3	7	13	5	52
Doctorate	4	1	0	1	3	9
Gender						
Male	17	8	7	8	5	45
Female	21	2	10	15	7	55

Note: CS = Concrete Sequential; AS = Abstract Sequential; AR = Abstract Random; CR = Concrete Random; CI = Creativity Index; Multi. = Multiple; CL = Creativity Level; AVG.= Average; HSD = High School Diploma.

Summary

This chapter presented the results of the study after 100 participants from the graduate departments of Adult Education and Higher Education Administration were surveyed. The participants completed one instrument designed to measure creativity and one instrument designed to measure learning style. The participants also completed a short demographic survey. The results revealed that there were 55 females and 45 males who participated in the study. Participants ranged in age from 21 to 76 years of age. The largest group of participants at 52 had completed Master's degrees. 35 participants had completed the Bachelor's degree. The remaining participants represented the extremes of educational level with four having completed

the high school diploma and nine the doctorate. The largest group of participants with 38 was identified as Concrete Sequential learners. The smallest group with 10 was identified as Abstract Sequential learners. There were 17 Abstract Random learners and 23 Concrete Random learners. Twelve participants were identified as Multiple Preference learners because their surveys revealed a tie between two learning style preferences. Thirty-five participants were identified by creativity level as Below Average or lower. Eighteen participants were identified as having a creativity level of Average. The remaining 47 participants were found to have Above Average or higher creativity levels. The Creativity Index scores revealed that scores by learning style preference ranged from a low mean of 70.7 for Concrete Sequential learners to a high mean of 73.9 for Concrete Random learners. When all learning style preferences were considered, the mean was 72.0.

Three research questions were addressed in this study. The relationship between creativity and learning style preference, age, and educational level achieved were explored through the measurements derived from the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator, as well as demographic information provided by the participants. This study considered graduate students from the departments of Adult Education and Higher Education Administration from a major southern university.

No statistical significance was observed in any of the findings. A marginal relationship was found between age and both Creativity Index and creativity level (r = .16 and .19, p = .12 and .06). Conclusions, discussion and recommendations will be presented in the next chapter.

CHAPTER 5

SUMMARY, DISCUSSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

This study considered the relationship between creativity and learning style preference, age, and educational level achievement among graduate students in two departments of a major southern university. The first chapter introduced the purpose, statement of the problem, research questions, definition of terms, significance, assumptions, limitations and the organization of the study. The second chapter discussed the literature review of the selective history, concepts and figures of importance in adult education and adult learning, historical review and background of creativity research, the assessment of creativity, historical review and background of learning styles research, the assessment of learning styles, overviews of the Abbreviated Torrance Test for Adults and Gregorc Style Delineator, and research relating to the combined topics of creativity and learning styles. Chapter 3 described the design of the study, sample, instrumentation – Abbreviated Torrance Test for Adults and Gregorc Style Delineator – reliability and validity, data collection, data analysis, and a summary. The fourth chapter presented the instruments, the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator, as well as the demographic profile of Creativity Index, creativity level, gender, age, educational level, and learning style preference. Additionally, Pearson product-moment correlation and analysis of variance results were provided. The present chapter provides conclusions, discussion and recommendations for future research.

Purpose of the Study

The purpose of this study was to examine the relationship between creativity and learning style preference in adults in the Adult Education and Higher Education Departments of a major southern university as measured by the Abbreviated Torrance Test for Adults and the Gregorc Style Delineator. The study also examined the relationship between creativity and age as well as creativity and completed formal education.

Research Questions

This study was guided by the following three research questions:

1. What is the relationship between creativity and learning style preference?
2. What is the relationship between creativity and age?
3. What is the relationship between creativity and achieved education level?

Summary

This study explored the relationship between creativity and learning style preference, age, and educational level achieved. Participants consisted of 100 graduate students in the departments of Adult Education and Higher Education Administration at a large southern university. Participants were asked to provide their age, gender, and the highest level of formal education achieved. Two instruments were used in the study, the Abbreviated Torrance Test for Adults (ATTA) and the Gregorc Style Delineator. The ATTA consisted of three timed activities, one verbal and two figural. The Gregorc Style Delineator consisted of ten rank-ordering word-association selections and was a timed activity. Findings were collected confidentially and with anonymity through the use of numerically coded responses.

