Creativity of Interior Design Students: Understanding the Relationship

Between Cognitive Style, Personality Style, Motivational Orientation, and

Creativity of Interior Design Students

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Abstract

The present study examined the relationship between cognitive style, personality style, motivational orientation, and creativity of interior design students. Participants included sophomore level students ($N = 51$) from interior design programs from three Midwestern universities. Four instruments were used, one each for the four variables. It was anticipated that there would be a significant relationship between the three independent variables and creativity of interior design students. Data analysis included correlation analysis, linear regression analysis, and Chi Square with Fisher's Exact test. Significant relationships were found between creativity and variables of Intrinsic Motivational Orientation, Extrinsic Motivational Orientation subscale of Compensation (EMO-C), and the personality trait of Inquisitiveness. The three variables were also significant predictors of creativity. The results indicated that interior design students tend to be ambitious and are influenced by a need to succeed. In conclusion, there is a need to examine the relationship between Intrinsic and Extrinsic Motivational Orientation for creativity in the discipline of interior design. Implications for design education included providing alternative class activities and assessment that foster inquisitiveness, curiosity, and reward creativity.

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Chapter One: Introduction

Background and Context of the Problem

Creativity and creative ability have become buzzwords lately, particularly concerning their significance in dealing with future problems. According to Hennessey and Amabile (2010), "creativity is one of the key factors that drive civilization forward" (p. 570). Similarly, Runco (2004) maintains that with the ongoing changes in technology, the information boom, and the rapid cultural evolution, creativity is one aspect that will aid humans to cope and survive. Runco (2004) also stated that flexibility associated with creativity would be significant in handling the varied fluctuations in the future. As we approach the future with its innumerable problems, creative ability will be paramount not merely for survival, but for sustained existence.

To meet future needs, organizations and corporations are beginning to value creative problem solving in their employees that would allow them to deal with global changes and ongoing tumultuous economic conditions. It is evident in these altering times that we need creativity to generate solutions for a number of problems that we are facing and will be facing in the future. Hence, examination of creativity to enhance it in the present and future generations is essential, especially in the education of future interior designers.

According to the 2010 Council of Interior Design Accreditation (CIDA) standards, educational programs must train professionals who are proficient in creative thinking and problem solving. Furthermore, the National Council for

Interior Design Qualification (NCIDQ) defines interior design as "a multi-faceted profession in which creative and technical solutions are applied within a structure to achieve a built interior environment" (National Council for Interior Design Qualification [NCIDQ], 2004). Several researchers (Myers, 1982; Baker & Sondhi, 1989; and Lee & Hagerty, 1996) have stated that, creativity is valued, expected, and enjoyed by students and professionals in interior design. Significantly, "creativity was viewed as a key component of original and useful design solutions. Developing creative thinking was seen as an essential part of design and education" (Pedersen and Burton, 2009, p. 29).

With all the emphasis on creativity for interior design, research into creativity has been surprisingly lacking in the discipline of interior design. One of the reasons for this disconnect is that for the discipline of interior design, the concept of creativity has not been clearly operationalized (Pedersen & Burton, 2009). In their concept analysis of creativity for interior design, Pedersen and Burton (2009) found no explicit attributes of creativity, reiterating the difficulty in conducting research on it for the discipline. They also stated that this was due to the "complexity and abstractness of the concept" of creativity (Pedersen and Burton, 2009, p. 29).

At the same time, Pedersen and Burton (2009) identified several influences on creativity, such as motivation, knowledge, thinking style, personality, environment (social and physical), and intelligence, interdisciplinary experience, cross cultural experience, ideas, educational approach, and new

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technological tools. This finding was in accordance with other researchers such as Amabile (1996), Sternberg and Lubart (1999), and Csikszentmihalyi (1996), who have emphasized on the multidimensional nature of creativity. According to Csikszentmihalyi (1996) "creativity does not happen inside people's heads, but in the interaction between a person's thoughts and a sociocultural context" (p. 23). This statement brings to light the multidimensional nature of creativity with different influences affecting an individual's creativity. These influences could be both internal (a person's thoughts) and external to an individual (sociocultural context).

Needless to say, these influences also require careful examination if one is to gain a better understanding of creativity. Hennessey and Amabile (2010) stated, "more progress will be made when more researchers recognize that creativity arises through a system of interrelated forces operating at multiple levels, often requiring interdisciplinary investigation" (p. 571). Similarly, Pedersen and Burton (2009) concluded that it is vital to study creativity in conjunction with its various influences.

Precedent literature in behavioral sciences, psychology, and related disciplines has illustrated the relationship between creativity and its various influences, significantly cognitive and thinking style, personality style, motivation, intelligence, knowledge, and environment. Researchers such as Pedersen and Burton (2009), Casakin, Davidovitch, and Milgram (2010), and Conti, Coon, and Amabile (1996) have found links between creativity and cognitive styles

especially about flexibility in thinking and cognitive style. Sternberg (1996) states that "to become a major creative thinker, it also helps if one is able to think globally as well as locally, distinguishing, the forest from the trees and thereby recognizing which questions are important and which ones are not" (p.11).

Specifically for interior design, researchers (Meneely & Portillo, 2005; Meneely, 2010) have suggested the need to develop creative adaptability with specific emphasis on flexibility and ability to draw on opposite thinking styles to create interior design solutions. "Adaptability may be particularly apropos to the design domain, enabling one to synthesize disparate artistic and functional criteria into creative solutions" (Meneely & Portillo, 2005, p. 163).

With respect to personality style, several researchers have found strong correlations between creativity and personality style (Meneely & Portillo, 2005; Houtz et al., 2003; Prabhu, Sutton & Sauser, 2008; Helson, 1999; Sheldon, 1995). Over the years, researchers (Dudek & Hall, 1991; Feist, 1998; Helson, 1999) have found strong evidence to support the presence of distinct personality style among creative individuals. Feist (1998) concluded that "empirical research over the last 45 years makes a rather convincing case that creative people behave consistently over time and situation and in ways that distinguish them from other" (p. 304). In addition, Portillo (1996 & 2002) found personality to be an important indicator as well as embodiment of creativity in interior design and related disciplines.

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Another significant influence that is widely researched is motivation. According to various researchers, (Amabile, 1985; Sheldon, 1995; Collins & Amabile, 1999; Runco, 1004; Dollinger et al., 2007; Prabhu, Sutton & Sauser, 2008; Meneely & Portillo, 2008) motivation has a strong relationship with creative performance. "Creativity reflects the pursuit of goals that are personally chosen, intrinsically motivated, and directed toward novelty and diversity defined in the broadest terms" (Dollinger et al. 2007, p. 100). According to Amabile (1983), an individual may possess the thinking style, skills, personality, and intelligence to be creative, but if the individual is not motivated to be creative, he/she will not pursue creative activities.

In presenting his concept of creativity, Csikszentmihalyi (1990) stated that a common characteristic among eminent creative individuals was that they loved what they did; they were intrinsically motivated to pursue activities in their chosen discipline. This notion formed the basis of Csikszentmihalyi's (1996) concept of *flow*, which is a state one reaches when he/she is completely immersed in a task. The state of *flow* often leads to impressive success in most endeavors, especially those of a creative nature. During the state of *flow,* an individual is able to tap into all his/her faculties and more in order to accomplish the intended task. Eventually an individual seeks further opportunities that allow him/her to stay in the state of *flow,* which adds to mastery and competence, as well as the motivation to seek creative pursuits. Overall, evidence reveals that motivation is an important influence on creativity.

In considering the influence of intelligence, it becomes evident that research related to intelligence is inconclusive with respect to its connection or influence on creativity. Although widely researched, the connection between intelligence and creativity is clouded with issues related to measurement of intelligence. While the Intelligence Quotient (IQ) has long been used as a measure of intelligence, it does not encompass all that intelligence entails. Another issue that complicates this matter is the concept that creativity might be a part of intelligence and not a separate notion to be measured and compared.

Another influence knowledge, on the other hand, has an interesting relationship with creativity; an excess of knowledge tends to reduce creativity. However, insufficient knowledge could also be damaging to the creative process; the optimum level of knowledge for creativity is a less researched subject. According to Weisberg (1996) "knowledge is necessary, not sufficient, for creative achievement" (p. 248). Weisberg (1996) suggests that researchers focus on a complete theory of creative thinking that could explain how creative individuals employ their knowledge.

The influence of environment on the other hand, has a rather straightforward relationship with creativity; a supporting environment that fosters and encourages creativity is necessary for creative achievement. A less than supportive environment could quell motivation to be creative and creative achievement. Environment also includes several realms of an individual's life

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ranging from the physical to educational to professional and even the upbringing of a person.

The majority of the discussion presented above was derived from evidence gathered in disciplines other than interior design. Within the discipline of interior design, few empirical studies have been undertaken to understand creativity specifically among interior designers and the processes that are involved in it. Some studies have explored aspects such as thinking or learning styles (Lim, 1996; Nussbaumer & Guerin, 2000; Watson & Thompson, 2001; Meneely, 2010), perceptions of creativity (Portillo, 1996), and personality style of creative persons (Mackinnon, 1962, 1965, 1976). However, these studies were conducted not in conjunction with creativity, but in isolation to gather better understanding of the influences.

To further our comprehension of creativity, a multidimensional approach to its examination in interior design is required. A multidimensional approach would take into consideration the various influences, their interaction, and impact on individual creativity. Based on the notion of interaction between the various influences several researchers (Amabile, 1996; Csikszentmihalyi, 1996; Sternberg & Lubart, 1999) have proposed confluence theories to the study of creativity in an attempt to understand how these influences interact to affect an individual's creativity. Three confluence theories were examined for the present study which included the Componential Theory of Individual Creativity (Amabile, 1996), Systems Approach (Csikszentmihalyi, 1996), and the Investment Theory

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(Sternberg & Lubart, 1999). These theories are discussed in detail in Chapter Two. There are several overlaps between theories proposed by these researches; these overlaps form the basis of the present study and have led to the selection of variables for the present study.

Evidence gathered in the study would enhance our understanding and appreciation of creativity for interior design. Specifically it would provide a better comprehension of the nature and interaction of the various influences. Furthermore, this evidence will aid future examination of creativity, as well as provide a basis to formulate changes in higher education.

Statement of the Problem

"Heightened creativity will enable design students to become more effective as the demands of the (interior design) profession increase" (Portillo, 1996, p. 15). The general perception surrounding the interior design profession is that it is a creative field. Designers tend to be creative problem solvers, trying to balance the needs of form with function to create effective design solutions. "It is generally accepted that design is a creative occupation and that good designers are themselves creative people and certainly we often refer to their work as creative" (Lawson, 1990, p. 106). Furthermore, various researchers as well as the two governing bodies for the discipline of interior design have highlighted the importance of creativity for interior design: NCIDQ and CIDA. In light of such importance, it is necessary that one attempts to understand the nature of creativity within the discipline of interior design.

Research into creativity within the discipline of interior design is sporadic and deficient. As previously mentioned this deficiency might be due to the elusive nature of the concept of creativity. Another issue that complicates this research is that there are various influences on creativity that need to be examined as well. Additionally, Meneely and Portillo (2005) stated that the nature of creativity might be discipline specific; future researchers would benefit by conducting more research to understand creativity and its influences within the discipline of interior design.

A discipline specific approach is especially relevant due to the nature of certain influences within interior design as well. Solutions in interior design often require an integrative and holistic approach to design to balance the needs of form and function. Such an integrative and holistic approach to design would involve a flexible thinking style, a certain personality type that is open to ideas and confident, as well as motivation to push boundaries and pursue through the challenges faced in the process. Hence, for the discipline of interior design, there is significant interaction among the influences of creativity.

This study is based on the notion that the influences often converge and work collectively to affect an individual's creativity. This notion is supported by three confluence theories of creativity examined for the present study. All three confluence theories place emphasis on several influences on creativity such as thinking preferences of creative individuals, their distinct personality style, knowledge, environment, intellectual style, formal and informal education, and

overall motivation to be creative. Some of the influences are common across the three theories. These include thinking style, cognitive style, motivation, personality style, and knowledge.

Drawing from the literature review on the influences and to limit the scope of the study to a manageable level, three influences were selected for the present study: cognitive style, personality style, and motivational orientation. As previously mentioned the two influences of thinking styles and personality style have been examined in a few studies in the discipline of interior design. Motivation, which may be a significant influence on creativity has yet to be explored. This researcher believes that motivation is perhaps the most significant of the influences on creativity.

It was anticipated that the study will provide better understanding of the relationship of the three influences on creativity and initiate further inquiry into creativity for interior design. Significantly, this better understanding would enable design educators to foster creativity in design classes by employing strategies derived from the results of the present study, specifically related to motivational orientation.

Objective and Purpose of the Study

The purpose of this discipline specific study is to understand the relationship between three influences of creativity for interior design students derived from the three confluence theories of creativity. The three influences include cognitive style, personality style, and motivational orientation of interior

design students. Motivational orientation, in the present study refers to an individual's disposition towards intrinsic or extrinsic reasons for pursuing creative tasks.

Research Question

The following research question and hypothesis guided the research for the present study.

- What is the relationship between cognitive style, personality style, motivational orientation, and creativity of interior design students?

The independent variables include the cognitive style, personality style, and motivational orientation of interior design students. The dependant variable is creativity of interior design students.

Hypotheses of the Study

The proposed hypotheses of this study were:

- H1: There is significant relationship between the cognitive style, personality style, motivational orientation, and creativity of interior design students.

- H2: Students with high measures on personality style will display greater flexibility in cognitive style.

- H3: Students with high measures on personality style and cognitive style will display greater creativity.

- H4: Students with high measures on personality style will display greater measured creativity.

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Definition of Significant Terms

Creativity

Most creativity researchers accept Morris Stein's (1953) definition of creativity as "that process which results in a novel work that is accepted as tenable or useful or satisfying by a group at some point in time". This definition includes two key elements that most researchers employ to define creativity novel and appropriate (Amabile, 1996, Feist, 1993, Sternberg, 1988).

Cognitive Style

Cognitive style is defined as "consistent individual differences in preferred ways of organizing information" (Messick et al, 1976).

Motivation

Motivation is a theoretical construct used to explain the initiation, direction, intensity, persistence, and quality of behavior, especially goal-oriented behavior (Maehr & Meyer, 1997).

Intrinsic Motivation

Intrinsic motivation is defined as the motivation to engage in an activity primarily for its own sake, because the individual perceives the activity as interesting, involving, satisfying, or personally challenging: it is marked by a focus on the challenge and enjoyment of the work itself (Collins & Amabile, 1999, p. 299).

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Extrinsic Motivation

Extrinsic motivation is defined as the motivation to engage in an activity primarily in order to meet some goal external to the work itself, such as attaining an expected reward, winning a competition, or meeting some requirement; it is marked by a focus on external reward, external recognition, and external direction of one's work (Amabile, 1983).

Personality Style

Personality is defined as "the dynamic organization within the individual of those psychophysical systems that determine his unique adjustments to his environment" (Allport, 1937, p. 48).

Chapter Two: Review of Literature

Creativity is one of the essential requirements and expectations for the discipline of interior design. According to Pedersen and Burton (2009) creating original and useful designs required creativity and that "developing creative thinking was seen as an essential part of design education" (p. 29). The National Council of Interior Design Qualification (NCIDQ) and the Council for Interior Design Accreditation (CIDA) have also emphasized the importance of creativity. Hence, the study of creativity is integral for the discipline of interior design, especially for design education.

Several researchers (Amabile, 1996; Sternberg & Lubart, 1999; Runco, 2004; Hennessey & Amabile, 2010) have indicated that creativity is a multi-dimensional construct with various influences that affect it. To understand creativity it is important to study and understand its various influences. These influences include intelligence, knowledge, personality styles, motivation, cognitive styles, and environment. While influences such as intelligence, environment, and motivation could be general as well as specific to a person, some of the influences are discipline related such as cognitive styles, personality styles (Feist, 1999; MacKinnon, 1962; Dudek & Hall, 1991; Pedersen & Burton, 2009), and knowledge.

This study adopts a discipline-specific, multi-dimensional approach to the study of creativity based on confluence approaches proposed by various researchers. Confluence approaches are based on the notion that multiple

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influences could simultaneously affect each other as well as an individual's creativity, subsequently affecting his or her creative performance and achievement. For instance, motivation and personality style could induce a person to take on unusual and unique projects, which could place significant demands on an individual's cognitive abilities. Thus, motivation and personality style could influence an individual's cognitive style. At the same time, a suitable environment and relevant knowledge base could also contribute to the success of this risk taking behavior. In such a case, multiple influences work simultaneously on an individual's creative endeavors and its success.

Confluence theories examined for the present study include the Componential Theory of Individual Creativity proposed by Amabile (1996), Csikszentmihalyi's Systems Approach (1996), and the Investment Theory proposed by Sternberg and Lubart (1996). Based on the three confluence theories examined for the present study, three influences were selected as independent variables for this study. Influences selected included cognitive style, personality style, and motivational orientation. This literature review begins with a brief background and discussion of the three confluence theories of creativity that form the basis of this study. Following the discussion of the theories, a presentation of research conducted in the psychological and cognitive sciences, interior design on creativity, and the three influences is included. Information regarding the measurement of each independent variable is also included after

the discussion of the variable. The chapter concludes with a section focusing on the measurement of creativity.

Componential Theory of Individual Creativity

The Componential Theory of Individual Creativity, developed by Amabile (1996) is one of many approaches to creativity study that is multi-dimensional in nature. Initially proposed as a theoretical framework, this theory resulted from a social psychological approach to the study of creativity. The main principle of the Componential Theory of Individual Creativity (Figure 1) is that creativity is a result of three components: expertise, creativity skills, and task motivation.

Figure 1. The Componential Theory – A Visual Model
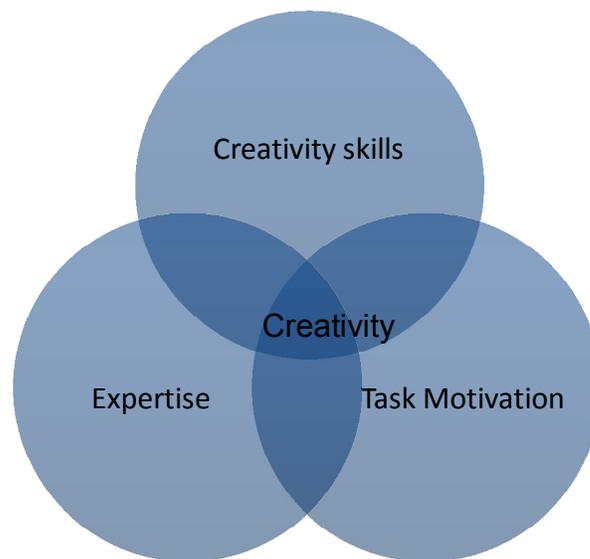
Figure 1. Visual model of the Componential Theory of Individual Creativity that shows interaction of the three components of individual creativity (Amabile, 1997).

The first component of expertise "includes memory for factual knowledge, technical proficiency, and special talents in the target work domain" (Amabile, 1997, p. 42). The component of expertise was derived from the component of domain relevant skills identified in the earlier framework by Amabile (1996). Domain relevant skills "can be seen as the set of cognitive pathways for solving a given problems or doing a given task" (Amabile, 1996, p. 85). This component requires that individuals possesses or trains to develop cognitive abilities of problem solving as well as relevant skills for a specific discipline. In addition, problem solving requires that the individual receive formal and informal education in the discipline so that he/she is familiar with the discipline (principles, facts, paradigms) and the factual knowledge needed to solve the required problems.

Table 1

Theresa Amabile's (1997) Componential Theory

Expertise	Creativity Skills	Task Motivation
Includes: Knowledge about the discipline Technical skills required Special discipline relevant "talent"	Includes: Appropriate cognitive style Explicit and implicit knowledge of heuristics for generating novel ideas Conducive work style	Includes: Attitudes toward the task Perception of own motivation for undertaking the task
Influences include: Innate cognitive abilities Innate perceptual and motor skills Formal and informal education	Influences include: Training (in creative problem solving) Experience in idea generation Personality characteristics	Influences include: Initial level of intrinsic motivation toward the task Presence or absence of salient extrinsic constraints Individual ability to cognitively minimize extrinsic constraints

Note. The Componential Theory suggests that creativity is a result of the combination of expertise, creativity relevant skill, and task motivation. Figure replicated and edited from Amabile, 1996, p. 85.

The second component of creative skills is somewhat dependant on certain personality characteristics such as independence, self-discipline, orientation towards risk taking, perseverance in the face of frustrations etc. The component of creativity relevant skills assumes that "an individual's use of creativity-relevant skills determines the extent to which his product or response will surpass previous products or responses in the domain" (Amabile, 1996, p. 88). This component depends on actual training and education in idea

generation. In addition to this, creative thinking skills include cognitive flexibility and intellectual independence.

The third component, task motivation includes two elements: "the individual's baseline attitude towards the task (the "trait"), and the individual's perception of his reasons for undertaking the task in a given instance (the "state")" (Amabile, 1996, p. 91). There are two kinds of motivation based on these two elements: intrinsic and extrinsic. The two kinds of motivation are concerned with the locus of control for an individual, internal in the case of intrinsic motivation and external for extrinsic motivation. According to Amabile (1996), it is important to "examine the individual's motivation toward that activity at that time" (p. 193).

Conti, Coon, and Amabile (1996) found preliminary evidence to support the Componential Theory of Individual Creativity in their study that included three experiments with same participants. Participants included psychology students who were asked to complete various tasks of story writing and art activities such as drawing, painting, and collage making. Creativity was assessed using the Consensual Assessment Technique (CAT; Amabile, 1982a). Since all three experiments included the same participants, this study afforded them the opportunity to compare the data from all three experiments.

Their study revealed that general creativity contributed to tasks within a single domain as well as across domains. This conclusion was drawn because all the participants were psychology majors, yet the tasks given were not related to

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their domain. The participants scored high in creativity on all tasks although they were not art or writing majors. Furthermore, the researchers stated that creativity measures taken during the same context were thus high indicating that task motivation was high and stable. However, this result was ambiguous in terms of task motivation. It must be stated that the researchers assumed that task motivation was present and stable across all three studies; no measure for motivation was used in the study. Hence, the results of the study did not support the assumption related to task motivation.

In addition, the study did not provide any explicit evidence for discipline relevant skills; since the participants were not selected from the same discipline as the tasks they were given. Overall, the researchers concluded that these studies provide strong evidence to support the theory, especially in relation to domain relevant skill. No other studies were found that tested the Componential Theory of Individual Creativity.

Several other studies have explored the relationship between the three components, which are presented in the later sections in this chapter. Significantly, the theory explains the relationship between the three components, specifically motivation and creativity. However, further research is needed to develop a clear understanding of these components and their relation to creativity. In order to do this a multidimensional approach would be ideal that would test the confluence of the three components and the influences outlined within them.

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A multidimensional approach would entail studying the various influences on creativity together. These influences include innate cognitive abilities, innate perceptual and motor skills, formal and informal education, training in creative problem solving, experience in idea generation, personality characteristics, and task motivation. Two other confluence theories were considered while selecting the three influences for the present study, which are discussed in the following sections.

Csikszentmihalyi's Systems Approach

Between 1990 and 1995, Csikszentmihalyi conducted in-depth interviews with 91 exceptional individuals. The researcher selected individuals based on sustained contributions in their chosen disciplines. The interview protocol included four sections: career and life priorities, relationships working habits, and attentional structures and dynamics. The interviews revealed pertinent information regarding individual creativity such as the nature of creative individuals, the creative process, and potential hindrances or conditions that encouraged creation of innovative ideas. Based on the interviews and the analysis of data collected, Csikszentmihalyi and his research team proposed the Systems Approach to understand and enhance creativity.

According to this Systems Approach, three forces influence creativity: domain, field, and the contributions of a person. Domain represents a specific discipline such as mathematics, biology, chemistry, and so on. Domains consist of a specific "set of rules and procedures" (Csikszentmihalyi, 1996, p. 27). These

rules and procedures are parameters and boundaries within which an individual needs to work. These parameters and boundaries are also what a creative individual might push against to generate and develop innovative and creative ideas.

Domains are an essential part of system and according to Csikszentmihalyi (1996) "existence of domains is perhaps the best evidence of human creativity" (p. 37). Domains allow us to make sense of the world around us; for instance, we are not genetically programmed to know about mathematics or biology, but the existence of the domains allows us the opportunity to learn about them. Some domains are well-defined and some are not, while some domains could be either rigid or flexible. These characteristics of a domain can affect the rate of creativity.

