UNDERGRADUATE STUDENTS' ATTITUDES TOWARD CREATIVITY: THE

DEVELOPMENT OF THE UNDERGRADUATE PERCEPTIONS OF CREATIVITY

SURVEY

A Dissertation Presented to the Faculty of the College of Education
University of Houston

In Partial Fulfillment of the Requirements of the Degree

Doctor of Education

by

Dale R. Dlouhy

May, 2012

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Abstract

The need for an instrument which measures undergraduate attitudes towards

creativity prompted the development of a survey. Using the published literature as a

theoretical basis, the items for a survey were constructed, and it was piloted and initially

validated with exploratory factor analysis. The exploratory factor analysis indicated that

the constructs of the scale are: creative self-perception, perceptions of creativity, and

creativity in education. Thereafter, a confirmatory factor analysis was computed on the

scale in order to validate and confirm the constructs, the results of which corroborated the

original three-factor structure. Cronbach's alpha coefficients indicate that the items are

reliable measures of the constructs.

The scale is the first specifically designed to ascertain the attitudes

undergraduates have towards creativity. With a valid and reliable survey that measures

undergraduate attitudes towards creativity, researchers and institutions may use the

instrument to assess the creativity attitudes of undergraduates studying in any discipline

or academic field. Moreover, the instrument could be useful in determining interventions

colleges and universities might implement to enhance students attitudes toward creativity

as global demand grows for professionals who value such creativity-related components

as innovative and flexible thinking.

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Undergraduate Students' Attitudes toward Creativity: The Development of the Undergraduate Perception of Creativity Survey

Creativity has and continues to be an instrumental factor in the development of human civilization. Davis (2004) describes history as the story of human creativity. According to Gray (1966) the flourishing of western civilization is a result of creative individuals transforming their cultures through innovation and achievements. The ancient Greek and Roman civilizations flourished because of certain individuals who transformed the economic, social, and political paradigms of the time. The Greek philosophers Socrates, Plato, and Aristotle laid the foundation of a way of thought and understanding that still defines how we objectify the world today (Cornford, 1979). The Roman Republic modeled after the democracy of Ancient Athens established a system of government which served as a template for the structure of government laid out in the Constitution.   The economic, social, and political achievements gained during the Renaissance, Baroque, and Enlightenment periods are the result of the ideas and innovations of creative people (Gray, 1966). The societal and economic implications derived from the technological developments of the Industrial Revolution transformed the world during the 17th and 18th centuries. The internet and the advent of the Information age have virtually transformed every aspect of human civilization (Diamond, 2005). From the beginning of human civilization to the present day, the role creativity has played is evident and crucial (Davis, 2004). As stated by De Miranda, Aranha, and Zardo (2009) "creativity has contributed to and greatly impacted on important social changes" (p.524). The continued success of western civilization depends on humanity's ability to adapt, modify, and thrive (Diamond, 2005; Gray, 1966).

The societal and economic implications of the internet and subsequent Information Age have rapidly changed the world economic systems. According to De Miranda et al. (2009) the internet's impact has shifted the economic balance of the world.

> Advanced economies have been moving from a traditional high-growth, heavily industrialized state, deeply dependent on imports of commodities and non-renewable resources...to a more globally integrated, entrepreneurial and eclectic productive fabric (p.524).

Creativity is seen as the key facilitator in the successful growth of the globally integrated contemporary economy (Vorley, Mould, & Smith, 2008). In fact, De Miranda et al. (2009) state that, "creativity in today's economy has firmly arrived and most businesses are recognizing that creativity has gained a strategic function" (p.523).

Governments are also recognizing the strategic role of creativity. In the Jobs Council year-end report to the President, the Council recommended that the universities should foster a culture of creativity and innovation and invest in research and development programs (Immelt, 2011). The Jobs Council recommendations are consistent with the understanding that creativity and innovation are strategic requirements for all nations if they are going to compete successfully in the global marketplace (Reuteman, 2011).

Recognizing creativity's economic and social importance, the European Union declared 2009 as the year of Creativity and Innovation. In the *European Year of Creativity and Innovation Manifesto* (2009), the Europeans established the following objectives to be implemented or started during the year:

1. Nurture creativity in a lifelong learning process where theory and practice go hand in hand.

2. Make schools and universities places where students and teachers engage in creative thinking and learning by doing.

3. Transform workplaces into learning sites.

4. Promote scientific research to understanding the world, improve people's lives and stimulate innovation.

5. Promote design processes, thinking and tools, understanding the needs, emotions, aspirations and abilities of users.

6. Support business innovation that contributes to prosperity and sustainability.

The objectives were to be implemented through a series of organized events and activities throughout the member states of the European Union. One of the 1,000 events held on creativity and innovation in 2009 was a survey electronically administered to the secondary teachers of the member states of the European Union. The purpose of the survey was to understand how the teachers conceptualize creativity and the support they receive in fostering their student's creativity (Quintin, 2009). The overall goal for administering the survey was to measure the attitudes of the teachers and use those data "for the development of a specific line of policy cooperation on creativity and innovation in Europe" (Quintin, 2009, p. 3).

As demand for creativity as a skill or desirable characteristic has grown, governments and educational institutions have taken the lead in designing and creating such creativity-based programs. Many researchers believe the first step in developing

creative and innovation- based policies and programs is to measure and understand how people perceive creativity (K.-W. Cheng & Chen, 2009; Diakidoy & Kanari, 1999; Gluck, Ernst, & Unger, 2002; Newton D.P, 2009; Petocz, Reid, & Taylor, 2009; Tin, Manara, & Ragawanti, 2010).

The important role universities play in the development of creative and innovative policy and program development is evident. De Miranda et al. (2009) states:

> We consider that universities have a special role to play in this new economy as institutions which 'new citizens' and new entrepreneurs, and make their R&D facilities greater 'solvers' for local realities and problems, as well as, cultural needs and services (p.534).

The first step the Europeans took in establishing creative and innovative based educational policies and programs was to measure the attitudes teachers have towards creativity (Quintin, 2009). Logically, if universities are to establish creative and innovative based policies, knowing the attitudes the students and faculty have toward creativity would be an important first step. However, there are currently no instruments that measure the attitudes students and faculty have toward creativity. In order to measure such attitudes, instruments need to be piloted and validated. In an attempt to address this need, an instrument designed to measure the attitudes undergraduate students have toward creativity was developed and piloted.

In this study, the construction, piloting, and validation of a survey are presented. The purpose of the survey reflects the purpose of the 2009 European survey: to measure attitudes toward creativity to create innovative policies and programs (Quintin, 2009).

Therefore, the purpose in creating this survey, which measures the attitudes undergraduate students hold toward creativity, is to provide a new tool for educational institutions and researchers. Once the survey was validated it could be used to measure how undergraduate students perceive creativity. The data collected from the instrument may be used by universities to foster a 'culture of creativity' as suggested by the report published by the President's Council on Jobs and Competitiveness (Immelt, 2011). The instrument may also be used by researchers to measure the attitudes of various groups of undergraduates to see if there is a difference between and among groups and it may also be used to measure how attitudes change over time.

Research Questions

The primary research questions for this study focus on validating the survey's constructs and the scale's reliability. The secondary research questions focus on reporting the results of the survey. In the survey development phase, the survey was piloted with a group of undergraduate students at a large urban research university in the Southwestern United States. After the data were collected an exploratory factor analysis (EFA) was conducted and the following three constructs were identified:

1. Creative Self-Perception
2. Perceptions of Creativity
3. Creativity in Education

The reliability of the items for each construct was measured by computing Cronbach's alpha coefficients. The Cronbach's alpha coefficients were above .7 which indicates that the items of each construct are reliable.

After identifying three constructs with the EFA, a confirmatory factor analysis (CFA) needed to be conducted in order to validate the scale. A CFA is appropriate for this study because the CFA "is typically used in the later phases of the scale development or construct validation after the underlying structure has been tentatively established by prior empirical analysis using an EFA" (Brown, 2006, p. 41). Therefore, the survey was administered to 160 undergraduate students at the same urban university. After the data had been collected, the researcher conducted a CFA, and once again Cronbach's Alpha's coefficients were also obtained for the items of each construct to ensure the reliability of the scale.

The following primary research questions address the validation and reliability of the scale's constructs:

1. Are the items of the construct Creative Self-Perception, identified in the exploratory factor analysis, validated with a confirmatory factor analysis?

2. Are the items of the construct Perceptions of Creativity, identified in the exploratory factor analysis, validated with a confirmatory factor analysis?

3. Are the items of the construct Creativity in Education, identified in the exploratory factor analysis, validated with a confirmatory factor analysis?

4. Are the items of the survey's constructs identified and confirmed in the confirmatory factor analysis reliable?

The following secondary research questions addressed the survey response data gathered from the respondents:

1. What are the gender, age, academic level, declared major, and department affiliation characteristics of the respondents?

2. What are the percentages of the respondents who strongly disagree, disagree, agree, strongly agree, or are neutral toward the items of each construct?

For research questions one through three the results of the three CFAs were reported. The CFA data were analyzed to determine if the items for each construct identified in the EFA could be retained. If the CFA data indicated an item did not measure the construct, it was eliminated. Cronbach's alpha coefficients were reported for the constructs for research question four. The actual survey respondent data were reported in secondary research question one and two. In research secondary question one, the percentages of the respondents' gender, age, academic level, declared major and department affiliation will be reported. The percentages of the respondents' responses were reported on a construct-by-construct basis. The percentages of respondents who strongly disagree, disagree, agree, strongly agree, or are neutral were also reported for each item.

Terms and Definitions

The following terms and their definitions have been established to clarify the specific aspects of this study. In the creation, piloting, and validation of the survey the respondents and constructs must be clearly defined and set. The validity of the constructs and of the survey itself partially rest on the clear and precise identification of the nature of the respondents, components of the survey, and of the validation process. The following are the terms and definitions for this study:

1. Respondents: The undergraduate students who successfully complete the survey.

2. Undergraduate students: Any actively enrolled Psychology, Educational Psychology, Human Development and Family Studies (HDFS), or Health Education student who is actively enrolled at the University of Houston and classified as a freshman, sophomore, junior, and senior student during the 2012 spring semester.

3. Creativity: This term will be operationally defined as the general attitude in which the survey's constructs jointly measure.

4. Construct: The underpinning psychological characteristic in which the factor analysis identifies the items to measure.

5. Perceptions of creativity: The items identified in the exploratory factor analysis which measure how the respondents perceive or define the construct of creativity.

6. Creative self-perception: The items identified in exploratory factor analysis which measure the how the respondents perceive the role creativity plays in their life.

7. Creativity in education: The items identified in the exploratory factor analysis which measure the role the respondents feel creativity plays in education.

Study Overview

This study serves as the researcher's dissertation study. The researcher is a doctoral candidate student enrolled at the University of Houston in the College of Education. With a background in history, education, and creativity research the researcher felt compelled to focus on creativity research. Recognizing creativity's important role in history, in education, and for the future the researcher decided to research the construct of creativity. In this research, the researcher discovered that the attitudes undergraduate students have towards creativity might have an impact on the future of creativity in the educational, political, economic, and social institutions of the future. The researcher also noticed there was not an instrument which measures the attitudes undergraduate students have towards creativity. Therefore, in the spring of 2011, the researcher piloted the survey. This study and the subsequent confirmation of the scale were completed in the spring of 2012.

CHAPTER II: Review of the Literature

History of Creativity Research

Humanity's introspective study into creativity started with the philosophers of ancient Greece. According to Sternberg (1999b) the Greeks and the Romans viewed creativity to be socially important and they associated it with madness and the capacity to be inspired. However, Christianity would ultimately shape perspectives toward creativity in western civilization until a paradigm shift in the sixteenth century corresponding with the Enlightenment.

The early Christian understanding of creativity is based from on the Creation story laid out in Genesis. In this perspective, humanity has been given the power to create from his creator (Augustine, 1950). During the middle ages, the West's understanding of creativity was firmly entrenched with Christian doctrine. The Enlightenment period radically changed the way humanity thought, reasoned, and viewed the world. The philosophers and scientists of the Enlightenment period began to empirically measure and understand the nature of human intelligence, thought, and reason (King, 2003). By the nineteenth-century, the field of Psychology opened the door to the scientific inquiry of the human conscious and behavior (Barzun, 2000). The scientific inquiry into creativity would not take place until the mid-twentieth century five years after the end of World War II.

J.P Guilford was a psychometrician involved in ability testing for the Army Air core during World War II. While serving in the military, he developed tests which measured the cognitive abilities and aptitudes of potential pilots (Plucker, 2012). The IQ test was one of several test batteries used to identify qualified personnel. However, he

determined that IQ tests failed to foretell creative qualities that the military sought. This failure of the IQ test prompted Guilford to seek other ways to test for creativeness (Feldman, Csikszentmihaly, & Gardner, 1994). After the war, in 1950, J.P. Guilford became the President of the American Psychological Association, and in his presidential address to the association he "challenged psychologists to pay attention to what he found to be a neglected but extremely important attribute, namely, creativity" (Sternberg, 1999b, p. 3). He called for an increase into creativity because of its economic and social importance (Guilford, 1950). According to Runco (2004), Guilford "argued that creativity is a natural resource and suggested that efforts to encourage creativity would pay high dividends for the whole of society" (p.8). He specifically called for an increase of research into measuring and identifying creative potential though psychometric tests. He proposed using a factor analysis to identify the components or traits of the creative person. He reasoned that, "once the factors have been established as describing the domain of creativity, we have a basis for the means of selecting the individuals with creative potentialities" (Guilford, 1950, p. 454). Due to Guilford's actions he is "credited with initiating the empirical research on creativity" (Runco, 2001, p. 245). Along with initiating research into creativity he is also credited with contributing some of the most important early research into the field (Fasko, 2001, p. 317).

