THE RELATIONSHIP BETWEEN CREATIVITY, IMAGERY, AND PERSONALITY TYPES IN INTERIOR DESIGN STUDENTS

BY

JEANNE L. DIEHL

Bachelor of Science
Oklahoma State University
Stillwater, Oklahoma
1982

Master of Science
Oklahoma State University
Stillwater, Oklahoma
1984

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THE RELATIONSHIP BETWEEN

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IN INTERIOR DESIGN STUDENTS

Thesis Approved:

Margaret F. Weber

Thesis Adviser

Elaine Jorgensen

Cheryl Farr-Popelka

Thomas C. Collins

Dean of the Graduate College

PREFACE

This research assessed the relationship between creativity level, imagery vividness, and personality types in Interior Design students. The data collected, analyzed, and reported in this study adds valuable information to the knowledge base for Interior Design Educators.

The format of this dissertation deviates from the prescribed thesis format at Oklahoma State University. This deviation was considered to create manuscripts suitable for publication as well as to meet the requirements of the traditional thesis. Chapters I, II, and III use the Publication Manual of the American Psychological Association along with the Oklahoma State University thesis style. Chapter IV and V also follow the Publication Manual of the American Psychological Association as necessary for publication in the Creativity Research Journal, and The Journal of Interior Design Education and Research respectively.

I wish to express my sincere appreciation to the members of my doctoral committee. Special thanks to Dr. Margaret Weber, my major advisor, for providing me proper guidance, opportunities, encouragement, and advice throughout my graduate program. I am also thankful to the other committee members; Dr. Kay Bull, Dr. Elaine Jorgenson, and Dr. Cheryl Farr-Popelka for their suggestions and support throughout the study. I feel extremely fortunate to have

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CHAPTER I

INTRODUCTION

It is the author's contention that creativity, imagery, and personality type merit investigation in regards to interior design education. Creativity and imagery are major components of the design process. These components as well as personality type influence the approach one uses in interior design practice and education, which in turn affect the outcome of each project. As an interior design educator, one must understand these three factors and integrate that knowledge into teaching the design process.

In order to better understand the process of interior design let us first define what an interior designer does. The 1990 bylaws of the American Society of Interior Designers (ASID) defines an interior designer with the following statement.

> Interior designer shall mean an individual qualified by education, experience, and examination to enhance the function and quality of interior spaces. For the purpose of improving the quality of life, increasing productivity, and protecting the health, safety and welfare of the public, the professional interior designer:
>
> * analyzes the client's needs, goals, and life and safety requirements;
> * integrates findings with knowledge of interior

design;

* formulates preliminary design concepts that are appropriate, functional, and aesthetic;
* develops and presents final design recommendations through appropriate presentation media;
* prepares working drawings and specifications for non-load bearing interior construction; materials, finishes, space planning, furnishings, fixtures and equipment;
* collaborates with professional services of other licensed practitioners in the technical areas of mechanical, electrical, and load-bearing design as required for regulatory approval;
* prepares and administers bids and contract documents as the client's agent;
* reviews and evaluates design solutions during implementation and upon completion.

As one can see, an interior designer must be well versed in the design process, creative problem solving, and critical thinking skills in order to achieve completion of any design project. In order for students to learn these skills, educators must understand the implications of personality type, creativity, and imagery.

Creativity is a focus area of interior design education. Design educators are interested in both the creative process and the creative product. The Foundation for Interior Design Education Research (FIDER) emphasizes the development of creative designers that use innovative and creative approaches to design problem

solving (Standards, 1980, p. 6).

The importance of creativity in interior design is further emphasized by Dohr's statement. "Interior design educators and practitioners expect design programs to provide opportunities for students to develop their creativeness. For example, FIDER accreditation teams use creativity as one measure to evaluate higher education programs" (Dohr, 1982, p. 24). The fact that FIDER emphasizes creativity as a major focus of education implies the importance of this trait. However, very little research exists in the area of creativity and interior design.

Sawyers and Canestaro (1989) looked at creativity and achievement in design coursework. They found that "ideational fluency is a valid predictor of student achievement in an interior design course" (p. 126). Their study links one factor of creativity as being important in the interior design process.

Past research indicates little evidence that creativity is linked with a particular college major. However, many people believe creativity levels may be a predictor of career choice. Gardner and Weber (1990) found that interior design majors scored significantly higher in creativity than non-interior design majors.

Though few research endeavors in this area exist, the few cited demonstrate that creativity is a desirable focus area for interior design education. Therefore, this research study is an important contribution to providing further information about creativity in interior design students.

In addition to creativity, imagery is also noted as an important skill in disciplines such as interior design. Though there are many

modalities of imagery, visual imagery will be the primary focus for this investigation. Designers must be capable of visualizing space in new and different ways. Imagery used as a perceptual tool is a skill that can benefit the designer in solving both functional and aesthetic problems. Without this skill, visualization of a space is impossible.

Sommer (1978) had a firm conviction that imagery, "the ability to picture the outcome in the minds' eye", is an indispensable trait for designers (p. 195). McKim (1980) agrees with Sommer and states, "visual thinking is obviously central to the practice of architecture, design, and the visual arts" (p. 9).

Kosslyn (1980) discusses the spatial properties of imagery and how it can be used to approach any spatial problem. He uses rearranging furniture, thinking about possible routes, and trying a new design idea as examples of using imagery to solve spatial problems.

Kaufmann (1985) cites imagery as being an important cognitive operation in chess playing. Chess playing can be thought of as having similarities to space planning. In space planning a designer manipulates space adjacencies and analyzes the overall impact on the space.

Kuzendorf (1982) posits that those that are better producers of visual images will be better comprehenders and creators of visually aesthetic stimuli. Kuzendorf also states, ". . . . visual imaging abilities are correlated not only with visual perceiving abilities, but also with aesthetic perceiving abilities" (p. 186).

Downing (1987) explored the way architectural designers use

place imagery to facilitate idea generation and to sustain ideas during the design process. Downing believes that imagery allows designers to bridge time by utilizing past experience to understand present and future situations. Pickard (1990) also believes that fantasy and imagination "enable one to leave the immediate and provides a bridge between what is known and what might be" (p. 5).

Goldschmidt (1991) identified the generation of architectural form as a creative activity. The fast, free-hand sketching that takes place when a designer first tackles a design task was the primary focus of her research. She found that visual imagery is an inherent part of this design reasoning phase of the design process.

Cohen and Saslona (1990) discuss the fact that many individuals that score high on visual imagery vividness do not necessarily do well when applying it to functional tasks. They believe this is due to visual memory performance. They hypothesized and confirmed that some people tend to have a habitual tendency toward employing visual imagery in daily life. It is possible that these "habitual visual imagers" are drawn to fields of study such as interior design, art, and architecture. Downing (1987) and Goldschmidt (1991) certainly found imagery to be secondary in nature to those designers they observed. Architecture and interior design have many similarities. Downing and Goldschmidt's research applies to the problem solving process in interior design.

Sommer (1978), McKim (1980), Kosslyn (1980), Kuzendorf (1982), Goldschmidt (1991), and Downing (1987) all recognize imagery as a useful skill in the design field. Since creativity and imagery are important traits in disciplines such as interior design

there is a need to research aspects of both. If indeed, there is a relationship between creativity and imagery, it is a definite benefit to the design profession to examine such relationships, so that the educational system can better train and teach individuals to be successful in the design process. Imagery and other domain relevant skills need to be developed within the curriculum of any interior design program. In order to develop curriculum appropriately one must understand process and the skills that are necessary for the practice of interior design.

In addition to the attributes of creativity and imagery a third variable must be considered. The variable of personality type is inherent in the way one see's the world, draws his or her inspiration, approaches a problem, and solves the problem. Jung's (1921) theory of psychological types delves into the way people take in information (perception) and make decisions (judgement). His model was used by Isabel Briggs Myers and Katharine Cook Briggs to develop the Myers-Briggs Type Indicator (MBTI) which was published in 1962 by Educational Testing Service. This model and instrument allow educators to gather information about the way students approach and solve problems.

Jung's (1921) theory and the MBTI do not deal specifically with creativity. However, much research has been conducted on the personalities of highly creative people. Manis (1966), Rogers (1970), Shouksmith (1970), Prentky (1980), and Klausmeier (1985) all identify personality traits of creative individuals. These traits will be discussed in the literature review.

If educators gain an understanding of different personality

types and their learning styles they will become better teachers and advisers. Since creativity, imagery and personality type appear to be interrelated and all impact on the design process interior design educators can gain through a more comprehensive understanding of these variables.

Justification

Creativity being a desired attribute of interior design students and imagery being a skill associated with creativity lend relevance to this topic of research. The fact that personality type has long been associated with creativity provides a link between the three variables to be studied. The introduction demonstrates interest in creativity, imagery, and personality type as they relate to interior design.

A justification for this study can be made from the following quote: "Relatively little research has been done on imagery, especially as it relates to the creative imagination" (Khatena, 1978, p. 37). Lindauer also believed that . . . "Research on imagery would benefit from the inclusion of subjects, materials, and observations related to the arts" (1983, p. 470). Lindauer and Khatena as well as others such as Goldschmidt (1991) and Downing (1987) recognized the importance of research in this area.

There has been virtually no research looking at the relationship between creativity, imagery and personality type in interior design. Though some research has been done in related fields, it is difficult to make assumptions as to how they apply specifically to interior design.

Purpose and Objectives

The purpose of this study is to assess the relationship between creativity level, imagery vividness, and personality types in Interior Design students. Specifically the objectives include:

1. To assess creativity level, imagery vividness, and personality type in interior design students.
2. To analyze the relationship between demographic information and personality type, imagery vividness, and creativity level.
3. To analyze the relationships between creativity level, imagery vividness, and personality type in interior design students.
    a. To compare similarities between creativity level and imagery vividness.
    b. To compare the differences in creativity level by personality type.
    c. To compare the differences in imagery level by personality type.
4. To analyze the personality types found in interior design students.
5. To analyze the subscales in the creativity and imagery data.
6. To discuss implications and make recommendations for interior design studio instruction based on the findings of this study.

Definitions

The following theoretical definitions help to clarify some terms used in this research:

Creativity - The ability of an individual or group to solve a problem in a way that provides the maximum opportunity to develop an original, vibrant solution within the boundaries of physical restraint.

Imagery - "An image is a sensation of form, color, sound, smell, movement or taste which is fixed in the immediate present and gives substance to past experience and future possibilities" (Downing, 1987, p. 61).

Eidetic Imagery - describes the type of imagery that resembles percepts and are usually under the control of the imager.

The following operational definitions are used in this project:

Visual Imagery - refers to the image that is a sensation that comes to the mind's eye.

Auditory Imagery - refers to the image that is a sensation that comes to the mind's ear.

Tactile Imagery - refers to the image that is a sensation that comes to the mind's touch.

Kinesthetic Imagery - refers to the image that is a sensation that comes to the mind's arms, legs, lips, etc. when thinking of performing a particular act or movement.

Gustatory Imagery - refers to the image that is a sensation that comes to the mind's taste.

Olfactory Imagery - refers to the image that is a sensation

that comes to the mind's smell.

Organic Imagery - refers to the sensations that come to the mind when thinking about organic factors such as pain, hunger or fatigue.

The following eight operational definitions apply to the attitudes and mental powers used in the Myers-Briggs Type Indicator and defined by McCaulley (1990, p. 183).

Extraversion Attitude (E) - refers to a person that seeks engagement with the environment and gives weight to events in the world around them.

Introversion Attitude (I) - refers to a person that seeks engagement with their inner world and gives weight to concepts and ideas to understand events.

Sensing Perception (S) - these people are interested in what is real, immediate, practical, and observable by the senses.

Intuitive Perception (N) - these people are interested in future possibilities, implicit meanings, and symbolic or theoretical patterns suggested by insight.

Thinking Judgment (T) - thinking persons rationally decide through a process of logical analysis of causes and effects.

Feeling Judgment (F) - These people rationally decide by weighing the relative importance or value of competing alternatives.

Judgment (J) - a judging person enjoys moving quickly toward decisions and enjoys organizing, planning, and structuring.

Perception (P) - this type of person enjoys being curious and open to changes, preferring to keep options open in case something better turns up.

Assumptions

"Assumptions are statements of what the researcher believes to be facts, but cannot verify" (Best, 1981, p.40). The following assumptions are included in the study:

1. The respondents understood and answered the questionnaire accurately.
2. The respondents were not influenced by extraneous variables.
3. The sample is truly representative of the population of interior design students.

Limitations

"Limitations are those conditions beyond the control of the researcher that may place restrictions on the conclusions of the study and their application to other situations" (Best, 1981, p. 40). The limitation affecting this study was: the sample is non-representative.

Delimitations

"Delimitations are the boundaries beyond which the study is not concerned" (Best, 1981, p. 40). The delimitation of this study was: the findings of this study only provide information about interior design students. Generalizations to other related fields such as architecture cannot be made. Generalizations to interior design professionals cannot be made, since the sample/population only consists of interior design students.

Summary

Interior designers are faced with many problem solving challenges each day in practice. A professional interior designer is expected to produce creative, functional, and aesthetic designs within the client's parameters, as well as within the architectural limitations. Because creativity is deemed an important trait to possess, interior design educators must work toward inducing creative process and creative output, as well as provide the theoretical knowledge necessary to become a successful designer. Imagery has been seen as a link to creativity, therefore imagery is also of interest. Certain personality types have been related to creativity. These three variables add important research knowledge needed in interior design education. The assessment of the relationship between creativity, imagery vividness, and personality type will provide valuable information for interior design educators.

CHAPTER II

REVIEW OF LITERATURE

Introduction

This literature review attempts to give a broad overview of creativity, imagery, and personality. The author will introduce the history, definitions, theories and models of each variable as well as discuss the relationships between these variables. This review will build an understanding of these topics, and provide a basis for this particular research project.

Creativity

Psychologists, educators, and many others have shown interest in creativity for decades. According to Guilford (1970), the interest in creativity began to increase in the 1950's. During this time several research centers for creativity came into existence. Taylor (1970) discusses the beginning of two major developments in the study of creativity in 1955: (1) the Utah Creativity Research Conferences, and (2) the Creative Education Foundation Creative Problem-solving Institutes.

Education also had a great impact on the field of creativity. According to Guilford (1970), the Creative Education Foundation objectives began to influence educators. Educators began to teach

creativity and encourage the students creative talents. Before1950, the existence of courses in creative thinking were much more common in industry than in educational institutions.

The quantity of research in the area of creativity has increased steadily since 1950. Creativity research lacks in abundance in comparison to many other areas of psychology and the study of thinking, but diverse subject matter exists in the creativity research. Freeman, Butcher, and Christie (1968) classify creativity research in three main divisions, according to theoretical emphasis: (a) intelligence and abilities, the assessment of the creative individuals intelligence; (b) personality characteristics, the identification of the creative persons traits; and (c) education and training, the investigation of educational techniques conducive to the development of creative talent.

More recently research in creativity has been analyzed from four perspectives: (a) process, (b) product, (c) personality, and (d) press. Research in the area of process deals with styles of problem solving and the thought process one uses in any creative endeavor. Another area of research focuses on the identification of creative products. Personality has consistently been a subject studied in relationship to creativity. Certain personality traits are recognized as predictors of creative persons. Press refers to environmental forces. Research in the area of environment deals with characteristics of the environment which promote a creative atmosphere.

As one can see, a variety of areas exist in which researchable questions apply to the study of creativity. Some aspects of

creativity research are thoroughly investigated, however many areas remain sparsely researched.

Origins of Creativity:

Taylor (1976) discusses 13 theories about the origins of creativity. Six of these theories are vitalism, nativism, romanticism, the unconscious, culture, and serendipity; (a) vitalism views the origin of creativity as a divine inspiration, (b) nativism views creativity as a hereditary endowment, (c) romanticism views creativity as an unsolvable mystery, (d) the unconscious views creativity as stemming from the unconscious, (e) cultural theorists believe that culture is an essential force from which creative ability emerges, and (f) the theory of serendipity is the concept of the happy accident.

In the past many theorists viewed creativity as a divine force in which the individual has no control over their creative actions. They believed that one is either born with creative talent or without it. Others view creativity as a learned process. "Probably most investigators of creativity agree that creativity can be developed through learning in interaction between the person and his or her environment: that given the opportunities, creativity will emerge in some, and will not in those denied these opportunities" (Taylor, 1976, p. 196). Today most theorists believe that creativity can be developed and encouraged.

Definitions of Creativity

In order to give the reader a better understanding of

creativity, a review of definitions follows. Many individuals and groups conduct research on different dimensions of creativity. In turn, many definitions of creativity and the creative process exist.

In past years definitions of creativity made a transition from the creative process or person to the creative product. According to Amabile (1983), many of the earliest definitions of creativity dealt with the creative process. Such definitions assume that a creative product results from this process. Several researchers define creativity in terms of process and product, others define creativity in terms of the person.

Kaha, simply states, "I would define creativity as a process which results in innovation" (1983, p. 86). E. Paul Torrance defines creativity as, "the process of becoming sensitive to problems, deficiencies, gaps of 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" (1976, p. 217).

Frank Barron says, "Creativity may be defined quite simply, as the ability to bring something new into existence" (1976, p. 190). Barron defines creativity in terms of the product or a novel idea. Rogers (1970) defines creativity by looking at the process and the product. He states, "my definition, then, of the creative process is that it is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand and the materials, events, people, or circumstances of his life on the other" (p. 139). Rogers also incorporates the person into his

definition.

Parnes defines creativity in terms of behavior. "Creative behavior is (a) a response, or responses, or pattern of responses which operate upon, (b) internal and/or external discriminating stimuli, usually called things, works, symbols, etc., and they result in at least one unique combination that reinforces the response or pattern of responses. In general, such creative behavior may be classified as discriminative, manipulative, and evaluative" (1966, pp. 193-194).

J.P. Guilford (1950), defines creativity in terms of the person. "In its narrow sense, creativity refers to the abilities that are most characteristic of creative people. . . Creative personality is then a matter of those patterns or traits that are characteristic of creative persons" (p. 444).

The variety of definitions acknowledged, demonstrate the quantity of meanings related to creativity. The fact that creativity does not have one concise definition leads to many different views about creativity.

Creative Process Theory

Much of the creativity research emphasizes the process of developing a creative product. Gowan (1967) discussed Simon's hypothesis that viewed the creative processes a person uses during creative thinking, as being indistinguishable from ordinary problem-solving processes, and that the only distinguishing factor between the ordinary and the creative thinker, is the distinctiveness of the product. Though some theorists believe that creative thinking and

ordinary thought process do not differ, there are many valid theories of creative thought process.

Several theorists view the creative thought process as occurring in stages. "In his famous paradigm of creative process, Graham Wallas (1926) identified four components: preparation, incubation, illumination, verification. By incubation, he meant any technique of relaxation of the conscious cognition (left cerebral hemisphere function), such as, but not confined to dreams, daydreams, fantasy, hypnosis, meditation, diversion, play, etc., which allows subliminal processes (right hemisphere functions) to operate. He saw preparation (academic discipline) as the necessary, and incubation (relaxation), as the sufficient condition for creative insights to emerge" (Gowan, 1979, p. 39). It is important to point out that most people do not process with one hemisphere function but with a mix of each. Freeman (1968) cites Patrick's four stages and defines the stages as follows: (a) preparation, the individual familiarizes himself with the problem situation; (b) incubation, this stage analyzes the problem; (c) illumination, the individual sets a specific goal and begins to work toward it; and (d) verification, this stage analyzes the results of the problem.