Domains that are well-defined with a clear set of rules and accessible knowledge allow for more creativity, while the less defined ones could make it difficult to formulate new and creative ideas. In a well-defined and structured domain with clear and accessible knowledge base, it is possible for an individual to internalize the basics of the domain rapidly and possibly generate new ideas rapidly as well. In a comparatively ill-defined domain with inaccessible knowledge where the basic tenets are not clear, one cannot internalize the basics easily. Hence, in the case of an ill-defined domain it becomes difficult to know if an idea is creative enough. According to Csikszentmihalyi (1996), a well-defined domain also has multiple, accessible, and established resources that aid its creative

progress; he cites the example of research funds readily available to certain domains allowing for more progressive and rapid creativity. Such resources are often lacking in ill-defined domains, making it difficult to successfully pursue new and innovative ideas.

The second force in the system approach is the field, which represents the gatekeepers of a domain. Field refers to the critics of the domain who determine which ideas or creations are worthy of being accepted as creative in the domain. Similar to the domain, the field can have specific characteristics; for instance the field can use a narrow or broad filter, or they can be reactive or proactive. In addition, fields can encourage creativity if they are able to channel relevant resources into their domains via a well-connected social network. These characteristics of the field could also affect the rate at which creativity develops in a domain. For instance, fields could be rigid and use a narrow filter for some domains such as mathematics; if a new idea goes radically against the established norms, it will not be accepted by the field. Conversely, in the domain of art, the field might use a broad filter and readily accept a radical idea. In fact, in the domain of art the field has a more dominant role in determining the rate at which creativity develops.

Hence, depending on the character of the field, promoting a creative idea could be an effortless or a monumental task. Clearly, not every generated idea would be accepted by the field and incorporated into a domain; it is up to the creative person to identify, develop, and promote a new idea in a way to make it

acceptable to the field. This brings us to the third force in the system - the contributions of the person.

"The individual is not as important as it is commonly supposed, neither is it true that novelty could come about without the contributions of individuals, and that all individuals have the same likelihood of producing novelty" (Csikszentmihalyi, 1996, p. 47). It is important that a creative individual is able to internalize the system by increasing knowledge and involvement in the domain and familiarity with the field. There are several other aspects of a person that impact creativity such as their personality style, their upbringing, the environment, and early influences, thinking preferences, cognitive flexibility, problem solving techniques, and motivation. These aspects collectively influence the creativity of a person and his/her ability to generate, develop, and promote creative ideas.

In addition, Csikszentmihalyi (1996) stated that an individual needs a natural disposition and affinity towards a domain, early interest in the domain, access to the field, as well as a certain complexity in personality to be creative. This complexity is represented certain paradoxes and contrasts in personality as well as thinking styles of creative individuals. Some of these contrasts and paradoxes include being able to think in flexible manner, both convergently and divergently, the ability to be smart and naive, playful and disciplined, modest and proud, extroverts and introverts, and being ambitious and selfless. These

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paradoxes contribute greatly to an individual's ability to balance needs of novel and appropriateness required for creativity.

An important aspect of the person is his or her intrinsic motivation and passion for the work he/she does. Based on his research on prominent creative individuals, Csikszentmihalyi (1996) concluded that most of the creative individuals were immensely passionate about their work and often did not aim to be creative consciously. Instead, they pursued challenges in their work for the pleasure of it, regardless of external recognition or rewards. The pleasure they derived from their work motivated them to seek further challenges they could excel at and master. Csikszentmihalyi (1996) also stated that the pursuit of these challenges often required high energy and drive, which came naturally to creative individuals. In this respect, the Systems Approach reiterates the ideas related to task motivation outlined in the Componential Theory of Individual Creativity.

The three forces presented in the Systems Approach collectively influence the creative success of an individual. In essence, individual creativity according to Csikszentmihalyi (1996) results from immersion in a domain, paying heed to the field, and the contributions of a person towards being creative. The influence of person would include the personality style of the individual, intrinsic motivation, flexible thinking style, and environment (physical, academic or professional).

The Systems Approach has not been tested in any research study; it provides a concise framework for understanding creativity. The interviews conducted by the researcher between 1990 and 1995 led to the development of

the Systems Approach. One of the aims of conducting this research according to Csikszentmihalyi (1996) was to learn from the lives of prominently creative individuals. This knowledge, according to the researcher could be used to cultivate creativity among all individuals. While one cannot influence the forces of domain and field, certain aspects of the person can be cultivated. The present study examines three aspects of the person, which overlap with the components in the Componential Theory, and the resources detailed in the Investment Theory.

The Investment Theory of Creativity

Sternberg and Lubart (1996) proposed the Investment Theory of creativity, where a creative individual will "buy low and sell high" ideas that could be promising but are a risk to pursue. The creative individual identifies and invests his/her efforts in an idea that is relatively unexplored. Eventually, the individual develops this idea to such an extent that it is acceptable in the mainstream and he/she is able to "sell" it at a profit. In this respect, the Investment Theory resembles the Systems Approach, where a person is immersed in the domain enough to be able to identify a novel idea and then applies his/her resources to promote the idea to the field. Similar to the proposed theory and approach of Csikszentmihalyi (1996) and Amabile (1996), the Investment Theory also stresses the importance of certain resources, which are related to an individual and, which influence and aid individual creativity.

Sternberg and Lubart (1996) proposed that there are six "distinct but interrelated" (p. 11) resources needed by a creative individual. These resources include intelligence, intellectual/thinking styles, motivation, personality, knowledge, and environment. The researchers further elaborated on each of the resources.

There are three different intellectual abilities: synthetic, analytic, and practical-contextual ability. Synthetic ability is needed to take a new outlook to ideas, an outlook that is unique and different from the usual. An analytic intellectual ability enables a person to distinguish between ideas to pursue and ideas to ignore. The third and final intellectual ability, practical-contextual ability, is one that enables a creative person to sell the idea to other people.

The second resource of thinking style is concerned with an individual's preference for using intellectual abilities and acting accordingly. According to Sternberg et al. (1996) there are three different thinking styles: inventing style, implementing style, and evaluating style. Individuals who prefer the inventing style tend to follow their own path and do things the way they like. The implementing style is preferred by individuals who like to follow and implement ideas of others; they prefer not to invent new ideas. Finally, individuals who prefer the evaluating style tend to be observers and critics. They prefer to analyze and criticize other works rather than create them. Sternberg et al. (1996) stated that the inventing style is most suited to creative individuals.

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The third resource, motivation is a vital for creativity, especially task oriented intrinsic motivation. The process of buying low and selling high requires significant commitment and contribution, which would be sustained by intrinsic motivation. Often creative ideas require long term sustained efforts as well as a willingness to tolerate and work beyond failures and frustrations. Hence, motivation is an integral resource for an individual's creativity.

Related to motivation is the fourth resource, personality. According to Sternberg (2006), there are certain personality attributes that are important for creativity. "These attributes include, but are not limited to, willingness to overcome obstacles, willingness to take sensible risks, willingness to tolerate ambiguity, and self-efficacy" (Sternberg, 2006, p. 89). Combined with motivation, personality is a vital resource for creativity.

The fifth resource for creativity is knowledge. With respect to knowledge, while enough of it would be needed to know the rules and procedures of a domain, too much knowledge could be limiting. Too much knowledge and awareness of the constraints could limit and closet a person, rendering him/her unable to think in a unique manner. According to Weisberg (1999) "knowledge is necessary, not sufficient, for creative achievement" (p. 248). On one hand, immersion in the domain and its specific knowledge could lead to development of heuristics. On the other hand, however, it is also possible that a person will rely too much on established heuristics and not think beyond them. Weisberg (1999) also stated what differentiates a creative individual from a non-creative individual

is the extra knowledge or use of it he/she brings to the table. This makes the relationship between knowledge and creativity complicated and certainly warrants a careful examination.

The final resource is environment; creativity would thrive in an environment that supports it rather than suppresses it. An individual might possess all the other resources, but an obstructive environment could make it difficult for an individual to be creative or pursue creative ideas. Besides the physical environment, one needs to consider the environment holistically, including the early influences on an individual's life as well as the academic and social environment. Hence, an assessment of environment would require a deep examination of an individual's life in its entirety.

The six resources presented in the Investment Theory were based on two studies conducted by Lubart and Sternberg (1995). These studies employed various self-report and behavioral tests to measure the six resources. Participants were asked to complete a series of tasks such as writing a story with an unusual title, drawing pictures with unusual themes, creating interesting advertisement ideas for boring products, and solving mathematical problems that are atypical. Results of the studies provided evidence to support the overall concept of the theory.

In a more recent study, Zhang and Sternberg (2011) tested the theory by using the Multifaceted Assessment of Creativity (MAC), which was specifically designed to test the Investment Theory. The MAC consisted of two parts; the first

part included 30 hypothetical cases with six statements, each representing one resource that might be needed to solve the case. The participants were asked to rate the six statements in the order of importance for creativity in solving the case. The second part of the test included six rating scales. Each of the scales represented one of the six resources and participants were asked to rate each in the order of usefulness in identifying creative individuals. The second part consisted of two different forms one for males and one for females.

Zhang and Sternberg (2011) employed the MAC in a study involving 120 university students in Shanghai, China; average age of the participants was 19 years. Participants included students from finance and engineering majors. Results indicated that intellectual styles emerged as the most important resource for creativity, followed by personality, knowledge, intelligence, environment, and motivation respectively. Overall, personality was considered more important than intelligence and motivation, but not significantly important than environment and knowledge.

The researchers cited some limitations of the study. Significantly, they stated that the participants were not given any definitions of the six resources, which might have affected their assessment of the same. The same notion applies to their understanding of creativity; the researchers did not specify a clear definition of it. Additionally, the research participants were Chinese, making generalization of the results inappropriate.

Overall, the three confluence theories make it apparent that to understand creativity it is important to take into consideration the various influences on it. However, literature review revealed that earlier approaches were narrow in their focus and tended to take a uni-dimensional approach (Sternberg, 1996; Runco, 2010); creativity researchers have often focused on one or two components or resources of creativity. In addition, most research on creativity has been done in fields of psychology and cognitive sciences and their related disciplines. Significantly, these studies have provided valuable background for future research and better understanding of the relationship between creativity and the specific influences.

All three theories place emphasis on certain influences on creativity such as thinking preferences of creative individuals, their distinct personality style, knowledge, environment (that includes early influences, physical, academic, and emotional environment), intellectual style, formal and informal education, and overall motivation to be creative. Some of the influences are common across the three theories. These include thinking style, cognitive style, motivation, personality style, and knowledge.

From these commonalities, the present research focused on three influences of cognitive style, personality style, and motivation. Previous research related to the influences was examined to formulate a basic understanding of their relationship and impact on individual creativity. This examination revealed that there is a noteworthy relationship between creativity and all the three

selected influences. Previous research on the other resources was also examined to gauge the feasibility of including them in the present study.

Research related to intelligence is inconclusive with respect to its connection or influence on creativity. The connection between intelligence and creativity is clouded with issues related to measurement of intelligence. While IQ has long been used as a measure of intelligence, it does not entirely represent all that intelligence entails. Another issue that complicates this matter is the concept that creativity might be a part of intelligence and not a separate ability to be measured and compared with intelligence. Considering these issues, intelligence was not included in the present study to allow for better inspection of the three selected influences.

While knowledge and environment are significant influences, they were not included in the study to limit the scope to a manageable level. Both environment and knowledge would require an extensively qualitative approach such as a case study design. Examining an individual's environment would involve looking into their physical environment, upbringing and early influences, as well as their social environment. For knowledge, one would need to be sure that the individual does not possess too little or too much of domain relevant knowledge. Additionally, examining knowledge would also require a study of heuristics for the specific domain and an individual's use of the same. Hence, attempting to assess knowledge and environment would have made the scope of the study difficult to manage. Nevertheless, it is the hope of this researcher that

the present study will clarify the relationship between the three selected influences and aid future examination of the remaining influences.

The three influences selected for the present study included: cognitive style, personality style, and motivational orientation. Motivational orientation was selected based on the concept presented by Amabile (1996) since the concept presents a more comprehensive understanding of the influence of motivation. The concept of motivational orientation allows one to consider both intrinsic and extrinsic motivation. The following section presents precedent literature related to the three selected influences of cognitive style, personality style, and motivational orientation.

Cognitive Style

Cognitive style is defined as "consistent individual differences in preferred ways of organizing information" (Messick et al, 1976). The present study is based on the premise that a cognitive style that relies on the collaboration of two hemispheres of the brain is vital for creativity in interior design (Meneely and Portillo, 2005; Meneely, 2010). Collaboration between the two hemispheres of the brain indicates some level of flexibility in thinking and problem solving. Interior designers need to be able to think both in a divergent and convergent manner requiring flexibility in the cognitive style. Researchers such as Csikszentmihalyi (1996) as well as Sternberg and Lubart (1996) also emphasize the importance of a being able to think in a flexible manner for creativity.

As mentioned flexibility in cognitive style is dependent on the notion of differing functions of the two hemispheres of the brain. Each hemisphere of the brain is responsible for a specific kind of activity, or thinking and cognitive functions. Several researchers such as Levy-Agresti and Sperry (1968), Sperry (1974), and Chakravarty (2010) have proposed this notion.

However, before evidence related to creativity and brain hemisphere is presented, a discussion of the creative cognitive process is necessary. This section begins by discussing the predominant proposal related to creative cognition, followed by studies related to creativity and brain hemispherity. Finally, precedent literature from the discipline of interior design is presented to make a case for flexibility in thinking for creativity in interior design.

Creative cognition.

The Geneplore model of creative functioning proposed by Finke, Ward, and Smith (1992) is one model that explains the cognitive processes involved in creativity. It is a broadly descriptive, heuristic model rather than an explanatory one. The Geneplore model proposes that creative solutions can be described in terms of the initial generation of ideas or exploration of initial ideas. The initial ideas stage is also referred to as "pre-inventive." Ideas at this stage are rudimentary and do not necessarily solve the problem at hand, but are promising enough to lead one to the next stage, the exploratory stage. In the exploratory stage, selected ideas are elaborated on and developed to be more concrete and viable. According to Finke et al. (1992), creativity involves moving back and forth

between these two stages. While moving between these two stages an individual focuses on various constraints of the problem at hand and tries to formulate a workable solution.

According to Finke et al. (1992), several processes are crucial to creativity, but not necessarily linked with a specific stage. These processes include insight, extending concepts, recently acquired knowledge, conceptual combination, and creative imagery. A creative individual might use all or some of these processes to develop the creative idea.

Guilford (1950, 1959) also defined creativity in terms of the mental abilities that result in creative achievement. According to Guilford, creativity involves divergent production. Divergent production includes four factors: fluency, flexibility, originality, and elaboration. Fluency refers to the ability to generate a number of ideas, flexibility refers to the number of different types of ideas generated, originality refers to unusualness, and elaboration refers to the details or completeness of the idea or product. According to Guilford these four factors are not enough for creativity, an individual needs to be sensitive to problems as well as be able to redefine information. To test for creativity, Guilford proposed the Alternate Uses Test (Guilford et al., 1978) that measures creativity on the four factors.

Based on Guilford's definition of creativity, Ellis P Torrance (1966/1974) developed the Torrance Test for Creative Thinking (TTCT; Torrance, 1966/1974). The TTCT (Torrance, 1966/1974) measures creativity in terms of the four factors

(fluency, flexibility, originality, and elaboration). A detailed description of the TTCT is presented in the section titled measuring creativity. The TTCT is one of the widely used tests for creativity and divergent thinking (Runco et al. 2010). Based on the proposals of Guilford (1986), Torrance (1966/1974), and Finke et al (1992), it could be stated that creativity requires different cognitive functions. These functions would be needed to perform tasks that are related to the four factors of creativity. These functions could involve both divergent and convergent thinking, and the various processes suggested by Finke et al. (1992). The various process and functions could involve collaboration between brain hemispheres, employing specific functions attributed to different hemispheres.

According to Meneely and Portillo (2005), Sperry (1974) is credited with first demonstrating the specialized functions of the brain. In his experiments with epileptic individuals whose corpus collosum was surgically severed, Sperry discovered that both the hemispheres are concerned with different cognitive functions. The right brain was found to specialize in "simultaneous processing of information, pattern recognition, and visuospatial tasks while the left brain is specialized in the sequential processing of information, analysis and verbal tasks" (Meneely & Portillo, 2010). This finding suggests that each hemisphere could potentially contribute in a different manner to the process of creative cognition. To understand the relationship between creativity and brain hemispherity the following section presents literature related to brain hemispherity and creative cognition.

Brain hemispherity and creative cognition.

Commenting from a neurological perspective, Chakravarty (2010) stated that brain modularity is evidenced by "localization of functions" (p. 609). The right brain is responsible for "spatial cognition, spatial imagery, face and object recognition, co-ordinated functioning of both the hemispheres;" the left brain on the other hand stores "language functions, motor control of skilled movements, categorical and arithmetic skills" (Chakravarty, 2010, p. 609). Hence, there might be a collaborative relationship between the two hemispheres that could contribute to creativity. According to Chakravarty (2010) "if you look at any creative works, you may find a harmonious and co-ordinated functioning of both the hemispheres" (p. 609).

Whitman et al. (2000) presented three proposals or avenues of thought related to brain hemispherity and creativity based on an examination of the existing literature on creativity and hemispherity. The first proposal stated that the right brain is more creative (Katz, 1983; Martindale et al.1984; Mihov et al. 2010), the second proposal stated that there is a complementary relationship between the two hemispheres with both hemispheres contributing to different aspects of a creative solution. The third proposal suggested that creativity is a result of the collaboration between the two hemispheres, known as the hemispheric collaboration. Several researchers (Rothenberg, 1983; Bogen & Bogen, 1969; Hutchison et al. 2003; Katz, 1997; Charkravarty, 2010; Whitman et al., 2010) further supported the proposal of hemispheric collaboration. Studies examining

hemispheric interaction range from those that use sophisticated tools such as EEGs (Martindale et al, 1984; Katz, 1997) or simple paper and pencil tasks that assess hemispherity (Katz, 1986).

Researchers such as Martindale, Hines, Mitchell, and Covello (1984) and Katz (1997) have relied on EEG tests to assess hemispheric involvement in creative tasks. Martindale et al. (1984) employed two creativity tests: Alternate Uses Test (AUT; Guilford, Christensen, Merrifield and Wilson, 1970) and the Remote Associates Test (RAT; Mednick & Mednick, 1967) to assess creativity. The researchers concluded that highly creative participants showed greater right hemisphere activity as compared to left hemisphere activity. Medium creative individuals showed the opposite asymmetry, while individuals low in creativity showed equal activation of both hemispheres.

Similar conclusion was drawn by Katz (1997) who reviewed several empirical studies that included case studies of eminent creators who had suffered unilateral brain damage, analysis of gifted youth, and EEG measures of the participant's performance on divergent thinking tests. Katz (1997) stated that there "appears to be some privileged role in creativity to the cognitive functions associated with the right hemisphere" (Katz, 1997, p. 220). Mihov et al. (2010) also concluded, "the right hemisphere is statistically the dominant one in tasks that require creative thinking" (p. 444). Their conclusion was based on a meta analysis of 88 studies that examined the relationship between creativity and hemispheric dominance. The studies included assessed hemisphere activity

using Electroencephalography (EEG), Positron Emission Tomography (PET), and Functional Magnetic Resonance Imaging (fMRI).

Whitman et al. (2010) also researched the hemispheric collaboration suggested by Katz (1997). Whitman et al. (2010) conducted a study that included forty-eight undergraduate psychology students. The participants were asked to complete a creativity test (TTCT) and 552 semantic priming tasks. The results indicated that participants scoring low on the TTCT for creativity showed more right hemisphere (RH) activation, while participants who scored high on the TTCT showed more cross-hemisphere collaboration. This conclusion was also in accordance with Katz (1986) who concluded that highly creative individuals are able to tap into functions of opposite hemispheres to reach creative goals suggesting greater hemispheric collaboration and flexibility.

In their study, Whitman et al. (2010) confirmed that the two hemispheres function in a collaborative manner in creative individuals. Furthermore, Whitman et al. (2010) also stated that although hemisphere collaboration is easily evident in creative individuals, other contextual and social factors must be studied to understand creativity entirely. The social and contextual factors could include factors such as experience, motivation, discipline knowledge, and a suitable environment, which are also important requisites for creativity.

It must be stated that the studies mentioned did not include assessment of the entire creative process. Both the creative and design process include stages that involve coming up with ideas, gathering information, synthesizing

information, elaborating on the ideas, evaluating them, and finalizing them. However, for the most part, ideation and divergent thinking has been the focus of a large number of creativity studies. Within the discipline of interior design, a handful of studies have explored cognitive functions that could be integral for the discipline. The following section presents related literature from the discipline of interior design.

Few studies in the discipline of interior design have looked at cognitive functions related to the discipline. These studies have examined dominant learning styles in the discipline (Watson & Thompson, 2001) and relationship between learning styles and visualization skills (Nussbaumer & Guerin, 2000). The studies conducted by Watson and Thompson (2001) and Nussbaumer and Guerin (2000) used different tools to assess the learning styles of interior design students; both the tools used were based on the notion that individuals have a preferred way of thinking, organizing, and accessing information.

Watson and Thompson (2001) used the Gregorc Style Delineator to assess learning styles of interior design students. According to the Gregorc Style Delineator, each learning style has a specific way of thinking that ranges between abstract and concrete thinking, with thoughts organized as random or sequential. An interesting result drawn by Watson and Thompson (2001) was that a significant portion of their participants (49.8%) were bimodal in their preference for learning styles. Among the bimodal participants, 23.2% were dominant in abstract random and concrete random, 8.8% in concrete sequential

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and concrete random, while 8.2% were dominant in concrete sequential and abstract random. These results indicate that a significant number of interior design students lean towards multiple ways of thinking, which is related to the influence of cognitive style in this study. Multiple ways of thinking could require varying functions of the brain, suggesting a need for hemispheric collaboration.

Nussbaumer and Guerin (2000) used Kolb's learning style inventory and Isham's (1995) visualization test to understand the relationship between learning preferences and visualization skills of interior design students. Kolb's learning styles are based on the notion that people differ in the way they learn and process information, which is dependent on whether they are right or left-brain oriented.

Nussbaumer and Guerin (2000) found evidence to further support the role of brain hemispherity for visualization skills in interior design. Nussbaumer and Guerin (2000) stated that "convergers and assimilators are left-brain individuals who grasp information through abstract conceptualization that involves analysis of surroundings through logic and order" while accommodators and divergers are "right-brain individuals who grasp information through concrete experience that involves experiencing the surroundings through the senses" (p. 12). The researchers found that divergers (30.3%) and assimilators (29.9%) were the largest groups in their study. Hence, according to these results, interior design students could prefer either right or left-brain thinking. In their study, left brain participants scored higher on the visualization test due to their ability to take

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quick decisions (convergers) and ability "to analyze and eliminate the wrong answer as they work through the problem" (Nussbaumer & Guerin, 2000, p.12).

Both Watson and Thompson (2001) and Nussbaumer and Guerin (2000) found that all learning styles were present among interior design students. Watson and Thompson (2001) stated that the presence of all cognitive styles could be due to the wide range of content that is part of the interior design curriculum. The practice and study of interior design requires balancing both form and function of a space.

Significantly, Watson and Thompson (2001) as well as Nussbaumer and Guerin (2000) have indicated that interior design students should be taught to think to beyond their preferred way of thinking and learning. Such training would enable interior design students to handle the varied demands of the design profession. Other researchers (Meneely and Portillo, 2005; Meneely, 2010) have also stressed on developing adaptable thinking among interior design students. Adaptable thinking involves being able to think in a flexible manner and navigate between the scientific and artistic demands of interior design. According to Meneely (2010), design instructors need to teach students to be adaptable in their thinking. "By modeling the role that different styles of thinking can play during the design process, instructors can help students understand the value of adaptable thinking and identify situations when employing a less-preferred style would be more beneficial" (Meneely, 2010, p. 30).

In a study profiling cognitive styles of interior design students based on the concept of adaptable thinking, Meneely (2010) concluded that interior design students "are most comfortable engaging in conceptual, integrative, and imaginative processes (right-cerebral) as well as expressive, sensory, and interpersonal processes (right limbic)" (p. 27). Participants of the study included 81 interior design students from a CIDA (Council for Interior Design Accreditation) accredited program. The researcher used Herrmann Brain Dominance Inventory (HBDI; Hermann, 1989) to assess cognitive styles of design students.