During the 1950's and 60's creativity research was mostly supported by the Department of Defense with efforts to "construct new tests that would be largely independent of IQ and would better predict creativity in the areas of technological and scientific inventiveness" (Feldman, Csikszentmihaly, et al., 1994, p. 6). During this

period, Guilford and his colleagues would develop several key theories and instruments

deigned to measure the creative abilities of adults.

Guiford's Structure of Intellect

The Structure of Intellect (SOI) model introduced by Guilford in 1967 became the

most distinguished model of intelligence. Even to this day it serves as a foundation for a

"major model of creative thinking" (Sternberg & Grigorenko, 2001, p. 309). In Guilford's

SOI theory, every cognitive undertaking involves an operation, content, and a product.

The SOI model was developed to explain every possible mental function an individual

can have (Davis, 1986).

Figure 2.1 Guilford's Structure of Intellect Model
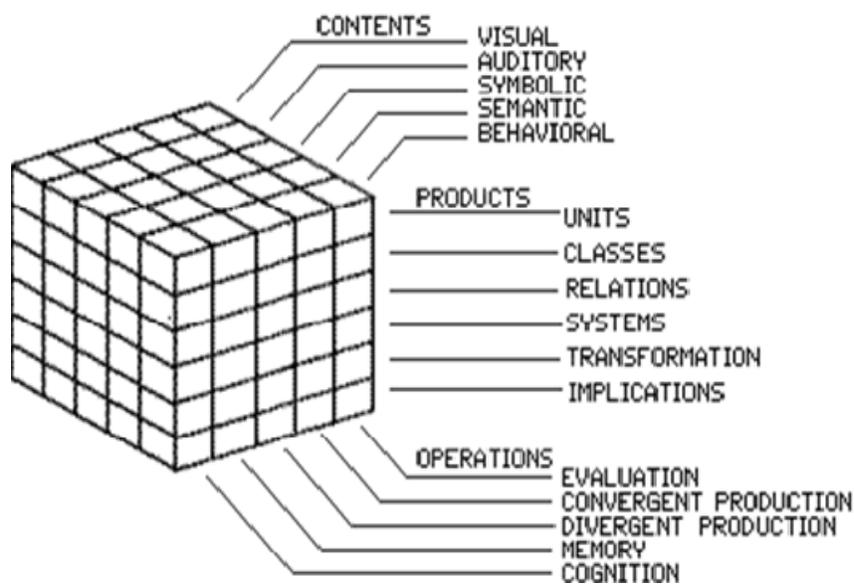
Figure 2.1. Guilford's Structure of Intellect Model (Culatta, 2012). Each cell in the cube
represents a cognitive ability, totaling 150 possible unique cognitive functions.

Guilford used the factor analysis method to identify the three main cognitive categories along with their subsequent functions. According to Guilford, creativity primarily lies in the divergent productions of the intellect (Bloomberg, 1973; Dacey & Madaus, 1969; Sternberg & Grigorenko, 2001). Divergent thinking is the process of generating several unique ideas from a singular paradigm while convergent thinking is combining several ideas into one paradigm (Bronson & Merryman, 2010). Divergent productions may operate with each of the functions of the content and products categories. According to Bloomberg (1973), Guilford identifies the factors of fluency, flexibility, originality, and elaboration as the characteristics of divergent creative productions. Not long after Guilford presented his SOI model, researchers and psychometricians began developing instruments to measure creative ability based on divergent thinking skills (Sternberg, 1999b). Eventually, Guilford departed from the 'divergent' paradigm of creativity he identified in the SOI model to construct an alternative explanation for creativity (Sternberg & Grigorenko, 2001). Guilford's structure of creativity describes it as a series of problem solving abilities identified below:

Table 2.1

Guilford's Structure of Creativity

1. Sensitivity to problems, or the ability to recognize problems.

2. Fluency, which encompasses

    a. Ideational fluency or the ability rapidly to produce a variety of ideas that fulfill stated requirements.

    b. Associational fluency or the ability to generate a list of words, each of which is associated with a given word.

    c. Expressional fluency or the ability to organize words into larger units, such as phrases, sentences, and paragraphs.

3. Flexibility, which encompasses

    a. Spontaneous flexibility or the ability to demonstrate flexibility.

    b. Adaptive flexibility or the ability to produce responses that is novel and high in quality.

(Sternberg & Grigorenko, 2001, p. 310)

Guilford's SOI model and theory on creativity spawned a series of intelligence and creativity tests during the 1960's. However, the Soviet's lunch of Sputnik 1 in 1957 and President Kennedy's call for a "man on the moon" by the late 60's would have unintended consequences for the field of creativity research (Feldman, Csikszentmihaly, et al., 1994).

Torrance's Measurements of Creativity

In the late 1960's, the focus of creativity research shifted from adults to children. The purpose for this shift towards children was to identify them and "give them intense training in science and related subjects, provide incentives for choosing careers in the national interest, and he result would be a generation of superior talent" (Feldman, Csikszentmihaly, et al., 1994, p. 7). According to Baer (1993), of the various many instruments designed during this time period, the most notable and enduring are the Torrance Tests of Creative Thinking (TTCT) developed by E. Paul Torrance, who was a colleague of Guilford. Torrance drew from Guilford's SOI model to develop instruments that measure the creative abilities of children (Feldman, Csikszentmihaly, et al., 1994). Torrance applied the divergent production from Guilford's SOI model to serve as the

theoretical basis for the TTCT (Davis, 1986; Kaufman & Baer, 2006; McCann, 2009; Runco, 2004; Sternberg, 1999b; Sternberg & Grigorenko, 2001). The tests are available in two forms "A" and "B" and each form consists of two separate tests, one verbal and one figural. There are seven activities in the verbal test which measures how well the respondent thinks creatively with words (Davis, 1986). In the three non-verbal or figural sub-tests, "an incomplete or abstract sketch is presented and the examinee is asked to complete the drawing – making the picture into something meaningful or imaginative" (Davis, 1986, p. 163). The TTCTs measurement of divergent and convergent thinking skills has become the "gold standard in creativity assessment" (Bronson & Merryman, 2010, p. 45). According to McCann (2009) the TTCT are scored on the flowing criteria:

1. Fluency- the production of many ideas.

2. Originality- the uniqueness of ideas.

3. Flexibility- the modifiability of ideas.

4. Elaboration- the extension of ideas. (p.7)

The TTCT marked the pinnacle for creativity research during the late 60's to the early 70's. However, not all creativity researchers are convinced of the TTCT's validity and assumption that creativity is a divergent cognitive function and problem solving skill (Healy, 1994).

Not long after the advent of the TTCT, the theoretical arguments for conducting creativity research and testing shifted. Creativity research was becoming viewed as a way to achieve personal fulfillment and social liberation rather than serving national security interests (Feldman, Csikszentmihaly, et al., 1994; Sternberg, 1999b).

The paradigm shift for conducting research in the early 70's proved to be a fateful move

for the field Feldman, Csikszentmihaly, et al. (1994) explain:

> As creativity research moved away from technological, military, and scientific
>
> goals, its power base and sources of support virtually vanished. Creativity
>
> research became seen as part of the revolutionary social movement of the 1960's,
>
> part of the 'problem' rather than a solution (P.9).

During the 1970's and on towards the 80's creativity research was confined to a handful

of creativity researchers concentrating on identifying and developing the creative abilities

of gifted and talented children (Sternberg, 1999b).

Renzulli's Enrichment Triad

The Enrichment Triad Model, developed by Renzulli in 1977, was designed to

develop the creative productivity in children by exposing them to the following three

types of Enrichment:

Table 2.2

The Enrichment Triad Model

1. Type I: General Exploratory Activities

    a. Expose children to a wide variety of disciplines that would not be
       regularly taught in the standard curriculum.
    b. Community leader, parents, students, and school officials collaborate
       to organize and plan Type 1 enrichment activities.

2. Type II: Group Training Activities

    a. Engage students in activities that promote thinking and feeling
       processes.

    b. Incorporate activities which promote the following skills;

       i. Cognitive thinking, problem solving, critical thinking, and affective processes.
      ii. Character development and affective skills.
    iii. Learn-how-to-learn-skills.
    iv. Use of advanced-level reference materials.
     v. Written, oral, and visual communication skills.

3. Type III: Individual & Small Group Investigation of Real Problems

    a. Allow students to engage in activities that interest them.
    b. Assist students in pursuing advanced training activities of their interest.
    c. Provide opportunities where students develop products.

(Renzulli & Reis, 2008, p. 19)

In 1985, Renzulli used the Enrichment Triad Model as a basis to develop yet a new, broader system designed to facilitate the development of creative outputs of children (Chislett, 1994). According to Renzulli and Reis (2008) the Schoolwide Enrichment Model (SEM) is a goal-based program designed to make schools into "enriching places where the mind, spirit, and values of each student are expanded and developed in an atmosphere that is enjoyable, interesting, and challenging" (p.7). The SEM is a system that is facilitated by the following five goals:

Table 2.3

The Schoolwide Enrichment Model

1. Goal I: A Focus on Talent Development

    a. Systematically assess strengths.
    b. Provide opportunities, resources, and services to develop student strengths.
    c. Use flexible differentiated curriculums.

2. Goal II: Improve Academic Performance of all Students

      a. Focus on making schools meaningful and enjoyable for impoverished and disadvantaged students.

3. Goal III: Bolster the Teaching Profession

      a. Promote continuous, reflective, growth-oriented professionalism.

4. Goal IV: Promote Social Values

      a. Create learning communities that honor, ethnic, gender, and cultural diversity.
      b. Encourage respectful behavior, respect for the democratic system, and for Earth's natural resources.

5. Goal V: Decentralize School Management

      a. Create decision making opportunities for students, parents, teacher, and administrators.

(Renzulli & Reis, 2008, pp. 8-10)

This model has been used in schools throughout the world from its inception and has been a major contribution to creativity research in the area of gifted and talented education (Chislett, 1994). While creativity researchers focused on identifying and developing the creative abilities of children in the 1970's and 80's there was a growing shift towards researching the meaning of the construct of creativity.

    Guilford's and Torrance's early work in the field of creativity research was based on the SOI model's assumption that creativity is a divergent problem solving process (Parkhurst, 1999). Today, Guilford's SOI model, "is considered by many psychologists to be somewhat of a theory of the past" (Sternberg & Grigorenko, 2001, p. 310). Due to the abandonment of Guilford's SOI model during the 1980's, the psychometric instruments that used the model as a theoretical basis have been scrutinized for their

validity (Baer, 1993; Feldman, Csikszentmihaly, et al., 1994; Westland, 1969). Baer

(1993) states:

> Divergent thinking tests were once the most common measure of creativity in
>
> psychological and educational research, but their popularity among researchers is
>
> waning because of serious questions about validity (p.80).

 As the SOI model became less popular, a void for a definition of creativity was formed.

Definitions of Creativity

In the 1980's, researchers began the task of understanding and defining the

construct of creativity. Several researchers defined creativity in terms of person, product,

press, and process (Davis, 1986; Rhodes, 1961). Csikszentmihaly (1997); Runco (2003);

Sternberg and Lubart (1996) presented their own theories on the construct of creativity.

According to Parkhurst (1999) there are over 60 definitions of creativity in the literature.

Gotz (1981) defines creativity as the process of making something. Westland (1969)

believes that science cannot unlock the mystery of creativity because it is "a mystery:

something we respond to intuitively" (p.130). Guilford (1950) defined creativity to be an

aspect of intelligence as indicated in his SOI model. Torrance also believed that

creativity is an aspect of human intelligence (Kaufman & Baer, 2006). Feldman defines

creativity as "a transformation of a body of knowledge, where that transformation is so

significant that the body of knowledge is irrevocably changed..." (Feldman,

Csikszentmihaly, et al., 1994, p. 87). According to Sternberg (1999b), some view

creativity as a spiritual phenomenon, where creativity is something that is spiritually

inspired. Bohm (1968), believes that because of creativity's complex nature it cannot be

defined. According to Richards (2007), Mark Runco defined creativity as a phenomenon where to be human is to be creative.

The lack of a singular definition for the construct of creativity has created validity issues in instruments and has thwarted attempts to design curricula and instructional approaches (Mumford, 2003). Bohm (1968), Craft (2003), Cramer, Neal, DeCoster, and Brodsky (2010), Dacey and Madaus (1969), Gotz (1981), Healy (1994), Mumford (2003), Parkhurst (1999), Westland (1969) call for a singular definition of the construct of creativity to be established in order to ensure the validity of creativity-based educational programs and psychometric instruments.

Four consistent themes of creativity have been identified in the published literature (Richards, 2007). The literature may be organized into the themes of the creative person, creative product, creative press, and the creative process (Davis, 1986). According to Davis (1986) the creative person, process, product and press are "interrelated in the obvious way: creative products are the outcome of creative processes engaged in by creative people, all of which is supported by creative environment (press)" (p.41).

The Creative Person. The term 'person' connotes a person's "personality, intellect, temperament, physique, traits, habits attitudes, self-concept, value systems, defense mechanisms, and behavior" (Rhodes, 1961, p. 307). According to McCann (2009) creativity researchers and theorists attribute certain characteristics that are typical of creative people. Many characteristics of the creative person may be positive in that they are beneficial toward the person however; many negative traits have also been

associated with creative people. The nineteen general 'positive' biographical

characteristics of the creative person are identified in Table 2.4.

Table 2.4

Positive Biographical Characteristics of the Creative Person

1. Aware of their creativeness
2. Independent
3. Self-confident
4. Risk-taking
5. Energetic
6. High in energy
7. Enthusiastic
8. Spontaneous
9. Adventurous
10. Thorough
11. Curious
12. Wide Interests
13. Good sense of humor
14. Playful and childlike
15. Artistic
16. Idealistic
17. Reflective
18. Needs for Privacy and alone time
19. Attracted to novelty, complexity, and the mysterious

(Davis, 1986, p. 37)

The creative person's various biographical characteristics may or may not be observable

(Durrenberger, 1999). Davis (1986) believes some creative people might exhibit a few of

the characteristics, others might exhibit all, and others might exhibit the characteristics in

various combinations. Creative people might also exhibit the negative biographical traits.