The demographic data indicated that there were 55 female and 45 male participants involved in the study. The ages of the participants ranged from 21 to 76. The largest group of participants was found to be those below the age of forty. Sixty-one participants were between

the ages of 21 and 39. Thirty-nine participants were between the ages of 40 and 76. Four participants had the High School Diploma as the highest level of educational achievement. Thirty-five participants held Bachelor's degrees and 52 had completed the Master's degree. Nine had received the Doctoral degree. Learning style preferences were dispersed as follows: 38 Concrete Sequential, 10 Abstract Sequential, 17 Abstract Random, 23 Concrete Random, and 12 Multiple Style learners. Twenty-one females and 17 males were identified as Concrete Sequential learners. Two females and eight males were Abstract Sequential in learning style preference. Ten females and seven males identified as Abstract Random learners. Concrete Random learners consisted of 15 females and eight males. Seven females and five males were recognized as Multiple Style learners. The mean age for Concrete Sequential learners was 35.7. Mean age findings for Abstract Sequential learners and Abstract Random learners were 37.0 and 43.1, respectfully. Concrete Random learners were revealed to have an age mean of 36.8. Multiple Style learners had a mean of 44.3. Creativity Index scores revealed that the lowest scores were found among Concrete Sequential learners with a mean of 70. 7. The highest Creativity Index mean of 73.9 was found among Concrete Random learners. Creativity levels indicated that the largest number of participants across all learning style preferences was identified as Below Average.

The findings for this study revealed that there were no statistically significant relationships between creativity and age, gender, educational level, or learning style preference. Findings support previous studies that indicated that creativity was not strongly identified with one particular demographic attribute, including learning style preference. Csikszentmihalyi (1996/2013) indicated that creativity may be viewed across the age spectrum. This study revealed that the creativity level of Average was the dominant level observed in four out of six age groups (distinguished by decade). Participants in their forties and fifties as a group achieved

slightly above the norm with the creativity level of Above Average. Previous studies indicate that gender differences were not found regarding creativity as measured by creativity tests (Sawyer, 2012). The participants of this study were closely aligned with no statistical significant differences as to gender distribution and creativity levels. The participants of this study were students taking graduate course work. Based on Creativity Index scores, this study revealed that the mean scores for all participants ranged from the low of 70.2 for those with a Bachelor's degree to 79.5 for those with the high school diploma as the highest level of educational achievement. Because of the low number of participants (4) in the high school diploma category coupled with the exceptionally high score of one of the participants in this group, this group received the highest mean score. Master's level participants received a mean of 73.2 and those in the doctoral category scored a mean of 70.8. No statistical significance was found between these scores though the lower score found for the doctoral category did concur with findings of previous studies (Simonton, 1984,1999). Previous studies have indicated that creativity was not linked to one particular learning style preference. Tsai and Shirley (2013) advised, based on findings, that the relationship between creative thinking and learning preferences was weak. Friedel and Rudd (2006) offered that the relationship between creativity and learning style preference was slight. This study revealed no significant relationship between creativity and learning style preference. The mean scores for Creativity Index were very close across the different learning style preferences. The CI mean scores for the different learning styles were as follows: Concrete Sequential/ 70.7, Abstract Sequential/ 71.7, Abstract Random/ 72.4, Concrete Random/ 73.9, and Multiple Learning Preferences, 71.7. Indications are that one learning style preference can not be identified as more creative than another.