Gagné (1985), theorizes that problem solving can apply to the study of creativity. She equates problem-solving with productive thinking. Problem-solving involves a stimulus situation and the establishment of a goal. She summarizes a number of phases in problem-solving: (a) reception of stimulus situation, (b) concept invention or concept formation, (c) central phase - determining the course of action, (d) decision making - when two or more courses of

action are available, and (e) verification - the final phase where feedback is necessary.

Brilhart and Jockem (1964), also define problem-solving in terms of stages. They identify problem-solving in five parts: "a. defining and analyzing the problem; b. establishing criteria for judging proposals; c. finding possible solutions (or generating proposals); d. evaluating proposals; and e. planning how to put proposals into effect" (Shouksmith, 1970, p. 81).

Perhaps one of the most involved theories of the process is that of Amabile (1983), who identifies three major components needed for creative performance: domain-relevant skills, creativity-relevant skills, and task motivation. The basic skills needed for any performance are the domain-relevant skills. Creativity-relevant skills deal with the cognitive style. Task motivation includes variables that determine an individuals approach to a given task. Amabile's framework of the creative process has five stages: (a) problem or task presentation, (b) preparation, (c) response generation, (d) response validation, and (e) outcome. She implies that the three components of creative performance influence the phases of the framework, which in turn influence the final outcome to the problem.

Parnes, Noller, and Biondi (1977) look at the creative process in terms of emotion rather than in terms of stages. They relate the creative processes in terms of sensitivity, synergy, and serendipity. Sensitivity involves the awareness of the problem situation. Synergy refers to the behavior of integral aggregate systems. Serendipity refers to the occurrence of accidental happenings.

In the study of creativity many people view it as a process such as problem-solving or creative thinking. This section acknowledges a few of the concepts that relate to creativity as a process. This subject is popular due to the fact that people want to know how to induce creativity. Processes such as brainstorming (Osborn, 1957) and lateral thinking (de Bono, 1970) are widespread due to societal pressure to be creative and productive.

Creative process is of primary concern in the instruction of the design process. Factors such as personality and imagery ability impact on the approach one takes in this process.

Creativity Tests & Measures

Over the years many instruments have been developed to assess creativity. The primary researchers in this area were: (a) Chassell (1916), one of the first researchers to develop a test for originality; (b) Guilford (1959), who developed tests for many of the intellectual domains of divergent production; (c) Torrance (1966), who developed the "Torrance Test of Creative Thinking" which measures both verbal and figural creativity; (d) Mednick (1967), who developed the "Remote Association Test (RAT)" which measures the ability to think creativity on associative interpretations; (e) Welsh (1959), who developed the "Welsh Figure Preference Test" which is a nonverbal measure of creative potential; and (f) Gough and Heibrum (1965), who developed the "Adjective Check List" which lists adjectives of self-descriptions and assesses creativity in regards to personality traits.

More recently, several tests and measures of creativity have

been developed: (a) "Thinking Creatively with Sounds and Words" by Torrance, Khatena, & Cunnington (1973), (b) "The How do You Think Test" by Davis and Subkoviak (1975), (c) "The Preference Inventory (PI)" by Bull (1978), (d) "The Creativity Assessment Packet" by Williams (1980), and (e) "The Statement of Past Creative Activities" by Bull & Davis (1980).

For the purposes of this study the Preference Inventory (PI) by Bull (1978) will be used to assess creativity. The PI was developed to appraise adult creativity and measures seven factors: (a) desire for creative production, (b) visualization before creation, (c) curiosity about things, (d) multidimensional originality, (e) mental visualization, (f) desire for fantasy/daydreaming, and (g) curiosity about art. This particular creativity instrument was selected because three of the factors deal with internal sensation seeking, which is closely related with imagery.

Design Process

For the purposes of this research, two theories of design process will be discussed to demonstrate the importance and parallels between creativity/creative process and the design process. These theories of design process were selected for review because they deal specifically with the architectural design process, which closely parallels interior design.

Zeisel's (1975) theory of design process involves five stages: (a) programming, (b) design, (c) construction, (d) use reality testing, and (e) diagnostic evaluation. Programming involves establishing goals, collecting and analyzing facts, determining needs, and stating

a problem. This stage is when the analysis takes place. During the design stage the generation of design concepts, as well as coming to closure on these concepts takes place. Upon completion of the design phase the actual construction of the project begins. During and after construction use-reality testing and diagnostic evaluation review take place.

Zeisel also discusses the thought process one goes through during the design process. His model is a spiraling effect beginning with the broad concept, eventually narrowing down to the closure of one's ideas.

The other theory to be discussed is closely related to Zeisel's model, however it differs in some aspects. Peña (1987) developed a model of design process with five stages: (a) programming/problem solving, (b) schematic design, (c) design development, (d) construction documents, and (e) construction. The first stage, programming/problem solving is virtually the same as Zeisel's. However, on the synthesis stage or design stage Peña further delineates the process. He identifies schematic design and design development. Schematic design encompasses the development of major concepts and needs, both aesthetic and spatial requirements. Design development is the detailed development of schematic design. The synthesis stage of the design process goes from the abstract to the essence. Once design development is complete the production of construction documents takes place. During production of construction documents minor changes may occur due to technical problems. Upon completion of construction documents the actual construction occurs. See Figure 1 for a graphic illustration of the

two theories.

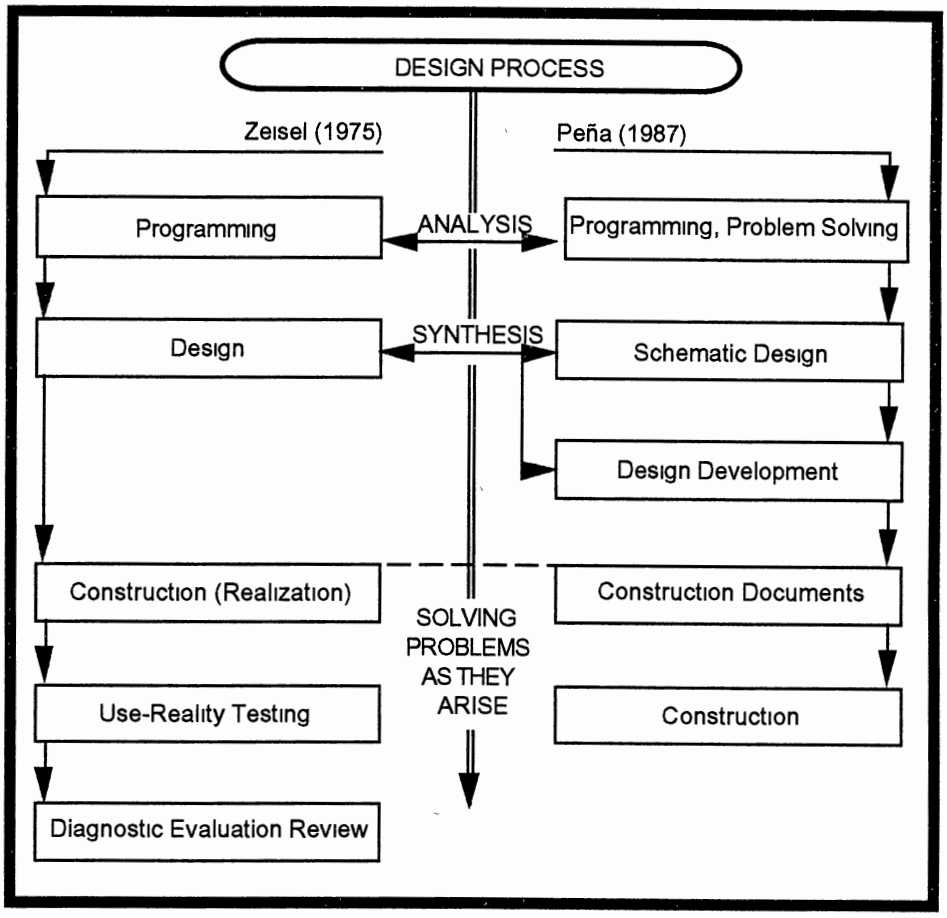

Figure 1. Design Process

Peña's model may more closely represent what takes place during actual practice. However, one must not neglect to evaluate a project once construction is complete.

During the design or synthesis stages of the design process creativity, imagery and personality type are perceived to be important. There are many parallels between creative process/

problem solving and the design process. It is important to recognize these parallels when teaching the design process, particularly when creativity is deemed an important factor within the design curriculum.

Personality, Intelligence, and Styles of Thinking

Personality, intelligence, and individual styles of thinking have been cited as having an impact on creativity. The following discussion will cover theories and styles of thinking and their relationship to creativity. In addition to individual styles of thinking, personality traits have been identified in creative people. These traits will also be discussed.

Philosophies of Thinking

In order to understand creativity and creative thinking, one must determine how individuals think and solve problems. Two prominent philosophies of the psychology of thinking identified by Mayer (1983) are the Associationist and the Gestalt. According to the associationist view, thinking can be described as the trial and error application of the pre-existing, response tendencies we call habits. This view assumes that for any problem situation, there are associations or links to many possible responses.

The associationists relate thinking to creative thinking, because one must be able to solve problems through association in order to think creatively. Many theorists believe that the more

associations one encounters when solving a problem, the greater the probability of solving that problem creatively. Mednick (1976) discusses three ways of achieving a creative solution, in terms of the associative theory. First, the environmental stimuli elicits associative elements that in turn stimulate a creative solution (usually by accident). Second, the similarity of stimuli can also elicit associative elements. Third, the mediation of common elements may evoke associative elements. Mednick further links creativity to the associationists theory through his definition of creativity. "He defines creativity as involving the formation of associations between stimuli and responses which are characterized by the fact that the elements linked together are not normally associated" (Cropley, 1970, p. 117).

The Gestalt psychologists view thinking and problem solving in a different way than the associationists. The Gestalt theory also has interesting implications for the study of creativity. "According to Gestalt psychologists, the process of problem solving is a search to relate one aspect of a problem situation to another, and it results in structural understanding - the ability to comprehend how all the parts of the problem fit together to satisfy the requirements of the goal. This involves reorganizing the elements of the problem situation in a new way so that they solve the problem" (Mayer, 1983, pp. 35-36).

There are two kinds of thinking identified in the Gestalt theory; productive thinking and reproductive thinking. Productive thinking refers to creating a new solution to a problem. Where as, reproductive thinking simply applies a past solution to the problem

at hand.

The reorganization of elements has implications for creative thinking and problem-solving, because one must reorganize the elements of a problem in order to create something unique. "Creative productions often seem to result from a novel combination of elements previously not connected" (Manis, 1966, p. 112). If creativity relies on creating something novel, then only productive thinking has possibilities for a creative outcome. Reproductive thinking has possibilities for creative sources of thinking. Both of these philosophies provide a basis for discussion on the different styles of thinking.

Intelligence, Styles of Thinking, and Personality

Both the Gestalt and Associationist philosophy assume some level of intelligence for the process to take place. Much controversy exists in the area of intelligence versus creativity. Some researchers are of the opinion that in order to be creative, an individual must be intelligent. Others believe that the process of creativity is separate and apart from intelligence. "Although researchers have found moderately positive correlations between divergent thinking and IQ, these correlations are not high enough to justify using only intelligence tests to identify students high in creativity" (Klausmeier, 1985, p. 336). Most researchers believe that some degree of intelligence must exist in order to solve a problem creatively or to produce a creative product. However, as IQ raises above 120, creativity level does not increase.

Perhaps Guilford remains one of the most influential

researchers in the area of creativity and intelligence. Guilford's interest lies in the cognitive and intellectual features of creativity. "Guilford (1967) as well as other researchers identify fluency, flexibility, and originality as three major components of creativity" (Domino, 1980, p. 209).

Guilford's mission was to define intelligence, during this process he identified primary cognitive traits related to creativity. He identifies fluency of thinking, flexibility of thinking, originality, redefinition and elaboration as primary traits. Fluency of thinking incorporates word fluency, and ideational fluency. These all deal with the ability to generate words, sentences, and ideas. Flexibility of thinking incorporates spontaneous and adaptive flexibility. These deal with unique outcomes. Originality refers to the ability to produce clever responses. Redefinition refers to the ability to reconceptualize a familiar interpretation and apply it to the current problem. Finally, elaboration refers to the ability to expand upon previous ideas.

Guilford identified three thinking interest factors related to creativity. These three factors are: "tolerance of ambiguity (willingness to accept uncertainty and avoidance of rigidity), convergent thinking (thinking through to one correct answer), and divergent thinking (a search that uncovers several answers)" (Prentky, 1980, p. 43). Some researchers believe that both divergent and convergent thinking are necessary for creativity to exist. Though both divergent and convergent thinking might be necessary, most researchers agree that divergent thinking solves a problem creatively.

Wakefield (1989) studied the relationships between creativity as a personality construct and a set of cognitive skills. He found that convergent thinkers tend to choose coursework in the physical sciences or the classics, and that divergent thinkers tend to choose coursework in biology or the arts. "Besides divergent thinking, other cognitive skills such as problem finding may be related to the artistic personality and to actual creative thought" (p. 52).

Individual styles of thinking and the approach one takes in solving a problem are dependent on ones personality. Jung (1921) developed a theory of psychological types. Jung believes that people differ in the ways they take in information (perception) and the ways they make decisions (judgment). His model describes four mental powers and four attitudes. The four mental powers are: (a) sensing, (b) intuition, (c) thinking, and (d) feeling. The four attitudes are: (a) extraversion, (b) introversion, (c) judgment, and (d) perception.

There are two kinds of perception: sensing and intuitive. A sensing person focuses on immediate experiences and what exists. On the other hand, an intuitive person refers to the perception of possibilities. Intuitive perception is more closely related to creative discovery, where as sensing perception is related to practicality and realism.

In Jung's model there are also two types of judgement: thinking and feeling. A thinking person makes logical decisions, where as a feeling person bases their decisions on a more subjective aspect of personal and group values. Literature suggests that a feeling person would have more creative tendency's. Jung theorized

that people could possess aspects of all traits but would have strong tendencies in one direction for each of the four variables. For example a person might be an introvert who is an intuitive and thinking person. These traits will identify how, in most cases, that person approaches problems, interacts with people, and makes decisions. Jung's theory of psychological types provides an in depth theory in personality and thinking styles.

Jung's model was used as the theoretical base for the Myers-Briggs Type Indicator (MBTI). Isabel Briggs Myers and Katharine Cook Briggs developed the MBTI which classifies people into one of sixteen personality types. These sixteen types stem from a combination of the four mental powers and four attitudes discussed earlier. The instrument measures one's preference on four scales; (a) Extravert "E" or Introvert "I", (b) Sensing "S" or Intuitive "N", (c) Thinking "T" or Feeling "F", and (d) Judging "J" or Perceiving "P". The MBTI is "one of the most widely used tools for working with normal populations" (McCaulley, 1990).

McCaulley (1987) identified sixteen approaches to problem solving related to the MBTI types (Figure 2). The way one approaches a problem and makes decisions is strongly related to ones personality. The different theories of thinking styles discussed above demonstrate a link between thinking styles and personality traits.

ISTJ	ISFJ	INFJ	INTJ
Contemplation Step-by-step,linear Analyze logically Organize, seek closure	Contemplation Step-by-step,linear Weigh values Organize, seek closure	Contemplation Back and forth, Global Weigh values Organize, seek closure	Contemplation Back and forth Global Analyze logically Organize, seek closure
ISTP	**ISFP**	**INFP**	**INTP**
Contemplation Step-by-step,linear Analyze logically Discover, adapt	Contemplation Step-by-step,linear Weigh values Discover, adapt	Contemplation Back and forth, Global Weigh values Discover, adapt	Contemplation Back and forth, Global Analyze logically Discover, adapt
ESTP	**ESFP**	**ENFP**	**ENTP**
Talk and action Step-by-step,linear Analyze logically Discover, adapt	Talk and action Step-by-step,linear Weigh values Discover, adapt	Talk and action Back and forth, Global Weight values Discover, adapt	Talk and action Back and forth, Global Analyze logically Discover, adapt
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**
Talk and action Step-by-step,linear Analyze logically Organize, seek closure	Talk and action Step-by-step, linear Weigh values Organize, seek closure	Talk and action Back and forth, Global Weigh values Organize, seek closure	Talk and action Back and forth, Global Analyze logically Organize, seek closure

Note Extracted from McCaulley, 1987, p. 43

Figure 2. Theoretical Characteristics of the Sixteen MBTI Types as Problem Solvers

Keirsey and Bates (1984) discussed the MBTI in detail. They not only discuss the sixteen personality types, but found that within

the sixteen character types, four basic temperaments exist. They classify these four temperaments as: (a) Dionysion temperament, (b) Epimethean temperament, (c) Promethean temperament, and (d) Apollonion temperament taken from Greek mythology.

The Dionysion temperament individuals are those that are SP's on the MBTI. Thirty-eight percent of the population fall into this category. These individuals are free, independent, and impulsive. They live for the immediate action. They gravitate to jobs where action is involved, and tend to be performing artists.

The Epimethean temperament individuals also comprise 38 percent of the population, and are those individuals that are SJ's on the MBTI. These individuals have a need to belong. They are dependable and stable with a strong work ethic. Giving is more important than receiving to these people, and they feel no gratitude or appreciation for their presence and cannot ask for it. They tend to be pessimistic and titles are important to them. One finds this type of temperament working in institutions; teaching, preaching, banking, etc.

Twelve percent of the population consists of the Promethian temperament individuals. These people are NT's on the MBTI. Power over nature fascinates them, and they have a desire to understand, control, predict and explain realities. They also want to achieve high levels of competencies, capabilities, and skills. They are individualistic and even arrogant. However, they are the most self-critical of the four temperament types. These people live in their work, even play is work. The jobs they are attracted to are: the sciences, mathematics, philosophy, architecture, design, and

engineering. They enjoy developing models, exploring ideas, and building systems.

The Apollonion temperament individuals are those NF's on the MBTI, and they occupy 12 percent of the population. They need to have meaning in life and their hunger is centered on people. They strive for unity and uniqueness and need to be recognized for this. A belief in being genuine with no facade or pretense is important to this type. They like to better the conditions of people in the world, and they are drawn to arts which involve verbal and written communication. They have difficulty placing limits on the amount of time and energy they devote to their work, and they work toward perfection. They are future oriented and focus on what might be. NF's professions tend to be writers, psychiatry, clinical work, counseling, ministry, and teaching. According to Dillon and Weissman (1987), NF's are drawn to the humanities and arts.

Jung's model provided the basis for much research in the area of styles of thinking and personality. McCaulley's (1987) work has interesting implications for the study of styles of thinking and creativity.

Personality Traits

Though there is a correlation between intelligence and creativity, many researchers investigate the non-cognitive traits related to creativity. "It seems highly likely that differences in creativity are more related to non-cognitive than to cognitive traits" (Freeman, 1968, p. 15). This assumption leads to many studies on the personalities of highly creative people. Rogers

(1970) postulates three qualities of the potentially creative person: (a) openness to experience, this refers to the person who lacks rigidity and displays spontaneity to the environment and problem situations; (b) An internal locus of evaluation, this refers to the ability of a person able to evaluate his creations, and external appreciation lacks importance as long as the creation expresses that person's inner feelings; (c) The ability to toy with elements and concepts, this trait refers again to the lack of rigidity and spontaneity. Guilford backs up Rogers concept with his views, "the original person should be one who is tolerant of ambiguity, flexible (as apposed to rigid), and divergent in thinking" (Prentky, 1980, p. 43).