According to Durrenberger (1999) a small portion of creative people suffer from various

kinds of mental illnesses which may result in the 'negative' biographical traits of the

creative person listed in Table 2.5.

Table 2.5

Negative Biographical Characteristics of the Creative Person

---

1. Egotistical

    a. Intolerant, self-centered, snobbish.
    b. Claims the rest of the parade is out of step.

2. Impulsive

    a. Acts without planning.
    b. Careless, impatient, irresponsible, capricious, disorganized, tactless.

3. Argumentative

    a. Cynical, rebellious, uncooperative, defiant, sarcastic, stubborn, autocratic.
    b. Little regard for rules, conventions, mores, law, and authority.

4. Immature

    a. Childish, sloppy, silly.

5. Absentminded

    a. Forgetful, mind wonders, careless, watches windows.

6. Neurotic

    a. Aloof, temperamental, uncommunicative.
    b. Low frustration tolerance.
    c. Mildly sociopathic.
    d. Unable to control emotions.

7. Hyperactive

    a. Physically and mentally overactive.

(Durrenberger, 1999, p. 173)

These traits are considered negative because of their ability to cause "personal or social

adjustment problems for the child or adult" (Davis, 1986, p. 45). The negative traits listed

in Table 2.5 may stem from attitudes, personality disorders, and other mental health issues. The primary affective disorders from which creative people suffer are bipolar disorder, psychosis, and schizophrenia (Runco, 2004). However, Durrenberger (1999) states that affective disorders may contribute to a person's creativity because they might provide the creative person with more information, and perhaps a wide range of options and associations. People who suffer from affective disorders could be more creative because the affective disorder "would give them richer subjective experiences" (Runco, 2007, p. 140) . Theory and research indicate that those suffering from schizophrenia and schizotypal symptoms tend to be creative people because of their ability to form original and unique perceptions and ideas (Durrenberger, 1999). While not every creative person suffers from a mental disorder "the high prevalence of mental illness in certain types of creative people points to a significant connection between creativity and madness" (Durrenberger, 1999, p. 176) .

Creative personality may be described as the personality traits of the creative person (Helson, 1999). In table 2.6, Davis (1986) and Runco (2007) identify the traits, tendencies and characteristics as distinct components of the creative person's personality.

Table 2.6

Personality traits of creative people

1. Aware of Creativeness

    a. Value originality and creativity
    b. Value own creativity

2. Original

    a. Imaginative

      b. Full of ideas
      c. Flexible in ideas and thought
      d. Is a "What if?" person
      e. Resourceful
      f. Non-conforming
      g. Unconventional in behavior
      h. Challenges assumptions
      i. Enjoys pretending
      j. Constructs
      k. Builds and rebuilds
      l. Finds ways of doing things differently
      m. Radical
      n. Bored by routine

3. Independent

      a. Individualistic
      b. Internally controlled, inner directed
      c. Sets own rules
      d. Self-aware
      e. Self-confident
      f. Self-sufficient
      g. Self-accepting
      h. Unconcerned with impressing others
      i. Uninhibited
      j. May dress differently
      k. May not fit environment
      l. May resist social demands
      m. Dissatisfied with the status quo
      n. May experience conflict between self-confidence and self-criticism
      o. May need to distance from and avoid contact with peers

4. Risk Taking

      a. Does not mid consequences of being different
      b. Not afraid to try something new
      c. Willing to cope with hostility
      d. Willing to cope with failure
      e. Rejects limits imposed by others
      f. Optimistic
      g. Courageous

5. Energetic

      a. Adventures
      b. Sensation seeking
      c. Seeks interesting situations
      d. Enthusiastic
      e. Alert
      f. Spontaneous
      g. Industrious
      h. Persistent
      i. Persevering
      j. Impulsive
      k. Unwilling to give up
      l. Driving absorption
      m. Drive for accomplishment and recognition
      n. High commitment
      o. High intrinsic motivation
      p. High need for competence in meeting challenges
      q. Ambitious
      r. Thorough
      s. Goes beyond assigned tasks
      t. Strives for distant goals
      u. Task-oriented
      v. Excitable, enjoys telling others about discoveries/inventions

6. Curious

      a. Questioning
      b. Experimenting
      c. Inquisitive
      d. Wide interests
      e. Open to new experiences and growth

7. Humorous

      a. Playful
      b. Plays with ideas
      c. Childlike freshness in thinking

8. Attracted to Complexity

      a. Attracted to novelty
      b. Attracted to the mysterious, asymmetrical
      c. Is a complex person
      d. Tolerant of ambiguity
      e. Tolerant of disorder

     f.   Tolerant of incongruity
     g. Tends to believe in physical phenomena, fly saucers

9. Artistic

     a. Artistic interests
     b. Aesthetic interests

10. Open-Minded

     a. Receptive to new ideas
     b. Receptive to other viewpoints
     c. Open to new experiences and growth
     d. Liberal
     e. Altruistic

11. Needs Alone Time

     a. Reflective
     b. Introspective
     c. Internally preoccupied
     d. Sensitive
     e. Like to work by himself or herself
     f.   May be withdrawn

12. Perceptive

     a. Intuitive
     b. Sees relationships
     c. Uses all senses in observing

(Davis, 2004, pp. 70-72; Runco, 2007, p. 314)

Research indicates that the personalities of creative people consist of overlapping and often eclectic patterns (Helson, 1999). According to Helson (1999), the creative person's personality has a significant impact on the nature of the person's creativity, more specifically the creative product. Along with the personality traits listed in Table 2.6, the creative person also exhibits certain cognitive traits.

According to Cropley (1999), divergent and convergent thinking skills are the primary cognitive characteristics of the creative person. Convergent thinking skills, "involve applying conventional logic to a number of elements of information in order to zero in on one and one only best answer" (Cropley, 1999, p. 633). The creative person may use convergent thinking skills to identify a singular meaningful conclusion from a large amount of data. Divergent thinking skills enable the creative person to generate a number of unexpected patterns and associations from an existing set of data (Runco, 2007) . These cognitive skills operate in union with the cognitive ability of metacognition. Jausovec (1999) identifies metacognition as the awareness, control, and monitoring ability one has of their own cognitive abilities. The metacognition monitoring process may be categorized into three parts:

- Knowledge about oneself and others involved in the problem solving process.

- Knowledge about problems.

- Metacognitive experiences that lead to the reevaluation of strategies. (Jausovec, 1999, p. 202)

The creative person's understanding of his/her own cognitive abilities allows him/her to understand and potentially became aware of personal creativeness. Epistemic cognition allows the creative person to understand the limits of knowing and the appropriate uses of knowledge (Jausovec, 1999). For the creative person, epistemic cognition is the ability to understand the nature of complex problems and if such problems can be answered through scientific, philosophical, or rational means.

Knowledge, divergent thinking skills, convergent thinking skills, and metacognition are some of the cognitive and intellectual characteristics of the creative person. The biographical characteristics, personality traits, and cognitive abilities, do overlap in several areas and operate together (Davis, 2004).There are tremendous complexities and differentiations among the personalities and cognitive natures of creative people. As Richards (1999b) indicates, each creative person will have his/her own unique combination of biographical, personality, and cognitive traits.

The Creative Process. Richards (1999b) defines the creative process as the "ways in which creators think, feel, experience, motivate and direct themselves, and behave related to the generation of original and meaningful outcomes" (p.733). Where the traits of the creative person define the characteristics of a creative person, the creative process is the creative person's method which results in the creative outcome. According to Davis (2004) the creative process may be utilized in terms of three primary functions. First, the creative process may involve a series of steps the creative person takes to solve a problem or accomplish a task. Secondly, the creative person's change of rapid perception due to an inspiration may also be understood as the creative process. Third, the tactics and actions the creative person uses to produce the creative result may be considered a function of the creative process.

Each creative person's process is unique. The personality, abilities, perceptions and strategy of the creative person contribute to their process (Davis, 2004). Also, the domain or field in which the creative person operates may influence their process (Davis, 1986). Domains such as agriculture, mechanical engineering, theatre, warfare, cooking, bio-

chemistry, and politics each present their own unique situations and problems that must be addressed by the creative person.

Creative people have been instrumental in the course of human events by recognizing problems and solving them (Pfenninger & Shubik, 2001). Despite the wide and idiosyncratic nature of the processes of creative people, researchers have been able to establish problem solving models based on the commonalities identified in their research (Davis, 1986, 2004). E. Paul Torrance's Future Problem Solving Program (1978) describes the creative process as a methodological step-by-step procedure. The process begins with sensing difficulties and identifying problems. The person then forms a hypothesis on how to solve the problem or resolve the difficulty. The process continues with the person applying the hypothesized solutions until the problem has been solved or the difficulty resolved. This process concludes with the person communicating the results with others (Davis, 2004). This process is similar to the scientific method, where the creative person forms a series of hypothesized solutions and applies those solutions in an organized manner. Another problem solving model called the Creative Problem Solving (CPS) model includes divergent and convergent thinking skills in its design (Davis, 2004). This model developed by Alex Osborn, founder of the Creative Education Foundation, contains six stages. The six stages are:

1. Fact Finding (locating a problem).

2. Problem Finding (examining what you know about the problem).

3. Problem Finding (selecting a specific problem definition).

4. Idea Finding (brainstorming).

5. Solution Finding (evaluating ideas).

6. Acceptance Finding (implementing ideas). (Davis, 2004, pp. 103-106)

In stages one and two, the creative person utilizes divergent thinking skills to generate a pool of facts and data. In stage three, the creative person uses convergent thinking skills to identify a solution from the pool of generated data. The CPS model illustrates the relationship between divergent and convergent thinking skills. Divergent thinking skills identify the possible solutions and convergent thinking skills are used to identify the best possible solution. Torrance's four step procedure and the CPS model both provide examples of how the creative people solve problems or accomplish tasks.

Cupchik (1999) explains creative perception as the relationship between a person's sensory-based cognitive structure (idea, mental image, visual) with a particular domain of creative activity. The phenomena of forming new ideas through sudden inspiration is the nexus of creative inspiration (Davis, 2004). According to Cupchik (1999) and Davis (2004) the development of new ideas derived from a sudden change in perception is not well understood however, it is considered to be the nexus of creative inspiration. The tactics and actions the creative person uses to produce the creative depend on the nature of the person and the field in which the person operates (Davis, 2004). There are many opinions on the nature of the creative process and how it can be measured and defined.

The Creative Press. Harrington (1999) describes the creative press as the "physical, social, and cultural environments in which creativity occurs" (p.323). The creative person manipulates and is influenced by the biological ecosystem in which he or she operates (Harrington, 1999). Creative people have been modifying their local

ecosystems and physical environments throughout history. This is evident in the ancient Egyptian, Mesopotamian, Indus River and Chinese civilizations where the construction of dams and irrigation canals allowed people to grow more food and live in cities (King, 2003). Each ecosystem presents its own challenges and creative people have been developing adaptive measures through improved farming techniques, utilization of resources, and construction of cities.

The society and culture in which the creative person lives also influences the creative result. Many inventions throughout history are in response to a need of the society. Almost every invention, ranging from the development of the wheel to the invention of the internet has been in response to a need of society (Davis, 2004). The needs of a society may include military, food, water, and economic motivations. The invention of the cannon, handgun, three-masted sailing ship, steam engine, machine gun, rifled breech-loader, telegraph, nitroglycerin, auto-mobile, radio, laser, and atomic bomb are all in response to some kind of need of the society (Boot, 2006). Societal pressures and needs significantly impact the nature of problems to be solved. Global, national, communal levels of society have their unique and specific problems and/or difficulties that need solving .The progression of civilization depends on creative people responding to the technological and social needs of their time. As one generation's technological and social needs are met, new challenges arise for the creative people of the next generation (Davis, 2004). The continuous needs of the society create an ever continuing demand for creative and innovative individuals.

The culture one lives in also influences the creative people and their work (Rhodes, 1961). Creative people have been painting, composing music, carving statues, and expressing themselves artistically in partial response to the culture in which they preside (Rhodes, 1961). Cultural characteristics such as religion, values, norms, and rituals plays a role in determining what is creative and what is not (Pfenninger & Shubik, 2001). Therefore, the needs of a society likely shape what is viewed as creative and the societal demands for certain kinds of creativity are dependent on that society's needs at the time.

The Creative Product. The creative product is what is produced as a result of successfully completing the creative process. Richards (2007) defines the creative product as the "result or outcome of the creative efforts, be this a concrete product, behavior result or repertoire, set of ideas to be communicated or indeed a process one is attempting to influence" (p.733). Richards definition of the creative product encompasses any 'result or outcome' resulting from one's 'creative efforts'. This all-encompassing definition depends on how one defines 'creative efforts.' Davis (1986, 2004) defines creativity as something that has social importance, practical use, or value. As discussed earlier, the third function of the creative process is problem solving through a series of steps. In some cases the creative person will identify a need in the society and fashion a creative product to fulfill the need. If a person devises something of no value to society and/or serves no purpose then the finished product may not be considered creative (Davis, 1986, 2004). Davis's definition of the creative product is constrained in that there are limitations on what results are considered creative. The literature on the nature of the creative product is inconclusive and varied. While Richards' definition (1999b) is all

encompassing and includes any result derived from a 'creative effort,' Rhodes' definition

(1965) set constrictions on what result may be considered creative or not creative.

Creativity Theories

Organizing and reviewing the available literature on creativity in terms of

personality, person, product, and press are an effective way to cover vastness of the topic.