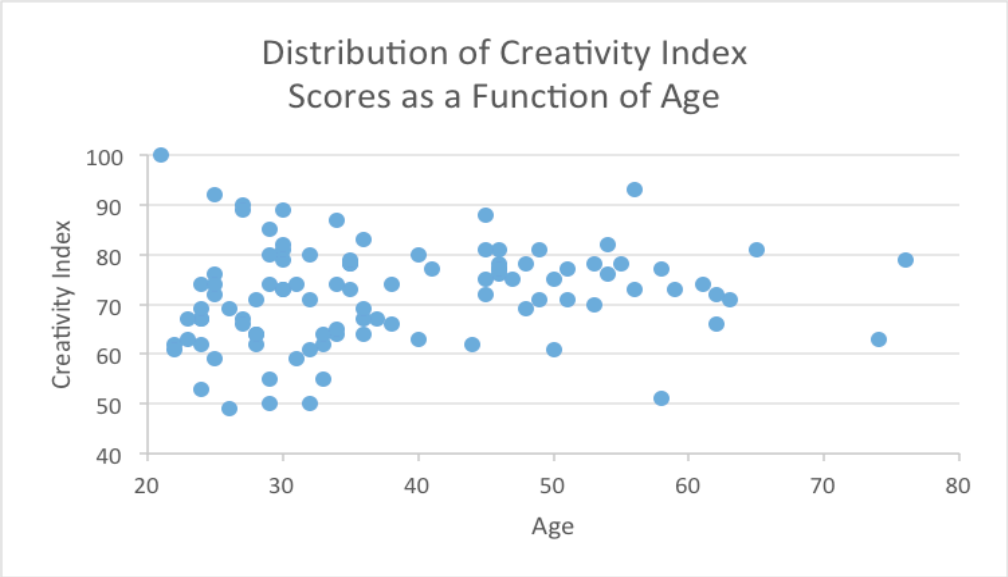
Discussion

This study explored the relationship between creativity and learning style preference, age, and educational achievement. Pearson product-moment correlation and ANOVA statistical techniques were used to explore these relationships among graduate students in Adult Education and Higher Education Administration programs at a large southern university. While no statistical significance was found for any of the relationships, there were a couple of findings that may prove to have some merit for further study.

Exploratory analysis was carried out between the two largest learning style groups. A pairwise comparison associated with the ANOVA for Concrete Sequential (n = 38) and Concrete Random (n = 23) was conducted. Non-significant differences were found (95% Confidence Interval: -8.185, 2.261, p =.263) however, with a larger sample, these differences could be significant. Should this be the case, it seems plausible that the other learning style groups would differ significantly with the Concrete Random group. This is founded on the estimated group marginal means that were all 2.2 – 3.1 points different from Concrete Random.

The full model that contained the covariate of age indicated a marginally significant relationship between Creativity Index and age ($F_{(5, 94)} = .757$, $p = .583$, $r^2 = .039$). When observed on a scatterplot, the finding suggested a regression of mean (see Figure 1).

Figure 1



The youngest participants had a wide range of CI scores while the older participants' scores were narrower in range. This would suggest that as the younger participants mature, their CI scores would move toward a more centralized group mean. Younger participants with a lower CI score would raise their score over time. This could be the result of the need for stronger creative skills as one ages and has more responsibilities, particularly in the workforce. In turn, younger participants with higher scores may settle at a lower CI score with age. This could be for multiple reasons. Once individuals move into the workforce, creativity may be hampered by lack of opportunity. Depending on the job, creativity may not be encouraged. Additionally, people could find that being too creative forces them to stand out in potentially uncomfortable ways. As individuals mature, they could find that routines develop in work and other aspects of life. Being creative may be too taxing for some to carry out in the long term. As a result, creativity may plateau. While the evidence from this study indicates that creativity can be found at various

stages of life, it also suggests that there may be a norm to be found in the group mean of adults 40 years and older.

Implications

Creativity is recognized as a significant dimension of life. Adults are impacted by creative acts and ideas on a regular basis. Many situations demand a creative perspective for growth and revitalization. From the solving of problems encountered in the most mundane of daily situations to the creation of the most profound examples of human production, creativity is necessary. The search for the understanding of creativity is an endeavor that warrants considerable attention and energy in the 21st Century.

This study explored the relationship between creativity and learning style preference, age, and educational level achieved among graduate students in the Adult Education and Higher Education Administration departments of a large southern university. The data revealed that a relationship between creativity and learning style preference, age, and educational level achieved could not be established in any statistically significant measurement. While not statistically significant, a marginally significant relationship was found between creativity as measured by the Abbreviated Torrance Test for Adults and age.

Review of the literature revealed that creativity should be an important aspect of educational programs. The inclusion of exercises and activities for the development of creativity should be included in schools at all levels. Gardner (2008) suggested that teachers should offer multiple opportunities for students to develop the uniqueness of their abilities. "Such multiple representations are grist for new ways of thinking about an entity, problem, or question: they catalyze creative questions and spawn creative solutions" (p.87). For those who wish to remain competitive in an increasingly challenging world, creativity must be identified and nurtured. Educational environments are logical outlets for this development. From pre-schools to

universities, techniques for the development of creativity should be taught with the understanding that the flexibility of thought that is encouraged will ultimately translate to increased economic and political empowerment. De Bono states, "More and more creativity is coming to be valued as the essential ingredient in change and in progress" (1970/1973, p. 11). Educators have an obligation to commit time and energy to the development of creative thinking skills.