Other researchers identify more specific personality traits. Shouksmith (1970), reveals three personality traits related to originality: (a) personal dominance, (b) responsiveness to impulse and emotion, and (c) expressed femininity of interest. Many believe that creative people are non-traditionalist and act against societies expectations. "Creative people are often somewhat unconventional and individualistic" (Manis, 1966, p. 111). Klausmeier (1985) lists twelve personality traits that creative individuals usually possess. These traits summarize most research and are listed in Figure 3.

"The highly creative person must be driven with curiosity, and with this attitude he is more sensitive to problems" (Guilford, 1977, p. 166). Many studies look at the effect of motivation on creativity. Two major types of motivation exist, intrinsic and extrinsic. "The distinction between intrinsic and extrinsic motivation is frequently made on the basis of whether there is an externally mediated reward

or constraint present in the situation" (Deci, 1980, pp. 30-31). Most creative personality types do not seem to need constant approval or reward from outside sources. "Characteristically, the creative individual refuses to be content with the most easily established perceptual constancies" (Barron, 1968, p. 75). This statement shows the need for the individual to go beyond the boundaries expected and accepted. In order for an individual to take that step they must be intrinsically motivated. According to Deci (1980), a person's need structure clarifies motivation type. Most creative people lean toward intrinsic motivation.

1.	Genuinely values intellectual and cognitive matters
2	Values own independence and autonomy
3	Is verbally fluent, can express ideas well
4	Enjoys aesthetic impressions; is aesthetically reactive
5.	Is productive, gets things done
6.	Is concerned with philosophical problems, for example; religion, values, the meaning of life
7	Has high aspiration level of self
8	Has a wide range of interests
9.	Thinks and associates to ideas in unusual ways; has unconventional thought processes
10.	Is an interesting, arresting person
11.	Appears straight forward, forthright, candid in dealings with others
12.	Behaves in an ethically consistent manner, has consistent personal standards

(Klausmeier, 1985, pg. 338)

Figure 3. Personality Traits of Creative Individuals

The personality aspect of the study of creativity interests many researchers. If one knows the personality traits that represent creative people, one can zero in on those particular traits in order to encourage creativity. Also, if educators and society understand these traits, they might be more accepting of the individualistic, nonconformist personality types.

Imagery

Imagery has been cited as an important skill in the design process. Historically the concept of imagery has always been present, although there has been and remains debate over its origin and relevance in cognitive functions.

According to Yuille and Marschark (1983), Aristotle in the classical era in Greece rejected Platos rationalism. He assumed that knowledge comes from experience. "The soul never thinks without a mental picture" (Yates, 1966, p. 32). Aristotle said the sensations interpreted by the common sense are permanently recorded like the impression of a seal on wax. The impressions are in the form of images, which are pale copies of the original percept. Imagery is not a new concept. However, there has never been true agreement on the definition and functions of imagery.

Richardson (1983) emphasizes several turning points in the research. "When psychologists were first interested in the study of consciously experienced events, they were obliged to distinguish between the contents of experiences that originated in the immediate stimulation of a sensory surface (percepts) and the contents of experiences that, although similar in many ways,

occurred in the absence of such stimulation (images)" (pg. 3). Thus studies took place dealing with the issue of perceptual versus imaged experience by researchers such as; (Perky, 1910), (Schaub, 1911), (Fernald, 1912), and (Fox, 1914). In 1919 Betts stated, "For some psychologists 'structuralists', the image was also a basic theoretical element that could combine with sensory and effective elements to produce every variety of complex experience. For others of a more functionalist persuasion, imagery was freed from this narrow theoretical role to become an individual difference variable of great potential importance" (Richardson, 1983, p. 4).

According to Richardson a turning point came when the Wurzburg psychologists demonstrated that thought processes could take place without the mediation of any consciously experienced imagery. During the early 1900's this theory of imageless thought caused a significant decrease in imagery research. Some research began to emerge in the 20's and 30's at a time when the the testing movement occurred. The factor analytic study of cognitive abilities played an important role. Griffiths (1927) and El Koussy (1935) linked visual imagery with visualization and spatial manipulation ability. By 1954 the areas were understood to the point that McBain created a test to measure visual imagery. From the late 1950's onward research in imagery increased in volume.

In the 60's this reappearance of imagery research, mainly emphasized memory. During the 70's research expanded into the area of imagery manipulation with Shepard's work, and in the 80's Kosslyn began to research imagery generation processes.

Imagery Theory

Pinker and Kosslyn (1983), and Dennett (1981a) classified imagery theory as either iconophile or iconophobes. Iconophile theorists are those attributing special properties to mental imagery representations and giving the reported spatial nature of images some important theoretical status. On the other hand iconophobes are those who believe that images are mentally represented in the same way as other forms of thought, with no special status accorded to some intrinsic "spatial" or pictorial" nature.

Three major categories of imagery theory are: pictorial, non-pictorial, and propositional. Pictorial theorists believe that a picture type image is formed in the mind. Non-pictorial theorists argue that images are depictional or descriptional not pictorial. Propositional theorists believe that image representations are no different from conceptual knowledge or abstract thought.

Pictorial Theory There are several imagery theories that are well worth mentioning in this review of imagery. One of the classic theories is known as Hebbs' Cell Assemblies. According to Hebb (1968), an image is formed when alike neurological structures in the brain are activated during perception in the absence of the appropriate stimulus. Hebb's cell assemblies are organized hierarchically. Lower-order assemblies respond to specific visual contours and produce sharp, detailed images. On the other hand, higher-order assemblies produce fuzzy or generic images. These higher-order assemblies are triggered by the lower-order assemblies.

Hebb also believed that cell assemblies at a given level are connected by neural assemblies triggering particular eye movement which activates the same sequence that would occur when one visually examines an object. This order in sequencing produces an organization in the image that constrains the way one can scan or access the image.

There has been criticism of Hebb's theory dealing with the eye-movement, because further research indicates that once a scene is encoded the image can be scanned from any direction.

Paivio's dual code theory (1971) is classified as a picture theory. According to Paivio people use words and images to remember and think about things they have experienced. Paivio concludes that images are better than words for representing the way things appear because images are concrete in the way they resemble events in a direct way. Paivio also believes that words and images, being of different natures, are supported by different processing systems. Words are dealt with by a verbal auditory system, and images are dealt with by a visio-spatial systems. "Images permit parallel processing (in both spatial and operational senses of the term) of their various aspects; words, tied as they are to the temporal stream of verbal processing, allow sequential or serial processing only. This division of labour does not mean that the two systems must function independently" (Morris & Hampson, 1983, pp. 120-121).

Bower's (1972) theory falls in line with Paivio's dual-code theory. "According to Bower, memory images provide a type of direct contact with the appearance of a thing by essentially

recreating the experience of seeing it, verbal or propositional representations do not evoke a percept like experience but convey information only about a things properties" (Pinker, Kosslyn, 1977, p. 48). Bower's theory also deals with memory imagery. He hypothesized that a common generative grammar may underlie production of images and verbal strings.

Shepard (1975) expanded on the model of representation. "Shepard argues that problems of representation arise more frequently with images than with words because the link between a word and the object to which it refers is obviously arbitrary whereas those between an image and its referent are not (Morris & Hampson, 1983, p. 122). Roger Shepard is also known for his findings on the process of mental rotation (Cooper & Shepard, 1973; Shepard & Metzler, 1971). He believed that images could be mentally maneuvered to create transformation. His theory deals with transformational processes that cut across imagery, pattern recognition, and spatial reasoning.

In 1975 Kosslyn rejected a simple picture metaphor on the grounds that images are not replays of unanalyzed sensation, but are often interpreted prior to becoming an image. Kosslyn, Shwartz, and Pinker devised an Array Theory.

> Array theorists posit at least three kinds of processes. First, there must be a means of interpreting the patterns depicted in the array. A 'minds eye' process, identical to pattern recognition processes in visual perception, acts to associate given patterns with symbolic descriptions. Second, there must be processes that fill the array with

> the contents of long-term memory files. From what we know about mental-image generation, we can state that these processes must be sufficiently powerful to form image patterns at novel sizes and locations and in novel combinations. Third, the data require processes that shift points from cell to cell in various ways, accounting for the ability to execute mental rotations, size scaling, translations, and so on (Kosslyn, 1980, p. 7).

In 1980 Finke developed a theory known as Finke's Levels of Equivalence. Finke proposes that the visual system is composed of a hierarchy of levels of processing, beginning with the retinal intensity/wavelength arrays and culminating in conceptual knowledge of the objects seen. These images occur at certain levels, but he clarifies the distinction between mental imagery and abstract thought.

Non-pictorial Theory Starting in 1973 non-pictorial models began to evolve. Pylyshyn (1973, 1981) and Kintsch (1977) rejected pictorial theories. Their reasoning behind this rejection of picture theories is based on the many meanings of representation. "To illustrate their point, consider the definition of the verb 'to represent' which is offered by the Concise Oxford English Dictionary: (to) call up by description or portrayal or imagination, (to) figure, (to) place a likeness before the mind, or senses. This definition includes at least the following four alternatives: (a) representing is equivalent to describing how something looked, (b) representing is like viewing a picture, (c) representing involves imagining,

pretending to see, or acting as if he were seeing, (d) representing is akin to fashioning or fabricating, e.g., sculpting" (Morris, 1983, p. 127). They claim that pictorial theories are based on an inappropriate notion of representation which leads to weaknesses in pictorial theories. Dennett (1981b) says, "Imagining is depictional or descriptional, not pictorial, and is bound only by this one rule borrowed from the rules governing sight; it must be from a point of view" (p. 54.).

Neisser's (1976) approach, known as percent-analogy theory resolves some of the debate between pictorial and non-pictorial imaging. He emphasizes imageries link with perception. He steers away from the traditional view of imagery that arises from memory rather than from sensory input, emphasizing imageries link with perception. He claims that imaging occurs not through retrieval but through the anticipation or readiness to perceive. According to Neisser's theory, imagery occurs when the schemata normally used for perceiving are used out of context. This approach focuses on view of perception rather than a picture-like representation. Neisser's theory or definition may answer some of the debate among other imagery theorists.

Neisser (1976) thinks there is a substantial difference between imagery and perception. He "claimed that imagery appears when the anticipation is going to be unfulfilled" (Kitamura, 1985, p. 84). On the other hand, Hampson & Morris (1979), and Ahsen (1982) proposed a model of imagery as an internal analogue of the perceptual cycle, suggesting the process of imagery and perception are similar.

Kitamura (1985) believes that the difference between perception and imagery is the degree of freedom imagery has in comparison to perception. In perception the temporal frame is restricted to current events, where imagery is not. Imagery is free from spatial restrictions, perception is not. With imagery one can experience imaginative or fictitious things. Location of the subject is also a difference. With imagery one can place themselves anywhere they wish. These points help to clarify the difference between perception and imagery.

Propositional Theories Another category of theories is known as propositional theories. According to these theories, also called structural-description theories, image representations are no different in kind from the representations underlying conceptual knowledge and abstract thought. On the other hand Finke (1980) finds a distinction between mental imagery and abstract thought.

Schwartz (1981) proposes imagery as a kind of symbolization. Within this type of imagery there are different modes such as visual and auditory. He believes that within each mode different types of symbolic representation exist. For instance in visual imagery one might see a picture or words for the same object. Schwartz does not agree with the anti-imagist theory that symbols have to be representational, allowing no room for translating or encoding.

"Moran's (1973) is a propositional theory in which he posits that all mental representations including those underlying images are 'symbolic' and furthermore that there are no special image operations" (Pinker & Kosslyn, 1983, p. 51). In his view memory

consists of a collection of productions" (Newell & Simon, 1972).

Hinton's (1979) structural descriptions theory describes a variant of the propositional theory of visual representation. In his theory images represent scenes as graph structures whose nodes correspond to objects and their parts and whose edges are labeled with the spatial relationship that is true of pairs of parts. Hinton found that subjects were unable to perceive spatial relationships among parts of an image or to rotate one part of an image relative to the rest, unless they conceive of the object as parts that form the whole. Three features of Hinton's theory make it different form other propositional theories: (a) each part has an intrinsic set of significant directions, (b) there is a second set of labels relating to the significant directions, and (c) every piece of quantitative information is specified by an activator point on a continuous analogy scale, and changing the value of a parameter involves shifting the activated point along the scale to a new position.

Block (1981) believes that all the argument between pictorialists and non-pictorialists comes down to ambiguity in the term mental image. He suggests that the confusion can be avoided by adopting the convention that "mental image" denotes the internal representations involved in mental imagery. Pylyshyn (1981) also discusses the debate over pictorial versus analogical images and addresses the issue of definition. He gives two opposing examples. "Image refers to what I experience when I imagine a scene, then surely that exists in the same sense that any other sensation or conscious content does (e.g. pains, tickles, etc). If on the other hand, image refers to a certain theoretical construct that is claimed to

have certain properties (e.g. to be spatially extended) and to play a specified role in certain cognitive processes, then the appropriate question to ask is not whether the construct is epiphenominal but whether the theoretical claims are warranted, and indeed whether they are true" (Pylyshyn, 1981, p. 152.). In regards to the images versus propositions controversy, Pylyshyn believes that rather than questioning the aspects of cognition associated with imagery, one should view it as governed by tacit knowledge. In terms of tacit knowledge theory, one should focus on the processes that operate upon symbolic encodings of rules and other representations, or whether they should be viewed as intrinsic properties of certain representational media.

Imagery Types and Styles

Morris and Hampson (1983) identified three major categories of imagery: (a) hypnogogic, which occurs when images accompany the drowsy state prior to sleep; (b) hypnopompic imagery, which occurs either while asleep or as waking up; and (c) eidetic images, which describes images that "resemble percepts, but which, while perceived as 'out there' are not, like hallucinations, mistaken for the real world, perhaps because they are usually under the voluntary control of the imager" (Morris, 1983, p. 85). Hypnogogic and hypnopompic imagery remain somewhat stable throughout one's life. On the other hand, eidetic imagery tends to decline with age.

Yabroff (1990) classifies imagery as either passive or spontaneous. Passive imagery just flows or is a memory, while spontaneous imagery is deliberately and actively invited. He

identifies spontaneous imagery as being used in creative problem solving and lists ten attributes of it: (a) it uses all five senses, (b) it is ongoing and natural, (c) it bypasses the semantic-language system, (d) it is self-energized, (e) it unifies reality, (f) it is unrestricted, (g) it is unbounded by time and space, (h) it seeks expression, (i) it can glean insights from the personal unconscious, and (j) it can help us reach the higher unconscious.

According to Forrest (1981), there are different imagery styles, properties, and types. Not all people necessarily possess all of these, nor are they limited to specific imagery styles and types.

The four imagery styles that Forrest (1981), discusses are; (a) spontaneous imagery, (b) self-generated imagery, (c) sensory-stimulated imagery, and (d) motor-stimulated imagery. Spontaneous imagery occurs by itself, the internal picture just happens without pre-planning. Self-generated imagery is a process where one selectively decides to see certain images, or to alter existing spontaneous imagery. Sensory-stimulated imagery is triggered by an external stimulus. The stimulus could be either visual, auditory, tactile, olfactory, or gustatory. Motor-stimulated imagery is triggered or sustained by ones own movement. These four imagery styles are important when one is studying imagery.

The image properties that Forrest discusses are; image location, concurrent conditions, image quality, image content, and image control. These properties bring up some questions that do not have a definite answer. Image location deals with where one sees the images. Concurrent conditions deal with when the imagery occurs. Image quality deals with the clarity, color, and depth of

ones images. Image content deals with the content of ones images. Image control deals with the ability one has to altar or change their images.

Forrest (1981), discusses six types of imagery. The first type being memory images which refer to all images that are basically constructed from material of past experience. The second type are imagination images, which are loosely based on past experiences by using elaboration. The third type fantasy and daydream images blend memory and imagination. The fourth type, autonomous images are those such as; hallucinations, dream images, hypnogogic images, and hypnopompic images. The fifth type are synasthetic imagery, which refer to images that are cross-modal. Finally, the sixth type is eidetic imagery, which was already discussed. Eidetic imagery is noted for its vividness and persistence.

Baker and Hill (1983) performed two studies to determine how a persons' image is related to actual imagery tasks. The studies implied that the act of imagery in a controlled task, or in the context of daily life, bears little functional relationship to the self-report of such processes. Based on their research Baker and Hill developed a typology. The types are; Alpha, Beta, Gamma, Delta, and Lambda.

The Alpha level is the simplest form in which visualization is described in terms of reconstruction of photographic reproduction of or from prior sensory experience. "This kind of visualization is involved in representing figural relationships, picturing the subject of a narrative description, and drawing a layout of a building or area" (p. 69). The Beta level distinguishes between recall or

reconstruction of an image and the active mental manipulation of elements of such images. Allowing one to rotate or project an image. In the Gamma level the imager invents a kind of mental model or image of how a system functions (synthetic process). Similar to virtual reality in the computer industry. The Delta level is imaginative synthesis, in which the imager creates a conceptual model whose analogues are themselves extrapolations or abstractions. The final type labeled as Lambda views visualization as a product of an uncontrolled process. It is divorced from meaning and is usually an indication neurological or psychological pathology. Baker and Hill's typology has an interesting approach to levels or types of imagery. All of these imagery types have a direct contribution to the theoretical development of imagery.

Imagery Tests and Measures

Galton (1880, 1883) was the first investigator to provide a method of quantitatively measuring voluntary imagery ability. He developed the famous "Breakfast Table Questionnaire". This test emphasized visual images. Galton's work led to the subsequent development of many questionnaires.

Perhaps the questionnaire of most prominence is the "Questionnaire Upon Mental Imagery" by Betts (1909). Betts' test systematically evaluated the vividness of evoked imagery in seven sensory modalities: visual, auditory, tactile, kinesthetic, gustatory, olfactory, and organic. Sheehan (1967) later developed a shortened version of this instrument which is known as the Betts QMI.

Another widely used instrument is the "Gordon Test of Visual

Imagery" (Gordon, 1949), which differentiates between autonomous and controlled imagery.

More recently Marks (1973) developed the "Vividness of Visual Imagery Questionnaire" (VVIQ) which concentrates exclusively on the visual modality. Marks' questionnaire is also based on the Betts QMI. These questionnaires have had a great impact on research in imagery. For the purposes of this study the Betts QMI will be used to assess imagery vividness.

Imagery and Cognitive Thought Process

There are two opposing points of view in regards to imagery in thought. One view argues that imagery is centrally involved in directing thought processes. Kosslyn (1980, 1983) is the key proponent to this view. On the other hand Pylyshyn (1973, 1981) believes that imagery is a by-product of thought directed by underlying knowledge and belief systems.

Zenhausern (1978) suggests that both Kosslyn's and Pylyshyn's models may be valid for different individuals. He implies that the uses of imagery will differ according to ones style of thought. "Zenhausern argues that individuals may be differentiated along the dimensions of inductive versus deductive thought. Inductive thinkers may utilize both words and images, but verbal sequential processes will be central to thought in the manner described by Pylyshyn. These individuals may rely more on the left hemisphere than the right. Deductive thinkers, in contrast, will also use both words and images, but imaginal holistic processes will be central to their thinking" (Forisha, 1983, p. 318).

McKim (1980) posits the concept of "visual thinking". He states: "Visual thinking is carried on by three kinds of visual imagery: (a) the kind that we see, (b) the kind that we imagine in our minds eye, and (c) the kind that we draw, doodle, or paint."(p. 8). McKim believes the three are interactive and form a method of visual thinking.