Of the 60 plus definitions of creativity, only a few have been well published, grounded in

theory, and validated though empirical research (Csikszentmihaly, 1997; Feldman,

Csikszentmihaly, et al., 1994; Richards, 1999a, 2007; Sternberg, 2003, 1999b; Sternberg

& Lubart, 1992a, 1992b, 1996).

In the literature, there are three established theories on creativity. The first theory

is the Investment Theory established by Sternberg (2003); Sternberg and Lubart (1992b),

in this theory, creativity is when the creative person 'buys low and sell high' in the realm

of ideas and products. In the Systems Theory developed by Csikszentmihaly (1997),

creativity is described as the relationship between the creative person, the field, and the

domain. Richards (1999a) and Runco (2004) developed the theory of Everyday Creativity

where creativity is a phenomenon of people solving the problems of everyday life.

Investment theory. In 1995, Robert Stenberg and Todd Lubart introduced the

investment theory of creativity. The investment theory of creativity is a confluent

approach towards creativity that focuses on the creative performance instead of potential

(McCann, 2009). In the Investment Theory, the creative person chooses to be creative by

"buying low and selling high." Sternberg and Lubart (1996) explain:

Buying low means pursuing ideas that are unknown or out of favor but they have

growth potential. Often, when these ideas are first presented, they encounter

resistance. The creative individual persists in the face of this resistance and

eventually sells high, moving on to the next new or unpopular idea (p.9).

The decision to pursue unknown ideas and in the face of adversity requires the creative

person to be dedicated in his/her decision and focused on his/her vision (Sternberg,

2003). In this theory, the creative act requires a series of six resources to converge

(Sternberg & Lubart, 1992a). They argue that the investment theory requires the

following resources to converge: intellectual skills, knowledge, thinking styles,

personality, motivation, and environment (Sternberg, 1999a, 2006; Sternberg & Lubart,

1992a). In this theory, the creative person utilizes the six resources to consciously

transform a relatively unknown and unpopular idea or product into a useful and

successful result.

Intellectual skills. The confluence of three following intellectual skills is

paramount in the creative person's ability to generate, analyze, and sell ideas:

1. The creativity skill to see problems in new ways and to escape the bounds of
   conventional thinking.

2. The analytic skill to recognize which of one's ideas is worth pursuing and
   which are not.

3. The practical-contextual skill to know how to persuade others of the value of
   one's ideas. (Sternberg, 2003, p. 107)

These three skills form Sternberg's triarchic theory of human intelligence and they form

the basis of the cognitive components in creative functioning (Sternberg, 1999a) The

creative person must have the innate ability to see problems differently outside the

parameters of established schools of thought. However, Sternberg (2003) emphasizes that

the creative person must consciously decide to use those innate skills.

Knowledge. A person's knowledge of the domain in which he/she operates will

set the limits of what he/she may contribute to the field (Sternberg, 2003). The person

must have a base of factual, historical, and practical knowledge in order to understand

and see the problem. Also, the ability to discern which knowledge is beneficial and which

is not is vital.

Thinking styles. According to Sternberg (2003), there are "preferred ways of

using one's abilities" (p.108). The decisions one makes in how to apply one's intellectual

skills and knowledge are important. This component is based on the particularities of the

person's preference on how to pursue their creative endeavors cognitively.

Personality. The personality of the creative person is a major factor in facing

opposition and pursuing unpopular ideas. The personality traits include readiness to face

challenges, readiness to take risks, ability to tolerate ambiguity, and self-efficacy

(Sternberg, 2003). The personality of the person must enable he/she to persevere in

relatively hostile social environments and to manipulate how others think.

Motivation. The driven, goal-specific desire to accomplish a task is an essential

component of creativity (Sternberg, 2003). According to Sternberg (2003, 2006)

motivation is not an inherent characteristic of creative people rather, it is a conscious

choice a person makes. The factors that influence one's motivation may be based on interests, needs, or ideals.

   Environment.   Sternberg (2003, 2006) and Sternberg and Lubart (1992a) define the environment as the social medium which enables the creative person to conduct their creative work. The creative person requires a social support structure that will support and reward creativity. Elements in the environment may either hinder or contribute to the creative output of the individual.

   Systems theory. In the systems theory, creativity is viewed as the interaction of three components (Csikszentmihaly, 1997). The theory is founded on the belief that creativity is the interaction of three key elements:

   The domain transmits information to the person, the person produces a variation, in which may or may not be selected by the field, and the field in turn will pass to the selected variation to the domain (Feldman, Csikzentmihalyi, & Gardner, 1994, p. 145)

An example of this process is when as individual develops a new technology that is evaluated by technology experts, and the experts will determine the usefulness of the item. If the experts deem the technology as innovative, it is transmitted to the culture. Figure 2.2 illustrates the relationship between the creative person, field of experts, and the culture in which the person operates.

Figure 2.2 Csikzentmihalyi's Systems Theory of Creativity
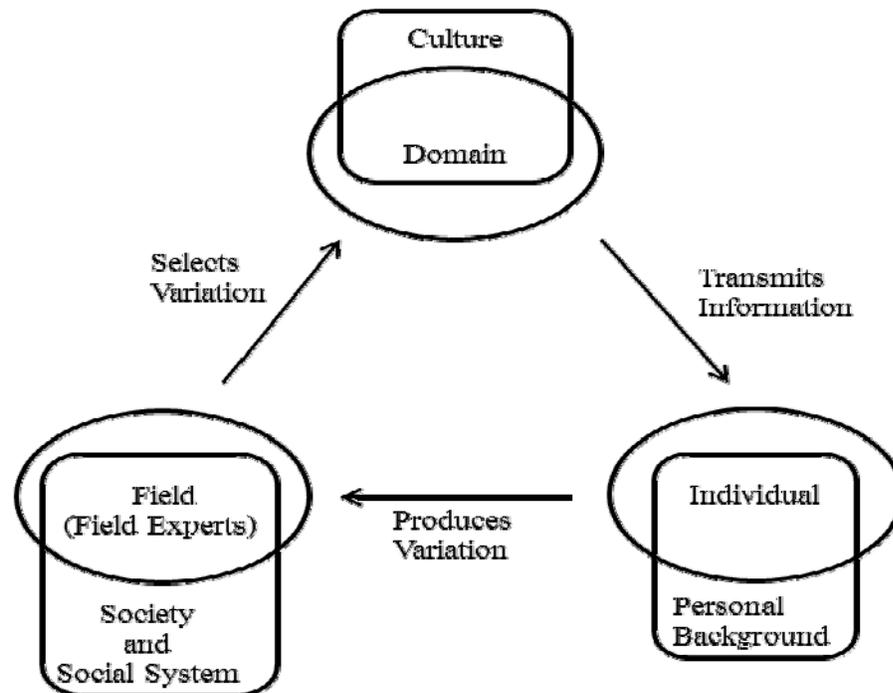
Figure 2.2 Demonstrates the relationship between the individual, domain, and the field (Csikszentmihaly, 1997, p. 6; Feldman, Csikszentmihaly, et al., 1994, p. 21; Sternberg, 1999b, p. 315).

The interaction described in Figure 2.2 illustrates the domain as the culture in which the person operates. The culture transmits to the creative person what is valuable or necessary. The creative person will take the information from the culture and fashion a product or variation (Pfenninger & Shubik, 2001). The field of experts will judge the creative variation. If the variation is approved by the field, it is transmitted to the culture where it is then utilized (Feldman, Csikszentmihaly, et al., 1994).

The creative person "solves problems or fashions products in a domain in a way that is initially novel but becomes acceptable in at least one cultural setting" (Pfenninger & Shubik, 2001, p. 129). According to Sternberg (1999b) three conditions are required of the creative person. First, the person must have access to the domain and perform

according to its particularities. Secondly, the person must exhibit creative personality traits and be highly motivated. Personality traits such as divergent thinking skills and disregard for established rules are essential. Third, the person must have the ability to convince the members of the field of the virtue and worth of the creative variation. The personal background of the person also contributed to the creativity process. The families, economic, social, and educational factors each influence the creative person in some fashion or form.

The domain is comprised of all of the facets of human culture and society. According to Sternberg (1999b), the domain cannot be understood as a singular construct. Each particular facet of human culture and society is considered a domain in its own regard. A culture's art, music, religion, cuisine, and morals are domains in their own regard. The field is "that part of the social system that has the power to determine the structure of the domain" (Feldman, Csikzentmihalyi, et al., 1994, p. 151). Each cultural domain is guarded and formed by the field of experts who determine what is creative and what is not. The field experts of each domain may control the structure of the domain by strategically choosing what creative variations to pass or and to reject.

Everyday theory of creativity. Another theory that has been well established in the literature is that of everyday creativity. According to Runco (2004), everyday creativity is the process of people solving the problems of everyday life and "any thinking or problem solving that involves the construction of new meaning…" (p.318). This inclusive perspective of creativity is founded on the nation that everybody is and can be creative.

Everyday creativity theory is founded on the belief that creativity is an innate human characteristic. Richards (2007) believes that creativity is a part of human nature and because of this every person is creative. In this theory, creativity "is an everyday phenomenon...it helps each person cope with hassles, express him or herself, and adjust to changes" (Richards, 2007, p. 93). This view of creativity is not limited to certain individuals or domains.

This theory is popular among educators because it "does not require high-level achievement or expertise, so children can (and do) demonstrate it" (Runco, 2004, p. 678). In this theory, creativity is an intrinsic characteristic of human nature; thus, it is a condition shared by all (Richards, 2007, p. 92). The implication of this theory in education is that educators can facilitate the development of creativity in every child.

Creative Self-Perception

The manner in which one perceives one's own creativity may influence one's behavior in both personal and professional lives (Diakidoy & Kanari, 1999). There are many ways in which an individual may perceive the role creative plays in his/her life. According to Sternberg and Lubart (1992b), a person might use their creativity to make innovative things. Davis (1986) believes that some individuals may perceive themselves as being artistically creative. In the Everyday Theory of creativity developed by Runco (2004), people might perceive creativity playing a role in everything they do.

As indicated by Tierney and Farmer (2002), there is a relationship between a person's creative self-perception and his/her creative endeavors. Therefore, if a person believes he/she is a creative person, there is a chance he/she may participate in some kind

of creative behaviors. Also, if a person states that being creative is important, then it is likely that he/she consciously engages in some kind of creative activity. Davis (1986) notes that creative people are aware of their creativity and they are likely to admit they are creative when asked.

Creativity's Role in Education

In May of 1999, the British National Advisory Committee on Creative and Cultural Education (NACCCE) issued a report to the Secretary of State for Education and Employment calling for a revision of the national curriculum for the British compulsory education system. The report acknowledged the seriousness of the economic and social challenges that wait in the not so distant future. The committee recommended that the national curriculum committee adopt programs that focus on creative education and "forms of education that develop young people's capacities for original ideas and action" (NACCCE, 1999, p. 5). The recommendations included promoting teaching styles that foster young people's creative problem solving abilities and training teachers in creative education. In the past twenty years, governments around the globe have enacted curriculum changing policies to foster creative and innovative development (Craft, 2003, p. 115). As the economic and social problems of the world become increasingly more complex and challenging, employers are pressuring educational systems to incorporate creativity development into their curricula and instruction (Farzaneh et al., 2010; Petocz et al., 2009).

Major Recent Research

Creative self-perception of Chinese workers. Xiang, Qian, Nini, and Lei (2010)

conducted a study to determine the relationship between self-perceived creativity and

innovative behavior. They hypothesized that people with high creative self-perception

should exhibit creative behavior. To test their hypothesis, they administered

questionnaires to 360 Chinese workers and their supervisors.

The survey instrument administered to the workers measured two constructs. The

first construct consisted of 14 items and it measured how much the Chinese philosophy of

Zhong Yong influenced their lives. Zhong Yong is a Confucian philosophy of social

harmony, balance between extremes, and living life holistically (Xiang et al., 2010). The

second construct measured the respondent's creative self-perception. The respondents

were asked to indicate the role creativity plays in their life on a seven-point Likert scale

ranging from strongly disagree to strongly agree. Then, the researchers administered a

similar survey to the worker's supervisors asking them to rate their employee's creative

output.

The researchers reported that "self-perceived creativity scores were significantly

correlated with supervisor-rated innovation behavior" (Xiang et al., 2010, p. 55). These

findings indicate that one's perception of his/her own creativity influences creative

behaviors. Therefore, respondents' creative self-perception may be a valid indicator of

their creative behavior.

British student teachers' concepts of creativity. To study and improve student

teachers' attitudes toward creativity, Newton D.P (2009) measured the attitudes of 16

science student teachers in England. The researchers first administered a questionnaire

measuring their concepts of creativity and the role they believe creativity plays in science

education and in education in general. The researchers took the responses from the

questionnaires to ask follow-up questions to clarify and supplement the interviews. The

researchers then analyzed the questionnaire data and the interview responses and grouped

the data into categories. The research questions were answered from the categorically

grouped data.

The researchers reported that the student teacher conceptualized creativity as

"novelty of thought" (Newton D.P, 2009, p. 54). The student teachers also indicated that

creativity plays in a role in science education. The researchers reported that the responses

of the student teachers formed five conceptual groups:

1. Children display creativity by constructing explanations of scientific

   phenomena.

2. The process of using the imagination to construct descriptive mental

   projections is creative.

3. Children identifying and using factual information to solve practical problems

   is creative.

4. Group collaboration on a shared feeling toward a topic in science was

   conceptualized as creative.

5. Creating things by following instructions. (Newton D.P, 2009, pp. 54-55)

According to Newton D.P (2009), the conceptions student teachers have toward creativity

may impact the future of creative based education programs.

Austrian art students' definitions of creativity. Gluck et al. (2002), conducted a study to measure the difference of creativity definitions between 'free' and 'constrained' art students at the Austrian Art Academy. The researcher defined 'free' artist as painters, sculptors, or metal designers and 'constrained' artists as architects, designers, and graphic designers. Each group was administered the German Definitions of Creativity Questionnaire (DOCQ) which is a "short quantitative and qualitative assessment of a person's individual conception of creativity" (Gluck et al., 2002, p. 57).