A significant finding was that interior design students displayed low preference for left hemispheric thinking that involves critical and analytical thinking. The conclusions of Meneely (2010) were consistent with the findings and conclusions of Watson and Thompson (2001) and Nussbaumer and Guerin (2000). Watson and Thompson (20001) found that only 2% of the participants in their study preferred the abstract sequential style of learning, which is similar the left-brain dominant style of analytical thinking. The researchers stated that analytic and critical thinking is vital for interior design as well as creativity. These conclusions of Meneely (2010), Watson and Thompson (2001), and Nussbaumer and Guerin (2000) further reiterate the importance of hemispheric collaboration for interior design as well as creativity.

The conclusions of these researchers (Martindale et al., 1984; Katz, 1989, 1997; Houtz et al. 2003; Meneely & Portillo, 2005; Chakravarty, 2010; Meneely,

2010; Mihov et al. 2010) indicate a preference for the right hemisphere among creative individuals. With specific reference to interior design McLain-Klark and Rawls (1988) stated that "when the right brain is dominant a more holist or exploratory approach is facilitated, and creativity in interior design is encouraged" (p. 24). In contrast they stated that when the left brain is dominant a more step by step and linear approach is facilitated, in this case creativity is low resulting in "rigid solutions" (p. 24).

However, considering the creative process and the concept of creative cognition, a collaborative relationship between the hemispheres of the brain is vital for creative performance. To be successful in interior design, an individual would need an ability to use both the hemispheres effectively to balance the demands of form and function. It is evident from precedent literature that creativity involves a collaborative functioning of the two hemispheres, especially within the discipline of interior design.

Within the context of the confluence theories of creativity, cognitive style is a vital influence on creativity. Specifically for the discipline of interior design, the ability to think in both divergent as well as convergent manner could be one of the most important skills for creativity. This skill to think divergently as well as convergently is a descriptor of creativity to begin with. A flexible and integrated thinking style is important for creativity to balance the demands of novel and appropriate as well as for balancing the demands of form and function. Other

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important influences on creativity, especially for the discipline of interior design are personality style and motivational orientation.

Meneely and Portillo (2005) conducted a study to understand the relationship between cognitive styles, personality styles, and creative performance in beginning interior design students. The researchers employed two instruments for psychological assessment and one for performance-based assessment. The instruments for psychological assessment included the Hermann Brain Dominance Instrument (HBDI; Hermann, 1989) and the Adjective Check List - Creativity scale (ACL-Cr; Gough & Heilbrun, 1983) to assess cognitive styles and personality style respectively. In addition, the Creative Assessment Technique (CAT; Amabile, 1982a) was used to assess the creative performance of the students.

Based on the results of the HBDI the sample was divided into low and high flexibility groups. Analysis of the HBDI results indicated that the sample of students preferred a right-brain cognitive style. The researchers theorized that a holistic discipline such as interior design demands a high level of cognitive flexibility as well as personality style. Further analysis indicated that the participants who scored high in ACL-Cr scored high on the CAT; suggesting that personality is a significant predictor of creativity in interior design. Further analysis did not reveal any significant relationship between a flexible cognitive style and creativity. However, the results did reveal that participants high in cognitive flexibility scored high in the ACL-Cr. The researchers stated that while

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cognitive style did not predict creativity, it is necessary for it. These findings emphasize the importance of confluence approaches for creativity research. The following section presents information regarding measurement of cognitive style related to creativity.

Measuring cognitive style.

One of the main premises of the present study is that creativity requires a flexible cognitive style, which is dependent on the different functions of the brain hemispheres. Brain hemisphere studies related to creativity have typically employed technology such as EEGs and PET scans (Katz, 1997; Mihov et al. 2010). However, these methods are not feasible for the present study. Cognitive style in the present study will be measured using the Human Information Processing Survey (HIPS; Khatena & Torrance, 1984).

Brain hemispherity has been a matter of much contention, and few psychometric measurements that are available to measure it. The Myers Briggs Type Indicator (MBTI; Myers & Macaulley, 1985) and Kirton Adaption Innovation Inventory (KAI; Kirton, 1987, 1994) are often used to assess cognitive styles of individuals. However, these instruments often place an individual on a continuum, suggesting an individual thinks in one way or another such as judging or perceiving or sensing and intuitive. Based on the precedent literature it is evident that a creative individual is able to think in a flexible manner and toggle between different ways of thinking. Hence, creative thinking involves greater interaction and collaboration between the different hemispheres of the brain

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(Katz, 1997; Charkravarty, 2010). As a result, the study required a measure of cognitive and hemispheric collaboration.

Two instruments matching the requirements of the study were found: the Hermann Brain Dominance Instrument (HBDI; Hermann, 1981) and the Human Information Processing Survey (HIPS; Torrance et al. 1984). The HBDI is a 120 item self-report survey; each item is characterized into one of the four cognitive dimensions. The four dimensions include right, left, cerebral (analytic thinking), and limbic (affective thinking). The "HBDI scoring allows a respondent to have a singular preference as a thinker (cerebral), a singular preference as a feeler (limbic), or a flexible preference as both a thinker and a feeler (cerebral and limbic)" (Meneely & Portillo, 2005).

The HIPS is a 40-item scale that also identifies four cognitive dimensions: right, left, mixed, and integrated. The HIPS also provides a tactics and statistics profile that provides information regarding an individual's problem solving and decision-making process. The HIPS instrument measures cognitive flexibility (mixed and integrated cognitive dimension) in an individual, which provides vital information for this study. Both the HBDI and HIPS provide information regarding the cognitive preferences of an individual, specifically they allow one to identify if an individual is flexible thinker. However, the HIPS instrument was selected as a measure of cognitive style due to the length of the instrument, the ease of administering, and the cost involved.

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Personality Style

Personality is defined as "the dynamic organization within the individual of those psychophysical systems that determine his unique adjustments to his environment" (Allport, 1937, p. 48). Watson et al (1994) stated that this definition includes aspects that are consistent over several definitions of personality. These aspects suggest that personality is "internal, organized, and characteristic of an individual over time and situations (Watson et al., 1994, p. 18). Watson et al. (1994) also stated that motivation and adaptive significance are also important for creativity. Significantly, personality is made up of traits that are not transient in nature, but relatively stable in a person's life style. According to personality researcher Feist (1999), there are many parallels between the study of creativity and personality, since they both are engaged in studying individual differences and uniqueness.

Personality research in the 1980s and 1990s focused on the Five Factor Model (FFM) that has proven to be a consistent model for individual differences in general. The FFM includes five personality factors: openness to experience (O), conscientiousness (C), extroversion (E), agreeableness (A), and neuroticism (N). Several researchers have examined the correlations between the five-factor model (FFM) of personality and creativity (Costa & McCrea, 1989; King, Walker, & Broyles, 1996; Feist, 1998; Furnham, 1999; Furnham & Bachtiar, 2008; George & Zhou, 2001). Most researchers have found strong correlations between the factors of openness to experience, extraversion (Costa & McCrea,

1989; King, Walker, & Broyles, 1996; Feist, 1998; George & Zhou, 2001; Batey &

Furnham, 2008, 2009, 2010) and conscientiousness (Batey & Furnham, 2009,

2010). Some researchers have found some negative correlations between

creativity and conscientiousness (King, Walker, & Broyles, 1996; Feist, 1998;

George & Zhou, 2001; Batey & Furnham, 2008).

However, over the course of years, various researchers (Barron &

Harrington, 1981; Helson, 1991; Feist, 1998, 1999; Helson & Pals, 2000; Feist &

Barron, 2003; Meneely & Portillo, 2005; Pedersen & Burton, 2009; Meneely,

2010) have found a set of core characteristics that are present consistently

among creative individuals. Similar core characteristics were found by other

researchers among creative artists and scientists (Feist 1998, 1999; Portillo,

2000), women (Helson, 1990), interior designers (Portillo, 2000; Meneely &

Portillo, 2010), and architects (Dudek & Hall, 1991). These traits are summarized

in Table 2.

Table 2

Personality Traits Found Across various studies

Researchers	Common / significant personality traits	Sample	Instrument / model used
Barron and Harrington, 1981	High valuation of esthetic qualities in experience, broad interests, attraction to complexity, high energy, independence of judgments, autonomy, intuition, self-confidence, ability to resolve antinomies or to accommodate apparently opposite of conflicting traits in one's self-concept, and finally, a firm sense of self as "creative"	Research studies on creative personality	Review of literature on personality and intellect.
Feist, 1998	Autonomous, introverted, open to experience, norm doubting, confident, self accepting, driven, ambitious, dominant, hostile, impulsive.	Artists and scientists	Review of literature on personality studies on artists and scientists.
Dudek and Hall, 1991	Driven, committed, over-learned skills, aesthetic sense, good salesmen	Architects	ACL-Cr, CPI
Helson, 1990	Complicated, idealistic, imaginative, interests wide, affected, autocratic, conceited, headstrong, and self-seeking	Women	ACL-Cr
Portillo, 2000	Artistic, complicated, humorous, idealistic, impulsive, having wide interests, reflective, and sensitive.	General among: architects, interior designers, landscape architects, and engineers	ACL-Cr
	Artistic, curious, energetic, sensitive, and spontaneous, sharp-witted, unconventional, assertive, intelligent, spontaneous, reflective	Interior designers	ACL-Cr
Meneely and Portillo, 2005	Imaginative, artistic, independent, curious, ambitious, adventurous, humorous, sensitive, intelligent, and energetic.	Interior design students	ACL-Cr

Note. Predominant and common traits found among creative individuals. The traits varied depending on the instrument used in the study.

Drawing from his meta analysis of studies related to creativity and personality, Feist (1998) concluded that "empirical research over the last 45 years makes a rather convincing case that creative people behave consistently over time and situation and in ways that distinguish them from other" individuals (p. 304). Feist (1998, 1999) concluded that temporal stability of creative personality suggested that personality characteristics might precede creative achievement, exerting some influence on an individual's creativity. He also concluded that an IQ test did not prove to be a valid predictor of adult creative achievement. Feist (2002) also concluded that personality traits tend to be stable over an individual's life; creative personality traits present in creative children tend to be present in their adulthood as well. This temporal stability and precedence of personality has also been evidenced by prominent longitudinal studies by researchers such as Dudek and Hall (1991), Helson (1999), and Feist and Barron (2003). In addition to specific personality traits found among creative individuals, several researchers have found that personality styles could be discipline specific (Barron & Harrington, 1981; Feist, 1999; Portillo, 2002).

Feist (1998) compared personality styles of artists and scientists. In his meta analysis to crystallize the existing knowledge related to personality and creativity in the science and art disciplines, Feist (1998, 1999) used the Five Factor Model to standardize data across studies that used various personality inventories (For details on the inventories and process refer to Feist, 1998, 1999). Feist (1998) concluded that besides some core characteristics among

creative artists and scientists, there were some specific differences among personality styles of artists and scientists. For instance, artists were more emotional and impulsive as compared to scientists, while scientists were more conscientious than artists were. The researcher also concluded that creative and non-creative artists displayed specific personality differences.

Dudek and Hall (1991) drew a similar conclusion in their research conducted on prominent male American architects. Dudek and Hall (1991) conducted a follow up study on a previous study conducted by MacKinnon and his collaborators in 1958 – 1960 to study personality traits of prominent male American architects. They concluded that despite changes, "the personality characteristics of the three groups of architects remained remarkably stable and were at least partly responsible for the various degrees of their success" (Dudek & Hall, 1991, p. 230). Reiterating the notion of personality stability, the researchers concluded that the three groups "retained their distinct characteristics and philosophies in life" (Dudek & Hall, 1991, p. 230).

Specifically in interior design, Portillo (2002) conducted an exploratory study to compare the personality of interior designers, architects, landscape architects, and engineers. Results indicated that interior designers were described with specific personality traits (Table 2). Portillo found that the perception of being creative and artistic for interior design practitioners was stronger as compared to architects or engineers. In addition, the researcher stated, "a common core of perceived traits extended across fields and (she) also

found evidence for disciplinary uniqueness" (Portillo, 2002, p. 23). While the above-mentioned studies provide ample evidence for the presence of a specific core characteristics found among creative individuals, they do not provide any insight into the relation between personality styles and creativity.

Several researchers have attempted to uncover the relationship between creativity, personality, and other influences such as intelligence to understand the importance of personality style for creativity. Notable among them are longitudinal studies conducted by Feist and Barron (2003), Helson (1999), and Helson and Pals (2000).

In a longitudinal study of males, Feist and Barron (2003) presented the results of a 44 year long study; data were collected at age 27 and 53. The researchers aimed to understand the relative importance of intelligence, potential, and personality for creativity from early to late adulthood in males. The researchers proposed that intelligence, potential, and personality would collectively predict creative achievement, but certain personality characteristics would explain variance over and above intelligence and potential. Feist and Barron (2003) defined potential of an individual as the possibility of making creative contributions later in their lives.

According to Feist and Barron (2003), previous research has clearly indicated that there is a moderately low degree of relationship between intelligence and creativity. With respect to intelligence, the threshold theory is widely accepted as a valid theory. The threshold theory proposes that IQ does

not matter to creativity above an IQ of 120 as much as it does below an IQ of 120. According to the threshold theory, intelligence and creativity are moderately positively correlated (+ .20 to +.30) approximately, at the IQ of 115-120; beyond this point the relationship between creativity and intelligence is nil.

Feist and Barron (2003) also concluded that at age 27, personality, specifically traits of self-confidence and submissiveness, predicted concurrent creativity and creative achievement over and above potential and intelligence (variance of 8%). However, personality traits of tolerance and psychological mindedness increased the variance explained 20% over and above potential and intellect. These results reiterated the importance of personality for creativity over intelligence and potential. Feist and Barron (2003) proposed that tolerance and psychological mindedness were two indicators of psychological maturity, which suggests that a well-formed personality could be a significant influence on creativity. Together the four predictors (intellect, potential, tolerance, and psychological mindedness) "explained a little more than a third of the variance in lifetime creative achievement" (Feist & Barron, 2003, p. 81).

Similarly, longitudinal studies conducted by Helson and her colleagues have provided further evidence for the influence of personality on creative achievement. Helson and her colleagues have examined creativity among women across various studies; their research suggested that creative personality could contribute to creative potential. Helson (1999) conducted a longitudinal study at the Institute of Personality and Social Research (at the time of the study

it was known as Institute of Personality Assessment and Research; IPAR) to study creativity in women. Results indicated that creative personality traits remained stable throughout their life for all the participants until age 52. Positive correlations were found between creative potential at age 27 and creative production at age 52, indicating that a creative personality precedes creativity and influences creativity at later ages.

Significantly, Helson's (1999) research brought to light the importance of personality for creative potential. Helson (1999) concluded, "inventory measures of creative traits at age 21 did predict creative potential at age 52" (p. 99). These results were further reinforced in a follow up study conducted by Helson and Pals (2000) on the same sample. During this study, the researchers employed the concept of achieved identity (Marcia, 1966) to describe a well-formed personality. Drawing from the California Q Set (CAQ; Block, 1978), Helson and Pals (2000) proposed that "characteristic(s) of the identity achieved individual are: Values own independence, Has a clear, consistent personality, Shows ethically consistent behavior, Is warm and compassionate, Is productive, and Has insight into own behavior" (p.11). The researchers also proposed that individuals' priorities and effectiveness in creative endeavors is influenced by how integrated or achieved their identity is. The researchers concluded that women high in creative potential at age 21 as well as high in achieved identity at age 43 were significantly high in creative achievement at age 52.

Conversely, women high in creative potential at age 21 and low in creative

achievement at age 52 were low in achieved identity at age 43. Helson and Pals (2003) further concluded that supporting creative potential at an early age gave individuals an incentive to be more open and take risks. Hence, they suggest that that "more attention should be devoted to encouraging individuals with creative potential to develop social integration and cohesive identities" (Helson & Pals, 2000).

Within the discipline of interior design, few studies have examined the relationship between personality style and creativity. The importance of personality style for creativity for interior design was revealed in a concept analysis of creativity conducted by Pedersen and Burton (2009). The researchers conducted the concept analysis of creativity based on a method prescribed by Walker and Avant (2005). Overall, the analysis revealed that creative person preceded the creative process, which preceded the creative product. Several indicators were identified as antecedents of a creative person, which were similar to those identified by other researchers (Amabile, 1985; Sternberg & Lubart, 1996). These included motivation, knowledge, cognitive style, personality, environment (social and physical), and intelligence, interdisciplinary experience, cross cultural experience, ideas, educational approach, and new technological tools.

Based on these studies, one can conclude that personality traits tend to be stable and consistent over an individual's lifetime. Personality also referred to as creative potential or achieved identity can predict and influence creative

behavior and achievement (Helson and Pals, 2000). In terms of implications for creativity, these conclusions indicate that creative personality style variation can be observed in any discipline.

A personality style that is defined as creative is composed of specific traits that differentiate a creative individual from a non-creative individual. Overall, these traits include complicated, imaginative, interests wide, affected, autocratic, conceited, headstrong, and self-seeking, curious, energetic, sensitive, humorous, impulsive, reflective, and spontaneous (Barron & Harrington, 1981; Dudek & Hall, 1991; Helson, 1999, Feist, 1999; Portillo, 2002). In addition, Csikszentmihalyi (1996) has suggested that a creative individual displays several paradoxes in personality traits; a creative person often oscillates between introversion and extroversion, between humility and arrogance, between playfulness and discipline to name a few. These paradoxes single out the creative personality from the non-creative personality. In his case study approach used to study 91 prominent individuals, Csikszentmihalyi (1996) found several of these paradoxes among highly creative individuals.

Besides the conclusions about personality styles, some researchers also found positive and significant relationship between personality style and the influences of motivational orientation and cognitive style. Specifically in the field of interior design, Meneely and Portillo (2005) conducted a multidimensional study to understand the relationship between creativity, personality style, and cognitive style of interior design students. The researchers concluded that

participants who had higher scores on the creative personality traits showed greater flexibility in thinking and designed more creatively as compared to participants who scored low on the creative personality traits. In addition, the researchers concluded that participants with high scores on creative personality traits also differed from the sample and displayed high scores for other personality traits such as alert, precise, logical, thorough, and suspicious which tend to display a preference for left hemispheric thinking. While these results provide evidence for the importance of certain personality traits for creativity, they also provide evidence that indicates a strong relationship between personality styles and cognitive styles for creativity among interior design students.

The influence of motivational orientation also shares an interesting relationship with creativity. Several researchers have found that creative individuals are highly intrinsically motivated towards their chosen careers and pursuit of creativity. Dudek and Hall (1991) referred to "drive" and "commitment" as two reasons that lead to continued and long-term success among eminent architects. Helson (1990) and Helson and Pals (2003) stated that participants in their sample who were committed and invested in their career aspirations were able to sustain their creativity and success in their careers. Participants in the Helson (1990), and Helson and Pals (2000) study only included women. Portillo (2002) found that creative individuals were energetic in their pursuit of creativity. The personality trait "driven" was consistently found by several researchers among creative individuals (Feist, 1998; Dudek & Hall, 1990) as well as traits

such as "high energy" (Barron & Harrington, 1981) and "energetic" (Portillo, 2002; Meneely & Portillo, 2010).

These results reiterate the need to study the influences of cognitive style, personality style, and motivational orientation in conjunction with each other. The results also reiterate the role of personality styles in sustaining creativity among individuals. A personality style would enable an individual to take risks, select a working style conducive to creative endeavors, and be independent thinkers as well as norm doubting. The following section presents information regarding measurement of personality style.

Measuring personality style.

This study utilizes the Khatena Torrance Creative Personality Inventory (KTCPT; Khatena & Torrance, 1976) to assess the personality style of the participants. There are several measures of personality such as the Myers Briggs Type Indicator (MBTI; Myers & Macaulley, 1985), Keirsey Temperament Sorter II (KTS II; Keirsey, 2006), Kirton Adaption Innovation Inventory (KAI; Kirton, 1987, 1994), Adjective Checklist – Creativity scale (ACL-Cr; Gough & Heilbrun, 1983) and the California Personality Inventory (CPI; Gough, 1975). Most of these measures identify specific personality types. For instance, the KAI categorizes individuals into Adaptor or Innovator personality types. Similarly, the MBTI and KTS II, both based on Jung's theory of personality type, categorize individuals on eight different personality types such as extrovert and introvert, judging and

perceiving, and so on. Interestingly, some researchers have also used the MBTI and the KAI to identify thinking styles of individuals.

Two instruments that are widely used in personality measurement based on the FFM model are the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991), and the NEO-FFM (Costa & McCrea, 1992). These instruments measure the five factors of agreeableness, openness to experience, neuroticism, conscientiousness, and extraversion. These inventories tend to provide a general understanding of an individual's personality, but do not provide insight into their personality style. With respect to creativity, of all the instruments mentioned, the ACL-Cr is one that identifies individuals as creative or not creative. The ACL is a self-report measure that includes 300 adjectives that an individual selects to represent his/her personality. When scored on Domino's creativity scale, the individual can be categorized as being creative or not creative.

However, a significant premise of the present study is that a specific personality style influences creativity of design students; the higher the presence of a well formed personality style, the greater the influence on creativity. Hence, it was important that in addition to identifying a creative personality, the level of personality style was also measured in the present study. The KTCPI is one instrument that does that.

The KTCPI includes two inventories: What Kind of Person Are You? (WKOPAY) and Something About Myself (SAM). SAM measures the creative attributes of environmental sensitivity, initiative, self-strength, intellectuality,

individuality, and artistry. The WKOPAY measures personality traits of acceptance of authority, self-confidence, inquisitiveness, awareness of others, and disciplined imagination. The inventories also provide an overall score that indicates the levels of self-perception of creativity among an individual; the higher the score, the more creative an individual perceives himself/herself to be. This notion resonates with the concept of achieved identity (Helson, 1991; Helson & Pals, 2000) and creative potential (Helson & Pals, 2000; Feist & Barron, 2003). Several studies have used the KTCPI (Morse & Khatena, 1989; Galucci et al. 2007); some studies have employed only one of the two inventories.

Several researchers such as Houtz et al. (2003), Prabhu et al. (2008), and Montgomery et al. (2004) have employed the WKOPAY. Houtz et al. (2003) used the WKOPAY to assess personality styles of psychology students (reliability ranged from mid range to .90). Prabhu et al. (2008) used the WKOPAY to assess the creativity of individuals, based on the participants' perception of their creativity.

The test retest reliability for the WKOPAY and SAM range from .71 to .98 (Morse, 1994). Morse (1994) also found good reliabilities for the overall scores for WKOPAY and SAM, but he cautioned that the reliabilities for the individual factors could only be used reliably in adult sample sizes of at least 40. The present study has an approximate sample size of 49. More information about the reliability and validity of the KTCPI can be found in the manual published by the Scholastic Testing Services. Several researchers have used the WKOPAY only

and have reported good reliabilities for the instrument (Morse & Khatena, 1989; Morse, 1994; Houtz et al., 2003; Gallucii et al., 2007; Prabhu et al., 2008). The present study will use the overall score from the WKOPAY to ascertain the level of creative personality among the sample.

Referring back to the confluence theories of creativity, it must be stated that the personality style of an individual is also dependant on his/her motivational orientation. Hence, motivational orientation emerges as a vital influence on an individual's creativity. Literature related to motivational orientation and its measurement is discussed in the following section.

Motivational Orientation

Motivation is a theoretical construct used to explain the initiation, direction, intensity, persistence, and quality of behavior, especially goal-oriented behavior (Maehr & Meyer, 1997). As mentioned earlier, there are two motivational orientations, intrinsic and extrinsic. Motivation, specifically intrinsic motivation, is closely related to creative behavior and has been studied by several researchers.

Amabile (1983) proposed a two-pronged hypothesis of motivation that stated, "the intrinsically motivated state is conducive to creativity, whereas the extrinsically motivated state is detrimental" (p. 91). In order to understand this hypothesis among writers, Amabile (1985) conducted a study in which she divided the sample of writers in to three groups: intrinsically motivated, extrinsically motivated, and a control group. Each group was given a pre and a posttest of creativity measure via a creative task. The intrinsic motivation group

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received an intrinsic motivation survey, while the extrinsic group received an extrinsic motivation survey as a priming questionnaire. Results of the study indicated that both the intrinsically motivated and control group scored high on the posttest, while the extrinsically motivated group displayed reduced creativity in the posttest. This evidence provided support for the detrimental effects of extrinsic motivation on creativity, while suggesting that intrinsic motivation could be beneficial to creativity.

Other researchers have proposed similar hypotheses and ideas. Csikszentmihalyi (1990a) concluded from his research on problem finding that creative individuals are attracted to complex problems that lead to creative solutions. This attraction is a result of their interest and curiosity in the subject matter. He also concluded the endeavor of problem finding is fueled by perseverance that is focused on gaining intrinsic rewards procured during the process of information processing. Csikszentmihalyi (1990b) further elaborated this notion in this concept of *flow.*

According to Csikszentmihalyi (1990b), *flow* is a state achieved by individuals when they are engaged in challenges that meet their skill level. This state of *flow* has been described as a state of psychological "high" that results in optimal involvement in a task. This optimal involvement results in increased enjoyment, concentration, and slowing of perception of time when involved in the activity of interest.