Thoughtful research into creativity and its relationship with each of the variables featured in this study, as well as many others, warrants continued scholarly attention. While this study may not have found a statistical significance between creativity and learning style preference as an identifier of creativity, knowledge of learning styles may provide a more efficient means for encouraging creativity through individualized programs that take learning style preference into account.

Creativity and age has the potential to become more important as people continue to live longer, more active lives. How creativity interacts with age throughout the life cycle could prove vitally important to the success of providing fulfilling life situations for the ever-expanding older population. Should the creativity plateau relating to maturity be found to be valid, focus could be shifted to allow for the development of programs designed to potentially overcome this obstacle. This could prove invaluable to businesses as well as any other life situation that aging humans experience.

Studies indicate that creativity and formal educational achievement are tied to balance (Csikszentmihalyi, 1990; Simonton, 1984,1999). This study supports previous findings. As a result, worthwhile attention should be given to finding ways to encourage the continued development of creativity with the continuance of formal education. By creating awareness on

the part of those involved in doctoral programs that informational protocols have the potential to limit creativity, students may develop safeguards that allow continued creativity nurturance.

The use of divergent thinking exercises in educational and training programs is one such tool that can contribute to the nurturance of creativity. Torrance proposes that, "The most successful approaches seem to be those that involve both cognitive and emotional functioning, provide adequate practice, and interaction with teachers…. Motivating and facilitating conditions certainly make a difference in creative functioning, but differences seem to be greatest and most predictable when deliberate teaching is involved" (1995, p. 287). Technology has multiplied the opportunities to introduce creativity into the ever-growing myriad of educational settings. Regardless of age, educational level, or learning style preference; the development of creativity thinking skills may be viewed as means to the betterment of life. The myth that creativity cannot be taught has been dispelled through the efforts of E. Paul Torrance and many others who were committed to the idea that creativity is worthy of concentrated efforts toward the identification, as well as encouragement, of creativity for the enhancement of life for both the individual and society at large.

Recommendations

This study was limited to graduate students in two departments of a large southern university. As a result, the findings support the following:

1. The study could be extended to other departments.
2. The study could be extended to undergraduate students.
3. The study could include a larger sample of participants.
4. The study could include participants in other geographic locations.
5. The study could include more then one type of instrument for the measurement of creativity. This study used the ATTA that is based on divergent thinking skills.

Instruments based on consensual creative product assessment, assessment by others, or self-assessment could be utilized.

6. The study could use a learning style assessment other then the Gregorc Style Delineator or combine it with other instruments.
7. The study could include race/ethnicity as a demographic variable.
8. The study could include a more varied age group of participants by including a larger sample of older students.
9. The study could be administered outside of class settings.
10. The study could have a more balanced sample based on educational level.
11. The study could be more varied as to the time of day that data was collected.
12. The study could include instruments that allow participants to submit information via computer or other electronic means.
13. The study could allow participants more than one opportunity to submit data.
14. The study could include faculty and staff as well as students.

The literature review indicated that creativity is an important facet of life. All indications are that it will continue to be well into the distant future. With the success of individuals as well as businesses dependent on a strong base of creative skills and abilities, the development of creativity skills should be an important part of all learning environments. As educators and trainers are responsible for preparing competitive societal participants, their knowledge base of creativity enhancement is mandatory. The training of educational leaders in creativity should become part of teacher training programs with an emphasis on those techniques that allow for a multi-faceted perspective of the world. In a time when many, particularly in learning environments, consider cultural diversity paramount, creativity may offer a means of insuring

that all participants in the life experience have the opportunity to grow, succeed, and flourish. Torrance offers the following:

> Our creative achievers will be those who accept only those parts of the dominant culture that are true and who hold to their individuality and their minority or disadvantaged culture. It will be they who possess the different element, the divine discontent, and the clearness of vision to see when the king wears no clothes (Torrance, 1995, p. 173).

Creativity crosses all boundaries including, but not limited to, gender, age, racial/ethnic, socio-economic, and educational levels. With continued research into creativity, insights gained can provide rich opportunities for each person willing to face life with a new perspective.

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