Kosslyn (1980, 1983), Pylyshyn (1973, 1981) McKim (1980) and others show a relationship of imagery and the cognitive thought process. Tower (1983) summarizes several cognitive benefits of imaginal development as they relate to divergent thinking skills. "It has been shown to improve (a) originality in thinking (Lieberman, 1965; Marshall & Hahn, 1967), (b) associative fluency (Dansky, 1980; Li, 1978; Dansky &Silverman, 1973, 1975; Lieberman, 1965), and (c) cognitive flexibility (Lieberman, 1965; Pulaski, 1973; Sutton-Smith, 1975), often accompanied by reflectivity (Weiner, 1975) and creativity in genera (Griffing, 1975)" (pp. 234-235).

As one can see imagery has many implications for the field of design and the design process. With imagery of all types, perceptual skills can be improved. The theories of Hebb, Paivio, Kosslyn and others give us an array of information related to imagery. The imagery styles, types and categories discussed offer us information that can be applied to different situations.

The Relationship Between Creativity, Imagery, and Personality

As noted by Parrott and Strongman (1985) the role of imagery in the creative process has received recognition by a number of

investigators such as: Paivio, 1971; Richardson, 1983; and Sheehan, 1972. Others that have conducted more specific investigation of the interrelationship of imagery and creativity are: Forisha, 1978, 1981; Kaufmann, 1981; Khatena, 1978; and Rhodes, 1981. Khatena (1978) stated:

> Creative people according to many theorists, researchers and dinicians, are likely to have a high degree of imagery. This ability stimulates, energizes, propogates and organizes original ideas (p. 36).

Khatena also said: "Much of brain activity relative to the creative imagination has to do with imagery or the re-experiencing of images (1978, p. 36).

Forisha (1978), Shaw and DeMers (1986) found significant relationships between selected measures of imagery and certain qualitative aspects of creative thinking. These studies demonstrate a direct link between creativity and imagery.

Richardson (1983) also saw a link between creativity and imagery and stated:

> Imagination images often seem to serve as the vehicle by which understanding occurs. Sometimes this understanding is a genuine creative insight following a long period of preparation and incubation. Indeed, this insight corresponds to the illumination stage of problem solving described by Graham Wallas (1926) (p. 35).

As one can see, research implicates a link between imagery and creativity. Using the creative process model of Wallas, one can

understand imagery being used as a productive tool, particularly in the stage of incubation. Just as one can see a link with imagery being used to enhance fluency, flexibility, and elaboration during the thought process.

Gowan (1978) developed a theory based on Graham Wallas's paradigm of creative process, saying that imagery occurs during the incubation stage. He believes that right-hemisphere imagery is the vehicle through which incubation produces creativity.

Wallas (1926) and Torrance (1966) both well known for their work in creativity, tie imagery to creativity. In Wallas's paradigm of creative process, he identified four stages: (a) preparation, (b) incubation, (c) illumination, and (d) verification. Wallas alludes to imagery in the stages of incubation and illumination. Torrance (1966) referred to Simpson's (1922) work on visual imagery in the development of his creativity test.

Parrott and Strongman (1985) investigated the predicted utility of vividness and control of visual imagery with verbal and figural divergent thinking tasks. They found that vividness of imagery is related to verbal divergent thinking more consistently in women. This relationship appears more often with fluency than originality. They also found that control of imagery is strongly correlated to vividness. In addition, they discovered that imagery seems to hinder verbal performance, and vivid imagery alone does not appear to enhance performance on figural tasks except in elaboration. They found that vivid imagery does interact with controlled imagery to produce superior associational fluency. Parrott and Strongman also found individual differences in

utilization of imagery. Personality could be a factor in this. In addition imagery performance was found to be influenced by imagery ability, task demands, environmental factors and creative orientation.

According to Kaufmann (1985) "the assistance of imagery based representation will be needed when the task takes on a high degree of novelty" (p. 57). Novelty has often been used in defining a creative output. Therefore, one can deduce that Kaufmann is associating imagery with creativity.

In Pickard's (1990) discussion of creative potential, she identifies both personal and public creativity. In both types of creativity she believes the role of fantasy and imagination "enables one to leave the immediate and provides a bridge between what is known and what might be" (p. 5).

Forisha (1983) looks at the relationship between creativity, imagery and cognitive style and states that:

> Creativity may be seen as the interact of two hemispheres of thought, one associated with holistic thinking primary process and the other with analytic thinking or secondary process. Creativity then requires the interaction of both primary and secondary processes, or the holistic and analytic thought represented by the two halves of the brain. Imagery, on the other hand is one of the main processes of the right half of the brain and thus bears a relationship to primary process and to other variables connected

> with primary process, such as dream recall and hypnotic susceptibility. Imagery is then at least potentially an integral part of the creative process (1983, p. 325).

Many researchers recognize a relationship between creativity and imagery. Particularly when looking at creative process. Imagery can be viewed as a mode of thought that has an impact on the creative process and product.

Summary

Over the years research in creativity has focused on personality, process, product and press. There is not one precise definition of creativity, which lends in the never-ending debate of creative theory. Theorists such as Wallas (1926), Gowan (1979), Gagné (1985), Amabile (1983) and others provide a theoretical basis for creative process. Rogers (1970), Prentky (1980), Manis, (1966), and Klausmeier (1985) provide background in personality characteristics of creative individuals. Intelligence and cognitive styles of thinking have an impact on creativity as well. The prominent philosophies of psychology have greatly influenced the direction creativity research has taken.

Imagery has been accepted since the classical era of Greece. The review of pictorial, non-pictorial, and propositional theories provides a broad overview of imagery research. As one can see imagery has many implications for the field of design and the design process. The theories of Hebb (1968), Paivio (1971), Kosslyn (1980, 1983) and others give us valuable information related to imagery.

Design process is greatly impacted by creativity and imagery. Peña (1987) and Zeisel's (1975) models of design process parallel many of the creative process models. The synthesis stage of design is when the majority of creative output will occur. Different approaches to problem solving influenced by personality impact on the use of creative process and imagery, which in turn impacts the product or solution to a problem.

This review of creativity, imagery, personality type, and their relationships provides valuable information to the body of knowledge in interior design education. The creative process with the use of imagery skills could invoke styles of thought that allow for more creative output.

CHAPTER III

METHODOLOGY

Introduction

Chapter three describes the research design, methods and procedures for this study. Also discussed are the population and sample, the description of the instruments, the data collection method, and the types of analysis to be used in this study.

Research Design

This research is a combination of non-experimental assessment and descriptive research. "Non-experimental research is systematic empirical inquiry in which the scientist does not have direct control of independent variables because their manifestations have already occurred or because they are inherently not manipulable. Inferences about relations among variables are made, without direct intervention, from concomitant variation of independent and dependent variables" (Kerlinger, 1986, p. 348). According to Kerlinger, random assignment cannot be used in non-experimental design.

According to Best, descriptive research "is concerned with hypothesis formulation and testing, the analysis of the relationships

between non-manipulated variables, and the development of generalizations" (Best, 1981, p. 24). Best also states, "descriptive research describes what is. It involves the description, recording, analysis, and interpretation of conditions that exist. It involves some type of comparison or contrast and attempts to discover relationships between existing non-manipulated variables" (Best, 1981, p. 25).

The second type of non-experimental research used in this study is assessment. "Assessment is a fact-finding activity, describing conditions that exist at a particular time. No hypotheses are proposed or tested, no variable relationships are examined, and no recommendations for action are suggested" (Best, 1981, p. 23). Assessment research design is used only on the first objective.

In this study the researcher will (a) analyze the relationships between creativity, imagery vividness, and personality type, (b) assess creativity, imagery vividness and personality types in interior design students, and (c) analyze the findings from (a) and (b) for patterns.

Description of the Sample

"The entire group of people in a category is called a population. The smaller group selected for testing is called a sample. The sample is then used to make generalizations about the population from which it is drawn" (Sommer, 1980, p. 185).

"The population must be defined in terms of (a) content, (b) units, (c) extent, and (d) time" (Kish, 1965, p. 7). For the purposes of this study the population is defined as: all persons studying

interior design at accredited programs in the United States, in 1991. The programs were solicited for participation through telephone contact with interior design programs. The only criteria was that the programs be FIDER accredited. The sample consists of 234 junior and senior Interior Design students from 11 accredited programs in the United States (Table 1).

TABLE 1

SUMMARY OF SUBJECTS AND PARTICIPATING INSTITUTIONS

School	Junior		Senior		Total
	Male	Female	Male	Female	
University of Texas Austin, Texas	2	3	5	22	32
Oklahoma State University Stillwater, Oklahoma	3	8	2	14	27
Kent State University Kent, Ohio	0	0	0	14	14
Baylor University Waco, Texas	0	2	0	10	12
Texas Christian University Fort Worth, Texas	0	6	0	4	10
Virginia Tech Blacksburg, Virginia	0	0	0	22	22
Kansas State University Manhattan, Kansas	0	0	2	33	35
Marymount University Arlington, Virginia	1	4	3	7	15
Mount Vernon College Washington, D.C.	0	10	0	11	21
Appalachian State University Boone, North Carolina	1	4	1	23	29
University of Missouri Columbia, Missouri	0	0	4	13	17
Totals	**7**	**37**	**17**	**173**	**234**

The Instruments

Several instruments were used in this study. The Betts QMI was selected to assess imagery vividness. The Preference Inventory (PI) was selected to assess creativity level. This particular creativity inventory was used because three of the subscales dealt with an internal sensation seeking scale, which addresses imagery. The Myers-Briggs Type Indicator (MBTI) was selected to assess personality type. In addition to these three instruments ten questions were asked to gain demographic information.

The Shortened form of the Betts Questionnaire upon Mental Imagery (Sheehan, 1967)

The purpose of the Betts QMI is to assess vividness of mental imagery. The questionnaire consists of five items in each of seven sensory modalities: visual, auditory, tactile, kinesthetic, gustatory, olfactory, and organic. Subjects are asked to rate the vividness of the mental imagery elicited by each of the 35 items. Rating is based on a seven degree scale, with responses ranging from "No image present at all" to "as vivid as the actual experience". Responses are averaged for each modality and for the total instrument, yielding a vividness of rating for each of the seven sensory modalities and a total vividness of imagery rating.

"Sheehan (1967) conducted cross-validation studies using the original Betts' and the shortened form. He reported correlations ranging from .92 to .98 and concluded that the shortened form predicted imagery vividness, essentially as well as the complete

questionnaire" (Rhodes, 1981, p. 92).

According to White, Sheehan, and Ashton the Betts QMI instrument is internally consistent and reliable. The validity of this questionnaire has been primarily analyzed through the use of factor analysis. "Both Richardson and Sheehan believe that a general imagery trait is being assessed" (White, 1977, p. 151). "The Betts QMI is currently the most widely used measure of imagery vividness" (White, 1977, 146).

The Preference Inventory (Bull, 1978)

This Preference Inventory (PI) was developed to appraise adult creativity. The questionnaire contains 53 questions with a five-point rating scale from strongly agree to strongly disagree. Seven factors are measured in this instrument. The seven subscales are: (a) desire for creative production, (b) visualization before creation, (c) curiosity about things, (d) multidimensional originality, (e) mental visualization, (f) desire for fantasy/daydreaming, and (g) curiosity about art.

Bull and Davis (1982) computed Hoyt internal consistency reliabilities for the PI and found a .91 reliability and determined the inventory to be reliable. In addition to this they computed Pearson correlation coefficients between scores on the PI and several other tests of creativity, finding a range from .212 to .587. Their findings documented reliability and validity in the Preference Inventory.

The Myers-Briggs Type Indicator
(Myers & Briggs, 1975)

The Myers-Briggs Type Indicator (MBTI) was designed by Isabel Briggs Myers and Katharine Cook Briggs. They developed this questionnaire, based on Jung's (1921) model, to help people in non-clinical populations discover their own preferences for perception and judgement.

For the purposes of this study the MBTI form G self-scorable version was used to assess personality type. The form G consists of 94 questions. The MBTI measures ones preferences on four scales; (a) Extravert "E" or Introvert "I", (b) Sensing "S" or Intuitive "N", (c) Thinking "T" or Feeling "F", and (d) Judging "J" or Perceiving "P". MBTI scoring generates four basic scores for each of the four preferences. There are sixteen types of preferences stemming from any combination in the four scales.

The MBTI is "one of the most widely used tools for working with normal populations" (McCaulley, 1990). Myers and McCaulley (1985) performed test-retest product-moment correlations of continuous scores to test reliability. They found correlations of .85 for females and .69 for males with form G of the MBTI. Internal consistency of continuous scores based on coefficient alpha were reported as: .74 -.83 for "EI", .77-.85 for "SN", .64-.82 for "TF", and .78-.84 for "JP" (p. 169). They also performed correlation coefficients with 24 other personality measures to test for validity (pp. 177-206). Through their statistical analysis Myers and McCaulley (1985) determined the instrument to be reliable and valid.

Data Collection

Data was collected in April of 1992. Questionnaires were administered by professors of Interior Design in 11 schools. The professors were instructed to hand out the test booklet which included the demographic questions the PI and the Betts QMI first. Upon completion of this handout the students were asked to complete the MBTI. These were completed in one sitting with no time limit. Due to the fact that all instruments used were self explanatory the administrators needed no training.

Upon gathering the instruments the professors returned the data to the researcher. In order to guard for consistency in the scoring of the MBTI, the researcher was responsible for scoring the MBTI.

Analysis

Descriptive analysis was used in this study. "Descriptive statistical analysis limits generalization to the particular group of individuals observed. No conclusions are extended beyond this group and any similarity to those outside the group cannot be assumed.The data describe one group and that group only" (Best, 1981, p. 221).

For the purposes of analysis the questionnaires were coded and input into the computer with PC File software. Statistical Analysis System "SAS" was used for statistical analysis. Frequency data were used for analysis of the first objective. For objectives two through five, analysis of variance and correlation coefficients were used.

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CHAPTER IV

THE RELATIONSHIP BETWEEN CREATIVITY AND IMAGERY IN INTERIOR DESIGN STUDENTS

MANUSCRIPT FOR PUBLICATION

JOURNAL TITLE: CREATIVITY RESEARCH JOURNAL

THE RELATIONSHIP BETWEEN CREATIVITY AND IMAGERY IN INTERIOR DESIGN STUDENTS

Abstract: Previous research and literature indicates a relationship between creativity, imagery, and the use of imagery in the design process in fields such as design, art, and architecture. This study examined relationships between creativity and imagery vividness in a sample of 234 interior design students. The Betts QMI instrument was used to assess imagery vividness and the Preference Inventory was used to assess creativity. Results indicated a significant correlation between creativity and imagery vividness, with males scoring higher on creativity than females. Due to the evidence of this relationship, imagery is a trait that should be taught and encouraged as an integral part of the design process.

Introduction

Interior Design educators are interested in both the creative process and creative product. The Foundation for Interior Design Education Research (FIDER) emphasizes the development of creative designers that use innovative and creative approaches to design problem solving (Standards, 1980, p. 6).

The importance of creativity in interior design is further emphasized by Dohr's statement. "Interior design educators and

practitioners expect design programs to provide opportunities for students to develop their creativeness. For example, FIDER accreditation teams use creativity as one measure to evaluate higher education programs" (Dohr, 1982, p. 24). The fact that FIDER emphasizes creativity as a major focus of education implies the importance of this trait. However, very little research exists in the area of creativity and interior design.

Sawyers and Canestaro (1989) looked at creativity and achievement in design coursework. They found that "ideational fluency is a valid predictor of student achievement in an interior design course" (p. 126). This study identifies ideational fluency, which is one factor of creativity as being important in the interior design process. Past research indicates little evidence that creativity is linked to a particular college major. However, many people believe creativity levels may be a predictor of career choice. Gardner and Weber (1990) found that interior design majors scored significantly higher in creativity than non-interior design majors.

Though few research endeavors in this area exist, the few cited demonstrate that creativity is a desirable focus area for interior design education. Therefore, this research study is an important contribution, that provides further information about creativity in interior design students.

In addition to creativity, imagery is also an important skill in disciplines such as interior design. Historically, creativity and imagery have been associated with one another, as well as with design. As noted by Parrott and Strongman (1985), the role of imagery in the creative process has received recognition by a

number of investigators such as: Paivio, 1971; Richardson, 1969; and Sheehan, 1972. Others that have conducted a more specific investigation of the interrelationship of imagery and creativity are: Forisha, 1978, 1981; Gowan, 1978; Kaufmann, 1981; Khatena, 1975; Rhodes, 1981; and Shaw and DeMers 1986. Wallas (1926) and Torrance (1966) both well known for their work in creativity, tie imagery to creativity. In Wallas's paradigm of creative process, he identified four stages: (a) preparation, (b) incubation, (c) illumination, and (d) verification. Wallas alludes to imagery in the stages of incubation and illumination. Torrance (1966) referred to Simpson's (1922) work on visual imagery in the development of his creativity test.

More recently, Forisha (1978) and Shaw and DeMers (1986) found significant relationships between selected measures of imagery and certain qualitative aspects of creative thinking. Though there are many modalities of imagery, visual imagery will be the primary focus for this investigation. Designers must be capable of visualizing space in new and different ways. Imagery used as a perceptual tool is a skill that can benefit the designer in solving both functional and aesthetic problems. Without this skill, visualization of a space is impossible.

Sommer (1978) had a firm conviction that imagery, "the ability to picture the outcome in the minds' eye", is an indispensable trait for designers (p. 195). McKim (1980) agrees with Sommer and states, "visual thinking is obviously central to the practice of architecture, design, and the visual arts" (p. 9).

Kosslyn (1980) discusses the spatial properties of imagery and

how it can be used to approach any spatial problem. He uses rearranging furniture, thinking about possible routes, and trying a new design idea as examples of using imagery to solve spatial problems.

Kuzendorf (1982) posits that those that are better producers of visual images will be better comprehenders and creators of visually aesthetic stimuli. Kuzendorf also states, ". . . visual imaging abilities are correlated not only with visual perceiving abilities, but also with aesthetic perceiving abilities" (p. 186).

Downing (1987) explored the way architectural designers use place imagery to facilitate idea generation and to sustain ideas during the design process. Downing believes that imagery allows designers to bridge time by utilizing past experience to understand present and future situations. "It is ideas that make architecture; not floors, walls or ceilings. The physical product - a room, building, street, park, or complex - is the climax to the search, combination, manipulation and culmination of many varying and changing ideas a designer generates and tests during the design process. It is ideas about what a place 'could' be like which are the stock and trade, the implements, of architecture" (Downing, 1987, p. 63). Pickard (1990) also believes that fantasy and imagination "enable one to leave the immediate and provides a bridge between what is known and what might be" (p.5).

Goldschmidt (1991) identified the generation of architectural form as a creative activity. The fast, free-hand sketching that takes place when a designer first tackles a design task was the

primary focus of her research. She found that visual imagery is an inherent part of this design reasoning phase of the design process.

Cohen and Saslona (1990) discuss the fact that many individuals that score high on visual imagery vividness do not necessarily do well when applying it to functional tasks. They believe this is due to visual memory performance. They hypothesized and confirmed that some people tend to have a habitual tendency toward employing visual imagery in daily life. It is possible that these "habitual visual imagers" are drawn to fields of study such as interior design, art, and architecture. Downing (1987) and Goldschmidt (1991) certainly found imagery to be secondary in nature to those designers they observed. Architecture and interior design have many similarities. Downing and Goldschmidt's research applies to the problem solving process in interior design.

Sommer (1978), McKim (1980), Kosslyn (1980), Kuzendorf (1982), Goldschmidt (1991), and Downing (1987) all recognize imagery as a useful skill in the design field. Since creativity and imagery are important in disciplines such as interior design, there is a need to research aspects of both. The purpose of this study is to assess the relationship between creativity level and imagery vividness in Interior Design students. If indeed, there is a relationship between creativity and imagery, it is a definite benefit to the design profession to examine such relationships, so that the educational system can better train and teach individuals to be successful in the design process.