The sample consisted of 22 'free' art students, 43 'constrained' art students, and 47 psychology students who served as a control group to the artists. The researchers used a content analysis to determine how the respondents define creativity. Also, they conducted a factor analysis to identify the latent structure of the responses. The results were analyzed with an analysis of variance to determine if there were any significant differences among the groups.

The researcher reported that all three groups believed that creative people must have many ideas (Gluck et al., 2002). However, there were significant differences in how the groups defined creativity. According to Gluck et al. (2002), 'free' artists defined creativity as risk-taking and hard work. The 'constrained' artists defined creativity as a problem solving process, and while the psychology students defined creativity as a skill that is valuable for society.

This study used a questionnaire to ascertain how a group of people define creativity. The use of DOCQ uses qualitative and quantitative means to measure the

respondent's perception toward the construct. The study sets a precedent for the use of questionnaire type instruments in the measurement of the how creativity is defined.

Undergraduate beliefs about creativity. According to Diakidoy and Kanari (1999):

> Understanding teacher's beliefs about creativity may provide valuable insights into their practice with respect to creativity objects, and may also provide the foundations for the improvement of professional preparation and training (p.226).

In an effort to contribute to the understanding of educational undergraduate beliefs about creativity the researchers surveyed 49 undergraduates majoring in education at the University of Cyprus. The open-ended questionnaire assessed the beliefs the student teachers have about creativity. The follow items are a selected few from the questionnaire:

1. How do you define creativity?
2. Can a teacher facilitate creativity in pupils?
3. Can children manifest their creativity in a variety of ways?
4. Good students are more likely to be creative than average students?
5. Creativity is a characteristic of all people.
6. Is creative thinking different from the thinking required to solve the problems of life? (Diakidoy & Kanari, 1999, pp. 241-243)

The items required the respondents to do the following: define creativity, describe its relationship to intelligence, list the domains of creativity and explain the role creativity plays in the educational process (Diakidoy & Kanari, 1999).

Diakidoy and Kanari (1999) reported 65.3 % of the respondents conceptualizing creativity as a "process leading to novel outcomes or products" (p.230). Along with conceptualizing creativity as a process, the respondents conceptualized creativity as a quality that every person demonstrates and utilizes in daily life by producing creative products and solving problems.

Indonesian teacher and student perceptions towards creativity. Tin et al. (2010) conducted a study measuring the perceptions Indonesian students and teachers have towards creativity. In the study, each subject had to read several poems written in a creative writing class and then choose the poem they deemed to be most creative. The subjects had to explain the criteria they used in judging the creativity quality of the poems. The researchers reported that the students and teachers considered the most creative poems to contain the qualities of originality, novelty of ideas and language play.

European teachers' attitudes towards creativity. In 2009, in an effort to promote creativity and innovation, the European Union coordinated several programs and events in a multinational event called the European Year of Creativity and Innovation. Recognizing the magnitude of the various problems that lay ahead, the European Union enacted several programs that focused on fostering the creative abilities for all persons of society. The member states of the European Union collaborated in "holding conferences on the neuroscience of creativity, financing teacher training, and instituting problem-based leaning programs driven by real-world inquiry for both children and adults" (Bronson & Merryman, 2010, p. 45). Along with all of the events listed above, the European Union administered a survey to all of the educators in Europe.

In 2009, a survey entitled, *Creativity in Schools in Europe: A survey of Teachers* was sponsored by the European Commission on Education and launched by the European Schoolnet Network. The survey was designed to accomplish to answer the following questions:

1. How do teachers in Europe frame and conceptualize creativity?

2. What assistance do European teachers need in order to foster student's creativity?

The European Schoolnet Network is comprised of all of the Ministries of Education in every member nation of the European Union. The survey was distributed to all 27 members of the European Union including the non-member nations of Croatia, Macedonia, Iceland, Norway and Turkey. The survey was distributed and posted on-line for the respondents to complete from September 15, 2009 to October 15, 2009 and 12,893 responses were collected. The following items where used in the European Survey as reported by Quintin (2009):

Creativity is a skill that can be applied to every domain of knowledge.

Creativity is a skill that can be applied to every school subject

Creativity is a fundamental skill to be developed in school.

Everyone can be creative.

Creativity is about finding connections between things that have not been connected before.

Creativity can be taught.

Creativity can be assessed.

Creativity varies according to groups.

Creativity is an inborn talent.

Creativity is only relevant to visual arts, music, drama and artistic

performance.

Creativity is a characteristic of eminent people only.

Creativity was covered in my teacher training.

I have received training on innovative pedagogies or methods. (pp. 11, 17, 19,

21)

According to Quintin (2009), in measuring the attitudes of European educators, the

survey provided valuable insights into the Europeans Union's collaborative effort to

foster a spirit of creativity and innovation in educational systems. The report also stated

that the results "are extremely encouraging for the development of a specific line of

policy cooperation on creativity and innovation in Europe, with education as a key actor"

(Quintin, 2009, p. 7).

Why develop a survey to measure undergraduate attitudes towards creativity?

Understanding how undergraduates define creativity, the role they believe it has

in education and their creative self-perception 'may provide valuable insights' into what

role creativity will play in their future personal and professional lives. As Chaiklin (2011)

and (Xiang et al., 2010) suggest, if there is in fact a relationship between attitudes and

behaviors, the future of creativity programs in society may be influenced by measuring

the attitudes of current undergraduates. However, there is not an instrument available in

the literature that is designed to measure the attitudes undergraduates hold toward

creativity. Therefore, the development of a valid and reliable survey which measures undergraduates' attitudes toward creativity is needed because such an instrument will have useful implications for a variety of institutions for curricular development, for instruction, and for assessment of creative potential.

According to Diakidoy and Kanari (1999) educators "beliefs may influence their perceptions and evaluations of outcomes as well as their choice of instructional methods and tasks" (p.226). Thus, the beliefs or attitudes current educational undergraduates have towards creativity may provide some insight into what role creativity will play in the classroom and educational programs of tomorrow. According to Runco (2007), if one's perception of his/her own creativity can influence one's actual creative performance then an instrument to measure the creative self-perception of current undergraduates could explain what role creativity plays in the personal and professional areas of their lives. Also, understanding how undergraduates define and conceptualize creativity may explain how their creative self-perception impacts their behaviors.

De Miranda et al. (2009), K.-W. Cheng and Chen (2009), Muhammad Abi, Sofian Abdul and Azman Che (2010), Vorley et al. (2008) argue that governments and business consider educational systems to be the future centers of creative thinking, innovation, and problem solving. If educational systems are to be institutions of innovation and problem solving then educators must be capable facilitators of creative thinking and learning. The attitudes future educational professionals have toward creativity need to be measured and analyzed to ensure the future of educational programs and policies likely to engender individual creativity and creative productivity.

Chapter III: Instrumentation, Respondents, and Methodology

Pilot Survey Development.

    Pilot Survey Design. A valid and reliable instrument is needed to measure the attitudes undergraduates have toward creativity. Therefore, the researcher designed, created, and test piloted a survey to measure the attitudes of undergraduate students. The pilot Likert scale survey consisted of 37 items. The response choices ranged from 'strongly disagree' to 'strongly agree' with a middle neutral choice. The survey was administered in the Spring 2011 semester to a group of 43 undergraduate students enrolled in an Educational Psychology department at a large urban research university in the Southwestern United States.

    Development of pilot survey constructs. The first step the researcher took was the establishment of conceptual constructs and the items deigned to measure them. To ensure validity of the scale, the researcher ascertained that the constructs were well grounded in the literature. Table 3.1 lists the three constructs along with their formative sources.

Table 3.1

Pilot Survey Constructs with Sources

Construct	Source
General perceptions of creativity as a construct	(Petocz et al., 2009; Quintin, 2009)
Creative self-perception	(Xiang et al., 2010)
Creativity in the educational process	(NACCCE, 1999; Quintin, 2009; Runco, 2003)

The literature demonstrates that these constructs, if measured correctly, can offer

valuable insights into the role creativity will play in the educational, economic, and

societal systems of the future (V. M. Y. Cheng, 2010; Diakidoy & Kanari, 1999; Hong &

Kang, 2010; NACCCE, 1999; Tin et al., 2010). In order to achieve valid EFA results the

researcher ensured the items for each construct were well grounded in the literature and

measured each construct.

      Pilot Survey Items and Constructs. The items and subsequent formative sources

for each construct will be listed one construct at a time. Also, the underlying thought

process for the items of each construct will be discussed.

      Creative self-perception. According to Runco (2007) **,** a person's opinion of

his/her own creativity or 'creative self-perception' can help explain the capacity that

creativity will have in their behavior and personal philosophy. Thus, people who believe

they are creative probably participate in creative activities. Research indicates a strong

relationship between creative self-perception and creative behaviors at the work place

(Davis, 2004). Therefore, items designed to measure the creative self-perception of

college undergraduate students might be an indicator of their creative behaviors now and

in the future. As Xiang et al. (2010) indicate, persons with high creative self-perception

are likely to exhibit creative behaviors. Also, creative people are very likely to admit

they are creative when asked (Davis, 1986). Therefore, the items for this construct were

designed to ascertain how the respondent perceives his or her own creativity. The

literature contains no pre-existing instrument to measure creative self-perception,

particularly among undergraduate students. The investigator developed ten items based

on the literature and the biographical and personality traits described in Davis (2004).

For example, the item 'I have a lot of creative ideas' used by Xiang et al. (2010) served

as a template for the item 'I have a creative idea every day.' Table 3.2 contains the items

and their formative sources for the construct, creative self-perception.

Table 3.2

Items and their sources for Creative Self-Perception

Items	Formative Sources
I use my creativity to make things	
I like to solve problems	
I am a creative person	
I have a creative idea every day	
Being Creative is important to me	(Davis, 2004; Runco, 2007; Xiang et al., 2010)
I apply my creativity in everything I do	
I have creative hobbies	
I am artistically creative	
Creativity is of little practical use to me	
I would take a course on creativity if it was offered	

General perceptions of creativity as a construct. The rationale behind the 17

items for this construct was based on two primary sources. The first source used to

construct the items was the 2009 European survey measuring teacher attitudes towards

creativity. In this survey the respondents were asked to "express their opinion about how

they view creativity, as a general concept" (Quintin, 2009). According to Quintin (2009),

the following are the European survey items that measured general perceptions towards creativity:

- Everyone can be creative

- Creativity is about finding connections between things that have not been found before

- Creativity varies according to age groups

- Creativity is an inborn talent

- Creativity is only relevant to visual arts, music, drama and artistic performance

- Creativity is a characteristic of eminent people only
  (p.11)

The European survey served as a template for six items. For the other 11 items, three established creativity theories were used as foundations. According to Csikszentmihaly (1997) , culture and society play essential roles in determining if a product or idea is creative. Sternberg and Lubart (1996) describe creativity as a problem solving process where the individual capitalizes on ideas. Other researchers such as Runco (2007), believe that creativity is something that everybody does in solving the problems that come forth in everyday life.

Using the examples in the 2009 European survey and the information from the literature, the investigator constructed 17 items to measure undergraduate perceptions toward creativity as a construct. The items were designed to measure how the respondents define creativity according to the established research to ensure validity and reliability. Table 3.3 contains the items and their formative sources.

Table 3.3

Items and their sources for General Perceptions of Creativity as a Construct

Items	Formative Sources
A person solving everyday problems is creative	(Runco, 2003, 2004, 2007)
Creativity can be applied to all aspects of life	
Everybody is creative	
Society Judges what is creative	(Csikszentmihaly, 1997)
What is creative in one culture might not be in another	
Creative ideas are original	(Sternberg, 2003, 2006; Sternberg & Lubart, 1992a)
Creative people make innovative products	
"Thinking out of the box" is creative	
Creativity and intelligence is the same thing	
Creative people are innovators	
Creativity is a problem solving process	
People are born creative	(Quintin, 2009)
Creativity is definable	
Everybody is creative	
Creativity is a cognitive process	
Creativity only applies to artistic activities	
Creativity is a learned trait	

Creativity in education. The items for this construct are designed to measure what role the respondent thinks creativity plays in the educational process. The majority of the items have been adopted from the 2009 European survey measuring teacher attitudes toward creativity in education. As reported by Quintin (2009), the following items were used to measure the attitudes of European teachers:

- Creativity is a skill that can be applied to every domain of knowledge

- Creativity is a skill that can be applied to every school subject

- Creativity can be taught

- Creativity can be assessed

- Creativity is a fundamental skill to be developed in school

These items listed are designed to measure the general attitudes of creativity in education.

Due to the fact that the respondents are undergraduates from various disciplines the

terminology is focused on broad themes of learning, teaching, and assessment. Thus, the

items may be appropriate for any undergraduate population. In Table 3.4, there are 11

items listed along with the corresponding formative sources.

Table 3.4

Items and their sources for Creativity in the Educational Process

Items	Formative Sources
Teachers need to teach students to be creative	
Creativity applies to all aspects of education	
Creativity is a necessary skill	
People can learn to be creative	(Best, 1982; Craft, 2003; Quintin, 2009)
Creativity should be an important goal in education	
Creativity can be tested	
Creativity applies to all academic subjects	
Educating people to be creative is a waste of time	
Teaching people to be creative is important	(Runco, 2004)

Exploratory factory analysis data. The researcher computed initial and Varimax rotated matrixes in order to identify the latent constructs. The item factor loadings in each matrix were analyzed. According to Field (2009), items with factor loadings less than .45 are ones that do not measure the construct and hence need to be eliminated. Therefore, the investigator eliminated the items with low factor loadings and items that loaded high across several factors. In Table 3.5, the Varimax rotated component matrix displays three distinct and identifiable constructs. The items that were retained are shaded in grey.