Csikszentmihalyi (1990) suggested that individuals involved in creative endeavors often sought activities that provided *flow* experiences and that creativity resulted from such activities. In his case study of eminent creative individuals, he discovered that such individuals often sought creative acts for the love and enjoyment in it, and not for success. Csikszentmihalyi (1990b) further stated that highly creative individuals are often involved in a constant loop; seeking challenges that increase their mastery and lead to a state of *flow,* prompting the individual to seek more challenges to attain the state of *flow* again. This constant involvement leads to heightened passion and drive that one has in the chosen activity and discipline. In this sense, the experience of *flow* resonates with the concept of intrinsic motivation for creativity.

Gardner (1993), on the other hand suggested that intrinsic motivation is a personal characteristic of creative individuals. In this respect, motivation could be related to personality style of creative individuals. Gardner's (1993) suggestion indicates that creative individuals could be more influenced by their personal reasons and values to seek unique solutions; external reasons such as rewards and success might not be as significant. Other researchers such as Albert (1990) and Perkins (1988) have stressed the importance of pleasure, curiosity, and interest in creative behavior. According to Perkins (1988), individuals seek challenging and complex problems that push boundaries and demand challenging solutions. These suggestions relate exceedingly well with the concept of *flow* and intrinsic motivation.

In a correlation study to ascertain the relationship between motivational orientations and creativity, Amabile (1994) found that intrinsic motivation correlated positively with creativity, while extrinsic motivation had a negative correlation with creativity. She used the Kirton Adaption-Innovator (KAI; Kirton, 1976) to measure creativity and the Work Preference Inventory (WPI; Amabile, Hill, Hennessey & Tighe, 1994) to measure motivation.

More recently, Kaufman (2002) reviewed literature related to creativity based on the Investment Theory of Creativity proposed by Sternberg and Lubart (1996). Six influences were examined: cognitive styles, motivation, knowledge, environment, intelligence, and personality. The researcher attempted to understand the relationship between the influences and creativity of writers. Kaufman (2002) concluded, "in essence, the study of creative writers should focus on internal forces, rather than external forces" (p. 36). The internal forces according to Kaufman (2002) include motivation and personality. The researcher further stated that these influences should be studied in conjunction to understand creativity better. Although the conclusion drawn by Kaufman was in relation to writers, the empirical evidence reviewed was not specific to studies that were conducted on writers. The same conclusions apply to creativity in general.

In addition, several other researchers have explored other closely related concepts to intrinsic motivation such as self-determination (Sheldon, 1995) and values (Shwartz, 1992; Dollinger et al, 2007; Kasof, 2007). Sheldon (1995)

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conducted two studies to understand the relationship between creativity and self-determination. The researcher assumed that "self-determined people are able to resist the controlling situation and interpersonal forces that can undermine creativity and are also better able to establish and maintain contact with intrinsic interests" (p. 25). According to this explanation, self-determination is similar to motivation, specifically intrinsic motivation, where the locus of control is internal to the individual and aids in pushing through obstacles.

Results of the two studies indicated, "creative people in this sample strived for self-determined reasons and had an autonomous motivational orientation and a general concept of themselves as self-determined" (Sheldon, 1995, p. 29). In terms of creativity, these results indicate that creative persons, who rate high on self-determination and autonomy scales, are able to sustain their motivation to be creative in the presence of situational difficulties. Sheldon (1995) also stated that high self-determination allowed individuals to "access deeper cognitive resources and creative capabilities within themselves" (p. 25). In addition, self-determined persons are more likely to engage in and devote conscious attention and effort to problems that interest them.

While Sheldon (1995) studied the concept of self-determination, other researchers (Dollinger et al., 2007; Kasof, 2007) have studied values of an individual in relation to their creativity. Both Dollinger et al. (2007) and Kasof (2007) have used the Schwartz Value Survey (SVS; Schwartz, 1992) as a measure of values. The SVS includes 10 value clusters: power, achievement,

hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. Of the 10, Schwartz (1992) identified that stimulation, self-direction, and universalism correlated highly with creative achievement. The other values correlated negatively with creative achievement. To elaborate further, self-direction was closely related to motivation of independent thought and pursuit of personally chosen creative and exploratory goals. Universalism was related to appreciation of beauty, tolerance, and protection of welfare of people. Finally, the value of stimulation was related to motivation for variety and novelty.

Both Dollinger et al. (2007) and Kasof et al. (2007) attempted to understand the relationship between creativity and values of individuals as measured by the SVS, based on the notion that motivation is central to creativity. The results of both the studies were in accordance with Schwartz's proposal and revealed that overall creative achievement was strongly related to the values of self-direction, universalism, and stimulation. Kasof et al. (2007) concluded that creative behavior was inhibited primarily by tradition value type and secondarily by conformity and security value type. Self-direction was found to interact with intrinsic motivation and to promote creative performance. Similarly, Dollinger et al (2007) found that creative achievement correlated negatively with power, tradition, conformity, and security. Dollinger et al. (2007) concluded that "creativity reflects the pursuit of goals that are personally chosen, intrinsically

motivated, and directed toward novelty and diversity defined in the broadest terms" (p. 100).

These studies also revealed a close relationship between values and personality. The values outlined in the SVS resemble personality traits commonly identified for creative individuals such as independence, autonomy, relative unconcern for social approval, alert, and passionate. The connection between personality and motivation is further evident in a study conducted by Prabhu et al. (2008).

In an attempt to understand the relationship between personality, motivation, and creativity, Prabhu, Sutton and Sauser (2008) conducted a study on undergraduate psychology students. Three personality traits were identified for the study: openness to experience, self-efficacy, and perseverance. Results of this study supported earlier evidence that creativity is related to openness to experience and self-efficacy. With specific reference to intrinsic motivation, a positive relation was found between intrinsic motivation and three personality traits, specifically openness to experience. Concerning extrinsic motivation, a two-way interaction was found between extrinsic motivation, perseverance, and creativity. The evidence suggested that when extrinsic motivation was high, a negative relation existed between perseverance and creativity. In the presence of an external reward, the focus of an individual shifts from being creative to the actual task of attaining the reward, thereby reducing perseverance to achieve creativity for an individual.

However, this was not the case at low levels of extrinsic motivation. Extrinsic motivation was also found to moderate the effect of self-efficacy on creativity at low levels. Overall, the study provided evidence for strong correlation between the personality traits of openness to experience and self-efficacy. In addition, evidence was found for the positive impact of intrinsic motivation on creativity, especially when it mediated personality traits of openness to experience and self-efficacy. Significantly, the study provided evidence that the role and execution of extrinsic motivation must be carefully managed if creativity has to be fostered, both in the work setting as well as in an educational setting (Prabhu et al. 2008).

Based on the theoretical advances in the definition of extrinsic motivation and research into its effect on creativity, Amabile (1996) revised her earlier two-pronged hypothesis to propose the Intrinsic Motivation Hypothesis. According to the Intrinsic Motivation Hypothesis "intrinsic motivation is conducive to creativity; controlling extrinsic motivation is detrimental to creativity, but informational or enabling extrinsic motivation can be conducive, particularly if initial levels of intrinsic motivation are high" (Amabile, 1996, p. 119).

Extrinsic motivation includes two facets: control and information. Amabile proposed that that there are two types of extrinsic motivators: synergistic extrinsic motivators and non-synergistic motivation. Synergistic motivators include information that support the task and work in conjunction with intrinsic motivation. Non-synergistic motivators include external controls such as rewards

and awards, these motivators work against intrinsic motivation. In some cases, extrinsic motivation via rewards (synergistic motivation) has been found to be beneficial to creativity (Eisenberger & Rhoades, 2001). As mentioned the facet of control can be harmful to creativity while the facet of information could aid creativity by providing a framework for an individual to create the solution in.

Eisenberger and his colleagues have conducted several studies that have indicated that rewards could facilitate and increase creativity. Eisenberger and Rhoades (2001) reported results of five studies that examined the effects of rewards and extrinsic motivation on creativity. Participants ranged from fifth and sixth grade students as well as undergraduate students and corporate employees. Participants were divided into a treatment and control group. The treatment group was rewarded for creativity, while the control group did not receive any rewards.

Overall results indicated that the creative performance of the treatment group increased in the second task; their responses were more creative when they were rewarded for creative solutions. Results of the study on employees revealed that rewarding creativity in the workplace increased the intrinsic motivation of the employees and their creativity. Eisenberger and Rhoades (2001) concluded that the rewards became a part of the employees' intrinsic motivation for success at the workplace. The researchers also concluded that "these findings are consistent with the view that expected reward for high performance leads to greater perceived self-determination over one's actions,

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contributing to intrinsic task interest and creativity" (Eisenberger & Rhoades, 2001, p. 736).

Similar studies have been conducted by Eisenberger and his colleagues on rewards and their effect on creativity. Rewards have been found to both increase (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994) and decrease creativity and production of novel solution (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994; Eisenberger & Shanock, 2003). These studies reinforced the case for the importance of motivational orientation, both intrinsic and extrinsic, for creativity.

While it is clear that motivation is a significant component of creativity, in the discipline of interior design, no precedent studies or literature were found that examined the influence of motivation for interior designers. With respect to the componential theory, motivational orientation is a vital influence for the component of task motivation. According to researchers such as Csikszentmihalyi (1990), Gardner (1993), and Amabile (1997) task motivation could be the most significant component of creativity; motivational orientation, specifically intrinsic motivational orientation could be the most important influence on an individual's creativity. The following section presents information regarding measurement of motivational orientation.

Measuring motivational orientation.

Based on the concept of motivational orientation, the Work Preference Inventory (WPI; Amabile, Hill, Hennessey & Tighe 1994) will be used to assess

the third influence of the study. One of the main premises of the study is based on the Intrinsic Hypothesis proposed by Amabile (1994), which states that intrinsic motivation is beneficial for creativity, while some forms of extrinsic motivation could be beneficial. Several researchers (Amabile, 1985; Csikszentmihalyi, 1990; Dudek & Hall, 1991; Sternberg & Lubart, 1999; Dollinger et al, 2001) have emphasized the importance of intrinsic motivation for creativity.

Measures of motivation tend to focus on overall motives or values of individuals and not on orientations such as intrinsic or extrinsic. For instance, the SVS (Schwartz, 1992) measures values such as power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. However, the SVS does not provide insight into motivational orientations of an individual. Some other tests that measure motivation are the Thematic Appreciation Test (TAT), Harter's scale of intrinsic and extrinsic motivation (1981), The Origin Climate Scale (deCharms, 1976), and the General Causality Orientations Scale (Deci & Ryan, 1985). Other than Harter's scale, these measures do not provide any information about the motivational orientations of individuals. However, the Harter scale is designed to measure motivational orientation among children. The WPI on the other hand, is a measure designed for adults; it categorizes individuals as intrinsically or extrinsically motivated. This was the main reason for selecting the WPI as a measure of motivational orientation. There are two forms of the test: a student form and a work form. For the present study, the student form will be employed.

Loos (2001) found the WPI (student form) to have moderate reliabilities; Cronbach's α ranging from .60 to .76 (pg. 227). Amabile et al. (1994) compared the results of the WPI with the results of other measures used for motivation, personality, social desirability, and environment perception. Overall, the EMO items had lower reliabilities in comparison to the IMO items. However, Loos (2001) stated that the WPI showed construct validity and is a valuable tool in understanding as well as describing motivation. In contrast, Abuhamdeh and Csikszentmihalyi (2009) found good reliabilities for the IMO items (α = .84) and moderate reliabilities for the EMO items (α = .68). For this study Cronbach's α will be calculated to assess the reliability of the test. While there is no conclusive evidence about the reliability and validity of the WPI, it has proved to be an effective tool in understanding motivational orientation of individuals.

Summary

Creativity is an important component of interior design. This literature review brought to light several key aspects in the study of creativity. Pedersen and Burton (2009) have stated that the concept of creativity has not been explicitly defined in the discipline of interior design. However, they also concluded that creativity was preceded by (antecedents) and manifested (empirical referents) itself via various constructs such as motivation, knowledge, cognitive styles, and environment. This conclusion was a result of a concept analysis of creativity for interior design and related disciplines.

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Implications of these findings suggest that creativity must be studied in context of the various antecedents as well as in relation to empirical referents. The antecedents include motivation, knowledge, cognitive style, personality, environment (social and physical), and intelligence, interdisciplinary experience, cross cultural experience, ideas, educational approach, and new technological tools.

These antecedents could also be referred to as influences or resources of creativity. These influences and resources were also found to be a part of various confluence theories examined for the present study. Confluence theories are based on the notion that various influences exert force on each other as well as affect an individual's creativity.

Precedent literature provides evidence that creative individuals display certain core set of personality traits consistently and that personality traits could be discipline specific (Feist, 1999; Meneely & Portillo, 2005). With respect to cognitive style, it was evident that creativity results from a collaborative relationship between the two hemispheres of the brain. This collaboration is needed to solve problems creatively, especially within the discipline of interior design. Amabile (1983, 1985) posited that although a person might possess the skill required for the discipline, a relevant cognitive style, and personality style; however, if the person is not inclined or motivated to be creative, he/she will not be involved in creative activities. This suggests a significant relationship between motivation and the components of creative personality and cognitive style.

Reiterating the confluence between various influences, James and Asmus (2000 – 2001) argued that there is a significant relationship between cognitive creative thinking and personality. They posit that personality and cognitive style each exert influence on each other and eventually the individual's creativity. This is due to the similarity in personality traits and cognitive style. For instance, personality traits of risk-taking and independent thought can be linked with the cognitive styles that include independent and original thinking. According to Eysenck (1994), individuals whose personality type is related to creativity tend to prefer divergent thinking, and hence incline more towards creativity. This notion further reinforces the need to study creativity in conjunction with the influences within a specific discipline.

The connection between the creativity and interior design is evident in the definition of the profession specified by NCIDQ as well as in the accreditation requirements of CIDA. Despite the importance of creativity for interior design, very few studies have explored creativity in interior design. However, few studies have explored creativity in isolation, and its related components such as cognitive styles and personality style. The following section present information on the measurement of creativity.

Measurement of Creativity

The three influences have been widely researched using a variety of instruments by several researchers. Creativity of individuals has also been

measured in a variety of ways. This section discusses the measurements that will be used in the present study.

Measuring creativity.

Assessment of creativity has come a long way as the definition and assessment techniques have been refined. According to Zeng et al. (2011), there are ten categories of creativity assessment that include personality inventories, biographical inventories, peer and teacher nominations, and judgment of products to name a few. Assessment of creativity depends on the intent of the research. Zeng et al. (2011) stated, "researchers who are interested in aspects of people and cognitive processes have been mainly relying on the psychometric approach to studying creativity" (p. 27).

Divergent thinking (DT), a concept first proposed by Guilford (1956, 1959), is a psychometric concept related to the process of ideation, and four aspects of it: flexibility, fluency, elaboration, and originality. Guilford did not consider divergent thinking to be the only indicator of creativity or the only representation of it. According to Guilford, creativity also involves sensitivity to ideas, ability to redefine and reinterpret problems as well as a flexibility and openness that is conducive to unique and different ideas. DT tests are however, the most widely used psychometric approaches to assess creativity (Zeng et al. 2011). There are several tests used to assess divergent thinking (DT) such as the Alternate Uses Test (Guilford et al. 1978), Wallach-Kogan Creativity Test (WKCT; Wallach & Kogan, 1965), and Getzels-Jackson Creativity Tests (GJCT; Getzels & Jackson,

1962). However, according to several researchers (Kim, 2006; Runco et al. 2010; Zeng et al. 2011) the Torrance Test for Creative Thinking (TTCT; Torrance, 1966/1974) is the most well known and widely used assessment of DT.

Another instrument that measures creativity is the Consensual Assessment Technique (CAT; Amabile, 1982a). The CAT involves expert judgment of creative products. The CAT, however only measures creative production at one point in time and thus is not as effective in predicting creativity or creative behavior in the future. An improvement of the CAT would be an assessment of an individual's portfolio of work spanning a considerable amount of time. The scope of the present study does not extend to the development of a measure of creativity, nor does it aim to assess creative production of design students over a period of time. Hence, the TTCT was selected as an appropriate measure of creativity.

TTCT was developed by Torrance based on Guilford's description of creativity. Building on Guilford's work, Torrance proposed the following definition of creativity:

> a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results (1966, p. 6).

The aforementioned definition of creativity includes aspects of motivation, creativity skills, and personality. The TTCT test does not measure all these

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aspects; based on Torrance and Guilford's definition of creativity, the TTCT measures four facets of creativity: flexibility, fluency, elaboration, and originality. In addition, the TTCT also provides an overall score of creativity that categorizes individuals on a seven-point scale ranging from minimal creativity to substantial creativity. Similar to Guilford (1956, 1959, 1960, and 1986), Torrance cautioned against using the TTCT as a sole measure of creativity (Torrance and Ball, 1984). Assessing aspects such as motivation, skills, and personality is also vital to completely understand and assess creativity of individuals (Runco et al. 2010; Zeng et al., 2011).

Although the TTCT is the most widely used instrument to assess creativity, it has been criticized due to increasing negative evidence against validity and reliability of DT tests such as the TTCT. According to Zeng et al. (2011), six main aspects affect the reliability and validity of DT tests like the TTCT. These aspects include lack of construct validity, not testing the integrated design process, neglect of domain specificity and expertise, poor predictive, ecological, and discriminant validity. The lack of construct validity is because DT tests do not assess the construct "appropriate", which is a vital aspect of creativity. Zeng et al. (2011) concluded that much work is needed to improve the present DT tests. However, they state that one of the merits of the TTCT is that there are significant amounts of norm samples that have provided longitudinal validation of its predictive validity.

To assess the validity and reliability of the TTCT, Runco et al. (2010) conducted a 50-year follow up on the TTCT data collected by Torrance and his colleagues in 1969. Runco et al. (2010) concluded that the results of the TTCT are valid and relevant based on their 50-year follow up of the studies. They also concluded that the TTCT was an effective predictor of personal creativity, but not of public creativity. The researchers suggested that this was because the sample included participants who were at a stage in their careers and life when public success was not as important. The researchers also stated that these results further emphasized the importance of divergent thinking for creativity and assessment of creative potential.

Considering the multidimensional nature of creativity, several researchers (Barron & Harrington, 1981; Batey & Furnham, 2003; Zeng et al., 2011) have recommended that DT test such as TTCT should be used in conjunction with other measures of creativity. Similar to Torrance, the researchers cautioned that the DT test alone do not explain or represent creativity, and should not be used to do so. Zeng et al. (2011) stated that often researchers measure creativity of participants based on the TTCT and then compare them to other measures such as personality styles and cognitive styles. They recommend that this process be reversed for future studies, measuring the other components first and then comparing them to the TTCT results. This method, according to Zeng et al. (2011) will provide a better insight into the creativity of individuals.

Referring back to the criticism related to the lack of domain specificity of the TTCT, the figural part of the TTCT will be used in the present study. The TTCT includes two versions a verbal and a figural version. Creativity of individuals in this study will be measured using the Torrance Test for Creativity Thinking - Figural (TTCT; Torrance, 1966/1974) since the discipline of interior design involves more visualization and visual competencies (Guilford, 1968; Nussbaumer & Guerin, 2000). Interior design solutions often involve visual brainstorming, ideation, as well as visual presentation of the final solution. Hence, the figural version of the TTCT may prove to be more relevant and applicable to assess creativity in the discipline of interior design.

Proposed Conceptual Framework for the Present Study

The present study is based on three confluence theories of individual creativity. The three theories examined were the Componential Theory of Individual Creativity (Amabile, 1996), the Systems Approach proposed by Csikszentmihalyi (1996), and the Investment Theory (Sternberg & Lubart, 1996). All three theories suggest that creativity results from the confluence of different influences or forces. The influences common among all three theories include cognitive style, personality style, thinking style, intelligence, knowledge, motivation, and environment. Of these influences, three were selected as independent variables for the present study. The selection was based on the literature review conducted on the influences as well as the need to limit the scope of the study.

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The three influences selected were cognitive style, personality style, and motivational orientation. The framework for the study is presented in Figure 2. The framework assumes a Systems Approach to creativity of interior design students. The assumption is that the model would evolve as an individual changes through life and gains better expertise, support for motivation, and improved creativity skills.

Figure 2. Proposed Conceptual Framework: The Present Study
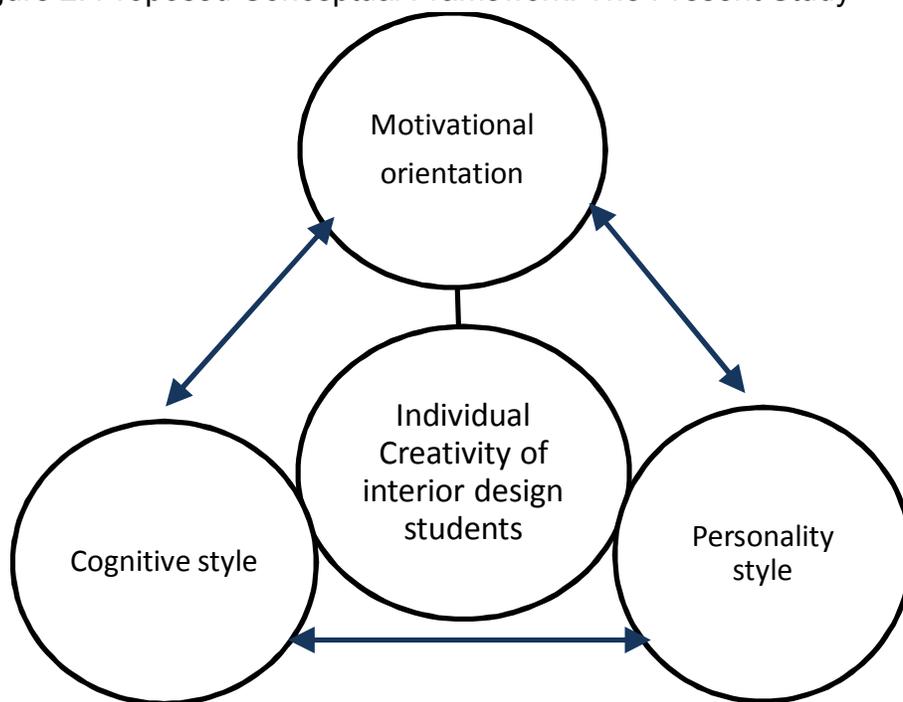
Hypotheses for the Study

The independent variables of the study are cognitive style, personality style, and motivational orientation of interior design students. The dependant variable is the creative performance of interior design students. Interior design students of at least sophomore standing were asked to volunteer to participate in

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the study. This partially ensured the presence of formal and informal training as well as some training in idea generation and problem solving that the students would have engaged in previous studios. Based on the conceptual framework of the study the following hypotheses were proposed.

H1: There is significant relationship between the cognitive style, personality style, motivational orientation, and creativity of interior design students.

H2: Students with high measures on personality style will display greater flexibility in cognitive style.

H3: Students with high measures on personality style and cognitive style will display greater creativity.

H4: Students with high measures on personality style will display greater measured creativity.

Chapter Three: Method

This chapter outlines the method planned for this study. Discussion of the population and sample is presented, followed by the procedures that will be followed to instruct participants and judges. Instruments that will be used in the study are discussed, followed by a description of the pilot test and data analysis.

Based on the literature review and the discussion presented, the researcher examined three confluence theories of creativity. Three independent variables included the cognitive style, personality style, and motivational orientation of interior design students; dependent variable was the creative performance. Hence, the researcher employed four different instruments, one each to identify the cognitive style, personality style, motivational orientation, and creativity of interior design students.

Population and Sample Selection

A convenience sample was used for this study. Three Midwestern universities accredited by the Council for Interior Design Accreditation (CIDA) were used as research sites. Sophomore students enrolled at the three research sites' interior design program were asked to volunteer to participate in this study.

Procedures for Participants

Participants were asked to volunteer to be a part of the study during regular class time. Instructors of the sophomore level studios at all three research sites were requested to allow the researcher to use regular studio time to administer the instruments. Participants were asked to complete four

questionnaires – to identify their cognitive style, personality style, motivational orientation, and creativity. The four questionnaires were administered in a span of two weeks. Average time taken to complete each questionnaire is approximately 30 to 40 minutes. The researcher and principal investigator (PI) administered the instrument at one of the Midwestern University site. At the two other research sites, co-investigators administered the instruments while the PI used Skype and Wimba to relay information regarding the study and the instruments. The instruments were mailed back to the PI by the co-investigators. The PI also sought appropriate Institutional Review Board (IRB) approval at all three research sites.