Method

Subjects and Procedure

The sample consisted of 234 junior and senior Interior Design students from 11 FIDER accredited programs in the United States. The questionnaires were compiled into one booklet with self-explanatory directions and administered by the professors during a regularly scheduled class period. No time limits were imposed.

Instruments

Two instruments were used in this study. The Betts QMI was selected to assess imagery vividness, and the Preference Inventory (PI) was selected to assess creativity level. This particular creativity inventory was used because three of the subscales dealt with an internal sensation seeking scale, which addresses imagery. In addition to these two instruments, ten questions were asked to gain demographic information. Each of the instruments are discussed below.

The Shortened form of the Betts Questionnaire upon Mental Imagery (Sheehan, 1967) The purpose of the Betts QMI is to assess vividness of mental imagery. The questionnaire consists of five items in each of seven sensory modalities. The seven sensory modalities are: (a) visual, which refers to the image that is a sensation that comes to the mind's eye; (b) auditory, which refers to the image that is a sensation that comes to the mind's ear; (c) tactile, which refers to the image that is a sensation that comes to

the mind's touch; (d) kinesthetic, which refers to the image that is a sensation that comes to the mind's arms, legs, lips, etc. when thinking of performing a particular act or movement; (e) gustatory, which refers to the image that is a sensation that comes to the mind's taste; (f) olfactory, which refers to the image that is a sensation that comes to the mind's smell; and (g) organic, which refers to the sensations that come to the mind when thinking about organic factors such as pain, hunger or fatigue. Subjects are asked to rate the vividness of the mental imagery elicited by each of the 35 items. Rating is based on a seven degree scale, with responses ranging from "No image present at all" to " as vivid as the actual experience". Responses are averaged for each modality and for the total instrument, yielding a vividness of rating for each of the seven sensory modalities and a total vividness of imagery rating.

"Sheehan (1967) conducted cross-validation studies using the original Betts and the shortened form. He reported correlations ranging from .92 to .98 and concluded that the shortened form predicted imagery vividness, essentially as well as the complete questionnaire" (Rhodes, 1981, p. 92).

According to White, Sheehan, and Ashton, the Betts QMI instrument is internally consistent and reliable. The validity of this questionnaire has been primarily analyzed through the use of factor analysis. "Both Richardson and Sheehan believe that a general imagery trait is being assessed" (White, 1977, p. 151).

The Preference Inventory (Bull, 1978) This Preference Inventory (PI) was developed to appraise adult creativity. The

questionnaire contains 53 questions with a five-point rating scale from strongly agree to strongly disagree. A total creativity score is generated along with scores for seven subscales. The seven subscales are: (a) desire for creative production, (b) visualization before creation, (c) curiosity about things, (d) multidimensional originality, (e) mental visualization, (f) desire for fantasy/daydreaming, and (g) curiosity about art.

Bull and Davis (1982) computed Hoyt internal consistency reliabilities for the PI and found a .91 reliability. In addition to this they computed Pearson correlation coefficients between scores on the PI and several other tests of creativity, finding a range from .212 to .587. Their findings documented reliability and validity in the Preference Inventory.

Findings

Of the 234 subjects involved in this study the mean age was 24.16, with 69.1 percent of the students falling between ages 21 and 23. The range of age in the sample was from 19 to 58. Female students comprised 89 percent of the sample with 11 percent being male. The majority of the subjects were Caucasian (85%). Marital status was classified as either (a) single, defined as single, divorced or widowed; or (b) married. Eighty-three percent of the sample were single and 17 percent were married.

Twenty-one percent of the sample were pursuing a minor in college. The subjects were primarily minoring in art, art history, architecture, and business management. Twelve percent of the

subjects held prior degrees. Prior degrees were: business (13%), art/art history (21.7%), sociology/psychology (13%), fashion merchandising (4.3%), and other (47.8%). Work experience in related fields is summarized in Table 2. It is interesting that 44.8 percent of the sample have work experience in interior design. The author contributes this to internship programs.

Insert Table 2 approximately here

The mean scores, standard deviations, and ranges for all variables on the creativity and imagery tests are shown in Tables 3 and 4. As expected the scores for both creativity and imagery vividness were relatively high. Surprisingly, in the subscale of visual imagery the range had a larger spread than the other subscales. However the mean score for visual imagery was not significantly lower than the other subscales.

It is interesting to note that in a study by Cheney, Miller and Rees (1982) with a sample of 40 college students in psychology the Betts QMI was administered with the mean scores being reported as: visual - 1.8, auditory - 3.2, kinesthetic - 2.9, gustatory - 3.4, tactile - 2.8, and olfactory - 2.9. Richardson (1978) also gave the Betts QMI to a sample of 58 university students in psychology and reported a total imagery score ranging from 2.3 - 3.3. The mean scores of the interior design students were lower for all sensory modes, which indicates that the interior design students have a higher degree of

imagery vividness. Unfortunately no studies were located that reported the mean scores for the PI. Therefore no comparison samples were available for the creativity measure.

Insert Tables 3 and 4 approximately here

Analysis of Variance procedure was conducted for creativity and imagery scores by the type of environment the subjects were raised in. No significant relationships at the .05 alpha level were found through the analysis of variance procedure.

A T-test procedure for creativity and imagery among Caucasian and non-caucasian subjects was performed. Race did not affect the mean scores for creativity, imagery and their subscales in this sample, as no significant difference was found. The T-test procedure was also calculated for creativity and imagery among male and female subjects. Males scored significantly higher on creativity, visualization before creation, curiosity about things, multidimensional originality, mental visualization, and desire for fantasy/daydreaming. Gender did not impact on the scores for the imagery factors. These findings are reported in Table 5.

Insert Table 5 approximately here

Pearson Correlation Coefficients were calculated for the creativity and imagery variables by age. Age significantly impacted on three variables. As age went up the scores for multi-dimensional originality, curiosity about art, and olfactory imagery increased (Table 6).

Insert Table 6 approximately here

Table 7 shows Pearson Correlation Coefficients for the creativity and imagery variables. A significant correlation exists between creativity and imagery vividness ($p = .0001$). The total creativity score was significantly correlated with all factors of the imagery vividness test except organic imagery. Desire for creative production was not correlated with any of the imagery variables. Therefore imagery vividness does not impact on one's desire for creative production. Visualization before creation is significantly correlated with the total imagery vividness score, tactile imagery, and kinesthetic imagery. It is interesting that visual imagery is not correlated with the visualization before creation variable of creativity. Curiosity about things is correlated with the total imagery score, gustatory imagery, and olfactory imagery. Multidimensional originality is correlated with all imagery variables but visual and organic. Mental visualization is correlated with all imagery variables except organic imagery. Desire for fantasy and daydreaming is correlated with the total imagery score.

However, it is not correlated with any of the imagery subscales. Curiosity about art is correlated with all variables of imagery except kinesthetic (Table 7).

Insert Table 7 approximately here

Summary

Given the results of this analysis, the evidence indicates a link between creativity and imagery vividness, with males scoring higher on creativity than females. However, gender did not impact on imagery vividness. Overall, race, age, and other demographic factors also did not significantly impact on creativity and imagery vividness scores. In light of these findings it appears as though interior design students tend to have moderate-to-high levels of creativity and imagery vividness and that there is a correlation between these variables. Due to the fact that this sample consisted of only junior and senior students the levels of these variables could be inherent or could be aroused through the previous design education. Further research using freshman and sophomore students could reveal more information and possibly provide valuable data for use in placement and advising of incoming interior design students.

Imagery and visual imagery are often equated with creativity in the literature. It is important to the focal point of this study that the imagery vividness variable and the visual imagery variable

correlated at highly significant levels to creativity. Thus it can be surmised that imagery vividness abilities may be important when creativity is desired in interior design.

Due to the evidence of this relationship, imagery is a skill that should be taught and encouraged as an integral part of the design process. Therefore, another issue must be addressed beyond this study and that is to what degree imagery can be taught in professional interior design programs. Results of this study suggest looking closer at how imagery can benefit the student in the generation of creative and functional design solutions, and if the use of imagery significantly impacts on the students solutions and success in design studio courses.

TABLE 2

FREQUENCIES OF WORK EXPERIENCE
IN RELATED FIELDS

Variables	Frequency	Percent
Art	51	22.0%
Architecture	32	13.8%
Technical Drawing	45	19.4%
Interior Design	104	44.8%
Industrial Art	5	02.2%
Construction	33	14.2%

TABLE 3

MEAN SCORES, STANDARD DEVIATIONS, AND RANGES FOR THE CREATIVITY VARIABLES AMONG INTERIOR DESIGN STUDENTS

Variable	Mean Score	Std Dev	Range
Creativity	1 18	36	20-2.1
Desire for Creative Production	1.63	53	33-3.0
Visualization before Creation	.85	.53	.00-2.7
Curiosity about things	1.15	65	.00-3 0
Multidimensional Originality	1.15	.63	.00-2.7
Mental Visualization	1.20	.53	.00-3.0
Desire for Fantasy/ Daydreaming	1.07	.66	.00-2 7
Curiosity about Art	1.02	.84	.00-3.7

Note: Mean Scores are on a scale of 0-5. A low score indicates a high degree of creativity.
N = 233

TABLE 4

MEAN SCORES, STANDARD DEVIATIONS, AND RANGES FOR THE IMAGERY VIVIDNESS VARIABLES AMONG INTERIOR DESIGN STUDENTS

Variable	Mean Score	Std Dev.	Range
Imagery	1.20	.63	0.1-3 4
Visual Imagery	1.30	.89	0.0-5 8
Auditory Imagery	1.13	.88	0.0-4 4
Tactile Imagery	1.08	.80	0.0-4.4
Kinesthetic Imagery	1.10	.75	0.0-3.6
Gustatory Imagery	1.20	.87	0 0-4.4
Olfactory Imagery	1.55	1.01	0.0-4 6
Organic Imagery	1.00	.78	0.0-4.0

Note: Mean Scores are on a scale of 0-7. A low score indicates a high degree of imagery vividness.
N = 231

TABLE 5

T-TEST PROCEDURE FOR CREATIVITY AMONG MALE AND FEMALE INTERIOR DESIGN STUDENTS

Variable	Mean Scores Male N = 25	Mean Scores Female N = 209	T-value	P > |T|
Creativity	.91	1.22	-4.2005	0001
Desire for Creative Production	1.47	1.65	-1 6005	1108
Visualization before Creation	46	90	-4 0838	0001
Curiosity about Things	97	1 20	-3 4792	.0006
Multidimensional Originality	.79	1 19	-3.0767	0023
Mental Visualization	95	1 23	-2.5330	0120
Desire for Fantasy/ Daydreaming	.69	1.11	-3.0507	0026
Curiosity about Art	1 05	1 22	-0.9397	.3483

TABLE 6

PEARSON CORRELATION COEFFICIENTS PROCEDURE
FOR AGE BY CREATIVITY AND IMAGERY
IN INTERIOR DESIGN STUDENTS

Variable	r value	P > |R|
Creativity	0.1187	0723
Desire for Creative Production	0.1139	.0848
Visualization before Creation	0.0579	.3814
Curiosity about Things	0.0767	2462
Multidimensional Originality	0.1336	0430
Mental Visualization	0.0669	3120
Desire for Fantasy/Daydreaming	0.0324	.6242
Curiosity about Art	0.1945	.0030
Imagery	0.0244	.7133
Visual Imagery	-0.0381	.5659
Auditory Imagery	0.1073	.1051
Tactile Imagery	0.0213	.7487
Kinesthetic Imagery	-0.0552	.4052
Gustatory Imagery	-0.0127	.8417
Olfactory Imagery	0.1441	.0292
Organic Imagery	-0.0826	.2126

TABLE 7

PEARSON CORRELATION COEFFICIENTS PROCEDURE FOR CREATIVITY AND IMAGERY MEASURES AND THEIR SUBSCALES RHO/P > |R|

Imagery Variables	Creativity Variables 1	2	3	4	5	6	7	8
Im. Total	0.2559	0 0710	0 1715	0.1604	0.1875	0.2120	0.1314	0.2305
	.0001	2311	**.0090**	**.0146**	**.0042**	**.0012**	**.0459**	**.0004**
Visual	0.2141	0.0699	0.1021	0 1026	0.1193	0.2003	0.1172	0.1408
	.0011	2895	1216	1197	.0702	**.0022**	.0753	**.0324**
Auditory	0.2048	0.1104	0 0975	0 1232	0.1529	0.1754	0 1027	0.1878
	.0018	0939	1393	.0615	**.0201**	**.0075**	.1196	**.0042**
Tactile	0.2038	0.0301	0 2295	0.1174	0.1405	0.1555	0.0905	0.2207
	.0018	.6490	**.0004**	.0749	**.0328**	**.0180**	.1705	**.0007**
Kinesthetic	0 1971	-0.0083	0 1628	0.1255	0.1526	0 1710	0.1215	0.1182
	.0026	.8998	**.0132**	.0567	**.0203**	**.0092**	0651	.0728
Gustatory	0.1459	0.0287	0.1129	0.1327	0.1332	0.1518	0.0475	0.1659
	.0265	.6640	.0867	**.0438**	**.0431**	**.0210**	.4720	**.0116**
Olfactory	0.2105	0.0962	0.0984	0.16214	0.20115	0 1625	0.1229	0.1786
	.0013	1449	.1357	**.0136**	**.0021**	**.0134**	.0621	**.0065**
Organic	0 1209	0.0581	0.0861	0.0409	0.0391	0.0550	0.0633	0.1592
	.0665	.3787	.1922	5356	.5538	.4054	3378	**.0154**

Note: Creativity Variables:
1 - Total Creativity
2 - Desire for Creative Production
3 - Visualization before Creation
4 - Curiosity about Things
5 - Multidimensional Originality
6 - Mental Visualization
7 - Desire for Fantasy/Daydreaming
8 - Curiosity about Art

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CHAPTER V

PERSONALITY TYPES IN INTERIOR DESIGN STUDENTS; IS THERE A RELATIONSHIP BETWEEN TYPE, CREATIVITY AND IMAGERY?

MANUSCRIPT FOR PUBLICATION

JOURNAL TITLE: JOURNAL OF INTERIOR DESIGN EDUCATION AND RESEARCH

PERSONALITY TYPES IN INTERIOR DESIGN STUDENTS; IS THERE A RELATIONSHIP BETWEEN TYPE, CREATIVITY AND IMAGERY?

Abstract: Past research and literature suggests a link between personality type, creativity and imagery in design. The purpose of this study was to assess personality types in interior design students, and analyze the relationships between personality type, creativity, and imagery. The Myers-Briggs Type Indicator (MBTI), the Preference Inventory, and the Betts QMI were administered to 234 interior design students during a regularly scheduled class period. Results indicated a significant relationship between personality type and creativity, but not between imagery vividness and personality type. In addition to the relationships studied, an assessment of personality type and a comparison with the general population is discussed in detail.

Introduction

It is the author's contention that creativity, imagery, and personality type merit investigation in regard to interior design education. Creativity in the design process and product has been clearly implicated as being important to interior design education. (Dohr, 1982; Sawyers and Canestaro, 1989; Standards, 1980)

In addition to creativity, imagery has long been cited as an important skill in the design process (Downing, 1987; Goldschmidt, 1991; Kosslyn, 1980; Sommer, 1978). Much of the research on imagery and design deals primarily with visual imagery; which is the ability to form an image that is a sensation that comes to the mind's eye. This is due to the belief that designers must be able to visualize space three dimensionally in new and different ways.

Historically, creativity and imagery have been associated with one another (Paivio, 1971; Richardson, 1969; Sheehan, 1972). Others that have conducted more specific investigation of the interrelationship of imagery and creativity are: Forisha, 1978, 1981; Gowan, 1978; Kaufmann, 1981; Khatena, 1975; Rhodes, 1981; and Shaw and DeMers, 1986. Forisha (1978), Shaw and DeMers (1986) found significant relationships between selected measures of imagery and certain qualitative aspects of creative thinking.

Both creativity, imagery, and their relationship have been established as important to the design process. The way one thinks and approaches any design problem, can be developed (Taylor, 1976), but is primarily inherent in ones personality type. Personality has long been linked with creativity, individual styles of thinking and the approach one takes in solving a problem. Jung (1921) believed that people differ in the ways they take in information (perception) and the ways they make decisions (judgement). He developed a model based on this belief. His model describes four mental powers and four attitudes. The four mental powers are: (a) sensing, (b) intuition, (c) thinking, and (d) feeling. The four attitudes are: (a) extraversion, (b) introversion, (c) judgment, and (d) perception.

According to Jung (1921) there are two kinds of perception: sensing and intuitive. A sensing person focuses on immediate experiences and what exists. On the other hand, an intuitive person refers to the perception of possibilities. Intuitive perception is more closely related to creative discovery, where as sensing perception is related to practicality and realism.

In Jung's model there are also two types of judgement: thinking and feeling. A thinking person makes logical decisions, where as a feeling person bases their decisions on a more subjective aspect of personal and group values. Literature suggests that a feeling person would have a tendency toward creativity. Jung theorized that people could possess aspects of all traits but would have strong tendencies in one direction for each of the four variables. For example, a person might be an introvert who is an intuitive and thinking person. These traits will identify how, in most cases, that person approaches problems, interacts with people, and makes decisions. Jung's theory of psychological types provides an in depth theory in personality and thinking styles.

Jung's model was used as the theoretical base for the Myers-Briggs Type Indicator (MBTI). Isabel Briggs Myers and Katharine Cook Briggs developed the MBTI which classifies people into one of sixteen personality types. These sixteen types stem from a combination of the four mental powers and four attitudes discussed earlier.

Keirsey and Bates (1984) discussed the MBTI in detail. They not only discuss the sixteen personality types, but found that within the sixteen character types, four basic temperaments exist. They

classify these four temperaments as: (a) Dionysion temperament, (b) Epimethean temperament, (c) Promethean temperament, and (d) Apollonion temperament taken from Greek mythology.

The Dionysion temperament individuals are those that are SP's on the MBTI. Thirty-eight percent of the population fall into this category. These individuals are free, independent, and impulsive. They live for the immediate action. They gravitate to jobs where action is involved, and tend to be performing artists.

The Epimethean temperament individuals also comprise 38 percent of the population, and are those individuals that are SJ's on the MBTI. These individuals have a need to belong. They are dependable and stable with a strong work ethic. Giving is more important than receiving to these people, and they feel no gratitude or appreciation for their presence and cannot ask for it. They tend to be pessimistic and titles are important to them. One finds this type of temperament working in institutions; teaching, preaching, banking, etc.

Twelve percent of the population consists of the Promethian temperament individuals. These people are NT's on the MBTI. Power over nature fascinates them, and they have a desire to understand, control, predict and explain realities. They also want to achieve high levels of competencies, capabilities, and skills. They are individualistic and even arrogant. However, they are the most self-critical of the four temperament types. These people live in their work, even play is work. The jobs they are attracted to are: the sciences, mathematics, philosophy, architecture, design, and engineering. They enjoy developing models, exploring ideas, and

building systems.

The Apollonion temperament individuals are those NF's on the MBTI, and they occupy 12 percent of the population. They need to have meaning in life and their hunger is centered on people. They strive for unity and uniqueness and need to be recognized for this. A belief in being genuine with no facade or pretense is important to this type. They like to better the conditions of people in the world, and they are drawn to arts which involve verbal and written communication. They have difficulty placing limits on the amount of time and energy they devote to their work, and they work toward perfection. They are future oriented and focus on what might be. NF's professions tend to be writers, psychiatry, clinical work, counseling, ministry, and teaching. According to Dillon and Weissman (1987), NF's are drawn to the humanities and arts.