Seven items in the first component in the Varimax matrix were retained. The items suggest that the construct creative self-perception was measured. The five items retained in the second component suggest that the construct of perceptions of creativity is measured. The four items retained in component three exemplify the construct, creativity in the education process.

Table 3.5

EFA Initial and Rotated Factor Loading Component Matrixes. Shaded segments are factor loadings greater than .45.

	Initial Component Matrix			Varimax Rotated Component Matrix		
	1st	2nd	3rd	1st	2nd	3rd
Creativity can be applied to all aspects of life.	.28	-.61	.23	.05	.65	.02
What is creative in one culture may not be in another.	.2	-.78	.23	-.05	.79	-.05
Creative people make innovative products.	.23	-.7	.02	.01	.72	-.41
Creative ideas are original.	.54	-.51	.03	.29	.85	.12

"Thinking out of the box" is creative.	.38	-.69	.3	.05	.8	.18
I use my creativity to make things.	.71	-.08	-.2	.75	.27	.05
I am a creative person.	.81	.07	-.41	.89	.08	.09
I have a creative idea every day.	.54	.19	-.37	.73	-.14	-.01
Creativity and intelligence is the same thing.	.08	.63	.25	.1	-.55	.24
Creativity people are innovators.	.16	.13	.55	-.06	.05	.19
Teachers need to teach students to be creative.	.45	.22	.09	.21	-.17	.53
Creativity applies to all aspects of education.	.54	-.08	.13	.35	.25	.07
Being Creative is important to me.	.84	-.11	-.05	.64	.37	.47
Creativity is a necessary skill.	.59	.23	.09	.41	.16	.53
I apply my creativity in everything I do.	.69	.37	-.2	.77	-.06	.05
I have creative hobbies.	.78	.15	-.04	.7	.05	.25
I am artistically creative.	.71	.23	-.25	.78	-.08	.25
Creativity is of little practical use to me.	-.54	.53	.08	-.35	-.51	-.18
Teaching people to be creative is important.	.56	.15	.4	.18	.1	.79
People can learn to be creative.	.12	.25	.47	.01	-.06	.09
Creativity should be an important goal in education.	.69	.1	-.05	.47	.05	.75
Creativity can be tested.	.17	.59	.29	.18	-.39	.1
I would take a course on creativity if it was offered.	.46	.42	.29	.39	.07	.1

Exploratory Factor Analysis Results. The EFA identified the construct creative self-perception, perceptions of creativity, and creativity in education. A total of 21 items

was eliminated due to low factor loadings or cross loading. The reliability of the survey's

constructs was confirmed with highly acceptable Cronbach's Alpha's scores. The

construct of creative self-perception has a high reliability, $\dot{\alpha} = .88$. The five items

measuring perceptions of creativity indicate a high reliability of $\dot{\alpha} = .86$. The reliability

score for the construct of creativity in education is slightly less at $\dot{\alpha} = .78$, however it is

still within the acceptable range. Table 3.6 displays the results of the EFA and the

construct's reliability scores.

Table 3.6

EFA Scale Items and Constructs with Factor Loadings (FL) and Cronbach's Alpha ($\dot{\alpha}$)

	Creative Self-Perception		Perceptions of Creativity		Creativity in Education	
	FL	$\dot{\alpha}$	FL	$\dot{\alpha}$	FL	$\dot{\alpha}$
I use my creativity to make things.	.75					
I am a creative person.	.89					
I have a creative idea every day.	.73					
Being creative is important to me.	.64	.88				
I apply my creativity in everything I do.	.77					
I am artistically creative.	.78					
I have creative hobbies.	.7					
Creativity can applied to all aspects of life.			.65			
What is creative in one culture may not be in another.			.79			
Creative people make innovative products.			.72	.86		
Creative ideas are original.			.85			
"Thinking out of the box" is creative.			.8			
Teachers need to teach students to be creative.					.53	
Creativity is a necessary skill.					.53	.78

Teaching people to be creative is important.	.79
Creativity should be an important goal in education.	.75

Study Instrument

The EFA retained 16 items and identified three constructs. In this study, the researcher validated the constructs and the items of the survey entitled, *Undergraduate Perceptions of Creativity Survey,* (see Appendix A). The items of the survey were listed in random order and it was electronically administered to the respondents. The survey's items were then analyzed with the CFA to ensure they measured the constructs appropriately and Cronbach's alpha coefficients were computed to determine the reliability of the items. Research questions one through four will address the validation of the scale.

The survey collected demographic information. According to Fraenkel and Wallen (2009) demographic information should be collected to provide a complete description of the respondents. Gender, age, academic level, declared major, and department affiliation were collected from each participant. The survey was electronically administered to the respondents and facilitated by the participating university's Sona experiment management system.

Content and Construct Validity. Content validity ensures that the content and format of the instrument is appropriate for the respondent's age and education (Fraenkel & Wallen, 2009). The items were constructed to be easy to read, to the point, and contain only one direct question. The readability of the scale items was calculated with the Flesch-Kincaid

Grade Level Readability Formula and it is one of the most common procedures used in determining the "relative difficulty or ease of a particular reading passage" (Harris, 2011, p. 89). The items' Flesch-Kincaid Grade Level is 6.7 which indicated that the items were at a seventh grade reading level (Scott, 2012). The readability of the items indicated that the wording and structure of the survey items were appropriate for English speaking undergraduates.

Construct validity is how well the scale measures the constructs it is designed to measure (Sirkin, 2006). To ensure construct validity, the formative source and rationale for each item in each construct was explained. Some items were developed using the 2009 European survey as a source, while other items had to be created using the research and theories identified in the established literature. The three constructs are theoretically supported by the literature and the items that are designed to measure them. Additionally, the survey's constructs were identified by the exploratory factor analysis. The EFA identified the correlations between and among the items and their respective constructs if those correlations constitute an identifiable factor or construct. In turn, the CFA confirmed the construct validity of the scale by identifying the items that accurately measure each construct.

Respondents

The respondents for this study were sampled from a pool described as any actively enrolled undergraduate student taking any Psychology, Educational Psychology, Human Development and Family Studies (HDFS), and Health Education course during the 2012 spring semester at a large, urban research university in the Southwestern United

States. The students enrolled in these courses had the option to earn extra credit by logging onto the Sona system and choosing to participate from a list of available research studies. Undergraduates who volunteered for this study simply selected this study from the list of available studies and then completed the instrument.

The goal for this study was to have ten completed surveys for each item on the survey in order to achieve a stable factor analysis (DeVellis, 2003). Therefore, the study required a minimum of 160 completed surveys. The researcher had anticipated an overwhelming majority of the respondents to be Psychology majors. To improve the generalizability of the results from the CFA, the researcher did do the following: If there were over 100 Psychology major respondents, the researcher will randomly select 100 psychology major surveys for analysis. The remaining 60 surveys to be included in the analysis would have included the most numerous groups of declared majors other than Psychology.

Method

The EFA analysis of the survey's underlying structure identified three constructs. In this study, three CFAs were conducted to confirm the relationships between the items and the constructs identified in the EFA. Three separate CFAs were conducted, one for the items of each construct. The Scree plot, Eigenvalues for the constructs, and the factor loadings for each item were analyzed to confirm that the items measured the constructs. Research questions one, two, and three are addressed in the analysis section below when the results of the three CFAs are reported.

Once the scale's constructs had been confirmed, Cronbach's alpha coefficients were calculated. The most frequently used and accurate method for ensuring a scale's reliability and consistency is Cronbach's alpha (Crocker & Algina, 2008; DeVellis, 2003; Field, 2009; Spector, 1992). Cronbach's alpha theoretically separates the data into every possible two group combination and then calculates the correlation coefficient for each combination. In this study, Cronbach's alpha was calculated for the items of each construct. Research question four is addressed in the analysis section when the results of Cronbach's alpha are reported.

Finally, the reporting of the demographic data and the descriptive data of the respondents' responses for each item are included below. The percentages of the respondents' gender, age, academic level, declared major, and department affiliation characteristics were calculated. Secondary research one, which concerns the demographic characteristics of the respondents are reported below. Also, secondary research question two was addressed by reporting the percentages of how many of the respondents strongly disagreed, disagreed, agreed, strongly agreed or were neutral toward each item.

CFA Methods. Three factor analyses were conducted to determine if the items and constructs were valid. The first step in any factor analysis is to determine if the data are appropriate for factor analysis (Horn, 2011). In each analysis, the following three criteria were analyzed to ensure that the data were appropriate for factor analysis: the correlation matrix, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, and Bartlett's test of sphericity.

The correlation matrix is a tool for evaluating the correlations between items, and every matrix reports a number called the determinant. According to Horn (2011), the determinate is used to ascertain the magnitude of the variance in the correlation matrix. The closer the determinate is to one, the greater the variance is among items.

Field (2009), states the KMO represents the ratio of squared correlations between variables to the squared partial correlations between the variables. A value of zero indicates that the sum of partial correlations is large, relative to the sum of squared correlations. A value close to zero indicates that the patterns of correlations are widely dispersed which will not yield distinct and reliable factors. A value close to one indicates that the patterns of correlations are relatively compact, and the factor analysis should yield distinct and reliable factors. A KMO score ranging from .5 to .7 is mediocre; .7 to .8 is good; .8 to .9 is great; and a score greater than .9 is superb (Horn, 2011). Bartlet's test of sphericity "tells us whether our correlation matrix is significantly different from an identity matrix" (Field, 2009, p. 648) If the p value is significant for Bartlet's test the correlation matrix is not an identity matrix. A significant value indicates that the variables which measure the same construct will be clustered together in the correlation matrix. Once it was determined that the data are appropriate for factor analysis, the results of each CFA were reported.

In each primary analysis, the scree plot, component variance, and component matrix data are presented and discussed for each construct. The Scree plot was examined to identify components with Eigenvalues greater than one. The Scree plot was used in conjunction with the data from the component variance chart. In the component variance

chart, the component's Eigenvalues and percentage of variance accounted for by each component were analyzed. Components with Eigenvalues greater than one were considered for further analysis (Field, 2009; Horn, 2011). The next procedure was the examination of the items of components with Eigenvalues greater than one. In the component matrix, the factor loadings of the items were analyzed to determine if they measured the construct. According to Field (2009), items with factor loadings greater than .45 should be retained, therefore items with factor loadings greater than .45 were retained. Constructs were considered 'confirmed' if they were identified in the Scree plot, accounted for a significant amount of the variance, and if they retained at least one item.

<center>**Chapter IV: Findings and Results**</center>

Confirmatory Factor Analysis Findings

      Creative self-perception.

      Preliminary analysis. The preliminary CFA data are provided in Table 4.1. The

determinate, Kaiser-Meyer-Olkin measure of sampling adequacy (KMO), and Bartlet's

test of sphericity results are provided.

Table 4.1

CFA Preliminary Data for Creative Self-Perception

Determinate	Kaiser-Meyer-Olkin (KMO)	Bartlett's Test of Sphericity		
		Chi-Square	df	sig
.13	.84	321.033	21	P < .001

The determinate was .13 which is good, suggesting that there was an acceptable amount

of variance in the correlation matrix. The KMO = .84, an excellent value, was indicative

that the sampling was adequacy for this analysis (Field, 2009). Bartlett's test of sphericity

was significant p < .001 and it indicated that the data would allow for the identification of

distinct components. The preliminary data suggested that these data were appropriate for

factor analysis.

      Primary analysis. In the scree plot, there were seven components, however only

one component was identified having an Eigenvalue above one. In Table 4.2, the total

variance explained by all of the components is listed.

Table 4.2

Component Variance for Creative Self-Perception

Component	Eigenvalue	Parentage of Variance	Cumulative Percentage
1	3.36	48	48.04
2	.91	12.96	61
3	.69	9.8	71
4	.68	9.74	81
5	.54	7.65	88
6	.46	6.61	95
7	.36	5.1	100

Only the first component satisfied Kaiser criterion for an Eigenvalue of at least one.

Component one had an Eigenvalue of 3.36, accounting for 48.04% of the variance. In

Table 4.3 the items and their factor loadings for component one are listed.

Table 4.3

Component Matrix for Creative Self-Perception

Item	Factor Loading
I have a creative idea every day.	.69
I use my creativity to make things.	.58
I am a creative person.	.8
I have creative hobbies.	.72
Being creative is important to me.	.72
I am artistically creative.	.73

I apply my creativity in everything I do.	.58

All seven items for this construct exceeded the criterion of .45 which indicated that these items measure the construct. All of the items were retained in this analysis. Therefore, the CFA analysis confirmed the validity of the items and the construct of creative self-perception. In response to research question one, 'Are the items of the construct creative self-perception, identified in the exploratory factor analysis, validated with a confirmatory factor analysis?' the construct 'creative self-perception' was in fact validated with the CFA. All items were retained and the construct was confirmed.

Perceptions of creativity.

Preliminary analysis. The preliminary data provided in Table 4.4. determined if the data were appropriate for factor analysis. The determinate, KMO, and Bartlett's test of sphericity results are provided.

Table 4.4

CFA Preliminary Data for Perceptions of Creativity.

Determinate	Kasier-Meyer-Olkin (KMO)	Bartlett's Test of Sphericity		
		Chi-Square	df	sig
.63	.65	72.765	10	P < .001

The determinate was .63 which is very good and it suggests that there was an acceptable amount of variance in the correlation matrix. The KMO = .65, was a mediocre value however, it was adequate to verify the sampling adequacy for this analysis (Field, 2009).

Bartlett's test of sphericity was significant at p < .001 and it indicated that the data would result in the identification of distinct components. The preliminary steps suggested that these data were appropriate for factor analysis.