Instructions to the Participants

Information regarding the study, procedures, and four questionnaires was provided as each questionnaire is administered (Appendix D). Participants were given the option to ask any questions or withdraw from the study at any time. As part of the Institutional Review Board (IRB) requirements, participants were informed about the benefits and risks of the study as well as their right to voluntary participation, to ask for clarifications, or to withdraw from the study at any time. Participants were ensured that their participation in the study is voluntary, and their non-participation would not affect their grade in the class in anyway. Participants were informed and ensured that confidentiality would be maintained throughout the course of the study. All participant questionnaires were coded and only the researcher had access to them and the results. No

identification markers were used that could link the information provided to the specific participants.

The participants were not be given any specific incentives. However, the participants would be given summarized results of the questionnaires so that they may know and understand their cognitive style, personality style, motivational orientation, and creativity. In case the participants had further questions in the future, contact information of the researcher was provided to the participants. Consent forms included all of this information and participants were asked to sign and date them as well as provide their email address in case they wished to receive individual results of the three questionnaires. All this information was provided in a cover letter for the consent form (Appendix A).

The Instruments Used in the Present Study

1. Cognitive style test: Human Information Processing Survey (Dr. E. Paul Torrance, Dr. Barbara Taggart-Hausladen, Dr. William Taggart).

The Human Information Processing Survey (HIPS) assesses individuals' preference for information processing identified as left-brain, right-brain, integrated, or mixed preference. The survey takes approximately 40 minutes and is a 40-item scale. The HIPS is a paper and pencil self-report questionnaire. The results are in the form of raw scores. Khatena and Torrance (1984) report strong reliability and construct validity for the HIPS. Beyler and Schmeck (1992) report high test retest reliability, after a one week interval" coefficients of convergence =

.84 for right scale; .86 for left; and .82 for integrated scales. They also found the constructs to be reliable.

2. Personality style: What Kind Of A Person Are You? (WKOPAY; Khatena and Torrance, 1976)

The Khatena Torrance Creative Personality Inventory (KTCPI; Khatena & Torrance, 1976) identifies the specific personality characters that are related to creative performance. The instrument contains two inventories: Something About Me (SAM) and What Kind Of a Person Are you? (WKOPAY). SAM measures the creative attributes of environmental sensitivity, initiative, self-strength, intellectuality, individuality, and artistry. The WKOPAY measures personality traits of acceptance of authority, self-confidence, inquisitiveness, awareness of others, and disciplined imagination. For the intent of this study, the WKOPAY was used. The test takes approximately 30 to 40 minutes to complete. Morse (1994) found good reliabilities for both SAM and WKOPAY (.71 to .98). Several researchers have used the WKOPAY only and have reported good reliabilities for it (Morse & Khatena, 1989; Morse, 1994; Houtz et al., 2003; Gallucii et al., 2007; Prabhu et al., 2008). Additional information regarding the validity and reliability of the WKOPAY can be found in the testing manual published by the Scholastic Testing Services.

3. Motivational orientation: Work Preference Inventory for students (Amabile, 1996)

Motivational orientation of the participants was assessed using the student version of the Work Preference Inventory (WPI; Amabile, Hill, Hennessey & Tighe 1994). The WPI is a 30-statement scale, 15 statements for intrinsic motivational orientation (IMO) and 15 for extrinsic motivational orientation (EMO). Each statement is rated on a four-point scale (never or almost never true, sometimes true, often true, or always or almost always true). Amabile et al (1994) reported good reliabilities for the scale; Cronbach's α ranging from .71 to .78. The questionnaire includes statements such as "To me, success means doing better than other people" (Amabile et al, 1994, pg.956; Appendix A). Respondents answer on a on a 4-point scale, from 1 = never or almost never true of me to 4 = always or almost always true of me.

4. Creativity: Torrance Test for Creativity (Figural TTCT – Form A)

The Torrance Test for Creative Thinking (TTCT; Torrance, 1966/1974) figural test is a test of divergent thinking and has two forms, A and B, which can be used for pre and posttests. The test measures four aspects of divergent thinking: fluency, flexibility, originality, and elaboration. There are three subsets: picture construction, picture completion, and lines/circles. The TTCT figural manual of 1990 reports a reports inter-rater reliability over .90 (Kim, 2007, pg. 123). Test –retest reliability ranged from .59 to .97. Kim (2007) states that the TTCT had predictive validity over a wide range and for long periods.

Sample Description

A total of 5 responses were received from the three research sites (UMN, *N=31;* UMizzou, *N* = 7; NDSU, *N* = 13).

Data Analysis

Data analysis included obtaining descriptive statistics, correlation analysis, chi square analysis with a Fisher's exact test, and multiple linear regression analysis to understand the relationship between the three independent variables and creativity of design students. Cronbach's α was calculated to measure the reliability of the instruments that were used. Correlation analysis was conducted to investigate the relationship between the personality styles and cognitive styles of interior design students. Significance was set at *p* = .05 for all measures.

Pilot Test

A pilot test was conducted in the spring of 2010. Sophomore students enrolled in the design studio at one of the research sites were asked to volunteer to participate in the study. Thirty-six participants agreed to take part in the study. However, data from only 30 were viable. This was due to some absences and missing questionnaires for some of the participants. The aim of the pilot test was to assess the feasibility of using the four instruments. In addition, the aim was to administer an abbreviated version of the TTCT, the Abbreviated Torrance Test for Adults (ATTA; Goff, 2002) and assess its effectiveness. The abbreviated version takes only 15 minutes to complete and has been considered a valid instrument for assessing creativity (Althuzen et al., 2010). The interior design

studio included two different sections. This allowed the researcher to administer the TTCT to one section and the ATTA to the other.

The pilot study enabled the researcher to assess that the time for completing the instruments ranged from 15 minutes to 35 minutes, the TTCT taking the longest time since it includes timed activities and specific instructions for each. In addition, the pilot test also allowed the researcher to decide to use the TTCT for the final study. The TTCT can be analyzed by the Scholastic Testing Services (STS), providing an accurate assessment of the participants' creativity. The STS does not analyze the ATTA.

Limitations of the Study

There are several limitations that must be discussed: The present study was a discipline specific study that focused on creativity in interior design. The sample was small, $N = 51$ and included undergraduate sophomore students from three different research sites. In addition, a convenient sample was used as opposed to a random sample. The study takes into consideration only three of the six identified influences on creativity. While this was done to limit the scope of the study, it would benefit future researchers to examine all the six resources together. The instruments selected have acceptable validity and reliability. However, the Cronbach's α for the WPI revealed that the instrument was not as reliable as expected.

Chapter Four: Results

The aim of this study was to explore the relationship between creativity of interior design students and their cognitive styles, personality styles, and motivational orientation. To do this, four instruments were employed to collect specific data for each of the four variables in the study. The research question posed for this study was:

- What is the relationship between cognitive style, personality style, motivational orientation, and creativity of interior design students?

The proposed hypotheses of this study were:

- H1: There is a significant relationship between the cognitive style, personality style, motivational orientation, and creativity of interior design students.

- H2: Students with high measures on personality style will display greater flexibility in cognitive style.

- H3: Students with high measures on personality style and cognitive style will display greater creativity.

- H4: Students with high measures on personality style will display greater measured creativity.

To explore the research question, data were collected that measured independent variables of cognitive style, personality style, motivational orientation, and the dependent variable - creativity of the participants. Data collected also included demographic information such as age and gender of the

participants. Analysis of the data included obtaining descriptive statistics, correlation analysis, chi square analysis with a Fisher's exact test, and multiple linear regression analysis to understand the relationship between the three independent variables and creativity of design students. A pilot test was conducted in spring of 2010 to test the logistics of conducting the study. This chapter presents the process and results of the data analysis for the final study.

Data Analysis and Results

Of the four instruments, the personality test - What Kind of Person Are You (WKOPAY) and the cognitive style test- Human Information Processing Survey (HIPS), were analyzed by the researcher using the manuals provided by the Scholastic Testing Services (STS). Raw scores on the questionnaires were converted to standard scores based on the instructions in the manuals. The Work Preference Inventory (WPI) was analyzed based on the instructions provided by the creator of the instrument, Theresa Amabile.

Creativity was assessed using the Torrance Test of Creative Thinking (TTCT) assessment. The coded TTCT workbooks were sent to STS for analysis. The analysis provided a standard score (SS creativity) for each participant that indicated their overall creativity score. The SS creativity score was used for the primary analyses in the study.

For the WKOPAY, the overall Creative Perception Index (CPI) was used as an indicator of creative personality style for the participants. A higher CPI score indicates a higher perception of creative personality style in an individual.

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In addition, the analysis provided specific results for the five personality traits

assessed by the WKOPAY. The five traits assessed were Acceptance of

Authority (AA), Self Confidence (SC), Inquisitiveness (I), Awareness of Others

(AO), and Disciplined Imagination (DI).

Mean scores and standard deviations were calculated for the overall CPI

(CPI, 612 mean, 1.91 SD) and the five personality traits (Table 3) - Acceptance

of Authority (AA, 4.02 mean, 1.78 SD), Self Confidence (SC, 3.55 mean, 1.53

SD), Inquisitiveness (I, 4.80 mean, 2.17 SD), Awareness of Others (AO, 4.35

mean, 1.68 SD), and Disciplined Imagination (DI, 4.94 mean, 1.89 SD). Mean

scores and standard deviation for both I and DI for the sample were higher than

those for AA, SC, and AO.

When compared to national averages presented in the normative data

manual, the sample proved to be similar to the average population with the

exception of the scores for CPI, Self Confidence, and Inquisitiveness. The mean

and standard deviation for the overall score of WKOPAY for adults was 26.68

and 5.52 respectively. The present sample scored significantly higher; M = 55.55,

SD = 9.55. These results suggest that the perception of being a creative person

is significantly high among interior design students.

With respect to the scores on the personality trait of Inquisitiveness, the

mean and standard deviation in college aged females is 3.60 and 1.24

respectively; the same scores for the present sample are 4.80 ($M)$, 2.17 (SD).

Being high in inquisitiveness, most participants in this sample tend to be

talkative, asking questions and seeking answers, as well as demanding

recognition and rights. In addition, the participants tend to feel strong emotions

while also being obedient. For the trait of SC, the normal mean for college-aged

females is 7.09, while that for the present sample was 3.55 *(M).* These results

indicate that interior design students tend to be more inquisitive, while the low

score on SC suggests a need to assess this personality trait more closely within

the discipline.

Based on the CPI scores the sample was divided into three groups: Low

CPI, Average CPI, and High CPI. As mentioned earlier, a high CPI score

indicates greater personal perception of creative personality. This categorization

was used for further analysis to understand the relationship between personality

style and creativity. A chi square analysis with a Fisher's exact test was

conducted to compare the results derived for the personality test and the overall

creativity scores. The results are discussed later in this chapter.

Table 3

Summary of Descriptive Statistics. Means and Standard Deviations for Scores on the WKOPAY, n = 49

	M	*SD*
CPI	55.55	9.55
AA	4.02	1.78
SC	3.55	1.53
I	4.80	2.17
AO	4.35	1.68
DI	4.94	1.89

The Human Information Processing Survey (HIPS) instrument was used to assess the cognitive style of the participants. Based on the HIPS analysis, participants were divided into one of the four categories - Left Brain Thinking Style, Integrated Thinking Style, Right Brain Thinking Style, and Mixed Thinking Style (Table 4). A majority of the participants preferred a Mixed Thinking Style (54.9%) followed by a Right Brain Thinking Style (27.5%). A small percentage preferred the Integrated Thinking Style (9.8%) and Left Brain Thinking Style (7.8%). Norms data for the HIPS was not available from STS.

Table 4

Results of the HIPS Analysis, Categories of Thinking Styles

Cognitive style preference	Frequency	Percent
Left brain thinking style	4	7.8
Integrated Thinking Style	5	9.8
Right brain thinking style	14	27.5
Mixed Thinking Style	28	54.9
Total	51	100.0

Results of the TTCT analysis included the overall SS as well as the scores for three of the four aspects of creativity assessed by the TTCT: fluency, originality, and elaboration (Table 5). The fourth aspect, flexibility is not assessed by the TTCT instrument. The scores for the three traits presented an interesting finding for the sample. As per the norms -technical manual for TTCT, the average

score for all test scores for the aspects tends to center around 100. It is evident from Table 4 that most of the sample scored around the average score of 100 or lower for the aspects of fluency and originality. However, a significant number of students scored above average for the aspect of elaboration (74%, N = 51). The score on elaboration was also 1.5 standard deviation above normal (129.8 M, 19.0 SD). The high score in elaboration also affected the overall creativity scores of the sample.

Table 5

Frequency distribution of the sample provided by STS (N = 51)

Score Intervals	Fluency		Originality		Titles		Elaboration		Closure		Average		Creativity Index	
	Freq.	Percentage	Freq.	Percentage	Freq.	Percentage	Freq.	Percentage	Freq.	Percentage	Freq.	Percentage	Freq.	Percentage
150+	0	0%	2	2%	0	0%	9	18%	0	0%	0	0%	2	4%
140-149	2	4%	2	4%	4	8%	11	22%	0	0%	1	2%	2	4%
130-139	0	0%	3	6%	6	12%	5	10%	1	2%	3	6%	6	12%
120-129	6	12%	0	0%	11	22%	11	22%	11	22%	6	12%	16	31%
110-119	6	12%	12	24%	12	24%	5	10%	10	20%	16	31%	15	29%
100-109	14	27%	9	18%	4	8%	7	14%	12	24%	16	31%	4	31%
90-99	10	20%	11	22%	6	12%	1	2%	5	10%	3	6%	4	8%
80-89	3	6%	4	8%	2	4%	1	2%	7	14%	4	8%	0	0%
70-79	7	14%	5	10%	4	8%	1	2%	4	8%	1	2%	1	2%
60-69	0	0%	3	6%	1	2%	0	0%	0	0%	1	2%	1	2%
50-59	3	6%	1	2%	1	0%	0	0%	0	0%	0	0%	0	0%
<50	0	0%	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%
Mean	99.4		100.5		111.5		129.8		103.5		109.0		118.9	
Stan.Dev.	20.0		21.3		20.9		19.0		17.3		15.3		16.9	

The TTCT analysis also included a national percentage for the sample, allowing the researcher to rate each participant's creativity on seven-point scale ranging from Minimal to Very Strong (Table 6). This categorization was done to compare the participants within the sample. According to the information provided in the scoring manual a national percentage of 50 is considered average for a sample. As is evident from Table 7, an equal percentage of students scored Above Average to Strong (20.8%) followed by Very Strong (18.9%), Average (17.0). Overall 63% of the sample was above average in terms of creativity strength when comparing within the sample.

Table 6

Ranking of the sample based on percentage range.

Percentage range	Ranking
10-20	Minimal
20-35	Weak
35-50	Below Average
50-60	Average
60-75	Above Average
75-90	Strong
90-100	Very Strong

Table 7

Ranking of Creativity Strength Based on National Percentages

Creativity Strength	Frequency	Percent
Minimal	2	3.92
Weak	6	11.76
Below Average	2	3.92
Average	9	17.65
Above Average	11	21.57
Strong	11	21.57
Very Strong	10	19.61
Total	51	100

To assess the motivational orientation of the participants the Work

Preference Inventory (WPI) was used. The WPI included 30 items that were

ranked on a four point Likert type scale ranging from Never or almost true to

Always or almost always true. The WPI provided results on two primary and four

sub scales. The two primary scales included Intrinsic Motivational orientation

(IMO) and Extrinsic Motivational orientation (EMO). The four subscales included

Enjoyment (IMO-E), Challenge (IMO-Ch), Outward (EMO-O), and Compensation

(EMO-C). Enjoyment and Challenge are two sub scales of IMO, while Outward

and Compensation are two sub scales of EMO. Reliability for the primary scales

was calculated using Cronbach's reliability. The two scales showed moderate

reliability IMO (α = .64), EMO (α = .50). Mean scores were calculated for both the

primary and the subscales. The mean scores and standard deviation for each are

presented in the Table 8. The overall mean for IMO (3.07, .29 SD) for the sample was slightly higher the mean for EMO (2.70, .29 SD).

Table 8

Descriptive Statistics for the WPI Data

	M	*SD*
Intrinsic Motivational orientation (IMO)	3.07	.29
Extrinsic Motivational orientation (EMO)	2.70	.29
Intrinsic Motivational orientation - Enjoyment (IMO-E)	3.02	.47
Intrinsic Motivational orientation - Challenge (IMO-Ch)	2.81	.43
Extrinsic Motivational orientation - Outward (EMO-O)	2.38	.37
Extrinsic Motivational orientation - Compensation (EMO- C)	3.25	.41

Data for the WKOPAY, WPI, and standard scores from the TTCT were included in the correlation and multiple regression analysis. Since the data derived from the HIPS survey were categorical, they were not appropriate for correlation and regression analysis. Instead, a chi square analysis with a Fisher's exact test was conducted to understand the relationship between thinking style categories and the creativity rankings. Further analysis was conducted to understand the relationship between creativity and CPI scores as well as CPI and the data derived from the HIPS survey. Table 9 to Table 12 provides an

overview of the analyses conducted with the independent and dependent

variables in the study.

Table 9

Overview of the Analysis One Conducted

	Dependent Variable	Independent Variable
Pearson's Correlation	SS creativity	IMO, EMO, CPI
Multiple Regression	SS creativity	IMO, EMO, CPI

Table 10

Overview of the Analysis Two Conducted

	Dependent Variable	Independent Variable
Pearson's Correlation	SS creativity	Subscales of WPI - IMO-E, IMO-Ch, EMO-O, EMO-C
Multiple Regression	SS creativity	Subscales of WPI - IMO-E, IMO-Ch, EMO-O, EMO-C

Table 11

Overview of the Analysis Three Conducted

	Dependent Variable	Independent Variable
Pearson's Correlation	SS creativity	Personality Traits -AA, SC, I, AO, DI
Multiple Regression	SS creativity	Personality Traits -AA, SC, I, AO, DI

Table 12

Overview of the Chi Square Analysis with Fisher's Exact Test

	Variable one	Variable two
Cognitive style preference and levels of creativity	Above Average/High Creatives and Below Average/Low Creatives	Left, Right, Mixed, and Integrated Thinking Style
Personality style and levels of creativity	Above Average/High Creatives and Below Average/Low Creatives	Low, Average, and High CPI
Cognitive style preference and personality style	Low, Average, and High CPI	Left, Right, Mixed, and Integrated Thinking Style

Sample and Missing Data

Fifty-one participants were surveyed in the study. With the exception of WKOPAY, all the instruments yielded complete data for all participants. Two WKOPAY questionnaires had missing responses; as a result, the overall personality score was not available for two participants. Typically, data from such participants is excluded in all analysis. However, since this researcher was analyzing the sub scales of the WKOPAY, all attempts were made to derive scores for the same. In order to do this, a list wise deletion option was selected the missing values analysis in the software SPSS. A list wise deletion utilizes all available data for the analysis; missing data points were ignored by SPSS in

relevant analysis. This process allowed the researcher to utilize the data derived from other instruments besides the WKOPAY for further analysis, eliminating the need to discard data for participants with missing answers and keeping the sample size intact for most analyses.

Correlation Analysis Results

To understand the relationship between creativity, motivation, and personality style, Pearson's correlation were conducted. Correlation analysis provides a coefficient that could range between -1 and +1. A correlation of -1 indicates a negative relationship, while a +1 indicates a positive relationship. This relationship could be in the positive or negative direction. A positive correlation between two variables indicates that as one variable increases in value, so does the other. A negative correlation suggests an inverse relationship, as one variable increases in value the other decreases.

The size of an effect is calculated based on the correlation coefficient. Values of ± .1 suggest a small effect, ±.3 a medium effect, and ± .5 suggests a large effect (Field, 2009). A small effect suggests a weak relationship between the variables, while a medium effect suggests a moderate relationship between the variable, and finally a large effect suggests a strong relationship between the variables.

For the sake of clarity and a more streamlined communication of the results, three separate correlation analysis were conducted (Table 9 to Table 11). The first analysis included primary scales of Intrinsic Motivational Orientation

(IMO) and Extrinsic Motivational Orientation (EMO), Creative Perception Index (CPI) scores, and creativity scores. Results of the correlation analysis revealed a moderate positive relationship between IMO and Creativity, $r = .27, p$ (one tailed) < .05 (Table 13). This result indicates that an individual's creativity is moderately related to the individual's intrinsic motivation. The positive correlation (one tailed) suggests that as the intrinsic motivation of an individual increases so does the individual's creativity. No other significant correlations were found during this analysis, which suggested that there was no significant relationship between the overall personality style, extrinsic motivational orientation, and creativity of individuals.

While the relationship between extrinsic motivation and creativity was circumspect to begin with, the lack of a relationship between personality style and creativity was contrary to the proposed hypothesis of the study. It was expected that the overall personality style would have a significant relationship with creativity of individuals. The significant relationship between personality style and creativity was well established based on the literature review conducted for the present study. This was a significant finding for the present sample of interior design students.

Table 13

Correlation for Primary Scales and Creativity - Analysis One

		CPI	IMO	EMO	SS total
CPI	Pearson Correlation	1	.17	.15	.02
	N	49	49	49	49
IMO	Pearson Correlation	.17	1	-.20	.27*
	N	49	51	51	51
EMO	Pearson Correlation	.15	-.20	1	.12
	N	49	51	51	51
SS total	Pearson Correlation	.02	.27*	.12	1
	N	49	51	51	51

Note. *. Correlation is significant at the 0.05 level (1-tailed).

A second correlation analysis was conducted for the sub scales of WPI and the overall creativity of the participants (Table 14). This analysis revealed a positive, but small to moderate relationship between the Compensation scale (EMO-C) and creativity (r = .24, p < .05). Compensation is a subscale of EMO, which is related to an individual's motive for completing a task. Strong positive correlations were also found between the Enjoyment scale (IMO-E) and Challenge scale (IMO-Ch), suggesting that the greater the challenge in a task the greater is the enjoyment derived from it (r =.65, p < .01). A small to moderately negative correlation (r = -.25, p < .05) was also found between IMO-Ch and the Outward scale (EMO-O) as well as IMO-E and EMO-O (r = -.24, p < .05).

Table 14

Correlation Between Subscales of WPI and Creativity - Analysis Two (n = 51)

		SS Creativity	IMO-E	IMO-Ch	EMO-O	EMO-C
SS Creativity	Pearson Correlation	-	.07	.11	-.09	.24*
IMO-E	Pearson Correlation	.07	-	.69**	-.24*	-.10
IMO-Ch	Pearson Correlation	.11	.69**	-	-.25*	-.05
EMO-O	Pearson Correlation	-.01	-.24*	-.25*	-	.08
EMO-C	Pearson Correlation	.24*	-.10	-.05	.08	-

Note. *. Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

Analysis three included the correlations between creativity and personality traits derived from CPI (Table 15). This analysis revealed a small to moderately positive relationship between inquisitiveness (I) and creativity (*r =.27, p < .05*). No other significant relationships were found between the other personality traits and creativity. However, some correlations were found among personality traits that could provide further insight in to the motivational orientations of the participants. Moderately negative correlations were found between the personality trait of acceptance of authority (AA) and inquisitiveness (I, *r = -.31, p < .05*) and disciplined imagination (DI, *r = -.27, p <.05*). Positive correlations were also found between acceptance of authority (AO) and self confidence (SC, *r =.37, p < .01*).

Table 15

Correlation for Subscales of WKOPAY and Creativity - Analysis Three (n = 49)

		SS Creativity	AA	SC	I	AO	DI
SS Creativity	Pearson Correlation	-	.07	.08	.27*	-.02	-.12
AA	Pearson Correlation	.07	-	.22	-.39*	.19	-.27*
SC	Pearson Correlation	.08	.22	-	.10	.37**	-.02
I	Pearson Correlation	.27*	-.31*	.11	-	.09	.19
AO	Pearson Correlation	-.02	.19	.37**	.09	-	-.13
DI	Pearson Correlation	-.12	-.27*	-.02	.19	-.13	-

Note. *. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

Linear Regression Analysis Results

Three different multiple regressions were conducted using the same format as the correlation analysis (Table 9 to 11). The first analysis for the multiple linear regression was done using the entry method in SPSS. This method takes into account all the variables and provides all related analysis. Independent variables or predictors included the primary scales of IMO and EMO, and CPI; the dependent variable included was the standard creativity

score (SS Creativity). The regression model was not significant, $F_{(11, 37)} = 1.790$, $p > .05$). Similarly, the second and third analyses were not significant (Table 16); an entry method was used for these analyses as well. The second analysis included sub scales of the WPI and creativity, while the third analysis included the sub scales of WKOPAY and creativity.