McCaulley (1987) identified sixteen approaches to problem solving related to the MBTI types. These sixteen types are outlined in Figure 4. McCaulley's work is interesting to educators and those that have an interest in learning and thinking styles.

Insert Figure 4 approximately here

The way one approaches a problem and makes decisions is strongly related to one's personality. The sixteen problem-solving approaches outlined above are interesting to review when discussing personality type, learning styles, and teaching styles within a

particular curriculum. When creativity is a goal of any curriculum or educational process, it makes sense to review different types of problem solving and how they relate to the processes taught in the classroom and the processes known to encourage creativity.

The demonstrated link between creativity, imagery, and personality type lend credence to this research dealing specifically with interior design students. The purpose of this study is to assess personality types in interior design students, and analyze the relationships between personality type, creativity, and imagery.

Method

Subjects and Procedure

The sample consisted of 234 junior and senior Interior Design students from 11 FIDER accredited programs in the United States. Data was collected in the spring semester of 1992. The questionnaires were compiled into one booklet with self-explanatory directions and administered by the professors during a regularly scheduled class period. No time limits were imposed.

Instruments

Several instruments were used in this study. The Betts QMI was selected to assess imagery vividness. The Preference Inventory (PI) was selected to assess creativity level. The Myers-Briggs Type Indicator (MBTI) was selected to assess personality type. In addition to these three instruments, ten questions were asked to gain demographic information.

The Myers-Briggs Type Indicator (Myers & Briggs, 1975) The Myers-Briggs Type Indicator (MBTI) was designed by Isabel Briggs Myers and Katharine Cook Briggs. They developed this questionnaire, based on Jung's (1921) model, to help people in non-clinical populations discover their own preferences for perception and judgement.

For the purpose of this study, the MBTI form G self-scorable version was used to assess personality type. The form G consists of 94 questions. The MBTI measures one's preferences on four scales; (a) Extravert "E" or Introvert "I", (b) Sensing "S" or Intuitive "N", (c) Thinking "T" or Feeling "F", and (d) Judging "J" or Perceiving "P". MBTI scoring generates four basic scores for each of the four preferences. There are sixteen types of preferences stemming from any combination in the four scales.

The MBTI is "one of the most widely used tools for working with normal populations" (McCaulley, 1990). Myers and McCaulley (1985) performed test-retest product-moment correlations of continuous scores to test reliability. They found correlations of .85 for females and .69 for males with form G of the MBTI. Internal consistency of continuous scores based on coefficient alpha were reported as: .74-.83 for "EI", .77-.85 for "SN", .64-.82 for "TF", and .78-.84 for "JP" (p. 169). They also performed correlation coefficients with 24 other personality measures to test for validity (pp. 177-206). Through their statistical analysis Myers and McCaulley (1985) determined the instrument to be reliable and valid.

The Shortened form of the Betts Questionnaire upon Mental Imagery (Sheehan, 1967) The purpose of the Betts QMI is to assess vividness of mental imagery. The questionnaire consists of five items in each of seven sensory modalities: visual, auditory, tactile, kinesthetic, gustatory, olfactory, and organic. Subjects are asked to rate the vividness of the mental imagery elicited by each of the 35 items. Rating is based on a seven degree scale, with responses ranging from "No image present at all" to " as vivid as the actual experience". Responses are averaged for each modality and for the total instrument, yielding a vividness of rating for each of the seven sensory modalities and a total vividness of imagery rating.

"Sheehan (1967) conducted cross-validation studies using the original Bett's and the shortened form. He reported correlations ranging from .92 to .98 and concluded that the shortened form predicted imagery vividness, essentially as well as the complete questionnaire" (Rhodes, 1981, p. 92).

According to White, Sheehan, and Ashton, the Bett's QMI instrument is internally consistent and reliable. The validity of this questionnaire has been primarily analyzed through the use of factor analysis. "Both Richardson and Sheehan believe that a general imagery trait is being assessed" (White, 1977, p. 151).

The Preference Inventory (Bull, 1978) This Preference Inventory (PI) was developed to appraise adult creativity. The questionnaire contains 53 questions with a five-point rating scale from strongly agree to strongly disagree. Seven factors are measured in this instrument. The seven subscales are: (a) desire for

creative production, (b) visualization before creation, (c) curiosity about things, (d) multidimensional originality, (e) mental visualization, (f) desire for fantasy/daydreaming, and (g) curiosity about art.

Bull and Davis (1982) computed Hoyt internal consistency reliabilities for the PI and found a .91 reliability. In addition to this they computed Pearson correlation coefficients between scores on the PI and several other tests of creativity, finding a range from .212 to .587. Their findings documented reliability and validity in the Preference Inventory.

Findings

Of the 234 subjects involved in this study the mean age was 24.16, with 69.1 percent of the students falling between ages 21 and 23. The range of age in the sample was from 19 to 58. Female students comprised 89.2 percent of the sample with 10.8 percent being male. The majority of the subjects were Caucasian (84.9%). Eighty-three percent of the sample were single and 17 percent were married.

Twenty-one percent of the sample were pursuing a minor in college. The subjects were primarily minoring in art, art history, architecture, and business management. Twelve percent of the subjects held prior degrees. Prior degrees were: business (13%), art/art history (21.7%), sociology/psychology (13%), fashion merchandising (4.3%), and other (47.8%). Work experience in related fields is summarized in Table 8. It is interesting that 44.8 percent of the sample have work experience in interior design. The author

contributes this to strong internship programs.

Insert Table 8 approximately here

Frequencies, sample percentages, and percentages for the general population for personality type (MBTI) are listed in Table 9. It is interesting to compare the sample of interior design students to the general population. All categories of NF (intuitive, feeling) types are sufficiently higher than the general population. Table 10 further classifies the personality types according to the Keirsey and Bates (1984) four temperaments. Due to the sample size, statistical calculations will be done with these four temperament classifications rather than with the 16 types. It is interesting to note that 40.2 percent of the sample were NF's/catalyst's, with only 12 percent of the general population falling into this category. Twenty-two percent of the sample were NT's/visionary temperaments. This category also occupies a higher percentage than the general population. Both the categories of SP's and SJ's held lower percentages of the sample than the percentages of the general population.

Insert Tables 9 and 10 approximately here

Frequencies and percentages for personality type by gender are listed in Table 11. In this sample gender and age does not impact on personality type. Analysis of variance procedure was performed to determine if there is a relationship between personality type and creativity (Table 12). There is a significant relationship between personality type and creativity and some of the creativity subscales.

Insert Tables 11 and 12 approximately here

Creativity is significantly related to personality type at the .05 alpha level (P = .0001). Visionaries (NT's) scored the highest on creativity, with a significant difference between themselves and the trouble shooters (SP's) and traditionalists (SJ's). The catalyst's (NF's) scored the next highest with a significant difference between this category and the trouble shooter's (SP's). The traditional (SJ's) personality type scored the next highest with the trouble shooter's (SP's) following. It is interesting to note that 62.4 percent of the sample are visionaries (NT's) and catalysts (NF's) which are the two personality types that scored the highest on the creativity instrument.

Personality type had a significant impact on several factors of creativity. The subscales of the creativity instrument found to be significantly related were: (a) desire for creative production, (b) multidimensional originality, (c) mental visualization, and (d) curiosity about art.

Analysis of variance procedure was also conducted to determine the relationship between personality and imagery vividness (Table 13). No significant relationship was found between personality type and imagery vividness or any of the imagery subscales.

Insert Table 13 approximately here

Summary

Given the results of this analysis, the evidence indicates a link between personality type and creativity in interior design students. Gender and age had no impact on personality types. These findings indicate that interior design students occupy all personality types according to the MBTI, with a large percentage being NF's and NT's, which is interesting due to the fact that those two categories are a smaller percentage of the general population.

Though a link exists between creativity and imagery, no relationship was found between personality type and imagery. Further research in styles of thought and imagery use in the creative design process in interior design students is necessary.

Due to the fact that creativity is of interest to interior design educators, this research provides further knowledge about factors that should be considered in developing teaching methodology and styles. The MBTI allows design instructors to have a better

understanding about why students think and approach problems differently. With this understanding teaching styles can be developed to enhance and encourage characteristics of the creative personality types, and provide flexibility for all types pursuing an education in interior design.

The profession of interior design has many facets, which allows many different personality types to be successful. As an educator one must be aware of these different types and mold each student to their strengths, not forgetting the goals of FIDER and the profession. This means providing opportunity for creative endeavor, and encouraging creativity in process and product.

Results of this study suggest looking closer at personality type and success as an interior design student and professional. This type of study would provide valuable information for advising purposes.

ISTJ	ISFJ	INFJ	INTJ
Contemplation Step-by-step,linear Analyze logically Organize, seek closure	Contemplation Step-by-step,linear Weigh values Organize, seek closure	Contemplation Back and forth, Global Weigh values Organize, seek closure	Contemplation Back and forth Global Analyze logically Organize, seek closure
ISTP	**ISFP**	**INFP**	**INTP**
Contemplation Step-by-step,linear Analyze logically Discover, adapt	Contemplation Step-by-step,linear Weigh values Discover, adapt	Contemplation Back and forth, Global Weigh values Discover, adapt	Contemplation Back and forth, Global Analyze logically Discover, adapt
ESTP	**ESFP**	**ENFP**	**ENTP**
Talk and action Step-by-step,linear Analyze logically Discover, adapt	Talk and action Step-by-step,linear Weigh values Discover, adapt	Talk and action Back and forth, Global Weight values Discover, adapt	Talk and action Back and forth, Global Analyze logically Discover, adapt
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**
Talk and action Step-by-step,linear Analyze logically Organize, seek closure	Talk and action Step-by-step, linear Weigh values Organize, seek closure	Talk and action Back and forth, Global Weigh values Organize, seek closure	Talk and action Back and forth, Global Analyze logically Organize, seek closure

NOTE: Extracted from McCaulley, 1987, p. 43.

FIGURE 4: THEORETICAL CHARACTERISTICS OF THE MBTI TYPES AS PROBLEM SOLVERS

TABLE 8

FREQUENCIES OF WORK EXPERIENCE IN RELATED FIELDS

Variables	Frequency	Percent
Art	51	22.0%
Architecture	32	13.8%
Technical Drawing	45	19.4%
Interior Design	104	44.8%
Industrial Art	5	02.2%
Construction	33	14.2%

N = 234

TABLE 9

FREQUENCIES AND PERCENTAGES FOR THE
MYERS-BRIGGS TYPE INDICATOR (MBTI)

Type	Keirsey & Bates Classification	Frequency	Percent (Sample)	Percent (Gen Population)
ENFJ	Pedagogue	21	9.0	5.0
ENFP	Journalist	37	15.8	5.0
ENTJ	Field Marshall	9	3.8	5.0
ENTP	Inventor	21	9.0	5.0
ESFJ	Seller	18	7.7	13.0
ESFP	Entertainer	11	4.7	13.0
ESTJ	Administrator	10	4 3	13.0
ESTP	Promoter	5	2.1	13.0
INFJ	Author	10	4.3	1.0
INFP	Quester	26	11.1	1.0
INTJ	Scientist	11	4.7	1 0
INTP	Architect	11	4 7	1.0
ISFJ	Conservator	15	6.4	6.0
ISFP	Artist	6	2.6	5.0
ISTJ	Trustees	15	6.4	6.0
ISTP	Artisan	8	3.4	7 0
TOTALS		234	100	100

TABLE 10

SUMMARY OF PERSONALITY TYPE CLASSIFICATION
WITH FREQUENCIES AND PERCENTAGES

Personality Type (MBTI)	Frequency	Percent (Sample)	Percent (Gen. Pop)
Dionysion Temperament			
Called: Trouble shooter **(SP's)**			
Composed of:			
ISTP	8	3.4	
ISFP	6	2.6	
ESTP	5	2.1	
ESFP	11	4 7	
	30	12.8	38 0
Epimethean Temperament			
Called: Traditional **(SJ's)**			
Composed of:			
ISTJ	15	6.4	
ISFJ	15	6.4	
ESTJ	10	4.3	
ESFJ	18	7.7	
	58	24 8	38.0
Promethean Temperament			
Called: Visionary **(NT's)**			
Composed of:			
INTJ	11	4.7	
INTP	11	4 7	
ENTP	21	9.0	
ENTJ	09	3.8	
	52	22.2	12.0
Apollonion Temperament			
Called. Catalyst **(NF's)**			
Composed of:			
INFJ	10	4.3	
INFP	26	11.1	
ENFP	37	15.8	
ENFJ	21	9.0	
	94	40.2	12.0

N = 234

TABLE 11

FREQUENCIES, PERCENTAGES, AND CHI SQUARE FOR PERSONALITY TYPE IN INTERIOR DESIGN STUDENTS BY GENDER

	FEMALE		MALE		TOTAL	
	N	%	N	%	N	%
Trouble shooter **(SP's)**	24	10.26	6	2 56	30	12.82
Traditional **(SJ's)**	54	23.08	4	1.71	48	24.79
Visionary **(NT's)**	47	20.09	5	2.14	52	22.22
Catalyst **(NF's)**	84	35.90	10	4 27	94	40.17
TOTAL	209	89.32	25	10.68	234	100.00

χ^2 = 3 663, df = 3, p = 300

TABLE 12

ANALYSIS OF VARIANCE PROCEDURE FOR PERSONALITY BY CREATIVITY

VARIABLE	MEAN SCORES by Personality Type				F value	P > F
	1 SP's	2 SJ's	3 NT's	4 NF's		
Creativity	1 38 (C)	1.27 (CB)	1.05 (A)	1 14 (AB)	7 54	.0001
A	1 81 (B)	1.67 (B)	1 44 (A)	1.64 (AB)	3 71	.0124
B	1 08 (B)	85 (A)	77 (A)	.82 (A)	2.42	.0665
C	1 32 (B)	1.21 (AB)	.99 (A)	1 15 (AB)	1.86	1365
D	1.49 (B)	1 36 (B)	.94 (A)	1 03 (A)	8.77	0001
E	1 42 (B)	1 27 (AB)	1.15 (A)	1 12 (A)	3.07	.0287
F	1.18 (A)	1.23 (A)	1.05 (A)	.98 (A)	2 57	.0554
G	1.62 (B)	1.58 (B)	.91 (A)	1.00 (A)	11.48	0001

NOTE: Duncan's New Multiple Range Test indicates means with different letters are significantly different.
Mean Scores are on a scale of 0 - 5 A low score indicates a high level of creativity
Creativity Subscales:
A Desire for Creative Production
B. Visualization before Creation
C. Curiosity about Things
D. Multidimensional Originality
E. Mental Visualization
F Desire for Fantasy/Daydreaming
G. Curiosity about Art

TABLE 13

ANALYSIS OF VARIANCE PROCEDURE FOR PERSONALITY BY IMAGERY VIVIDNESS

VARIABLE	MEAN SCORES by Personality Type				F value	P > F
	1 SP's	2 SJ's	3 NT's	4 NF's		
Imagery	1 36	1 25	1.16	1 12	1 27	.2869
Visual	1.50	1 21	1.40	1.19	1 33	.2853
Auditory	1.37	1 20	1 09	1 04	1 16	3271
Tactile	1 28	1 11	1 06	1 01	0 84	4743
Kinesthetic	1 24	1.18	97	1 09	1.06	3674
Gustatory	1 24	1.31	1.21	1 11	0.61	.6123
Olfactory	1 71	1.69	1 39	1.51	1 12	.3415
Organic	1 17	1.04	1.03	89	1.10	3492

NOTE: Mean Scores are on a scale of 0 - 7 A low score indicates a high level of imagery vividness

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APPENDIXES

APPENDIX A

QUESTIONNAIRE AND CORRESPONDENCE

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
FOR HUMAN SUBJECTS RESEARCH

Proposal Title: The Relationship Between Creativity, Imager, and Personality in Interior Design Students

Principal Investigator: Margaret J. Weber / Jeanne L. Diehl

Date: 3-18-92 IRB # HE - 92- 040

This application has been reviewed by the IRB and

Processed as: Exempt [X] Expedite [ ] Full Board Review [ ]

Renewal or Continuation [ ]

Approval Status Recommended by Reviewer(s):

Approved [X] Deferred for Revision [ ]

Approved with Provision [ ] Disapproved [ ]

Approval status subject to review by full Institutional Review Board at next meeting, 2nd and 4th Thursday of each month.

Comments, Modifications/Conditions for Approval or Reason for Deferral or Disapproval:

Signature: Marcia S. Tilley Date: 3-25-92
Chair of Institutional Review Board

OSU

Oklahoma State University

OFFICE OF THE ASSOCIATE DEAN FOR RESEARCH
COLLEGE OF HOME ECONOMICS

STILLWATER, OKLAHOMA 74078-0337
HOME ECONOMICS 108
405-744-5054

Dear Interior Design Major,

Your assistance with a research study related to management style and creativity would be greatly appreciated. I realize your time is valuable, but a few minutes of your time would be helpful. Data from this study will be used to assess students in Interior Design for recommendations for education; therefore, your input is extremely important.

Please answer the questions as honestly as possible. There are no right or wrong responses. Your responses will remain confidential.

Thank you in advance for your time and valuable assistance.

Sincerely,

Jeanne Diehl-Shaffer

Jeanne Diehl-Shaffer, ASID, IDEC
Assistant Professor, Interior Design

Margaret J. Weber

Dr. Margaret J. Weber
Professor

ID Number_____
School_____

A. Background

DIRECTIONS: For the following questions please check the appropriate blank provided to the left of each answer, or fill in the requested information. You may check more than one answer if necessary.

1. Age _____

2. Gender _____Male _____Female

3. Ethnicity (Check one)

(a)_____Afro-American
(b)_____Native American
(c)_____Oriental
(d)_____Caucasian
(e)_____Hispanic
(f)_____Other (Specify)_____

4 Present marital status (check one)

_____Married _____Single _____Divorced _____Widowed

5. Where did you live during the majority of your childhood?

(a) _____ Primarily in an urban area (population greater than 50,000)
(b) _____ Primarily in a suburban area (community outside of, but adjoining, a city of 50,000 or more)
(c) _____ Primarily in a rural area (population less than 50,000)
(d) _____ A mix of the above with less than 50% of the time in any one area.

6. What is your educational status?_____ Junior _____ Senior

7 Do you have a minor? _____ yes _____ no
If yes, what is your minor? _____

8. Is this your first degree? _____ yes _____ no
If no, what was your past degree? _____

9. Please indicate if you have had any work experience in the following areas:

_____ Art
_____ Architecture
_____ Technical drawing
_____ Other, please specify _____
_____ Design
_____ Industrial Art
_____ Construction

10. In what area are you interested in practicing Interior Design?

_____Residential Design
_____Intsitutional Design
_____Lighting Design
_____Commercial Design
_____Hospitality Design
_____Other, Please specify_____

B. Preference Inventory

Directions: These questions ask about your self-perceptions and attitudes. All questions are in a rating scale form which allows you to indicate the degree to which you agree with or accept the statement. Indicate how strongly you agree or disagree with the statements below. Mark your responses according to the following scale: Strongly Agree = SA, Agree = A, Undecided = U, Disagree = D, Strongly disagree = SD. Circle your answers below.