Primary analysis. The scree plot identified five components, with two containing Eigenvalues above the threshold of one. The two components with the acceptable Eigenvalues accounted for 59% of the variance as indicated in Table 4.5 below.

Table 4.5

Component Variance for Perceptions of Creativity.

Component	Eigenvalue	Parentage of Variance	Cumulative Percentage
1	1.87	37.35	37.36
2	1.1	21.81	59.2
3	.8	16	75
4	.65	13	88
5	.6	12	100

Component one had an Eigenvalue of 1.87, and it accounted for 37.35% of the variance. Component two had an Eigenvalue of 1.1, and it accounted for 21.81% percent of the variance. Due to the fact that these components satisfied Kaiser's criteria of one, they were selected for further analysis. Ultimately, the items and their factor loadings for each component would serve as the deciding criteria for selecting a component. Table 4.6 lists the items and their factor loadings for the two components.

Table 4.6

Component Matrix for Perceptions of Creativity.

Items	Factor Loadings	
	Component 1	Component 2
Creative ideas are original.	.47	-.57
"Think out of the box" is creative.	.77	.03
Creativity can be applied to all aspects of life.	.67	.03
What is creative in one culture may not be in another.	.14	.88
Creative people make innovative products.	.71	-.17

In Table 4.6, component two had only one item with a factor loading greater than .45.

The rest of the items yielded low factor loadings, and they could not be retained.

Therefore, component two was not a viable construct and it was consequently

disregarded from any further analysis. In component one, four items exceeded the .45

threshold, and they were retained. The item 'What is creative in one culture may not be in

another' was eliminated due to its low factor loading of .14 and the four items retained

for component one confirmed the validity of the construct perceptions of creativity.

The data indicated that the first component items measure the construct of

perceptions of creativity. Therefore, the CFA analysis has confirmed the validity of the

items and the construct of perceptions of creativity. In response to research question two,

'Are the items of the construct perceptions of creativity, identified in the exploratory

factor analysis, validated with a confirmatory factor analysis?' one item was eliminated

due to a low factor loading. The remaining four items were validated, and the construct creative self-perception was confirmed.

Creativity in education.

Preliminary analysis. The preliminary CFA data are provided in Table 4.7. The determinate, KMO, and Bartlett's test of sphericity results are provided.

Table 4.7

CFA Preliminary Data for Creativity in Education.

Determinate	Kasier-Meyer-Olkin (KMO)	Bartlett's Test of Sphericity		
		Chi-Square	df	sig
.29	.72	194.334	6	P < .001

The determinate of .29 suggested that there was an acceptable amount of variance in the correlation matrix. A KMO score of .72 was a good score and, it verified the sampling adequacy for this analysis (Field, 2009) . Bartlett's test of sphericity was significant p < .001, indicative that the data would result in the identification of distinct components. The preliminary data review suggested that these data are appropriate for factor analysis.

Primary analysis. In the scree plot, there were four components, but only one component had an Eigenvalue above one. In Table 4.8, the total variance explained by all of the components identified in the scree plot is provided.

Table 4.8

Component variance for Creative Self-Perception

Component	Eigenvalue	Parentage of	Cumulative

		Variance	Percentage
1	2.36	58.98	58.98
2	.89	22.26	81
3	.43	10.7	92
4	.32	8.03	100

The first component's Eigenvalue was 2.36, and it accounted for 58.98% of the variance, which satisfied Kaiser's criterion for an Eigenvalue of at least one. This component's items factor loadings were analyzed. In Table 4.9, the items and their factor loadings for component one are listed.

Table 4.9

Component matrix for Creativity in Education

Items	Factor Loadings
Creativity is a necessary skill.	.48
Teachers need to teach students to be creative.	.83
Teaching people to be creative is important.	.86
Creativity should be an important goal in education.	.83

All four of this component's items exceeded the criterion of .45, which indicated that these items measured the construct. All of the items were retained. The CFA analysis confirmed the validity of the items and the construct of creativity in education. In response to research question three, 'Are the items of the construct creativity in

education, identified in the exploratory factor analysis, validated with a confirmatory

factor analysis?' the construct was validated and confirmed.

Scale Reliability

The most frequently used and accurate method for ensuring a scale's reliability

and consistency is Cronbach's alpha (Crocker & Algina, 2008, p. 117; DeVellis, 2003, p.

28; Field, 2009, p. 681; Spector, 1992, p. 65). Cronbach's alpha theoretically separates

the data into every possible two group combination and then calculates the correlation

coefficient for each combination. A correlation coefficient of .7 or higher is considered

acceptable because this signifies that the respondents are consistently achieving the same

results (Field, 2009, p. 681).

Research question four, 'Are the items of the survey's constructs identified and

confirmed in the confirmatory factor analysis reliable?' addresses the reliability of the

scale's three constructs. For the construct of creative self-perception Cronbach's alpha

was .81which indicated the construct's items were highly reliable. The four items

measuring perceptions of creativity reported a low reliability of $\acute{\alpha} = .6$. The reliability

coefficient for the construct of creativity in education was highly reliable at $\acute{\alpha} = .76$.

Therefore, in response to research question four, the constructs creative self-perception

and creativity in education were highly reliable, but the construct of and perceptions of

creativity had a low reported reliability.

Respondents' Demographic Data

Secondary research question one, 'What is the gender, age, academic level,

declared major, and department affiliation characteristics of the respondents?' concerns

the characteristics of the 160 respondents. Fraenkel and Wallen (2009) state that researchers should gather as much demographic data possible to obtain a complete description of the respondents and/or to support an argument for representatives of a certain population. In the following sections the Respondents' gender, age, academic level, department affiliation, and declared major are reported. Due to the fact, only Psychology students were randomly selected, the demographic data may only be generalized to the population of Psychology students at the participating university.

Therefore, one purpose for collecting demographic data in this study was to understand the characteristics of the respondents collectively. The researcher hoped to learn how many of the respondents were male or female. The researcher also wished to know the age of the respondents because the instrument was designed for undergraduates. The researcher anticipated the mean age to be 21. The respondents' academic level informed the researcher of how the freshman, sophomores, juniors, and seniors participants are distributed. Similarly, the Respondents' department affiliation informed the researcher which of the participating University's departments the respondents belonged to. The Respondents' declared major was the primary variable used in selecting surveys for the EFA.   The second purpose for collecting the demographic data was to make generalizations of the Psychology student population at the participating university.

Gender. In Table 4.10 the gender of the respondents is reported.

Table 4.10

Respondent's Gender

Gender	n	Percentage
Male	18	11
Female	142	89

Of the 160 respondents, 89% were female, and while 11% were male. Hence, an overwhelming majority of the respondents were female.

Age. Table 4.11 reports the age of the 160 respondents.

Table 4.11

Respondents Age

Age	n	Percent
18	9	6
19	20	12
20	30	19
21	32	20
22	14	9
23	11	7
24	9	6
25	8	5
26	2	1
27	6	4
29	2	1
31	3	2
33	1	1

34	4	2
35	1	1
38	2	1
40	1	1
43	1	1
44	1	1
45	1	1
46	1	1
54	1	1

The mean age of the respondents was 32 and the mode was 21 years. The range of the

respondent's ages spans from 18 to 54 years with 79% of the respondents falling between

the ages of 18 to 24.

       Academic level. All of the respondents were actively enrolled undergraduate

students. The survey asked the respondents to indicate if they were freshman,

sophomores, juniors, or seniors. Table 4.12 lists the respondents' academic level.

Table 4.12

Respondents Academic Level

Academic Level	n	Percent
Freshman	12	7
Sophomore	42	26
Junior	64	40

Senior	42	26

Of the respondents 40% were in their junior year. Seniors and sophomores together accounted for half or 52% of the respondents, however only 7% were in their freshman year.

      Respondents Academic Department. The respondents were asked to report with which of the following departments they were affiliated: Psychology, Educational Psychology, and Curriculum & Instruction. If a respondent was not affiliated with any of the above departments the respondents, he/she was asked to choose 'other' as the department. Table 4.13 lists the respondents' department affiliation.

Table 4.13

Respondents Department Affiliation

Academic Department	n	Percentage
Psychology	107	67
Educational Psychology	19	12
Curriculum & Instruction	2	1
Other	32	20

      Respondents Declared Major. The respondents' declared major were yet another demographic variable selected for analysis. For purposes of for a sable CFA, a minimum of 160 completed surveys (ten per item) was required (DeVellis, 2003). One hundred Psychology majors were randomly selected, and the rest comprised the most

numerous clusters of declared majors. Table 4.14 lists the declared majors of the 160

respondents chosen for the CFA analysis.

Table 4.14

Respondents' Declared Major

Declared Major	n	Percent
Biology	14	9
Business	7	4
Education	6	4
Human Development & Family Studies	18	11
Health	15	9
Psychology	100	62

The respondents' declared majors represent a rather diverse group of undergraduate

students. These varied groups represent different fields of study and school of thought.

While only the psychology majors were randomly selected, the respondents represent

several diverse undergraduate groups.

Survey Response Data

Secondary research question two, 'What are the percentages of the respondents

who strongly disagree, disagree, agree, strongly agree, or are neutral toward the items of

each construct?' concern the actual respondents' responses for the items. In this section

the responses for each item are reported construct by construct.

Creative self-perception items. In Table 4.15 the response data for this construct's seven items is reported**.**

Table 4.15

Percentages of the respondents, who strongly disagree (SD), disagree (D), neutral (N), agree (A), or strongly agree (SA) with the items of Creative Self-Perception

Item	% SD	% D	% N	% A	% SA
I have a creative idea every day.	2	19	31	40	7
I use my creativity to make things.	1	12	13	55	18
I am a creative person.	3	10	20	51	16
I have creative hobbies.	.6	16	20	46	18
Being creative is important to me.	0	4	22	45	29
I am artistically creative.	9	21	28	30	12
I apply my creativity in everything I do.	1	19	39	34	7

For seven items in this construct, the respondents overwhelmingly either agreed or strongly agreed with the statement item. Approximately 73% of the respondents reported that they use their creativity to make things. As much as 67% of the respondents indicated that they are creative people. Nearly 64% of the respondents have some kind of creative hobby. Interestingly, 74% of the respondents decided that being creative is important. However, only 42% of the respondents believed they are artistically creative and 41% apply their creativity in everything they do.

Perceptions of creativity items. In Table 4.16 the response data for this constructs four items are reported.

Table 4.16

Percentages of the respondents, who strongly disagree (SD), disagree (D), neutral (N), agree (A), or strongly agree (SA) with the items of Perceptions of Creativity

Item	% SD	% D	% N	% A	% SA
Creative ideas are original.	1	11	21	50	17
"Thinking out of the Box" is creative.	1	2	4	58	35
Creativity can be applied to all aspects of life.	.6	1	6	48	44
Creative people make innovative products.	0	1	13	48	7

Over 50% of the respondents agreed with each statement item for this construct. Nearly

67% of the respondents considered creative ideas to be original. Also, 93% of the

respondents perceived creativity as 'thinking out of the box'. Similarly, 92% of the

respondents indicated that creativity can be applied to all aspects of life. A reduced

amount of 55% of the respondents believed creative people make innovative products.

Creativity in education items. In Table 4.17 the response data for this construct

are reported.

Table 4.17

Percentages of the respondents, who strongly disagree (SD), disagree (D), neutral (N), agree (A), or strongly agree (SA) with the items of Creativity in Education

Item	% SD	% D	% N	% A	% SA
Creative is a necessary skill.	2	.6	12	46	40
Teachers need to teach students to be creative.	3	7	12	49	29

Teaching people to be creative is important.	2	6	9	51	32
Creativity should be an important goal in education.	.6	6	13	51	29

A majority of the respondents believe that creativity is a necessary skill and the data indicated that a majority believe that teachers need to teach students to be creative. Approximately 83% of the respondents agreed that teaching people to be creative is important. The respondents also indicated that creativity should be an important goal in education. Overall, the majority of the respondents agreed with the statement items of this construct.

Survey response data analysis. The data indicated that a majority of the respondents either agreed or strongly agreed with the three constructs' statement items. Secondary research question two, 'What are the percentages of the respondents who strongly disagree, disagree, agree, strongly agree, or are neutral toward the items of each construct?' was addressed in Tables: 4.15; 4.16 and 4.17. The statistical data allow the reader to review the degree to which the respondents agreed with the items for each construct.

Analysis Summary

The results of the three CFA's are the confirmation and validation of the three constructs identified in the EFA. The CFA for the construct, creative self-perception resulted in retaining all seven items from the pilot version of the instrument and the confirmation of the construct. One item was eliminated from the construct of perceptions

of creativity; however the remaining four items measure the confirmed construct. The construct creativity in education was also confirmed and all four of its items were retained. The CFA's results successfully addressed questions one through three. Cronbach's alpha was computed for the items of each confirmed construct. The constructs of creative self-perception $\dot\alpha = .81$ and creativity in education $\dot\alpha = .76$ are highly reliable scales. The five items measuring perceptions of creativity have a low reliability at $\dot\alpha = .6$. The results of the Cronbach's alpha computations indicate the scales are reliable which satisfies research question four.

Secondary research question one concerned the respondents' demographic characteristics. Of the 160 respondents, 89% were female and 60% were between the ages of 19 to 22. Freshman consisted of 7% of the respondents, while juniors and seniors combined accounted for over half or 66% of the 160 undergraduates. Nearly 67% of the respondents are enrolled in the Department of Psychology and 62% had declared Psychology as their major. The other respondents declared Biology 9%, Business, 4%, Education 4%, Human Development and Family Studies 11% and Health 9% as their majors.

Secondary research question two called for the percentages of respondents who either strongly disagreed, disagreed, agreed, strongly agreed, or were neutral toward the items of each construct to be reported. The percentages for the items responses were provided on a construct by construct basis. For the construct of creative self-perception, at least 64% of the respondents either agreed or strongly agreed that they make things

with their creativity, have creative hobbies, define themselves as creative people, and consider their creativity to be important.