A fourth multiple regression analysis was conducted for two reasons. The first was to assess if the significant relationships revealed in the correlation analysis would still be applicable. A second reason for conducting this step was the significance revealed in the regression analysis one, two, and three for three of the predictors: IMO ($b = 17.02$, $p < .05$), I ($b = .46$, $p < .05$), and EMO-C ($b = .12$, $p < .05$). The fourth regression analysis included IMO, I, and EMO-C as predictors and SS creativity as the dependent variable. This regression model was significant $F_{(3, 33)} = 3.79$, $p > .05$), suggesting that IMO, I, and EMO-C together are significant predictors of individual creativity.

Table 16

Results of the Multiple Regressions

	Dependent Variables	Independent Variables	*P*	Adj. R^2
Analysis one	SS Creativity	IMO, EMO, CPI	.18	.04
Analysis two	SS Creativity	IMO-E, IMO-Ch, EMO-O, EMO-C	.49	-.01
Analysis three	SS Creativity	AA, SC, I, AO, DI	.28	.03
Analysis four	SS Creativity	IMO, I, EMO-C	.02	.38

Chi Square Analysis with Fisher Exact Test

Chi square analysis is typically employed to understand relationships between categorical data and is ideal for large sample sizes. This study however, had a smaller sample size (n = 51). A chi square analysis using a Fisher's exact test is an appropriate test for small sample sizes (Field, 2009). Hence, to understand the relationship between the categorical data in the study, a chi square analysis using Fisher's exact text using a 2 x 2 and a 2 x 3 contingency table was employed (Table 12).

Based on the data derived from the HIPS survey, TTCT, and WKOPAY the data was divided into different categories. Deriving from the HIPS results, the sample was divided into four categories: Left, Right, Mixed, and Integrated. Based on the TTCT analysis the sample was categorized into two groups: Above average/High Creatives (n = 32, 63%) and Below average/Low Creatives (n = 19, 37%). This categorization was done to understand the relationship between creativity and cognitive flexibility. The analysis was based on the notion that the more flexible an individual's thinking, the more creative he/she will be.

The results of the WKOPAY instrument enabled the researcher to categorize the sample into Low, Average, and High CPI. This categorization was done to understand the relationship between cognitive style, personality style, and creativity. The relationship was examined based on the notion that the more flexible an individual's thinking the more he/she will score on the personality scale. Result of the chi square analysis using the Fisher's exact test for the

relationship between cognitive style and creativity was not significant (*p* = *.43,* 2 sided). Similar to the earlier results, the Fisher exact test for the relationship between creativity and CPI scores was not significant (*p* = .32, 2 sided) and neither was the one for the relationship between CPI and cognitive style (*p* = .32, 2 sided).

Discussion

The overall results only partially supported the hypotheses of the present study. Prior to discussing the overall results, a finding related to the nature of creativity of the present sample is discussed. This finding is worth mention since it brings to light the unique nature of creativity of interior design students.

As previously mentioned, the TTCT analysis provided by the STS also included participant scores on three aspects of creativity: elaboration, originality, and fluency (Table 5). The aspect of elaboration is assessed based on two assumptions. The first assumption is that there is a minimal response to each visual stimulus; the minimal response itself must include a certain amount of details, which make it a viable solution. The second assumption is that "imagination and exposition of detail is a function of creative ability" (Torrance et al. 1992, 2008, p. 10). The second assumption is labeled as elaboration; after the minimal level of details is reached, credit for each viable detail is given to generate the elaboration score. The other two aspects assessed were originality and fluency. Originality is concerned with the uniqueness of ideas an individual generates in response to the visual stimulus, while the aspect of fluency refers to

the number of relevant ideas an individual develops for the given stimulus. Scores on both of these aspects were closer to average for the sample. However, the results revealed that interior design students tend to score high on the aspect of elaboration, suggesting that while interior design students might not be as adept at generating multiple, varied, and unique solutions, they are more proficient in detailing and refining an idea.

Creating new and unique design solutions is important, but refining and developing an idea is vital to ensure that an interior design solution functions well for its intended use. Once the initial design concept is finalized, the success of the final design solution is entirely dependent on the details that go into that solution. Each detail, no matter how minute, has to reinforce the initial concept. Clearly, this result highlights the importance of the aspect of elaboration for interior design.

The ability to elaborate a design solution might be one criterion that distinguishes interior design students from students in other related disciplines in terms of creativity. It would be beneficial to investigate if the same results hold true in a larger sample of interior design students. Additionally, a comparison with students from other disciplines will also aid in defining the nature of creativity for interior design students. The high score on the aspect of elaboration also increased the overall creativity score of interior design students in the sample.

The remaining results concerning the research question will be discussed in this section. The research question for this exploratory study was: What is the

relationship between cognitive style, personality style, motivational orientation, and creativity of interior design students? For the data analysis, the question was divided into two separate analyses. The first portion explored the relationship between creativity, the primary scales, and sub-scales of personality style and motivational orientation using correlation and regression analysis. The second portion explored the relationship between cognitive style and creativity, cognitive style and personality style, and personality style and creativity using a chi square analysis.

Of all the variables, significant positive relationships were found between IMO, personality trait of Inquisitiveness, and the EMO-C sub-scale of WPI in the correlation analysis. No significant relationship was found between the overall personality style and creativity of the interior design students as per the correlation analysis. This result was an interesting find for the present study, especially since it was contradictory to precedent literature as well as the projected hypothesis of the study. Additionally, no significant relationship was found between cognitive style and creativity as per the chi square analysis. This result was somewhat in accordance with the precedent literature but not the hypothesis of the present study. The following sections present a more detailed discussion of the results related to specific variables.

Cognitive Style

One of the premises of this study was that greater flexibility in cognitive style as measured by hemispheric dominance would be significantly related to creativity and would predict higher creativity for the participants. Hence, it was anticipated that participants who preferred an Integrated Thinking Style would score higher in creativity (hypothesis 3). However, the results of the present study did not support this prediction. As per the chi square analysis, no significant relationship was found between cognitive style and creativity.

A similar result was derived by Meneely and Portillo (2010) in their study to assess the relationship between cognitive style, personality style, and creativity of interior design students. They employed the Hermann Brain Dominance Inventory (HBDI; Hermann, 1989) to measure how individuals employed the different quadrants of the brain to think and its relationship to creativity. The HBDI is similar to the HIPS instrument used in the present study; both the instruments are based on the concept of brain hemispherity. They found no association between creativity and cognitive style. The overall results of the HBDI revealed that all four thinking styles were found in the sample, but they also found that interior design students tend to prefer a right brain thinking style.

Similarly, in a study conducted by Monfort et al. (1990) assessing information processing and laterality among various disciplines and colleges, the researchers found that interior design students preferred a Right Brain Thinking Style. Monfort et al. (1990) also used the HIPS instrument to assess information

processing of 1023 college students. Besides interior design students majoring in advertising, music, journalism, art, oral communication, and architecture also preferred a right-brain hemispheric processing. Other majors evaluated included accounting, management, computer science, mathematics, nursing, funeral services, criminal justice, and elementary education, all of which preferred a left-brain hemispheric processing style. However, the results of the present study were not in accordance to these studies. A large portion of the sample in the present study preferred a Mixed Thinking Style followed by the Integrated Thinking Style.

While the Integrated Thinking Style is the most flexible of all the thinking styles, a mixed thinking style suggests some level of cognitive flexibility. Individuals who prefer a Mixed Thinking Style are able to use both the hemispheres effectively; the individual alternates between the Left and Right Thinking Style as needed but not in combination.

This finding of the present study is consistent with the findings of Watson and Thompson (2001). In a study assessing learning styles of interior design students, Watson and Thompson (2001) found that a large number of interior design students preferred a bimodal learning style. Learning styles in their study were assessed using the Gregorc Style Delineator (Gregorc; 1982b). This was an unusual finding for learning styles; the researchers concluded that was because interior design requires a wide range of skills, knowledge, and competencies. The right hemisphere is responsible for receptive, spatial, and

intuitive thinking while the left hemisphere is responsible for active, verbal, and logical thinking. Both of these functions are vital for different aspects of the interior design process.

Personality Style

No significant relationship was found between creativity and the overall personality style as measured by WKOPAY in the correlation analysis. Similarly, personality style did not prove to be a predictor of individual creativity as was revealed by the regression analysis. These results are in contradiction to the proposed hypothesis and precedent literature reviewed for the present study.

Several researchers have stressed on the significant relationship between creativity and personality style (Feist, 1998; Dudek & Hall, 1991; Helson 1999; Helson & Pals, 2000; Feist and Barron, 2003). In a longitudinal study on creativity among women, Helson (1999) and Helson and Pals (2000) concluded that a creative personality in the early years predicted creative potential and creative achievement in later life in their sample. They concluded that to foster creativity among women, significant effort must be made to develop their identity and personality. The sample in this study also included a majority of females (94.7%) mean age was 22.63. The sample is similar to the one in the Helson (1999) study with respect to age and gender, but the results proved otherwise.

Research in interior design has also found personality style to be a precedent (Portillo, 2000) as well as a significant predictor of creativity (Meneely & Portillo, 2005). However, this finding was not supported in the present study.

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Meneely & Portillo (2005) employed the ACL-Cr to assess the personality style of design students and they found significant relationship between creative performance of design students. They also concluded that there is a significant relationship between cognitive flexibility and personality style of interior design students. However, the results of the present study did not reveal any relationship between personality style and cognitive flexibility.

In addition to the predictive nature of personality style, it was also anticipated that individuals high in personality style as measured by the WKOPAY would score high in creativity as measured by TTCT (hypothesis 2). The chi square analysis with Fisher's exact test comparing the CPI scores and the creativity scores was not significant, thus rejecting the proposed hypothesis. Secondary analysis between the subscales of CPI and creativity were conducted to advance the understanding the relationship between specific personality traits and creativity.

Further investigation and a secondary correlation analysis revealed a significant positive relationship between creativity and the personality trait of inquisitiveness ($r = .27, p < .05$). Inquisitiveness was also found to be a significant predictor of individual creativity ($b = .46, p < .05$) according to the regression analysis. Inquisitiveness (I) is related to "always asking questions, feeling strong emotions, talking a lot, demanding recognition and insisting on rights, and being obedient" (KTCPI Manual, 1998). The participants of the present study also scored nearly one standard deviation above the norm for the trait of

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inquisitiveness. Referring back to earlier studies related to personality, especially the Five Factor Model (FFM), some similarities are apparent between this result and previous evidence.

Precedent research into the FFM and creativity has consistently shown strong relationship between creativity and factors of openness to experience and extraversion (Costa & McCrea, 1989; King, Walker, & Broyles, 1996; Feist, 1998; George & Zhou, 2001; Batey & Furnham, 2008, 2009, 2010). Openness to Experience is related to being curious, broad minded, imaginative, and non-traditional (Sung & Choi, 2009). Extraversion on the other hand, relates to being energetic, and enthusiastic, as well as a propensity to seek stimulation and ways to improve thinking and creativity by meeting problems head on (Costa & McCrae, 1992).

There are several parallels between the specific traits of openness to experience (O), extraversion (E), and inquisitiveness (I). Asking questions (I), is similar to being curious (O) as well as seeking ways to improve thinking and creativity (E). Similarly, feeling strong emotions and talking a lot (I) could be likened to being enthusiastic and energetic (E) and demanding recognition and insisting on rights (I) could be similar to meeting problems head on as well as a propensity to seek stimulation (E).

To summarize, the overall results of the study did not support the predictive nature of the overall personality style for individual creativity. However, the results of the present study supported the relationship between certain

personality traits and creativity. These traits, similar to the trait of inquisitiveness as per the WKOPAY, include being curious, ambitious, adventurous, sensitive, headstrong, self-seeking, affected, and conceited. Overall, the results did not support hypotheses two, three, and four for the present study.

Motivational Orientation

Researchers such as Csikszentmihalyi (1990b) and Gardner (1993) have posited that personal satisfaction and enjoyment that is derived from meeting a challenge is a key motivator for prominent creators. This personal satisfaction and enjoyment is related to their intrinsic motivation, which drives them to excel in their chosen field. Similarly, Dollinger et al. (2007) and Kasof et al. (2007) found the value of self-direction to be vital for creativity, further explaining the relationship between creativity and intrinsic motivation. Researchers such as Amabile (1996), and Sternberg and Lubart (1996) have affirmed the significance of motivation for creativity, especially Intrinsic Motivational Orientation (IMO).

Based on these precedents, it was anticipated that IMO would have a strong and positive significant relationship with creativity. This notion was partially supported in the present study. The results indicated that the relationship between IMO and creativity was moderate and positive ($r = 27$, $p < .05$). While the relationship was not strong, the positive finding was in conformity with the conclusions of earlier researchers (Perkins, 1988; Amabile, 1985; Albert, 1990; Csikszentmihalyi, 1990b; Gardener, 1993) who have found positive relationship between creativity and Intrinsic Motivational Orientation. Significantly, IMO was

also found to be a significant predictor of individual creativity in the regression analysis (b = 17.02, $p < .05$).

In addition to IMO, it was also anticipated that there would be some relationship between EMO and creativity; the true nature of this relationship was unclear. The literature review also indicated that the true nature of the relationship between EMO and creativity, whether positive or negative, is ambiguous. Dollinger et al. (2007) and Kasof et al. (2007) found that the extrinsic values of power, tradition, conformity, and security, which can be linked to EMO, are negatively related to creativity. Conversely, researchers such as Eisenberger and his colleagues have found positive relationships between EMO and creativity (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994; Eisenberger & Rhoades, 2001). This extrinsic motivation was synergistic in nature, where being creative was rewarded, thereby increasing an individual's creativity. Another kind of extrinsic motivation that could be beneficial is informational in nature, providing specific information for the task or on how to circumvent issues and problems. Such extrinsic motivation is referred to as enabling or informational motivation (Amabile, 1996), which could have a positive impact on creativity. However, the correlation analysis did not reveal any relationship between creativity and EMO.

This finding was somewhat in accordance with various researchers who found a negative relationship between EMO and creativity (Amabile, 1996, Dollinger et al 2005). A reason for this lack of relationship between EMO and creativity could be that this study only tested for EMO and not any informational

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or synergistic external motivation. The students were not being graded or rewarded for anything, neither were they involved in any creative project. On the other hand, correlation analysis of the subscales of WPI revealed an interesting result.

The EMO subscale of compensation (EMO-C) displayed a positive relationship with creativity (r = .23, p < 05). The regression analysis also revealed EMO-C to be a predictor of creativity (b = .12, $p < .05)$. Compensation is related to motivation that responds to the need for external rewards such as grades (sample item *"I am keenly aware of the goals I have for getting good grades"*). The reason for this result could be the nature of the sample. All the participants of the study were sophomore level students in the interior design program, who at this point in their academic career are more concerned with doing well in class. Grading is one way of measuring success in class. Hence, it is possible that the students perceive getting better grades to being creative. This result also brings forth the relationship between motivational orientation and personality style, specifically the personality trait of inquisitiveness.

The personality trait of inquisitiveness is related to being ambitious and seeking ways to improve their thinking and creativity. Since grading tends to be the primary measure of success for students, it is natural that inquisitive individuals would focus on their grades over other measures of thinking or creativity. This finding reiterates the impact of personality style and EMO on creativity.

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Overall, the findings emphasize the need for further investigation to understand the relationship between EMO and creativity. Exploring synergistic motivation and informational EMO that is supportive could provide a way to detract students from relying solely on grades to assess their creativity. Similarly, assessing the effect of reward for creativity and flexible thinking could also provide significant insights into creativity. This insight could affect how educators assess and evaluate student projects. Furthermore, it would be vital to understand how this affects an individual's thinking preferences, personality, and creativity. Some of these suggestions for future research and possible implications on design education are discussed in Chapter Five.

Chapter Five: Summary, Conclusions, and Implications

Summary

The purpose of this discipline specific study was to understand the relationship between individual creativity of interior design students and three influences on creativity. The three influences, which formed the independent variables for the study, included cognitive style, personality style, and motivational orientation of interior design students. This purpose was based on three confluence theories and related precedent literature that indicated that creativity is a multidimensional construct impacted by the confluence of various influences. Three confluence theories for creativity were discussed in Chapter Two that formed the basis for selecting three influences as independent variables for the present study.

Relevant precedent studies for the three independent variables were discussed in Chapter Two, which were dominated by research conducted in disciplines of psychology and its related fields. A few studies conducted in interior design were discussed where relevant. Measurement of each independent variable and creativity were also discussed in Chapter Two, which concluded with the presentation of four hypotheses for the study.

To test the hypotheses, data related to the variables were collected from sophomore level students enrolled in three interior design schools (*n = 51)* accredited by the Council of Interior Design Accreditation (CIDA) located in the Midwest region of United States. Four instruments, all of which were paper and

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pencil based were selected for collecting data. Since two of the three research sites were not accessible by the investigator personally, permission to collect data and employ co-investigators was obtained from the two remote sites. The co-investigators were selected to assist with distributing the instruments, collecting, and mailing the instruments back to the researcher. The researcher collected data in person from one research site. To maintain consistency in the data collection procedure, the researcher used Skype and Wimba technology to collect data at the two remaining sites. As per IRB procedures, the researcher introduced the study, its procedures, and instructions for the instruments. All instruments were coded to protect the identity of the participants and the codes were only available to the researcher. Of the four instruments, three were analyzed by the researcher and the fourth instrument was coded and sent to the Scholastic Testing Services (STS) for scoring.

Chapter Four presented the results of the data analysis of the study. Data analysis included obtaining descriptive statistics, correlation analysis, multiple regressions, and chi square analysis with a Fisher's exact test. Results of the analysis partially supported the hypotheses of the study. Overall a majority of the sample was above average (20.8%), strong (20.8%), and very strong (18.9%) in creativity. The majority of the sample also preferred a Mixed Thinking Style (54.9%). Significant correlations were found with creativity and between Intrinsic Motivational Orientation (IMO, $r = .27, p < .05$), personality traits of Inquisitiveness (I, $r = .27, p < .05$), and Compensation (EMO-C) sub scale of

Extrinsic Motivational Orientation (EMO-C, $r = .23$, $p < .05$). The correlation

relationships were further explored with a multiple regression which was

significant F (3, 33) = 3.79, $p > .05$. The results revealed that the three

independent variables – IMO ($b = 17.02$, $p < .05$), I ($b = .46$, $p < .05$), and EMO-C

($b = .12$, $p < .05$) significantly predicted individual creativity for the sample.

Significant conclusions and implications are discussed in the following sections.

Conclusion

Creativity is a vital component of interior design, and interior designers are

expected to be creative, often referred to as creative professionals or individuals.

This belief is also held by most interior designers. In an attempt to discover the

implicit theories of creativity for interior design and related disciplines, Portillo

(2002) concluded that among all practitioners, interior designers had stronger

perceptions of being creative as compared to professionals in architecture,

engineering, and landscape architecture. Furthermore, "creativity is highly valued

in the workplace where novel and appropriate solutions to real world problems

are sought" (Portillo, 2009, p. 10). Both CIDA and the National Council of Interior

Design Qualification (NCIDQ) emphasize the importance of creativity training,

thinking, and practice for the discipline of interior design.

However, in the absence of a clear understanding of what this training,

thinking, and practice might entail, including creativity in design instruction would

be a difficult endeavor. In conclusion of their concept analysis of creativity in the

discipline of interior design, Pedersen and Burton (2009) stated that creativity as

a concept was under-defined within the discipline of interior design. However, they also stated that their concept analysis revealed a need for further investigation into creativity, especially the antecedents and their significant impact on creativity.

Pedersen and Burton (2009) identified several antecedents to creativity that can be likened to influences on creativity identified by several researchers. The influences included cognitive style, personality style, knowledge, motivation, thinking style, and environment. These influences were also a part of the three confluence theories examined for the present study. Theories examined included the Componential Theory (Amabile, 1996), Csikszentmihalyi's Systems Approach (1996), and Sternberg and Lubart's Investment Theory (1996).

All three theories are based on the notion that a person's creativity is influenced by several forces/components or rely on certain resources. Research on these forces/components/resources was examined and three influences were selected for the present study. Selection of the three specific variables was based on their significant relationship with creativity revealed in the literature review. Additionally, the number of variables was also limited to ensure that the scope of the study was manageable. The three influences selected were cognitive style, personality style, and motivational orientation. These served as independent variables for the study and data collected for the same were analyzed with regards to their relationship with creativity of interior design students.

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Prior to presenting specific conclusions related to the three influences, it is important to clarify the specific research design employed. An important criticism uncovered during investigation of the influences revealed that often researchers studied the influences in relation to creativity itself. Most of the research studies measured creativity for the sample and then compared the results with those derived for the influences such as cognitive style, personality style and so on. As a result, specific relationships between the influences and how they interacted were not examined. According to Zeng et al (2011), this limits the understanding of the influences and narrows the scope of research. To counter this criticism, the present study followed the suggestions of Zeng et al (2011) and examined the three influences prior to comparing results with the creativity scores of the participant. This allowed the researcher to uncover the specific nature of the influences within the domain of interior design. Comparisons with the creativity scores were done later to uncover the specific relationship between creativity and the three influences. Results drawn for each influence are discussed in the following sections.

Cognitive Style

In the present study, cognitive style was measured using the Human Information Processing Survey (HIPS, Khatena & Torrance, 1984) that assessed the thinking preferences of individuals based on brain hemispherity. Results revealed that a Mixed Thinking Style was most prominent among the sample (54.9%), which was followed by a Right Brain Thinking Style (27.5%) while small

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percentages of the sample preferred the Integrated Brain Thinking Style (9.8%) and the Left Brain Thinking Style (7.8%). The results of this study were somewhat in contradiction to those of previous researchers (Lim, 1996; Nussbaumer, 1997; Meneely & Portillo, 2005; Meneely, 2010), who found a preference for Right Brain Thinking Style among interior design students. Meneely and Portillo (2005) and Meneely (2010) used the Hermann Brain Dominance Instrument (HBDI; Hermann, 1989) to assess the thinking preference of interior design students. Similar to the instrument used in the present study, the HIPS, HBDI is also based on the concept of brain hemispherity.

Lim (1996) and Nussbaumer (1997) on the other hand, utilized Kolb's learning style inventory to assess learning styles of interior design students. Both researchers found that a majority of the interior design students were accommodators; these students prefer to work by trial and error, are intuitive and more interpersonal in their approach to problem solving. Although Lim (1996) and Nussbaumer (1997) assessed learning styles and used a different instrument, thinking preferences of accommodators are similar to those of that prefer a right brain approach to thinking. According to Taggart and Torrance (1984), individuals who prefer the right brain style of thinking are "receptive, spatial, intuitive". Similarly, Meneely stated that individuals who prefer a right brain approach to thinking are more inclined towards conceptual, integrative, expressive, and interpersonal processes. Since this study aimed to test the relationship between creativity and cognitive style, a chi square analysis using a Fisher's exact test

was conducted. It was anticipated that higher flexibility in cognitive style would be significantly related to higher creativity. However, results of the test were not significant and did not support the relationship between creativity and cognitive style. As per the HIPS, the Integrated Brain Thinking Style is considered the most flexible of the four styles. In the present study, no significant relationship was found between the Integrated Thinking Style and creativity.

Similar results were derived by Meneely and Portillo (2005) with respect to cognitive style and creativity. Meneely and Portillo (2005) examined the relationship between creativity of interior design students and the influences of personality style and cognitive style. As previously mentioned, they used the Hermann Brain Dominance Inventory (HBDI, Hermann, 1989) which is similar to the instrument used in this study in the respect that both the instruments are based on the notion that different functions are performed by different hemispheres of the brain. Results of their study also indicated that there was no significant relationship between greater cognitive flexibility and creativity (Meneely & Portillo, 2005).

Personality Style

Personality style is an important influence on creativity and while it may be prudent to say that a creative personality exists, the results of this study and its precedents make it evident that creative individuals consistently display certain personality traits and peculiarities. Helson and Pals (2000) suggested that personality, referred to as creative potential, could predict creative performance

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in latter lives of creative individuals. Similar conclusions have been drawn by researchers such as Pedersen and Burton (2009) and Jefferies (2007) who concluded that personality style along with other influences is a significant antecedent to creativity. The results of this study however, did not entirely coincide with these conclusions.