1	I have often thought of new ideas for products, stories, paintings, etc., and I have actually produced many of them.	SA A U D SD
2.	I cannot be bothered with taking things apart to find out what is inside them	SA A U D SD
3.	I have a great many interests.	SA A U D SD
4	When I am shown an object I can usually visualize where it might be used and the things which would be around it.	SA A U D SD
5	Paintings or pieces of sculpture can be appreciated but little value is gained by studying them.	SA A U D SD
6	When I was young, I was always building or making things.	SA A U D SD
7	I like to work on things which require me to create mental images.	SA A U D SD
8.	I often enjoy daydreaming about future projects, activities, or problems.	SA A U D SD
9.	I am very artistic.	SA A U D SD
10.	I like to look at old things and try to figure out what they were used for.	SA A U D SD
11.	When I visualize an art project I can't wait to complete it.	SA A U D SD
12.	I am often inventive or ingenious.	SA A U D SD
13.	I often enjoy daydreaming about future projects, activities, or problems.	SA A U D SD
14.	I like to visualize new things before I try to make them.	SA A U D SD
15.	I have always been active in drawing or painting.	SA A U D SD
16.	When I study a painting or sculpture I am interested in determining what cues the artist used to communicate his/her mood.	SA A U D SD
17.	I engage in some form of daydreaming every day.	SA A U D SD
18.	I am not interested in the way mechanical things work.	SA A U D SD
19.	I enjoy thinking of new and better ways of doing things.	SA A U D SD
20.	Sometimes I like to let myself go in fantasy before I go to sleep.	SA A U D SD
21.	I am quite original and imaginative.	SA A U D SD
22.	I get some of my best ideas by daydreaming rather than relying on books, well-established authorities, or other people.	SA A U D SD

23.	When I have an idea for an invention I can's wait to make it to see if it will work.	SA A U D SD
24	I have had many hobbies.	SA A U D SD
25.	When I get a new idea for making something I try to figure out how to make it work.	SA A U D SD
26.	When I am asked to create something that is new and different I first like to create a mental blueprint or plan for it.	SA A U D SD
27.	I would rate myself high in "intuition" or "insightfulness".	SA A U D SD
28.	The imaginary stories I create in my mind seem to be replays of ones I have thought up before.	SA A U D SD
29.	I like to create ideas and think about them.	SA A U D SD
30.	I like to make things.	SA A U D SD
31	I like trying new ideas and new approaches to problems.	SA A U D SD
32.	I do not like to go to art museums.	SA A U D SD
33.	I find it exciting to think about haw I will make something and how it will look.	SA A U D SD
34.	When I see something new I try to figure out how it was made and why it was made that way.	SA A U D SD
35.	I often become totally engrossed in a new idea.	SA A U D SD
36.	When I create a fantasy it is usually new to me.	SA A U D SD
37.	I like to read art history books.	SA A U D SD
38.	My daydreams are always interesting because they are new and different.	SA A U D SD
39.	I have engaged in a lot of creative activities.	SA A U D SD
40.	I can think of many ideas for new things but that is as far as it usually goes.	SA A U D SD
41.	I do not enjoy daydreaming.	SA A U D SD
42.	I like to think of ways to embellish tales which have been told to me.	SA A U D SD
43.	I want to understand how to build or make things.	SA A U D SD
44.	When I am going to make something new and different I can see it clearly in my mind before I begin.	SA A U D SD
45.	I am interested in learning about art of various types, i.e., painting, sculpture, etc.	SA A U D SD
46.	I have taken things apart just to find out how they work.	SA A U D SD

47	Sometimes I dream of things which I later make or do.	SA A U D SD
48.	I am not interested in making or building things.	SA A U D SD
49.	I like to create fantasize in my mind.	SA A U D SD
50	I like to discuss art (painting, sculpture, etc.) with other knowledgeable people.	SA A U D SD
51	I try to find out how different things work and why they work.	SA A U D SD
52.	Sometimes I dream of things which lead me to new insights and discoveries.	SA A U D SD
53.	I have experienced moments of inspiration and creativity when artistic expression, ideas, or the solution to problems that I have struggled with came to me with a special intensity and clarity.	SA A U D SD

C. The Betts QMI Vividness of Imagery Scale

Directions: The aim of this test is to determine the vividness of your imagery. The items of the test will bring certain images to your mind. You are to rate the vividness of each image by reference to the accompanying rating scale, which is shown below. For example, if your image is "vague and dim" you give it a rating of 5. Record your answer in the brackets provided after each item. Just write the appropriate number after each item. Before you turn to the items on the next page familiarize yourself with the different categories on the rating scale. Throughout the test, refer to the rating scale when judging the vividness of each image. A copy of the rating scale will be printed on each page. Please do not proceed to the next section until you have completed the items on the section you are doing, and do not turn back to check on other items you have done. Complete each page before moving on to the nest page. Try to do each item separately independent of how you may have done other items.

The image aroused by an item of this test may be:

Perfectly clear and as vivid as the actual experience	. . . Rating 1
Very clear and comparable in vividness to the actual experience	. Rating 2
Moderately clear and vivid	. . Rating 3
Not clear or vivid, but recognizable	. . Rating 4
Vague and dim	. . . Rating 5
So vague and dim as to be hardly discernible	. . . Rating 6
No image present at all, you only "knowing" that you are thinking of the object	. . . . Rating 7

An example of an item on the test would be one which asked you to consider an image which comes to your mind's eye of a red apple. If your visual image was moderately clear and vivid you would check the rating scale and mark "3" in the brackets as follows:

Item		Rating
5.	A red apple . .	(3)

Now turn to the next page when you have understood these instructions and begin the test.

Think of some relative or friend whom you frequently see, considering carefully the picture that rises before you mind's eye. Classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the rating scale.

Item		Rating
1	The exact contour of face, head, shoulders and body .	( )
2.	Characteristic poses of head, attitudes of body, etc. .	( )
3.	The precise carriage, length of step, etc. in walking	( )
4.	The different colors worn in some familiar costume . .	( )

Think of seeing each of the following, considering carefully the picture which comes before your mind's eye; and classify the image suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the rating scale.

5.	The sun as it is sinking below the horizon . . .	( )

Think of each of the following sounds, considering carefully the image which comes to you mind's ear, and classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the rating scale.

Item		Rating
6.	The whistle of a locomotive	( )
7.	The honk of an automobile	( )
8.	The mewing of a cat	( )
9.	The sound of escaping steam . .	( )
10.	The clapping of hands in applause.	( )

RATING SCALE: The image aroused by an item of this test may be:

Perfectly clear and as vivid as the actual experience	. . . Rating 1
Very clear and comparable in vividness to the actual experience	. . . . Rating 2
Moderately clear and vivid	. . . . Rating 3
Not clear or vivid, but recognizable	. . . . Rating 4
Vague and dim	. . . . Rating 5
So vague and dim as to be hardly discernible	. . . . Rating 6
No image present at all, you only "knowing" that you are thinking of the object	. . . . Rating 7

Think of "feeling" or touching each of the following, considering carefully the image which comes to your mind's touch, and classify the images suggested by each of the following questions as indicated bvy the degrees of clearness and vividness specified on the rating scale.

Item		Rating
11.	Sand	( )
12.	Linen	( )
13.	Fur	( )
14.	The prick of a pin	( )
15.	The warmth of a tepid bath . . .	( )

Think of performing each of the following acts, considering carefully the image which comes to your mind's arms, legs, lips, etc., and classify the images suggested as indicated by the degree of clearness and vividness specified on the rating scale.

Item		Rating
16.	Running upstairs	( )
17.	Springing across a gutter	( )
18.	Drawing a circle on paper	( )
19.	Reaching up to a high shelf	( )
20.	Kicking something out of your way	( )

RATING SCALE: The image aroused by an item of this test may be:

Perfectly clear and as vivid as the actual experience	... Rating 1
Very clear and comparable in vividness to the actual experience	.... Rating 2
Moderately clear and vivid	... Rating 3
Not clear or vivid, but recognizable	.... Rating 4
Vague and dim	.... Rating 5
So vague and dim as to be hardly discernible	.... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	.... Rating 7

Think of tasting each of the following considering carefully the image which comes to your mind's mouth, and classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the rating scale.

Item		Rating
21.	Salt	( )
22.	Granulated (white) sugar	( )
23.	Oranges	( )
24.	Jelly	( )
25.	Your favorite soup	( )

Think of smelling each of the following, considering carefully the image which comes to your mind's nose and classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the rating scale.

Item		Rating
26.	An ill-vented room	( )
27.	Cooking Cabbage	( )
28.	Roast beef	( )
29.	Fresh paint	( )
30.	New leather	( )

RATING SCALE

The image aroused by an item of this test may be:

Perfectly clear and as vivid as the actual experience	... Rating 1
Very clear and comparable in vividness to the actual experience	.... Rating 2
Moderately clear and vivid	... Rating 3
Not clear or vivid, but recognizable	... Rating 4
Vague and dim	... Rating 5
So vague and dim as to be hardly discernible	... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	.... Rating 7

Think of each of the following sensations, considering carefully the image which comes before your mind, and classify the images suggested as indicated by the degrees of clearness and vividness specified on the rating scale.

Item		Rating
31.	Fatigue	( )
32.	Hunger	( )
33.	A sore throat	( )
34.	Drowsiness	( )
35.	Repletion as from a very full meal	( )

RATING SCALE

The image aroused by an item of this test may be:

Perfectly clear and as vivid as the actual experience	.... Rating 1
Very clear and comparable in vividness to the actual experience	... Rating 2
Moderately clear and vivid	... Rating 3
Not clear or vivid, but recognizable	.... Rating 4
Vague and dim	... Rating 5
So vague and dim as to be hardly discernible	... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	... Rating 7

Myers-Briggs Type Indicator®

Form G — Self-Scorable Question Booklet

Katharine C. Briggs
Isabel Briggs Myers

Directions

There are no "right" or "wrong" answers to these questions Your answers will help show how you like to look at things and how you like to go about deciding things Knowing your own preferences and learning about other people's can help you understand where your special strengths are, what kinds of work you might enjoy, and how people with different preferences can relate to each other and be valuable to society

Read each question carefully and mark your answer on the separate answer booklet *Make no marks on this question booklet* Do not think too long about any question If you cannot decide how to answer a question, skip it and return to it later

When reading the questions, be sure to follow the question numbers and work ACROSS the page from left to right When you mark your answers on the separate answer booklet, you will also work across the page

There are two parts to this question booklet Part I is above the shaded line, the instructions for this part are at the top of the page Part II is below the shaded line, the instructions for this part are at the bottom of the page Be sure to read and follow the separate directions for each part

Read the directions on the front of the answer booklet After reading each question, mark your answer by making an "X" in the appropriate box

When you finish answering all the questions, read the directions at the bottom of your answer booklet for how to score your MBTI® Be sure to turn in your question booklet when you have finished with it

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3803 E. Bayshore Road, Palo Alto, CA 94303

PART I (above the shaded line). Which Answer Comes Closer to Telling How You Usually Feel or Act?
WORK ACROSS→

1 Are you usually (A) a "good mixer" or (B) rather quiet and reserved?	2 If you were a teacher would you rather teach (A) fact courses or (B) courses involving theory?	3 Do you more often let (A) your heart rule your head or (B) your head rule your heart?	4 When you go somewhere for the day would you rather (A) plan what you will do and when or (B) just go?
5 When you are with a group of people, would you usually rather (A) join in the talk of the group or (B) talk with one person at a time?	6 Do you usually get along better with (A) imaginative people or (B) realistic people?	7 Is it a higher compliment to be called (A) a person of real feeling or (B) a consistently reasonable person?	8 Do you prefer to (A) arrange dates, parties, etc. well in advance or (B) be free to do whatever looks like fun when the time comes?
9 In a large group do you more often (A) introduce others or (B) get introduced?	10 Would you rather be considered (A) a practical person or (B) an ingenious person?	11 Do you usually (A) value sentiment more than logic or (B) value logic more than sentiment?	12 Are you more successful (A) at dealing with the unexpected and seeing quickly what should be done or (B) at following a carefully worked out plan?
13 Do you tend to have (A) deep friendships with a very few people or (B) broad friendships with many different people?	14 Do you admire more the people who are (A) conventional enough never to make themselves conspicuous or (B) too original and individual to care whether they are conspicuous or not?	15 Do you feel it is a worse fault to be (A) unsympathetic or (B) unreasonable?	16 Does following a schedule (A) appeal to you or (B) cramp you?
17 Among your friends are you (A) one of the last to hear what is going on or (B) full of news about everybody?	18 Would you rather have as a friend (A) someone who is always coming up with new ideas or (B) someone who has both feet on the ground?	19 Would you rather work under someone who is (A) always kind or (B) always fair?	20 Does the idea of making a list of what you should get done over a weekend (A) appeal to you or (B) leave you cold or (C) positively depress you?
21 Do you (A) talk easily to almost anyone for as long as you have to or (B) find a lot to say only to certain people or under certain conditions?	22 In reading for pleasure do you (A) enjoy odd or original ways of saying things, or (B) like writers to say exactly what they mean?	23 Do you feel it is a worse fault (A) to show too much warmth or (B) not to have warmth enough?	(On this next question *only* if two answers are true, mark both.) 24 In your daily work do you (A) rather enjoy an emergency that makes you work against time or (B) hate to work under pressure or (C) usually plan your work so you won't *need* to work under pressure?
25 Can the new people you meet tell what you are interested in (A) right away, or (B) only after they really get to know you?	26 In doing something that many other people do, does it appeal to you more to (A) do it in the accepted way or (B) invent a way of your own?	27 Are you more careful about (A) people's feelings, or (B) their rights?	28 When you have a special job to do do you like to (A) organize it carefully before you start or (B) find out what is necessary as you go along?
29 Do you usually (A) show your feelings freely or (B) keep your feelings to yourself?	30 In your way of living, do you prefer to be (A) original, or (B) conventional?	**PART II (see instructions below).** 31 (A) gentle (B) firm	32. When it is settled well in advance that you will do a certain thing at a certain time do you find it (A) nice to be able to plan accordingly, or (B) a little unpleasant to be tied down?
33. Would you say you (A) get more enthusiastic about things than the average person, or (B) get less excited about things than the average person?	34 Is it higher praise to say someone has (A) vision or (B) common sense?	35 (A) thinking (B) feeling	36. Do you (A) rather prefer to do things at the last minute or (B) find doing things at the last minute hard on the nerves?
37 At parties, do you (A) sometimes get bored or (B) always have fun?	38 Do you think it more important to be able (A) to see the possibilities in a situation, or (B) to adjust to the facts as they are?	39 (A) convincing (B) touching	40 Do you think that having a daily routine is (A) a comfortable way to get things done or (B) painful even when necessary?
41 When something new starts to be the fashion, are you usually (A) one of the first to try it or (B) not much interested?	42 Would you rather (A) support the established methods of doing good, or (B) analyze what is still wrong and attack unsolved problems?	43 (A) analyze (B) sympathize	44 When you think of some little thing you should do or buy do you (A) often forget it till much later or (B) usually get it down on paper to remind yourself or (C) always carry through on it without reminders?
45. Are you (A) easy to get to know or (B) hard to get to know?	46 (A) facts (B) ideas	47 (A) justice (B) mercy	48 Is it harder for you to adapt to (A) routine or (B) constant change?
49 When you are in an embarrassing spot, do you usually (A) change the subject, or (B) turn it into a joke, or (C) days later, think of what you should have said?	50 (A) statement (B) concept	51 (A) compassion (B) foresight	52. When you start a big project that is due in a week do you (A) take time to list the separate things to be done and the order of doing them or (B) plunge in?
53. Do you think the people close to you know how you feel (A) about most things, or (B) only when you have had some special reason to tell them?	54 (A) theory (B) certainty	55 (A) benefits (B) blessings	56. In getting a job done do you depend on (A) starting early, so as to finish with time to spare, or (B) the extra speed you develop at the last minute?
57 When you are at a party, do you like to (A) help get things going, or (B) let the others have fun in their own way?	58. (A) literal (B) figurative	59 (A) determined (B) devoted	60 If you were asked on a Saturday morning what you were going to do that day, would you (A) be able to tell pretty well, or (B) list twice too many things, or (C) have to wait and see?
61 (A) hearty (B) quiet	62. (A) imaginative (B) matter-of-fact	63 (A) firm-minded (B) warm-hearted	64. Do you find the more routine parts of your day (A) restful, or (B) boring?

(continued)

PART II (below the shaded line). Which Word in Each Pair Appeals to You More?
Think what the words mean, not how they look or how they sound.

PART II (continued). Which Word in Each Pair Appeals to You More?

Think what the words mean, not how they look or how they sound.

WORK ACROSS ⟶

65	(A) reserved (B) talkative	66	(A) make (B) create	67	(A) peacemaker (B) judge	68	(A) scheduled (B) unplanned
69	(A) calm (B) lively	70	(A) sensible (B) fascinating	71	(A) soft (B) hard	72	(A) systematic (B) spontaneous
73	(A) speak (B) write	74	(A) production (B) design	75	(A) forgive (B) tolerate	76	(A) systematic (B) casual
77	(A) sociable (B) detached	78	(A) concrete (B) abstract	79	(A) who (B) what	80	(A) impulse (B) decision
81	(A) party (B) theater	82	(A) build (B) invent	83	(A) uncritical (B) critical	84	(A) punctual (B) leisurely
		85	(A) foundation (B) spire	86	(A) wary (B) trustful	87	(A) changing (B) permanent
		88	(A) theory (B) experience	89	(A) agree (B) discuss	90	(A) orderly (B) easygoing
		91	(A) sign (B) symbol			92	(A) quick (B) careful
		93	(A) accept (B) change				
		94	(A) known (B) unknown				

APPENDIX B

OBJECTIVE SIX

Objective Six: To discuss implications and make recommendations for interior design studio instruction based on the findings of this study.

Introduction

The significant correlation found between creativity and imagery in this investigation suggests that these two components are valuable in the design process. In addition to this correlation, the medium-to-high level of creativity and imagery vividness found in this sample implies that imagery could be valuable as a teaching/learning component in the creative design process. The following model of design inquiry and application of this model provides a basis for a creative teaching methodology in the design studio.

A Model of Design Inquiry

Based on the findings from an extensive literature review the author has developed a model of design inquiry. Design inquiry begins with the initial information available on any given project and follows through to a solution. During design inquiry the designer analyses the project requirements and familiarizes themselves with the physical space to be worked with. Once this analysis has taken place the creative synthesis may begin through schematic design and design development. During these phases of the design process the designer explores various option integrations with the use of visual imagery. The designer must then express those ideas or reintegrate

the images into the one most pleasing, useful, or unique. The communication tools most commonly used during this phase of development are words and sketches. One must have visual thought or an image in their mind prior to transferring their ideas to paper (See Figure 5).

Insert Figure 5 approximately here

Written information and sketches are not only used for communication but also to record our thoughts; it is very difficult for one to remember all the images that have been explored.

McKim (1980) posits the concept of "visual thinking." He believes that visual thinking is composed of three kinds of visual imagery; 1. the kind that replicates what we see; 2. the kind that we imagine in our mind's eye without external referents; and 3. the kind that we translate by drawing, doodling, or painting. McKim believes the three are interactive and form a method of visual thinking.

The model of design inquiry presented here is also a concept of visual thinking related specifically to interior design. In this model the process described in Figure 6 is used in all three stages of the model. In other words, within each phase of design inquiry the designer uses visual imagery to explore options. Then these ideas become substantive by communicating through written word, verbal speech, or sketching.

Insert Figure 6 approximately here

In this model of design inquiry, visual imagery is used in the analysis/programming phase to create an image of the project requirements, both aesthetic and functional, and to review the physical space being designed. During the analysis of the physical space, many times the designer is confronted with only a two-dimensional plan of the space. In order to better understand the space, the designer should be thinking in three-dimensional form. Visual imagery is used at this stage to develop or visualize the components of the space three-dimensionally. The two-dimensional floor plan is used as external-stimulus to project a three-dimensional image (See Figure 7). These components can be manipulated until a satisfactory synthesis/reintegration is achieved.