For the four items of the construct perceptions of creativity, approximately 50% of the respondents agreed. A total of 93% of the respondents agreed or strongly agreed with defining creativity as 'thinking out of the box'. According to the data, over half of the respondents perceived creativity as original ideas, the manufacturing of innovative products, and something that be applied to all aspects of life.

Approximately 78% of the respondent either agreed or strongly agreed with the items of the construct, creativity in education. A majority of the respondents believed that creativity should be an important goal in education and it is a necessary skill. Approximately 80% of the respondents indicated that teaching people to be creative is important and teachers need to teach student to be creative.

Chapter V: Summary and Conclusions

This study concerned the creation, piloting, validation, and confirmation of a survey designed to measure undergraduate attitudes toward creativity. More specifically, the study entailed the validation of a scale which was previously piloted. The researcher test piloted the survey, which had been designed with three constructs containing 37 items. The sample in that study was comprised of 43 undergraduate students enrolled at a large, urban research university in the Southwestern United States. As is statistically appropriate in the initial phase of instrument development, the researcher conducted an exploratory factor analysis (EFA) to identify what constructs, if any, the survey inherently contained. The EFA process resulted in the refinement of the scale in which 16 of the original 37 items were retained. The EFA also identified the three literature-based constructs upon which the original survey was developed. The three constructs were creative self-perception, perceptions of creativity, and creativity in education.

In the current study, the researcher completed the validation of the instrument by administering the 16-item version to 160 undergraduates at the same university in the spring of 2012. The instrument's validation and confirmation were accomplished by computing three confirmatory factor analyses (CFAs), one associated with each construct. Once the constructs were confirmed and validated, Cronbach's alpha coefficients were computed for each construct to measure reliability.

Study Limitations

The generalizability of the survey results to a population of undergraduates is compromised for several reasons. First, the respondents were not randomly selected

from a population and, second, the respondents were acquired through the Sona system where undergraduates enrolled in certain classes may choose to take the survey for extra credit. Even though 100 Psychology majors were randomly selected from the group acquired through the Sona system, the other 60 respondents were not. The other 60 respondents were selected based on the groups with the most numerous declared majors. Generalizations from this study may only be made to the participating university's Psychology undergraduates. However, the inability to generalize the survey data to any other population is not terribly detrimental to the study because the purpose of this study was the validation of an instrument. The intent was not to measure the attitudes of a randomly selected sample for generalizing the results to a population.

Study Implications

This study's primary objective was to confirm, validate, and compute the reliability for the three constructs in the instrument entitled *Undergraduate Perceptions of Creativity Survey.* The validation of the scale's constructs completes the development of the instrument. The scale is ready to be used to assess the creativity attitudes of undergraduates studying in any discipline or academic field. The scale is actually a conglomerate of three valid and reliable sub-scales. The items of the validated scales were analyzed with an oblique rotated factor analysis and the resulting correlation coefficients among the constructs suggested that there were slight correlations among the constructs. According to Field (2009) a correlation coefficient ranging from -.1 to .1 indicate a slight correlation and a coefficient ranging from -.3 to .3 indicate a moderate relationship between any two variables. The constructs, creative self-perception and

creativity in education were slightly correlated, r = .09. Similarly, the constructs,

perceptions of creativity and creative self-perception were slightly correlated, r = .04.

However, the constructs, creativity in education and perceptions of creativity were

moderately correlated, r = .21. The slight correlations among the constructs suggest that

the sub-scales could jointly measure general perceptions of creativity.

Creative self-perception.

The items in this scale measure the manner in which one perceives one's own

creativity. The undergraduate respondents overwhelmingly agreed or strongly agreed

with the items. Thus, the respondents believe they are creative people who do creative

things. It is likely that this reflects the attitudes of other undergraduates. Further

applications of this scale on other undergraduate groups are needed to understand the

role creativity plays in their lives.

Tierney and Farmer (2002) suggest that one's perception of their own creativity

is strongly related to creative behaviors. Additionally, Davis (1986) states that creative

people are likely to admit to being creative when asked. Therefore the scale may be

used in research applications to determine how creative a certain group of

undergraduates is.

The items in the scale ask the respondents how often they have creative ideas,

what do they do with their creativity, and what importance does creativity have in their

lives. Xiang et al. (2010) used a creative self-perception scale to measure the

relationship between Chinese worker's creative self-perception and actual creative

behavior. The researchers concluded that there is a positive relationship between

creative self-perception and innovative behaviors. The creative self-perception scale developed in this study may be used similarly with undergraduate students. As Tepper (2006) indicates, there is an increased interest of American Universities to foster and develop the creativity of undergraduate students. A survey specifically designed to measure the creative self-perception of undergraduates may be a valuable tool for developing and implementing programs to foster undergraduate creativity.

Perceptions of creativity.

The items for the construct, perceptions of creativity, were derived from the published theories on the construct of creativity. As mentioned earlier, four consistent themes have been identified in the published literature on the construct. According to Richards (1999b) creativity may be defined and understood in terms of the creative person, process, press and product. However, there are three theories well established in the literature that attempt to define the construct. These theories are the Investment Theory developed by Sternberg (2003), the Systems Theory developed by Csikszentmihaly (1997), and the Everyday Theory developed by Richards (1999a) and Runco (2004). The items in this scale are designed to measure in which creativity theory the respondents' believes. Also, the items may be used to determine if the respondents' believe creativity resides with the person, process, press and/or product. The respondents overwhelmingly believe that creative ideas are original, and it is a phenomenon that applies to all aspects of life. Also, the respondents believe that creative people make innovative products and 'thinking out of the box' is creative. This implies that the undergraduates agree with the current available theories on the

construct of creativity. However, the elimination of the item 'What is creative in one culture may not be in another' could have resulted from the respondents' misunderstanding of the statement or the vagueness of the term 'culture'. The term 'culture' may encompass any meme, behavior, characteristic, or shared values of a certain group of people. Therefore, the item was flawed because the term 'culture' was open to interpretation by the respondents.

This scale may be used in research studies similar to those conducted by Diakidoy and Kanari (1999), Petocz et al. (2009) and Quintin (2009). In each of these studies the researcher(s) used an instrument to measure the perceptions the participants hold toward creativity for the purposes of developing creative based programs and policies. The items for this construct may be used similarly by universities to determine how undergraduates frame creativity. Petocz et al. (2009), states that undergraduate perceptions of creativity may be used by universities to discuss, "the ways that different students (and lectures) view creativity and how it might be shown in an assessment task could be a useful addition to an early discussion of the course requirements" (p.414). Moreover, Quintin (2009) reported that the results of a European survey which measured European teachers perceptions toward creativity are "extremely encouraging for the development for the development of a specific line of policy cooperation on creativity and innovation in Europe" (p.3). The items for the construct, perceptions of creativity, developed in this study may yield significant data which may be used to fulfill the objectives set by governments and educational institutions.

Creativity in Education.

The items for this construct were aligned with the current published literature on the important role creativity has in education. The respondents' responses indicate that they believe creativity was a necessary skill and that it was very important in the educational process. This is very encouraging considering the increased recognition of creativity's importance in society. Three governments have called for an increase of creativity and innovation in the curricula of all levels of education. The British are considering revising their national curriculum for their compulsory school system to develop programs that will foster young people's creative capacity (NACCCE, 1999). The European Union implemented policies and procedures to "make schools and universities places where students and teachers engage in creative thinking and learning by doing" (*Manifesto for Creativity and Innovation in Europe*, 2009, p. 2). In the United States, the Presidential Jobs Council recommended that universities need to create an atmosphere of creativity and innovation (Immelt, 2011). The items of this construct ascertain the respondents' attitudes on the importance of creativity in education and its role as a life skill. This scale may be a valuable tool for universities in their mission to develop a culture of creativity and innovation as recommended by the Jobs Council.

Implications of the Demographic Data.

The gender, age, academic level, declared major, department affiliation and department level were collected from the undergraduate respondents. These demographic data were collected to accomplish three tasks. First, the researcher wished to understand the background the characteristics of the respondents. Due to the fact that the instrument was designed for undergraduates, the researcher wanted to ensure that

the respondents selected for the EFA were as representative as possible of the national undergraduate population.

In a 2010 report published by the American Council on Education, women earned a majority of undergraduate and graduate degrees nationally (Hennessy, 2010). In 2007, "women aged 25-34, 42% had earned an associate or bachelor's degree, while just 34% of men of that age group had done so" (Fiegerman, 2010, p. 1). In this study, women accounted for 89% of the respondents, which is significantly higher than the national average. This might indicate that the participating university has higher percentage of female students compared to the national average. In 2009, 18 to 24-year-olds accounted for 41% of undergraduates nationally (NCES, 2011) . The undergraduates aged 18 to 24-years-old accounted for 66% of the respondents, which was slightly higher than the national average in 2009 however, it is still in-line with the national average.

Undergraduate respondents in their junior year accounted for 40% of the respondents and freshman only accounted for 7%. The lack of participation from freshman students implies that the instruments' constructs were validated with mostly upperclassmen. Finally, the instrument was validated by an academically diverse group of students, the respondents consisting of Biology, Business, Education, Health, Human Development & Family Studies, and Psychology majors. This diversity successfully attempts to mirror the different fields of inquiry in American academia.

The second task for gathering the demographic data was to use the declared major variable in the selection of surveys for the EFA. As mentioned earlier, 100

Psychology majors were randomly selected and 60 surveys comprising of the most numerous groups of declared majors were also included in the EFA computation. The third task was to use the gender and age variables to make generalizations about the participating university's Psychology undergraduates. Therefore, the demographic data indicates that a majority of the participating university's Psychology undergraduates are female and between the ages of 18 to 24.

Suggestions for Further Research

With the confirmation of the constructs in the survey entitled, *Undergraduate Perceptions of Creativity Survey* the instrument is ready for research applications. This survey was the first that was specifically designed, piloted, and confirmed to measure collegiate undergraduate students' creative self-perception, perceptions of creativity, and attitudes toward creativity in education. In this study, the respondents consisted of Biology, Business, Education, Health, Human Development & Family Studies, and Psychology majors coming from the Psychology, Educational Psychology, Curriculum Instruction, and various other departments of the participating university. The survey may be administered to any undergraduate sample or population to measure their attitudes towards any of the scale's three constructs. The survey may also be divided up so that only one or two of the constructs may be administered at any one time.

This scale might be particularly useful for business schools and colleges across the nation as businesses increasingly consider creativity to be a necessary skill of college graduates (Reuteman, 2011). Taking into account the demand for recent college graduates who think and behave creatively, this scale may be used to measure the

attitudes business undergraduates have towards creativity in order to prepare them for a career in business. A university may wish to administer the perceptions of creativity sub-scale to freshman enrolled in a business courses to gather data for a creative business course. Or all three of the constructs may be administered to measure the attitudes entrepreneurial business undergraduates have towards creativity in order to prepare them for a career in business.

With an increased call for the infusion of creativity in educational programs, the scale might be useful for universities to measure the attitudes of educational undergraduates. The attitudes educational undergraduates hold toward the importance of creativity in education might influence the future of educational programs and policies. The survey may be used to measure how undergraduates' attitudes toward creativity change over time. For example, a longitudinal study may be conducted to measure how freshman education students' perceptions of creativity changes over a four year span. The survey may be administered to a randomly selected group of freshman majoring in education at the beginning of every fall semester. The mean calculation of attitudes toward creativity in education from every year may be collected. The four means may then be analyzed with an analysis of variance (ANOVA) to determine if there is a statistical difference between and among attitudes on a year to year basis.

The survey may be also used to measure differences in attitudes among different undergraduate population groups. For example, the survey may be administered to a randomly selected and assigned group of Art majors and randomly selected and

assigned History students. An independent means t-test may be used to determine if there are any statistical differences between the two groups.

Even after 60 years, researchers are still answering J. P. Guilford's (1950) call for an increase of research in to the construct of creativity. The potential research applications for this instrument are limitless. As research into the construct of creativity continues and expands, this instrument may contribute to the ever growing body of knowledge about creativity.

Concluding Remarks

The United States, the European Union and England recognize creativity's vital role in the course of human history and call for an increase in creative and innovative based educational and social programs (Immelt, 2011; NACCCE, 1999; Reuteman, 2011). For example, in the *Manifesto* for the European year of creativity and innovation, creativity is described as a fundamental dimension of human and the key to continued human prosperity (*Manifesto for Creativity and Innovation in Europe*, 2009). Reflecting the sentiments of several of the worlds' governments, businesses consider creativity to be vitally important for economic success (Vorley et al., 2008). Today's businesses consider creativity to be a necessary skill of college graduates because of the rapidly changing global economy (Reuteman, 2011). There is no doubt that creativity is being hailed as one of the most vital human qualities for the future. This survey will serve as a new tool in the effort to develop this ever important human quality in the young people enrolled in universities and colleges throughout the United States. Researchers and

universities now have a unique tool in their arsenal to assist in more fully understanding the mysteries of human potential.

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APPENDIX A

Undergraduate Perceptions of Creativity Survey

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I have creative hobbies.					
2	Creative ideas are original.					
3	Creativity can be applied to all aspects of life.					
4	I am artistically creative.					
5	Teachers need to teach students to be creative.					
6	I apply my creativity in everything I do.					
7	Being creative is important to me.					
8	Creativity is a necessary skill.					
9	Creativity should be an important goal in education.					
10	I am a creative person.					
11	What is creative in one culture may not be in another.					
12	Teaching people to be creative is important.					
13	I have a creative idea every day.					
14	Creative people make innovative products.					
15	"Thinking out of the box" is creative.					
16	I use my creativity to make things.					

Gender	M F
Age	Please write in your age:
Academic Level	Freshman Sophomore Junior Senior Graduate
Major	What is your major?
Academic Department	What is your academic department?