In the present study, personality style did not prove to be a significant predictor of creativity. Both the correlation and regression analysis did not provide any significant results related to the relationship between creativity and personality style. Secondary analysis however proved that the personality trait of inquisitiveness was a significant predictor of individual creativity. Similar conclusions were drawn by Portillo (2002) who surveyed professionals in interior design and related disciplines of architecture, landscape architecture, and engineering. In accordance with their study, the results of the present study also suggested that creative individuals in interior design tend to be being curious, ambitious, adventurous, sensitive, headstrong, self-seeking, affected, and conceited, which coincide with the trait of inquisitiveness. Based on the conclusions of various researchers (Helson & Pals, 2000; Portillo, 2002) encouraging and nurturing these personality traits early on in students could influence their future creativity. Some ways of encouraging certain traits are discussed in the implications sections of this chapter.

Motivational Orientation

The present study is the only one within the discipline of interior design that takes into consideration the influence of motivational orientation on individual creativity along with the influence of personality style and cognitive style. The importance of motivational orientation for creativity has been stressed by several researchers, notably Csikszentmihalyi (1996) and Amabile (1996). In conjunction with the findings of Amabile (1996) and several researchers (Gardner, 1993; Sheldon, 1995; Dollinger et al., 2007; Kasof, 2007), the results of the present study reinforced the importance of an individual's intrinsic motivation for creativity. The results also present an interesting relationship between the Extrinsic Motivational Orientation of an individual and creativity, as well as the confluence between motivational orientation and personality style of interior design students.

Of the three independent variables of the present study, only Intrinsic Motivational Orientation yielded significant results in both the correlation and regression analysis. Intrinsic motivation is related to an individual's personal and internal reasons for pursuing an activity irrespective of any external reward, acknowledgement, or praise. Since a person is not distracted by any external stimuli, all energy and effort is focused on the creative activity. This could result in total immersion into the activity, further resulting in higher levels of performance and achievement.

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When a person is faced with an interesting challenge, which matches his/her ability, the person is able to reach a state where enjoyment is derived from successful execution or completion of this challenge. This notion was proposed by Csikszentmihalyi (1996) who referred to it as *state of flow.* As and when a person is able to get to this state of *flow*, he/she is able to invest all available resources and abilities into the activity. A slightly different version of this concept was presented by Sternberg and Lubart (1997).

According to Sternberg and Lubart (1997) and their investment theory, creativity results from "buying low and selling high". In this process, an individual decides to invest into an idea that is not as developed and needs significant effort. After investing all available resources and efforts into the idea, the creative individual promotes and sells it as a new and path breaking idea. Often the idea selected is in its infancy and requires further investment of time and effort to garner knowledge to develop it, which might require the individual to step out of his or her comfort zone or domain. This process could take years of sustained effort, experimentation, and dealing with failure or discouragement. As a result, the process requires a high level of intrinsic motivation that would propel and sustain the person's energy and efforts until the idea catches on.

Similar to Csikszentmihalyi, Sternberg and Lubart (1997) state that a person has to love the work he is involved in to be truly motivated to pursue it. At the same time, certain personality traits work with motivation to support this

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process. This relationship is explained in the following section, reiterating the confluence between personality and motivational orientation.

Confluence of Personality and Motivational Orientation

The state of *flow* explained in the previous section is one aspect of intrinsic motivation. The other aspect is a person's individual aim or natural disposition to pursue creative tasks and challenges. In this respect, motivation is related to the personality style of an individual. When combined together, personality style and motivational orientation of an individual are more likely to push an individual to access complex abilities to solve complex problems.

Certain personality traits work with motivation to support this process. These personality traits include an affinity to take risks, be able to defy the crowd while staying focused on the task. Important personality traits are a certain tolerance for ambiguity, willingness to overcome obstacles, willingness to grow, willingness to take sensible risks, and belief in oneself. An intrinsically motivated person, with a propensity to seek and pursue these challenges is more likely endure in the event of obstacles. In their study of prominent creative individuals, both Csikszentmihalyi (1996) and Gardner (1993) found this to be a vital contributor to their success and creativity.

With specific reference to the result of the present study, personality and motivation share an interesting association, which is vital for the discipline of interior design. Interior design is a competitive discipline, where the success of a designer is based on his or her ability to develop an edge over other competing

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designers. Considering this, it would be logical to assume that creativity in interior design is influenced by the need to succeed and be competitive. This need is closely related to the personality trait of inquisitiveness as well as the extrinsic motivation sub scale of compensation; both of which emerged as significant predictors of individual creativity in the present study. In addition, a competitive streak also requires significant intrinsic motivation, to constantly approach new challenges and improve oneself to meet them. The need to succeed, fueled by personality and extrinsic motivational orientation, affects a designer's intrinsic motivation, which in turn can influence their creativity.

Hence, this study brings to light a need to examine and balance intrinsic motivation, extrinsic motivation, and personality style within interior design education. Specifically, how much of this need for success is related to intrinsic motivation and how much of it is related to extrinsic motivation (rewards, monetary gains etc)? Several implications of this study on design education and future research are discussed in the following sections.

Implications for Design Education

Creativity is important for both design education and practice. For design education, it is important to understand what creativity entails and how it can be taught or enhanced in an individual. Creativity is a relatively unexplored concept for interior design particularly in relation to the various influences on it. This study aimed to uncover the relationship between three influences and creativity within the discipline of interior design. In the larger perspective for design education,

this study provides some insight into the importance of motivational orientation, Inquisitiveness, and Mixed Thinking Style for interior design. Specifically the results of the study bring to focus the need to balance both intrinsic and extrinsic motivation to foster creativity among interior design students.

The predominant premise maintained by earlier researchers was that any external motivation is harmful for creativity. Several researchers (Amabile, 1996; Csikszentmihalyi, 1990; Gruber, 1990) have stressed on the importance of intrinsic motivation over extrinsic motivation. However, the significant relationship between the Compensation subscale of extrinsic motivation and creativity revealed in the present study warrants a better understanding of this relationship for the discipline of interior design. Is it possible to employ this significant relationship into making creativity and the design process the focus of interior design students?

Often in design education, the final product and its presentation become the focus of all student efforts since they form the definitive criteria for grading. As a result, a large portion of an interior design student's energies is focused on creating an impressive final presentation and project package. There remains hardly any focus on the process of creating and developing a creative design solution. Often in this process, the focus also shifts from function to the form and aesthetic appeal of the final solution and presentation. Students are often unable to effectively articulate the concept of the project or demonstrate the evolution of the project from abstract concepts to concrete design decisions. "Empirical

studies have shown, however, that highly creative practitioners are able (if reluctant) to articulate the conceptual and schematic underpinnings of their work, both *a priori* and *post hoc*, thereby providing criteria for critical evaluation and assessment of their creative ability as well as of their craft of execution of their created works" (Cowdroy & DeGraff, 2005, p. 516).

Hence, the question that arises is how can students be made aware of the importance of process over product, and its importance for creativity? Furthermore, is it possible to employ the relationship between EMO and creativity to shift the focus from product to process? Based on the results of the present study related to the trait of Inquisitiveness and EMO-C, we could assume that getting good grades and succeeding in the class are important to interior design students. We could also assume that the evaluation and assessment techniques employed in the design classes could be altered to bring about a desirable change and encourage creativity.

According to Chen and Ling (2010), creativity cannot be taught or passed on from instructor to student. This makes the process of incorporating creativity in the design curriculum even more difficult. Cheng and Ling (2010) presented a few case studies where beginning design students were encouraged to explore their own individual creativity, as well as self-expression of it. Basing their research on Jungian psychoanalysis theory, the authors suggest that to incorporate creativity in higher education, educators need to provide opportunities to practice specific skills to increase their comprehension and

mastery. They state that doing so would require using non-traditional classroom techniques as well as a high level of dedication of the educators in treating each student individually. Similarly, Livingston (2010) stated that in light of the changes the world is facing, educators need to provide students the opportunity to develop skills that will serve them well in the outside world. The nontraditional techniques as suggested by Chen and Ling (2010) could include alternative class assignments as well as alternative assessment measures that highlight process over product.

As part of the alternative assignments, educators could encourage students to present verbally or in the written format, their concept and its various iterations. One way to do this would be to require students to maintain design journals throughout their academic careers; these journals could be project based as well as reflective in nature. Design journals could be in any format: digital or non-digital, verbal or written, using actual books or podcasts, allowing students the freedom to select their means of communication. The purpose of these design journals and alternate ways of design communication would be to inculcate in students a habit of being immersed in the creative process and revising their design choices or decisions in the process. Such a practice would provide students with an opportunity to practice these skills as per Livingston's (2010) suggestions.

Additionally, assessment techniques would also need to be altered to scaffold this process. Assessment of these alternative products would need to be

adjusted from quantitative to qualitative methods. A qualitative method of assessment could also provide a way to maintain a continuous and wholesome dialogue on the creative process. Such a dialogue would also reiterate the practice of expressing abstract ideas.

The benefits of such an assessment change would be threefold: one it would aid in developing a foundation that supports the importance of process over product; second, the process would allow students to develop various modes of thinking involving differing functions of the brain. The third and perhaps most important benefit would be the development of a more critical way of thinking about design.

Putting the process into words or some form of tangible product places a spotlight on the process, which might force or encourage students to take a harder look at the motives for creating the final product. In her report outlining the importance of critical writing for the interior design curriculum, Beecher (2006) stated that "the development of a strong written critical argument requires the critic to make a series of creative decisions that are analogous to those used in the architectural design process" (p. 54). This process according to Beecher (2006) affords students the opportunity to enhance their creativity. This would also take some of the focus away from the aesthetics of the final presentation and place it on the process instead.

As mentioned earlier, one of the benefits of this change could also have significant impact on developing a more flexible cognitive style among design

students. Emphasizing on the need to develop adaptable thinking for interior design, Meneely (2010) suggested that it is important incorporate alternative and diverse class activities to enhance a more flexible way of thinking. He stated that alternative class activities would allow students to identify and develop ways to employ the varied cognitive abilities different from their preferred ability, which in turn could affect their overall creativity.

Another way to employ assessment techniques to encourage creativity would be to reward certain behaviors or in this case, the creative process over the product. Eisenberger and Rhoades (2001) concluded that rewarding creativity in activities tended to increase overall creativity in individuals. Based on their research on extrinsic motivation and creativity, rewarding high performance among employees resulted in influencing their overall intrinsic motivation.

Concerning higher education in interior design, this would mean that rewarding the creative process over the final product would make it a part of the project for the students and eventually a part of their intrinsic motivation. However, this relationship needs to be carefully balanced. Several other studies by Eisenberger and his colleagues (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994; Eisenberger & Shanock, 2003) have also shown negative impacts of rewards on creativity. This finding clearly suggests that extrinsic motivation needs to be carefully managed for creativity.

Other concluding results of the present study that affect design education were related to the influence of personality style. Certain personality traits have

consistently emerged as common traits among creative individuals, which include being *artistic, complicated, humorous, idealistic, and impulsive, having wide interests, reflective, sharp-witted, unconventional,* and *assertive*, *curious, energetic, spontaneous* and *sensitive.* Specifically, for interior design students in this study the personality trait of inquisitiveness emerged as a significant predictor of creativity. Combined with the EMO subscale of Compensation, the study revealed the importance of traits such as "being curious, ambitious, adventurous, sensitive, headstrong, self seeking, affected, and conceited."

Thinking about the broader implications on interior design education, students can be encouraged to be more curious and interested in wider and varied activities; activities not typically associated with interior design. Livingston (2010) proposed the need to re-examine the overall pedagogical approach to teaching creativity. He suggested that educators need to acknowledge the fact that with the amount of exposure incoming students have to innovation; educators can assume that students are already creative. It is important to employ the students' inherent curiosity, innovativeness, and technological skills to further their comprehension of creativity.

Similar to assessment interventions suggested above, class activities and project evaluation could include an emphasis on seeking varied activities outside of the typical realm of interior design. These activities could be used as design inspiration for design ideas. For instance, class activities could focus on local theater and art events, or ask students to seek unusual and offbeat resources to

solve design problems. The aim of these activities would be to instill in students a sense of curiosity and adventure. Class projects will also require students to reflect ways in which these activities can be incorporated into design ideas. It is important that students are trained and given opportunities to think creatively, rather than expecting them to do so. The above-mentioned suggestions could affect the overall motivational orientation and personality of students and eventually influencing their overall creativity.

This point brings to light the importance of understanding the antecedents of creativity, significantly motivational orientation, personality style, and environment to provide an opportunity for educators to examine their pedagogical approach in incorporating creativity in design education. However, these measures need to be made a part of the larger educational philosophy of design programs.

Implications for Future Research

Several different directions into future research could be suggested based on the present study. Future researchers could consider various different directions both in terms of the study variables and in terms of the methodology. While the present study considered only three of the several influences on creativity, to understand a multidimensional concept such as creativity, future research studies could include other influences in conjunction with creativity. These other influences include environment, intelligence, and knowledge.

Significant information could be drawn from longitudinal studies that assess the long-term impact of the specific influences. For instance, it could be predicted that motivation for being creative might be higher among beginning design students as compared to more advanced students. This might be due to fact that in later design classes students are more aware of the technical aspects of design. Projects get more complex and demanding in terms of technical and programmatic requirements. Hence, motivation to be creative might take a backseat to incorporating various important and technical aspects of a design solution. Longitudinal studies could assess this relationship and ways to maintain motivation for creativity throughout a student's academic career.

Based on some of the interventions and suggestions made in the earlier section, studies could also assess the implications of the interventions related to assessment techniques. It would be interesting to investigate if the alternative activities and assessment techniques did in fact improve creativity of the design students. Similarly, the long-term impacts of class activities that encourage curiosity and inquisitiveness could be also assessed by future researchers. These studies would require employing more qualitative research methods that assess the reflective journals the students maintain. Student experiences with these interventions and their effect on student outlook towards creativity could also be studied. Furthermore, an analysis of student projects and their ratings on creativity using the CAT could also be conducted. If feasible, a comparative analysis of projects before and after the class interventions would provide better

information on the impact of the proposed suggestions. The following sections present future directions for research in to creativity in interior design.

Future Directions for Research Design

An aspect of the research method that could be explored is related to the ways of assessing creativity and the various influences. One of the limitations of the present study was the instruments used to assess creativity and motivational orientation. The present study assessed creativity using the Torrance Test for Creative Thinking (TTCT; Torrance, 1966/1974) which is a divergent thinking assessment. Divergent thinking (DT) is just one aspect of creativity. In a recent article related to DT tests and their uses, Runco and Acar (2012) state that "DT is not synonymous with creativity but DT tests provide useful estimates of meaningful potential" (p. 73). While DT tests have proven to be a valid and useful measure of creativity and creative potential, the lack of domain specificity often attracts criticism on their use.

Having said that, it must be mentioned that the TTCT results in the present study revealed unique results related to the creativity of interior design students. Students in the present sample scored 1.5 standard deviation higher on the aspect of elaboration, which in turn increased their overall creativity score. It would be beneficial to ascertain if this is a feature unique to interior design students. To achieve this, future studies could administer the TTCT in several different interior design programs. A comparison with students in other disciplines could also reveal the true nature of creativity for interior design students.

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An alternative way to assess creativity that future researchers could employ is the Consensual Assessment Technique (CAT; Amabile, 1996). This technique involves assessing projects or activities within a domain, which makes CAT a domain specific assessment of creativity. Projects are assessed by judges who individually rate them on a creativity scale based on their personal understanding of creativity. CAT has proven to be a valid and reliable measure of creativity. However, the process of setting up the CAT often makes it cumbersome to execute and often this test is used to assess creativity at one point in time. Consequently, it does not provide a true picture of an individuals' creativity. However, CAT could be used as an ongoing assessment of creativity or as an assessment of an individual's portfolio of collected work. When used in this manner, it could provide a more accurate assessment an individual's creativity as well as how it has progressed or regressed. Combined with an assessment of the proposed interventions, CAT can provide meaningful insight to see if the interventions were successful.

Of the three influences, motivational orientation has consistently emerged to have a noteworthy impact on creativity. However, there is a need to develop a significantly valid and reliable instrument to assess it. The present study utilized the Work Preference Inventory (WPI; Amabile, Hill, Hennessey & Tighe, 1994) to assess motivational orientation. This instrument was the only known assessment for motivational orientation among adults and was discussed in detail in Chapter Three. The reliability assessment conducted for this study yielded moderate

results for the WPI. However, as mentioned there is a need to develop a stronger assessment for measuring motivational orientation. Future researchers could attempt to design and test ways to assess motivational orientation for creativity within the domain of interior design.

Other suggestions of future research include using alternative ways to assess cognitive style and personality. For instance, cognitive style can be assessed using the Embedded Figures Test (Witkins et al. 1971) that assesses field independence and field dependence of an individual. Field dependent individuals tend to be influenced strongly by the field, while field independent individuals are able to look beyond the field. To simplify, the field dependent individuals see the forest i.e. the whole picture, while the field independent individuals are able to see single trees, i.e. the smaller details. The test provides valuable information related to the way individual uses domain related knowledge to solve problems. In this regard, the test provides valuable insight into how complex an individuals' thinking style related to creative problem solving could be.

Another way to assess cognitive style would be to employ the Hermann Brain Dominance Inventory (HBDI; Hermann, 1989), which also provides insight into the ways an individual employs different quadrants of the brain. Two separate instruments could also be used to compare the results and gain further insight into cognitive style. For instance, the figures embedded test could be used in conjunction with HBDI to assess how interior design students approach

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problem solving in terms of field dependence and brain hemispherity. While the results might not be as sophisticated as mapping brain activity, the results could provide insight into whether a flexible thinking style is more suited to creativity.

Similarly, alternate ways to assess personality style could include the Adjective Check List (ACL; Gough & Heilbrun, 1986). The ACL rated on a creative index (CR; Domino, 1970) has been widely used to assess personality style of individuals. The ACL-Cr provides valuable information related to various personality traits commonly found among creative individuals.

To further extend the scope of research and garner a more in depth understanding of creativity, professional interior designers could be included as participants of the study. As seasoned professionals, their way of approaching a design or creative project in terms of thinking process, motivational orientation, or even inspirations would be entirely different from those of a novice designer. Would it be possible to uncover some of these specific differences and incorporate those into possible classroom activities?

Comparing advanced professionals in the field to novices would be one way to gather more information related to the specific influences on creativity. For instance, are advanced designers just as intrinsically motivated to be creative as novice designers are? Are there differences in the way advanced designers approach a problem? Do they seek varied activities that influence their overall creative process? Uncovering the way in which the influences affect the creativity

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of the professional designers could provide valuable information that could be significant for design education as well.

The present study brought to light several results specific to the discipline of interior design, indicating a further need for more domain specific studies of creativity. As already suggested, there are many avenues available to approach the study of creativity for interior design; one can study the creative person, the process, or assess creative products to uncover the underlying processes of creativity. However, it is important to reinforce that the nature of creativity is multidimensional and hence studying any one aspect will only provide with limited information related to creativity. These limited portions can be combined to provide a better picture of creativity and certainly further our understanding of it. This might allow us to integrate creativity training into the interior design curriculum in a more evidence based manner. The three confluence theories that formed the basis of the present study emphasize that the influences work together to impact an individual's creativity. Hence, it would be important to consider these influences to understand creativity. To reiterate, until a clearer understanding of creativity is derived, incorporating it into the design curriculum would not be feasible.

References

Albert, R. S. (1990). Identity, experience, and career choice among the exceptionally gifted and eminent. In M. A. Runco & R. S. Albert (Eds.), *Theories of creativity* (p. 13 - 34). Newbury Park, CA: Sage.

Allport, G. W. (1937). *Personality: A psychological interpretation*. New York: Holt.

Althuizen, N., Wierenga, B., & Rossiter, J. (2010). The validity of two brief measures of creative ability. *Creativity Research Journal, 22*(1), 53-61.

Amabile, T. M. (1982a). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 43*(5), 997-1013.

Amabile, T. M. (1983). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 4*5, 357-377.

Amabile, T. M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of Personality and Social Psychology, 48*(2), 393-399.

Amabile, T. M. (1996). *Creativity in Context: Update to Social Psychology of Creativity.* (Eds.) Boulder, CO, Westview Press.

Amabile, T. M., Hennessey, B. A. (1988). The conditions of creativity. In R. Sternberg (Eds.), *The Nature of Creativity, (*p. 11-43). New York, NY, Cambridge University.

Amabile, T. M., Hill, K.G., Hennessey, B. A., & Tighe., E.M. (1994). The Work

 Preference Inventory: Assessing intrinsic and extrinsic motivational

 orientations. *Journal of Personality and Social Psychology, 66,* 950-967.

Amabile, T, M. (1996).A theoretical framework. In Amabile, T. A., *Creativity in*

 Context. (81 – 130). Boulder, CO, Westview Press.

Baer, J. (1998). The case for domain specificity of creativity. *Creativity Research*

 Journal, 11(2), 173-177.

Baker, I. J. and Sondhi, L. E. (1989), Entry-Level Competencies and Attributes

 Needed by Interior Design Graduates: A Survey of Top Interior Design

 Firms. Journal of Interior Design, 15: 35–40. Doi: 10.1111/j.1939-

 1668.1989.tb00142.x

Barron, F., & Harrington, D.M. (1981).Creativity, intelligence, and personality.

 Annual Review Psychology, 32, 439 -476.

Barron, F., & Welsh, G. S. (1952). Artistic perception as a possible factor in

 personality style. *Journal of Personality, 33,* 199-203.

Batey, M., & Furnham, A. (2006). Creativity, Intelligence, and Personality: A

 Critical Review of the Scattered Literature. *Genetic, Social, and General*

 Psychology Monographs, 2006, *132* (4), 355–429.

Batey, M., Furnham, A. (2008). The relationship between measures of creativity

 and schizotypy**.** *Personality and Individual Differences*, 45 (8), pp. 816–

 821.

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Batey, M., Chamorro-Premuzic. T., Furnham, A. (2009). Intelligence and

personality as predictors of divergent thinking: the role of general, fluid

and crystallised intelligence. *Thinking Skills and Creativity*, 4 (1), pp. 60–

69.

Batey, M. (2010). Intelligence, general knowledge and personality as predictors

of creativity. *Learning and Individual Differences, 20*(5), 532-535. Doi:

10.1016/j.lindif.2010.04.008.

Beecher, M. A. (2006). Designing Criticism: Integrating Written Criticism in

Interior Design Education. *Journal of Interior Design*, *31*(3), 54-61.

Beyler, J., & Schmeck, R. R. (1992). Assessment of individual differences in

preferences for holistic-analytic strategies: Evaluation of some commonly

available instruments. *Educational and Psychological Measurement,* 52,

709-719.

Bogen, J. E., & Bogen, G, M. (1969). The other side of the brain III: The corpus

callosum and creativity. *Bulletin of the Los Angeles Neurological Societies,*

34, 191-220.

Briggs, K. & Myers, I. (1976).*The Myers-Briggs Type Indicator.* Palo Alto, CA:

Consulting Psychologists Press.

Casakin, H., Davidovitch, R., & Milgram, R. (2010).Creative thinking as a

predictor of creative problem solving in architectural design students.

Psychology of Aesthetics, Creativity, and the Arts, 4(1), 31-35.

Chakravarty, A. (2010). The creative brain – Revisiting concepts. *Medical Hypotheses, 74*, 606–612.

Chen, K., & Ling, T. (2010). Creativity-provoking design education based on Jungian Psychoanalysis Theory. *Procedia-Social and Behavioral Sciences,2* (2), 4555-4560.

Csikszentmihalyi, M. (1990).The domain of creativity. In M. A. Runco & R. S. Albert (Eds.), *Theories of creativity* (190-214). Newbury Park, CA: Sage.

Csikszentmihalyi, M. (1990a). *Flow: The psychology of optimal experience.* New York: Harper & Row.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the Psychology of Discovery and*. Harper Collins.

Collins, M. A., & Amabile, T. M. (1999). Motivation and creativity. *Handbook of creativity*, *297*.

Conti, R., Coon, H., & Amabile, T. (1996). Evidence to support the componential model of creativity: Secondary analyses of three studies. *Creativity Research Journal, 9* (4), 385-389.

Costa, P. T., Jr., & McCrae, R. R. (1985).The NEO personality inventory manual. Odessa, FL: *Psychological Assessment Resources.*

Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment.

Cowdroy, R. & de Graff, E (2005). Assessing highly-creative ability. *Assessment and Evaluation in Higher Education.* 30 (5), 507-518.

DeCharms, R. (1976). Enhancing motivation: Change in the classroom.

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of research in personality*, *19*(2), 109-134.

Dollinger, J, S., Burke, A, P., & Gump, W, N., (2007). Creativity and values. *Creativity Research Journal*, 19, (2–3), 91–103.