Insert Figure 7 approximately here

This three-dimensional image of the space allows the designer to analyze any physical limitations as well as spatial opportunities afforded with the given physical surroundings. This image of the

physical space plus the image of the project requirements remains with the designer throughout the process.

The model breaks the synthesis stage of design inquiry down to two phases; 1. schematic design; and 2. design development. Visual imagery is used during schematic design to create many holistic design concepts, integrations, and to explore their options with the project requirements and spatial considerations in mind. Design development is a further refinement of the schematic design in which detailed development, reintegration, takes place. An example of this could be working out a woodworking detail on a reception desk, or a specific area of space planning.

Through the use of imagery, the designer can easily visualize and design three-dimensionally, creating many options to explore. During the exploration of these options, the design elements and principles, as well as, the technical knowledge can be applied. This model of design inquiry focuses on the use of visual imagery as a form of thought which is necessary in interior design.

Applying this Model of Design Inquiry in the Teaching of Interior Design

It is common knowledge that factors such as repressive environments and fear of rejection can hinder creativity (Koberg & Bagnall, 1981; Davis, 1986). Imagery allows the student to explore options without fear, because others cannot see their visual thoughts. During design inquiry in the classroom, the instructor should attempt to create a safe environment for idea generation so that the students are free to communicate all of their solutions.

The instructor should also encourage a loose approach to the design inquiry stage of a project. The following ideas may help encourage a loose approach: 1. encourage the students to imagine with their eyes closed or staring ahead, 2. encourage the quick generation of many ideas, 3. discourage the use of parallel rules or straight edges, and 4. encourage the use of markers, felt-tip pens or other writing instruments that promote free-flowing sketches. This process supports rapid and creative integrating images.

Three important factors of success with this model are the student's ability to create self-generated visual images, to integrate these images into a coherent design, and to communicate these ideas through sketches and writing. Educators of interior design give great attention to incorporating drawing and writing into the curriculum. However, little attention is given to the training of creative thought, imagery generation, and imagery integration.

Imagery exercises can help a student to develop visualization skills. Imagery exercises can be practiced in either a team or individual format. The scenario for the team exercises would be to have teams of two, where the first partner generates an image, and communicates that image to their partner verbally. The second partner than is asked to generate sketches based on the other's verbal description of the image. This exercise can be done several times with partners trading responsibilities. Images could be modified, grouped or built upon to promote imagery integration.

Three types of imagery exercises for the individual are valuable. The first type of exercise involves asking the student to

create self-generated images. To start the instructor may want to suggest something in particular, such as a chair or a house. One should begin with simple items and then expand the scope of the image to more complicated things such as an entire space. The latter promotes imagery integration. The second type of individual exercise consists of having the student manipulate an image. An example of this would be to rotate, simplify, expand, or change the color of an existing image. Exercises of three-dimensional projection are the third type. For this exercise the student takes a two-dimensional plan and in their mind they project the walls up to create a three-dimensional image of the space. All three of these exercises for individuals need to be communicated through words or sketches.

Based on the model of using imagery in design inquiry, a seven stage approach to teaching in the interior design studio has been developed. The stages are: 1. visual imagery exercises, 2. project requirements review, 3. three-dimensional imagery exercise, 4. the requirements image, 5. holistic concept generation, 6. closure of concept, and 7. detailed development of concept.

The first phase involves the instructor leading a series of visual imagery exercises outlined above. This phase prepares the students mind for visual thought, and creates a relaxed environment. The second phase includes a review of the programming requirements and the physical space for the particular project. In the third phase the student is asked to perform a three-dimensional projection exercise to foster image integration using the plan for the given project. In the fourth phase the instructor gives the

students some time to form an image of the overall project needs and spatial considerations. The first four phases of this teaching approach prepare the student to proceed with design. At this point the students should have a clear image of the programming requirements and spatial considerations. If they do not, they should repeat phases two, three, and four. At the end of the fourth stage the instructor should remind the students that this overall image needs to remain with them throughout the completion of the design inquiry.

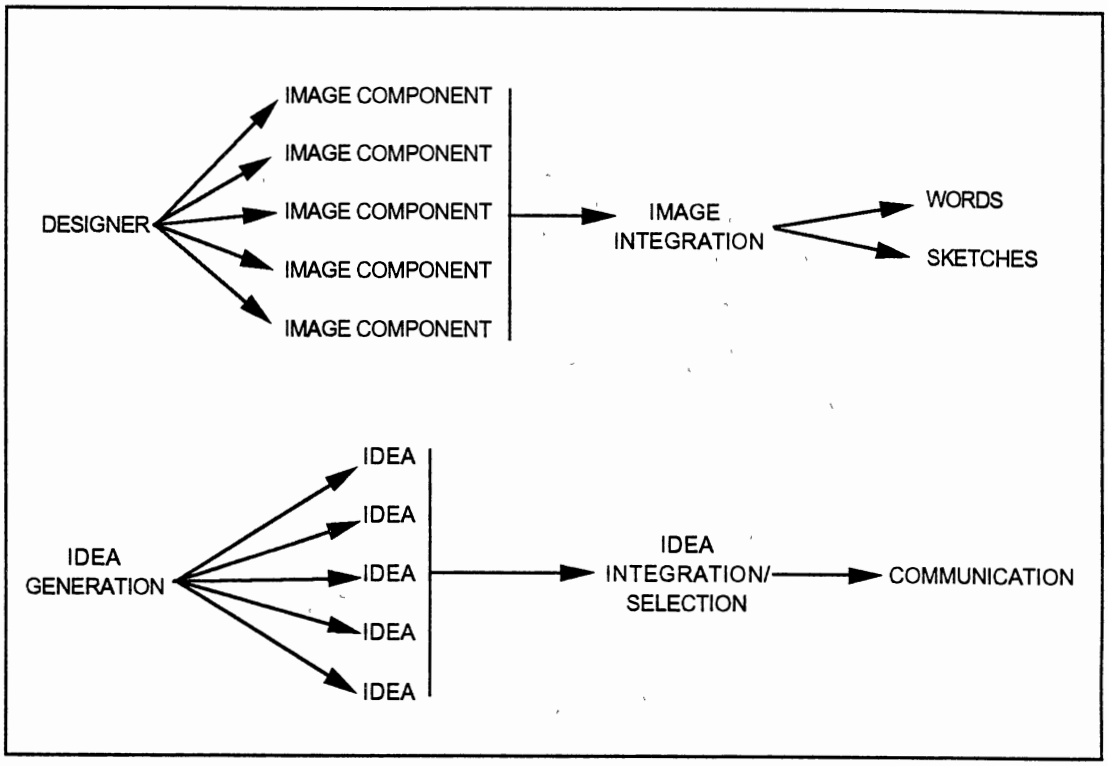
The fifth phase of this instructional method involves using visual imagery as a brainstorming tool to generate holistic concepts. The students should be encouraged to communicate all ideas generated. In the sixth phase students further analyze the ideas generated in phase five and should come to closure on a concept utilizing image integration. The fifth and sixth phases are known as schematic design. The final phase, design development, encourages the students to work out the specific details of the holistic concept, leading to image reintegration. This seven phase instructional method encourages the use of imagery during design inquiry. It also allows for individual teaching styles within the framework.

Summary

The model of design inquiry was developed based on the overwhelming agreement that imagery is an important factor in fields such as architecture, design, and the visual arts. Based on the literature review of imagery, creativity, design process, and the findings of this study, the author posits that imagery integration

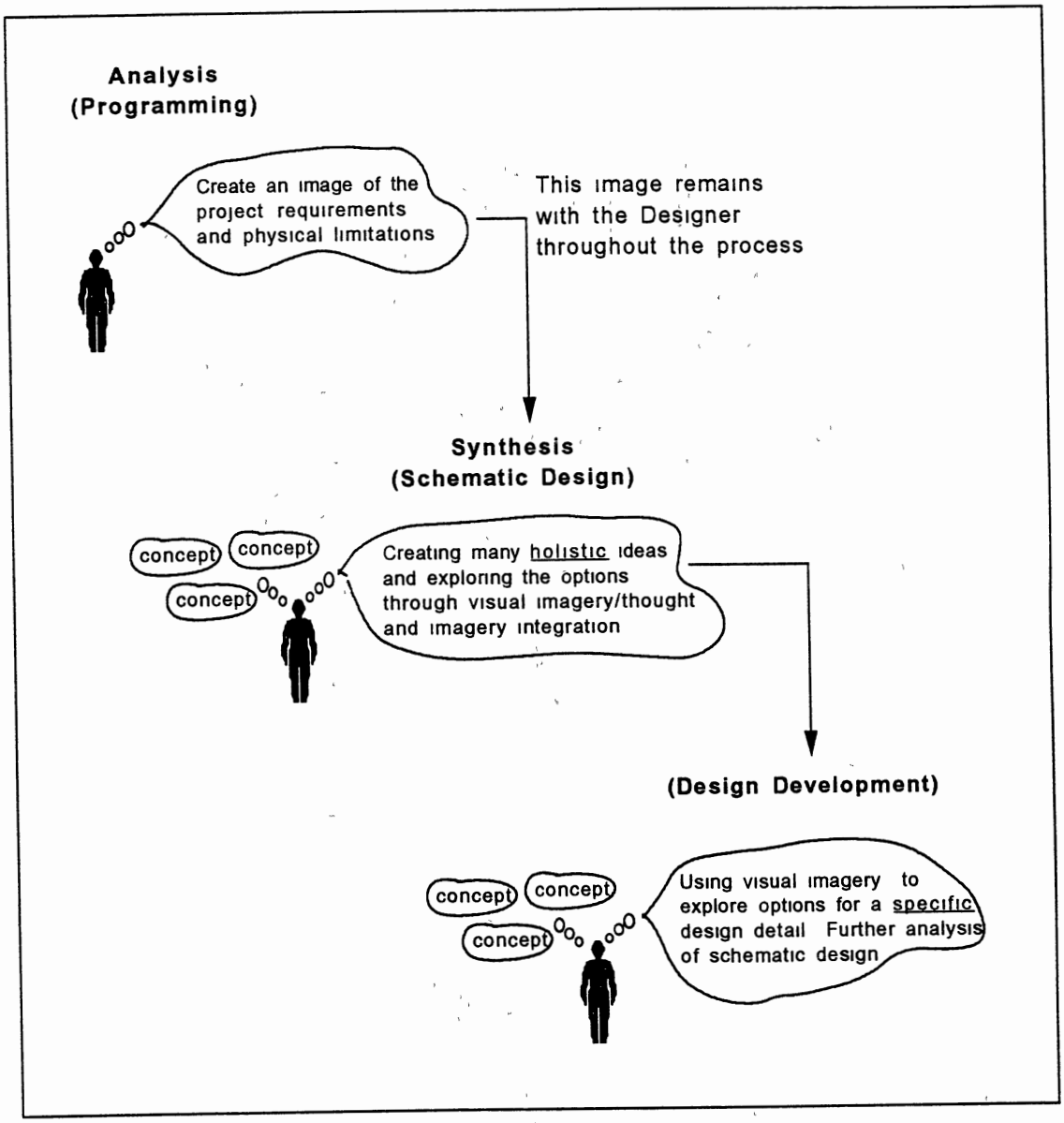
can be used to induce creative thought during the process of design inquiry.

The use of self-generated images in design inquiry has interesting implications for interior design education. Does visual imagery need to become one of the many technical skills developed during a students education? Can one generate more creative ideas with the use of visual imagery? These questions can only be answered through more scientific exploration. Further research is necessary in the areas of imagery training, design process, imagery integration, and teaching approaches in interior design.



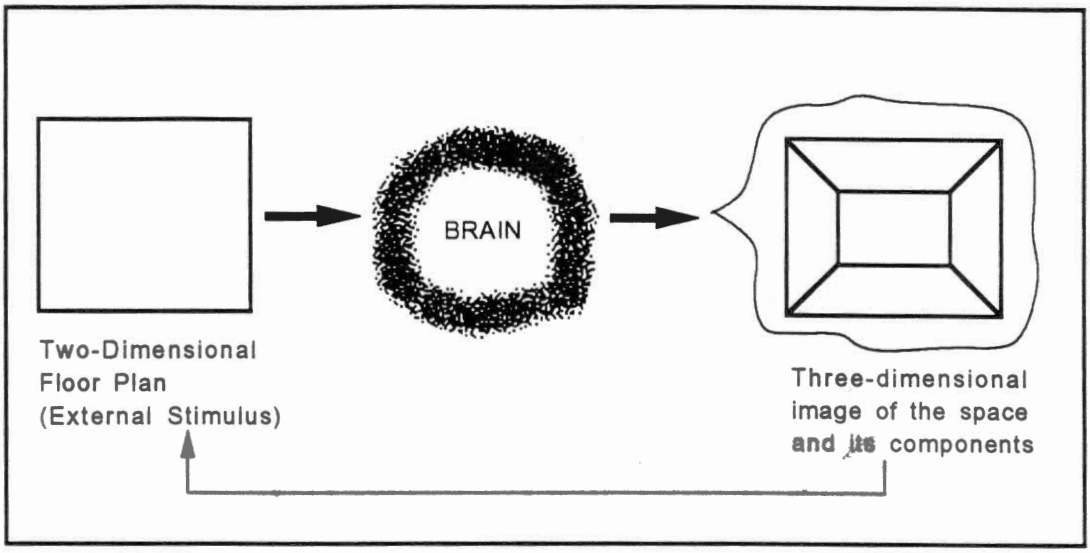
Note Taken from unpublished manuscript by Diehl-Shaffer, J and Bull, K S , 1992

Figure 5. Tools of the Trade



Note Taken from unpublished manuscript by Diehl-Shaffer, J and Bull, K S , 1992

Figure 6. Design Inquiry



Note: Taken from unpublished manuscript by Diehl-Shaffer, J. and Bull, K.S., 1992

Figure 7. Three-Dimensional Image Generation

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APPENDIX C

ADDITIONAL TABLES

TABLE 14

INTERIOR DESIGN STUDENTS INTEREST
IN PRACTICING SPECIALIZATIONS

Variables	Frequency	Percent
Residential Design	121	52.2%
Institutional Design	32	13.8%
Lighting Design	23	09.9%
Commercial Design	132	56.9%
Hospitality Design	52	22.4%

TABLE 15

T-TEST PROCEDURE FOR CREATIVITY AND IMAGERY BY RACE IN INTERIOR DESIGN STUDENTS

Variable	Mean Scores Caucasian N =197	Other N = 37	T-value	P > |T|
Creativity	1.17	1 29	-1.8733	.0623
Desire for Creative Production	1 63	1.62	0 0595	9526
Visualization before Creation	82	.98	-1 6726	.0958
Curiosity about Things	1 14	1 23	-0.8164	4151
Multidimensional Originality	1 12	1 30	-1.5223	1293
Mental Visualization	1 20	1 22	-0.3260	7455
Desire for Fantasy/ Daydreaming	1.06	1 08	-0.1735	8624
Curiosity about Art	1 20	1 24	-0.2903	.7719
Imagery	1 19	1.21	-0.1387	.8898
Visual Imagery	1 28	1 26	0 1273	8988
Auditory Imagery	1.12	1.22	-0.6252	5325
Tactile Imagery	1.06	1 20	-0.9136	3619
Kinesthetic Imagery	1.10	1.12	-0.0881	9298
Gustatory Imagery	1.24	98	1.6315	1042
Olfactory Imagery	1.53	1.72	-1.0155	3109
Organic Imagery	1.00	96	0.3107	7563

Note: Mean Scores are on a scale of.
Creativity Factors. 0 - 5 A low score indicates a high level of creativity
Imagery Factors: 0 -7 A low score indicates a high level of imagery vividness

TABLE 16

T-TEST PROCEDURE FOR IMAGERY VIVIDNESS AMONG MALE AND FEMALE INTERIOR DESIGN STUDENTS

Variable	Mean Scores Male N = 25	Female N = 209	T-value	P > |T|
Imagery	1.11	1.20	-0.6988	4854
Visual Imagery	1 34	1 27	0.3298	7418
Auditory Imagery	97	1.15	-0 9719	3321
Tactile Imagery	1 10	1 08	0.1072	9147
Kinesthetic Imagery	97	1 12	-0 9522	3420
Gustatory Imagery	1.10	1.21	-0.6218	5347
Olfactory Imagery	1 40	1.57	-0.7960	.4269
Organic Imagery	90	1.00	-0.9343	3556

Note Mean Scores are on a scale of 0 - 7 A low score indicates high level of imagery vividness

TABLE 17

ANALYSIS OF VARIANCE PROCEDURE FOR CREATIVITY BY CHILDHOOD ENVIRONMENT

Variable	Mean Scores Urban N = 61	Suburb N = 101	Rural N = 61	F value	P > F
Creativity (total)	1.23	1.13	1.21	1 57	0.2105
Desire for Creative Production	1.66	1.61	1 61	0.31	0.7306
Visualization before Creation	.91	.77	.89	1.85	0.1596
Curiosity about Things	1.30	1.10	1.10	2.13	0.1215
Multidimensional Originality	1.15	1.11	1 23	0.65	0.5220
Mental Visualization	1 20 (AB)	1.13 (A)	1.32 (B)	2.37	0 0961
Desire for Fantasy Daydreaming	1 15	1.02	1.07	0.80	0.4484
Curiosity about Art	1.24	1.11	1.28	0.94	0.3931

Note: *Duncan's New Multiple Range Test indicates means with different letters are significantly different.

*Mean Scores are on a scale of 0 - 5. A low score indicates high levels of creativity

TABLE 18

ANALYSIS OF VARIANCE PROCEDURE FOR IMAGERY VIVIDNESS BY CHILDHOOD ENVIRONMENT

Variable	Mean Scores			F value	P > F
	Urban N = 61	Suburb N = 101	Rural N = 61		
Imagery (total)	1.24	1 15	1.22	0.39	0.6759
Visual Imagery	1.37	1 19	1.33	0 90	0.4093
Auditory Imagery	1 13	1.09	1.20	0 26	0.7711
Tactile Imagery	1.18	1 02	1 12	0.80	0.4506
Kinesthetic Imagery	1.14	1.13	1 09	0 10	0.9019
Gustatory Imagery	1.07	1.21	1.21	0.05	0.9504
Olfactory Imagery	1 61	1 49	1.49	0.27	0.7625
Organic Imagery	1.05	93	1.09	0.94	0 3927

Note: *Mean Scores are on a scale of 0 - 7. A low score indicates a high level of imagery vividness.

VITA

JEANNE L. DIEHL

Candidate for the Degree of

Doctor of Philosophy

Thesis: THE RELATIONSHIP BETWEEN CREATIVITY, IMAGERY, AND PERSONALITY TYPES IN INTERIOR DESIGN STUDENTS

Major Field: Home Economics

Biographical:

Personal Data: Born in Jacksonville, Florida, June 2, 1960, the daughter of Russell Diehl Jr. and Lois Korona Diehl. Married to Lawrence J. Shaffer, June 15, 1991.

Education: Received Bachelor of Science degree in Interior Design from Oklahoma State University, Stillwater, Oklahoma in May 1982; received Master of Science degree in Housing, Interior Design, and Consumer Studies from Oklahoma State University in December, 1984; completed requirements for the Doctor of Philosophy degree at Oklahoma State University in December, 1992.

Professional Experience: Assistant Professor, Interior Design Department, Mount Vernon College, Washington, DC, August 1988 - present; Project Designer, Interior Planning & Design, Washington, DC, September 1987 - August 1988; Instructor, Housing, Interior Design, and Consumer Studies Department, Oklahoma State University, August 1985 - August 1987.