Domino, G. (1970). Identification of potentially creative persons from the Adjective Check List. *Journal of Consulting and Clinical Psychology*, *35*(1p1), 48.

Dudek, S.Z., & Hall, W.B. (1991). Personality consistency: Eminent architects 25 years later. *Creativity Research Journal, 4 (3)*, 213 -231.

Eisenberger, R., Armeli, S., & Pretz, J. (1998). Can the promise of reward increase creativity? *Journal of Personality and Social Psychology, 74*, 704–714.

Eisenberger, R., & Rhoades, L. (2001).Incremental effects of reward on creativity. *Journal of Personality and Social Psychology, 81,* 728–741.

Eisenberger, R., & Selbst, M. (1994). Does reward increase or decrease creativity? *Journal of Personality and Social Psychology, 66*, 1116–1127.

Eisenberger, R., & Shanock, L. (2003). Rewards, intrinsic motivation, and
creativity: A case study of conceptual and methodological isolation.
Creativity Research Journal, 15 (2 & 3), 121-130.

Feldman, H. D. (1999). The development of creativity. In R. Sternberg (Ed.),
Handbook of creativity (1st ed., 169-186). United Kingdom: Cambridge
University Press.

Feist, J. G. (1998). A Meta-analysis of personality in scientific and artistic
creativity. *Personality and Social Psychology Review*, 2 (4), 290 – 309.

Feist, J. G. (1999).The influence of personality on artistic and scientific creativity.
In R. Sternberg (Ed.), *Handbook of creativity* (1st ed., 169-186). United
Kingdom: Cambridge University Press.

Feist, J. G., Barron, F. X. (2003). Predicting creativity from early to late
adulthood: Intellect, potential, and personality. *Journal of Research in
Personality, 37*(2), 62-88. Doi: 10.1016/S0092-6566(02)00536-6.

Field, A. (2009). *Discovering statistics using SPSS* (3rd Ed.). London: Sage
Publication.

Finke, R. A., Ward, T. B., & Smith, S. M. (1992). *Creative cognition: Theory,
research, and applications*. Cambridge, MA: MIT press.

Florida, R. (2002). *The rise of the creative class: And how it's transforming work,
leisure, community and everyday life.* New York, NY: Basic Books.

Furnham, A., & Bachtiar, V. (2008). Personality and intelligence as predictors of
creativity. *Personality and Individual Differences*, *45*(7), 613-617.
151

Gallucci, T. N., Middleton, G., & Kline, A. (2000).Perfectionism and creative strivings. *The Journal of Creative Behavior, 34 (2)*, 135 – 141.

Gardner, H. (1989). *To open minds.* New York: Basic.

Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi.* New York: Basic.

George, J. M., & Zhou, J. (2001). When openness to experience and conscientiousness are related to creative behavior: an interactional approach. *Journal of Applied Psychology*, *86*(3), 513.

Goff, K. (2002). The Abbreviated Torrance Test for Adults (ATTA). *IL Scholastic Testing Service*.

Gough, H. G. (1957/1987). *California Psychological Inventory Manual.* Palo Alto, CA: Consulting Psychologists Press, (Originally published in 1957).

Gough, H.G., & Heilbrun, A.B. (1983).*Manual for the Adjective Check List* (rev. ed.). Palo Alto, CA: Consulting Psychologists Press.

Gregorc, A. F. (1982b). *An adult's guide to style.* Maynard, MA: Gabriel Systems, Inc.

Guilford, J.P. (1950). Creativity. *American Psychologist, 5,* 444-454.

Guilford, J. P. (1959). Traits of creativity. In H.H. Anderson (Ed.), *Creativity and its cultivation*, 142-161, New York: Harper.

Guilford, J. P. (1986). *Creative talents: Their nature, uses and development*. Buffalo: Bearly Limited.

Guilford, J.P., Christensen, P.R., Merrifield, P.R., & Wilson, R.C. (1978).*Alternate Uses: Manual of instructions and interpretations*. Orange, CA: Sheridan Psychological Services.

Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental psychology*, *17*(3), 300.

Helson, R. (1999). A longitudinal study of creative personality in women. *Creativity Research Journal*, 12 (2), 89-101.

Helson, R., & Pals, J. (2000). Creative potential, creative achievement, and personal growth. *Journal of Personality, 68*(1), 1-27. Doi: 10.1111/1467-6494.00089.

Hennessey, B. A., & Amabile, T. M. (2010).Creativity. *Annual Review of Psychology,* 61, 569-598.

Herrmann, N. (1989). *The creative brain* (2nd ed.).Kingsport, TN: Quebecor Printing Book Group.

Houtz, C. J., Selby, E., Giselle, B. E., Okoye, A. R., Peter, M. K., & Treffinger, J. D. (2003). Creativity styles and personal type. *Creativity Research Journal, 15*(4), 321-330.

Hutchinson, A., Whitman, R. D., Abeare, C., & Raiter, J. (2003). The unification of mind: Integration of hemispheric semantic processing. *Brain and Language, 87,* 361-368.

153

James, K., & Asmus, C. (2001).Personality, cognitive skills, and creativity in

different life domains. *Creativity Research Journal 12,* 149–159.

Jeffries, K. K. (2007). Diagnosing the creativity of designers: individual feedback

within mass higher education. *Design Studies*, *28*(5), 485-497.

John, O. P., Donahue, E. M., & Kentle, R. L. (1991).*The big five inventory-*

*Versions 4a and 4b.*Technical Report, Institute of Personality and Social

Research, University of California, Berkeley, CA

Kasof, J., Chen, C., Himsel, A., & Greenberger, E. (2007).Values and creativity.

Creativity Research Journal, 19 (2-3), 105-122

Katz A. N. (1986). The relationships between creativity and cerebral

hemisphericity for creative architects, scientists, and mathematicians.

Empirical Studies of the Arts, (4), 97-108

Katz, A. N. (1997). Creativity and the cerebral hemispheres. In M. A. Runco

(Ed.), *The Creativity Research Handbook* (1st ed., 203-226). United

States: Hampton Press Inc.

Kaufman, J. C. (2002). Dissecting the golden goose: Components of studying

creative writes. *Creativity Research Journal*, 14 (1), 27-40

Khatena, J.C., Plucker, J.A., & Baer, J. (2008).*Essentials of Creativity*

Assessment. (52 – 83).Hoboken, NJ, John Wiley & Sons, Inc.

Khatena, J., & Torrance E.P. Manual for- Khatena-Torrance Creative Perception

Inventory. Chicago, Ill.: Stoelting, 1976

Kim, K.H. (2006). Can we trust creativity tests? A review of Torrance Test of

Creativity Thinking (TTCT).*Creativity Research Journal, 18 (1)* 3-14

King, L. A., Walker, L. M., & Broyles, S. J. (1996). Creativity and the five-factor

model. *Journal of Research in Personality*, *30*(2), 189-203.

Kirton, M.J. (1976). Adaptors and innovators: A description and measure. *Journal

of Applied Psychology, 61,* 622-629

Lawson, B. (1990). How designers think: The design process demystified (2nd

edition]. Great Britain. Butterworth Architecture

Lee, K. J. and Hagerty, W. H. (1996), Comparison of Occupational Expectations

Between Interior Design Students and Practitioners. Journal of Interior

Design, 22: 1–14. Doi: 10.1111/j.1939-1668.1996.tb00222.x

Levy-Agresti, J., & Sperry, E. W. (1968). Differential perceptual capacities in

major and minor hemispheres. *Proceedings of the National Academy of

Sciences (USA), 61,* 1151

Lim, Y. (1996). *The effectiveness of multimedia presentation tools in teaching

perspective drawing for interior design students.* (Unpublished doctoral

dissertation). University of Minnesota, Twin Cities.

Livingston, L (2010) Teaching creativity in higher education. *Arts Education

Policy Review,* (111)*, 59 - 62.

Loos, R. (2001). Motivational orientations towards work: An evaluation of the

work preference inventory (Student form). *Measurement and Evaluation in

Counseling and Development*. 33, 222-233.

Lubart, T. I., & Sternberg, R. J. (1995). An investment approach to creativity: Theory and data. *The creative cognition approach*, 271-302.

MacKinnon, D. W. (1962). The nature and nurture of creative talent. *American Psychologist, (17)*, 484-495.

MacKinnon, D. W. (1965). Personality and the realization of creative potential. *American Psychologist, (20)*, 279-28 1

MacKinnon, D. W (1976). Architects, personality types, and creativity. In Rothenberg & C.R. Hausman (Eds.) *The Creativity Question*, 175-188. Durham, N.C.: Duke University Press.

McLain-Klark, J., & Rawls, S. (1988). CAD education in interior design: Computers and the creative process. *Journal of Interior Design Education and Research*, 14(2), 23–26.

Martindale, C., Hines, D., Mitchelle, L., & Covello, E. (1984). EEG alpha asymmetry and creativity. *Personality and Individual Differences,* 5, 77-86.

Meneely, J. (2010), Educating Adaptable Minds: How Diversified Are the Thinking Preferences of Interior Design Students?. Journal of Interior Design, 35: 21–32. Doi: 10.1111/j.1939-1668.2010.01040.x

Meneely, J., & Portillo, M. (2005). The adaptable mind in design: Relating personality, cognitive style, and creative performance. *Creativity Research Journal, 17*(2 & 3), 155-166.

Mednick, S. A., & Mednick, M. T. (1967).*Examiner's manual: Remote Associations Test.* Boston: Houghton Mifflin
156

Maehr, M., & Meyer, H. (1997).Understanding motivation and schooling: Where

    we've been, where we are and where we need to go. *Educational*

    Psychology Review, 9, 371 -409

Messick, S. et al (1976).*Individuality in Learning.* Jossey-Bass, London.

Mihov, C. M., Denzler, M., & Forster, J. (2010). Hemispheric specialization and

    creative thinking: A meta-analytic review of lateralization of creativity.

    Brain and Cognition, 72, 442-448.

Morse, D. T., & Khatena, J. (1989). The relationship of creativity and life

    accomplishments. *The Journal of Creative Behavior*, *23*(1), 59-65.

Montgomery, D., Hodges, P. A., & Kaufman, J. S. (2004). An exploratory study of

    the relationship between mood states and creativity self-perceptions.

    Creativity Research Journal, *16*(2-3), 341-344.

Monfort, M., Martin, S.A., & Fredrickson, W. (1990). Information-processing

    difference and laterality of students from different colleges and disciplines.

    Perceptual and Motor Skills, 70, 163-172.

Myers, C. (1982), Entry Level Competencies Needed By Interior Designers.

    Journal of Interior Design, 8: 19–24. Doi: 10.1111/j.1939-

    1668.1982.tb00454.x

Myers, I. B., McCaulley, M. H., & Most, R. (1985). *Manual: A guide to the*

    development and use of the Myers-Briggs Type Indicator. Palo Alto, CA:

    Consulting Psychologists Press.

Nickerson, R. (1999). Enhancing Creativity. In R. Sternberg (Ed.), *Handbook of creativity* (1st ed., 392-430). United Kingdom: Cambridge University Press.

Nussbaum, L. L., & Guerin, D. A. (2000). The relationship between learning styles and visualization skills among interior design students. *Journal of Interior Design*, *26* (2), 1-15.

Pedersen, E. L., & Burton, K. L. (2009). A concept analysis of creativity: Uses of creativity in selected design journals. *Journal of Interior Design, 35*(1), 15-32.

Perkins, D. N. (1988).The possibility of invention. In R. J. Stenberg (Ed.), *The Nature of Creativity* (362-385). Cambridge University Press

Portillo, M. (1996). Uncovering implicit theories of creativity in beginning design students. *Journal of Interior Design 22(2):* 15-24

Portillo, M. (2002). Creativity defined: Implicit theories in the professions of interior design, architecture, landscape architecture, and engineering. *Journal of Interior Design, 22*(2), 15-24

Prabhu, V., Sutton, C., & Sauser, W. (2008). Creativity and certain personality traits: Understanding the Mediating effect of intrinsic motivation. *Creativity Research Journal, 20*(1), 53-66

Rothenberg, A. (1983). Psychopathology and creative cognition: A comparison of hospitalized patients, Nobel laureates, and controls. *Archives of General Psychiatry,* 40, 937 – 942

Runco, M.A. (2004). Creativity. *Annual Review Psychology, 55,* 657-687

Runco, M.A., Miller, G., Acar, S., Cramond, B. (2010).Torrance Tests of Creative

Thinking as predictors of personal and public achievement: A fifty-year

follow-up. *Creativity Research Journal, 22 (4)*, 361-368

Runco, M. A. & Acar, S. (2012). Divergent Thinking as an Indicator of Creative

Potential, *Creativity Research Journal*, *24(1),* 66-75

Schwarzer, R. and Jerusalem, M. (1995).Generalized Self-Efficacy Scale. In

Weinman, J., Wright, S., and Johnson, M. (eds.), 35-37, Windsor England:

NFER-NELSON.

Schwartz, S.H. (1992). *The universal content and structure of values: Theoretical*

advances and empirical tests in 20 countries. In M. P.

Zanna (Ed.), *Advanced experimental social psychology* (Vol. 25, pp. 1-

65). New York: Academic.

Stein, M. I. (1953). Creativity and culture. *The journal of psychology*, *36*(2), 311-

322.

Sternberg, R. J. (1988). The Nature of Creativity: Contemporary Psychological

Perspectives. Cambridge University Press, New York (NY).

Sternberg, R. J. (2010). To get the real star students, college admissions should

look beyond SATs. *The Washington Post.* Retrieved from

http://www.washingtonpost.com

Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal*,*18*

(1), 87-98.

Sternberg, R. J., & Lubart, T. (1999). The concept of creativity: Prospects and
paradigms. In Sternberg. R. (Ed.), *Handbook of creativity* (1st ed., 3-15).
United Kingdom: Cambridge University Press.

Sternberg, R. J., and Todd I. Lubart (1996). "Investing in creativity." *American
psychologist* 51 (7), 677-688.

Sheldon, M. K. (1995). Creativity and self-determination in personality. *Creativity
Research Journal*, 8 (1), 25-36

Sperry, R. (1974). Lateral specialization in the surgically separated hemispheres
(Ed.). Cambridge: MIT Press.

Sung, S, Y., & Choi, J, N. (2009). Do big five personality factors affect individual
creativity? The moderating role of extrinsic motivation. *Social Behavior
and Personality,* 37 (7), 941-956. Doi 10.2224/sbp.2009.37.7.941.

Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking-Norms-
Technical Manual Research Edition-Verbal Tests, Forms A and B-Figural
Tests, Forms A and B*. Princeton, NJ: Personnel Press.

Torrance, E. P. (1974). *The Torrance Tests of Creative Thinking-Norms-
Technical Manual Research Edition-Verbal Tests, Forms A and B- Figural
Tests, Forms A and B.* Princeton, NJ: Personnel Press.

Torrance, E. P., & Ball, O. E. (1984). *The Torrance Tests of Creative Thinking
Streamlined (revised) manual, Figural A and B.* Bensenville, IL: Scholastic
Testing Service, Inc.

160

Torrance, E. P., & Ball, O. E. (1992, 2008). *The Torrance Tests of Creative Thinking Streamlined (revised) manual, Figural A and B.* Bensenville, IL: Scholastic Testing Service, Inc.

Torrance, E. P., Taggart, B., & Taggart, W. (1984). *Human information processing survey*, Bensenville, IL: Scholastic Testing Service.

Walker, L., & Avant, K. (2005). Concept analysis: Strategies for theory construction in nursing, 37-82.

Watson, D., Clark, L. A., & Harkness, A. R. (1994).Structures of personality and their relevance to psychopathology. *Journal of Abnormal Psychology, 103* (1), 18-31. Doi:10.1037/0021-843X.103.1.18.

Watson, S. A. & Thompson, C. (2001). Learning styles of interior design students as assessed by the Gregorc Style Delineator. *Journal of Interior Design*, *27*(1), 12-19.

Weisberg, R. W. (1999). Creativity and Knowledge: A Challenge to Theories. *Handbook of Creativity*, 226.

Whiteside, S. P., Lynam, D. R. (2001). The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*, (30), 669-89.

Whitman, R, D., Holcomb, E., & Zanes, J. (2010). Hemispheric collaboration in creative subjects: Cross-hemisphere priming in a lexical decision task. *Creativity Research Journal,* 22 (2), 109-118.

Witkins, H, A., Oltman, P. K., Raskin, E., & Karp, S. A, (1971). *A manual for the Embedded Figures Tests.* Palo Alto, California: Consulting Psychologists Press.

Zhang, L., & Sternberg, R. J. (2011). Revisiting the Investment Theory of Creativity. *Creativity Research Journal,* 23 (3), 229-238.

Appendix A - Cover Letter for the Consent Form for University of Minnesota, Twin Cities

Dear student,

My name is Aditi Hirani; I am a PhD. student at the University of Minnesota. You are invited to be in a research study about creativity, personality styles, cognitive styles, and motivational orientation. You were selected as a participant because you are currently a student in the Department of Design, Housing, and Apparel / Department of Apparel, Design, and Hospitality Management during the fall semester. If you agree to be a part of this study, we would ask you to do the following:

1. Complete a short biographical questionnaire

2. Complete four questionnaires, one each about your cognitive style, personality style, creativity, and motivational orientation. Each questionnaire will take approximately 30 - 40 minutes to complete

This study does not have any risks or benefits to you. Your participation in the study is voluntary and you can withdraw at any time. The records of this study will be kept private. There will be no identifying markers that will identify you from your scores. In the event of a publication, we will not include any information that will make it possible to identify you. All research records will be kept in a locked file, only the researchers will have access to these records.

Your decision to participate will not affect your current or future relations with the University of Minnesota. If you decide to be a part of the study you are

free to withdraw at any time without affecting those relationships. If you chose not to participate, you may leave, or complete the questionnaire but not turn it in to the researchers, or continue to work on other course work.

If you have questions now, please ask them. If you have questions later, you may contact me at hira0043@umn.edu or my advisor, Dr. Stephanie Zollinger at szolling@umn.edu.

Thank you very much for helping us with our research.

Aditi Hirani   Stephanie Zollinger, Ed.D
Graduate Student   Associate Professor and
                                                                Advisor

Appendix B - Cover Letter for the Consent Form for University of Missouri, Columbia

Dear student,

My name is Aditi Hirani; I am a PhD. student at the University of Minnesota. You are invited to be in a research study about creativity, personality styles, cognitive styles, and motivational orientation. You were selected as a participant because you are currently a student in the College of Architectural studies during the fall semester. If you agree to be a part of this study, we would ask you to do the following:

1. Complete a short biographical questionnaire

2. Complete four questionnaires, one each about your cognitive style, personality style, creativity, and motivational orientation. Each questionnaire will take approximately 30 - 40 minutes to complete

This study does not have any risks or benefits to you. Your participation in the study is voluntary and you can withdraw at any time. The records of this study will be kept private. There will be no identifying markers that will identify you from your scores. In the event of a publication, we will not include any information that will make it possible to identify you. All research records will be kept in a locked file, only the researchers will have access to these records.

Your decision to participate will not affect your current or future relations with the University of Missouri, Columbia. If you decide to be a part of the study, you are free to withdraw at any time without affecting those relationships. If you

chose not to participate, you may leave, or complete the questionnaire but not turn it in to the researchers, or continue to work on other course work.

If you have questions now, please ask them. If you have questions later, you may contact me at hira0043@umn.edu, or Emili Carlson ejcxb2@mail.mizzou.edu the co-investigator, or my advisor, Dr. Stephanie Zollinger at szolling@umn.edu.

Thank you very much for helping us with our research,

Aditi Hirani   Emili Carlson   Dr. Stephanie Zollinger, Ed.D
Graduate Student   Graduate Student   Associate Professor and
(Principal investigator)   (Co-investigator)   Advisor

Appendix C - Cover Letter for the Consent Form for North Dakota State University

Dear student,

My name is Aditi Hirani; I am a PhD. student at the University of Minnesota. You are invited to be in a research study about creativity, personality styles, cognitive styles, and motivational orientation. You were selected as a participant because you are currently a student in the Department of Apparel, Design, and Hospitality Management during the fall semester. If you agree to be a part of this study, we would ask you to do the following:

1. Complete a short biographical questionnaire

2. Complete four questionnaires, one each about your cognitive style, personality style, creativity, and motivational orientation. Each questionnaire will take approximately 30 - 40 minutes to complete

This study does not have any risks or benefits to you. Your participation in the study is voluntary and you can withdraw at any time. The records of this study will be kept private. There will be no identifying markers that will identify you from your scores. In the event of a publication, we will not include any information that will make it possible to identify you. All research records will be kept in a locked file, only the researchers will have access to these records.

Your decision to participate will not affect your current or future relations with the North Dakota State University. If you decide to be a part of the study, you are free to withdraw at any time without affecting those relationships. If you

chose not to participate, you may leave, or complete the questionnaire but not turn it in to the researchers, or continue to work on other course work.

If you have questions now, please ask them. If you have questions later, you may contact me at hira0043@umn.edu, or Dr. Susan Ray-Deggessusan.ray-degges@ndsu.edu the co-investigator, or my advisor, Dr. Stephanie Zollinger at szolling@umn.edu.

Thank you very much for helping us with our research.

Aditi Hirani   Dr. Susan Ray-Degges   Dr. Stephanie Zollinger, Ed.D
Graduate Student   Program Co-ordinator   Associate Professor and
(Principal investigator) (Co-investigator)   Advisor

Appendix D – Instruction to the Participants

Instructions for the WKOPAY

Thank you for participating in the study. You will be asked to complete a questionnaire today that will identify your personality style. Listed below are a number of statements concerning personal attitudes and traits. Read each item and select the one from either A or B that is most like you. It is best to go with your first judgment and not spend too long mulling over any one question. The questionnaire will take approximately 30 minutes to complete. Please let me know if you have any questions.

Instructions for the WPI

Thank you for participating in the study. You will be asked to complete a questionnaire today that will identify your motivational orientation. Listed below are a number of statements concerning personal attitudes and traits. Read each item and select one option from "never o almost never true" to "always or almost always true". It is best to go with your first judgment and not spend too long mulling over any one question. The questionnaire will take approximately 30 minutes to complete. Please let me know if you have any questions.

Instruction for the HIPS

Thank you for participating in the study. You will be asked to complete a questionnaire today that will identify your cognitive style. Listed below are a number of statements concerning personal attitudes and traits. Read each item and select one option from "never o almost never true" to "always or almost always true". It is best to go with your first judgment and not spend too long mulling over any one question. The questionnaire will take approximately40 minutes to complete. Please let me know if you have any questions.

The TTCT manual provides specific instructions for the instrument. The researcher will follow the same.

Appendix E – Work Preference Inventory

	Items	Never or almost never true	Sometimes true	Often true	Always or almost always true
1.	I am not that concerned about what other people think of my work.				
2.	I prefer having someone set clear goals for me in my work.				
3.	The more difficult the problem, the more I enjoy trying to solve it.				
4.	I am keenly aware of the goals I have for getting good grades.				
5.	I want my work to provide me with opportunities for increasing my knowledge and skills.				
6.	To me, success means doing better than other people.				
7.	I prefer to figure things out for myself.				
8.	No matter what the outcome of a project, I am satisfied if I feel I gained a new experience.				
9.	I enjoy relatively simple, straightforward tasks.				
10.	I am keenly aware of the GPA (grade point average) goals I have for myself.				
11.	Curiosity is the driving force behind much of what I do.				
12.	I'm less concerned with what work I do than what I get for it.				

13.	I enjoy tackling problems that are completely new to me.				
14.	I prefer work I know I can do well over work that stretches my abilities.				
15.	I'm concerned about how other people are going to react to my ideas.				
16.	I seldom think about grades and awards.				
17.	I'm more comfortable when I can set my own goals				
18.	I believe that there is no point in doing a good job if nobody else knows about it.				
19.	I am strongly motivated by the grades I can earn.				
20.	It is important for me to be able to do what I most enjoy.				
21.	I prefer working on projects with clearly specified procedures.				
22.	As long as I can do what I enjoy, I'm not that concerned about exactly [what grades or awards I can earn.] [What I'm paid.]				
23.	I enjoy doing work that is so absorbing that I forget about everything else.				
24.	I am strongly motivated by the recognition I can earn from other people.				
25.	I have to feel that I'm learning something for what I do.				
26.	I enjoy trying to solve complex problems.				

27.	It is important for me to have an outlet for self expression. I feel I gained a new experience.				
28.	I want to find out how good I really can be at my work.				
29.	I want other people to find out how good I really can be at my work.				
30.	What matters most to me is enjoying what I do.				