

TEACHER IMPACT ON STUDENT CREATIVITY

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A Project Submitted to the Faculty of

The Evergreen State College

In Partial Fulfillment of the Requirements

For the Degree of

Master in Teaching

2009

This Project for the Master in Teaching Degree

by

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has been approved for

The Evergreen State College

by

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## ABSTRACT

This paper examines the effects of teacher attitudes and behaviors on student creative performance. An investigation of the history of creativity research, and corresponding educational movements, provides the background for the current crisis of definition in creativity research, while simultaneously illuminating the role of the teacher as a gatekeeper of student creativity. A critical review of the literature reveals conflicted and questionable findings that further illustrate the lack of a consistent and complete conceptualization of creativity by the research community. Tentative classroom implications are discussed and suggestions for further research are outlined.

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## ACKNOWLEDGMENTS

I would like to express gratitude and appreciation to my faculty advisor, Dr. Masao Sugiyama. Thank you for your guidance in interpreting statistical results and your good-humored patience and advice throughout the process of compiling this literature review. I would also like to thank Tim for his friendship and tireless support—you are a creative genius. To my housemate Lorri, thanks for always being a few steps ahead of me and answering my questions with a smile. Finally, a fond thank you to my family, the Milroy household, Gary Jr. and my trusty bicycle.

## CHAPTER ONE: INTRODUCTION

### *Introduction*

Creativity is a complex, yet important educational outcome. Creative thinking is valuable on both an individual and societal level. Creativity is the construction of a product that is both novel and useful within a social context. All people who are capable of constructing knowledge are capable of developing their creativity. The goal of this paper is to examine the role of the teacher in shaping student creativity. This chapter explains the value of creativity, consider the role of the teacher, and provide a specific definition of creativity. Chapter two draws historical and social parallels between educational movements in the United States and creativity research—it focuses primarily on the last sixty years. The third chapter critically examines the recent literature base that connects creativity to teaching practices. Finally, the fourth chapter interprets the results of the literature review and outlines the effects of different teaching behaviors on student creativity. It offers potential classroom implications and highlights specific arenas that need further research.

### *Rationale*

Many psychologists, educators, researchers and theorists argue in favor of both the study and development of creativity. Creativity is a key tool used to solve multidimensional, complicated problems, especially those on a global scale (Beghetto, 2005; Martinsen, 2003). Jalongo (2003) argued creativity is connected to resourcefulness, invention, imagination and ethics—all key components of problem solving in the present day and the unknown future. Indeed, Martinsen stated, “creativity is fundamental to all individual and societal development” (p. 227). Creative thought is flexible thought—ideal

for adapting with a rapidly changing global market, organizational structure or workplace (Crockenberg, 1972; James, Clark, & Cropanzano, 1999; Sternberg, 2000; Kind & Kind, 2007). Intelligence alone does not translate into innovation (Crockenberg, 1972).

Creative ideas, because they are both novel and appropriate, are highly valued by business and industry (Guilford, 1950; Plucker, Beghetto, & Dow, 2004). Ingenuity is also a crucial piece of scientific discovery (Simonton, 2003). According to Guilford (1950) creative leaders hold two crucial qualities: vision and imagination. While multiple theoretical perspectives on the topic exist, ultimately the research community agrees that creativity is a source of accomplishment, increased productivity or additional socially valuable outcomes (Esquivel, 1995).

While creative acts may have broad social implications, there are also individual benefits to enhancing creativity. Sternberg (2000) and Martinsen (2003) argued creativity allows for the development of both adaptation and coping skills. Cropley (1990) proposed a connection between creativity and individual mental health, particularly in reference to the psychological attributes associated with creativity: “openness, autonomy, playfulness, and flexibility” (p. 175). Creativity’s connection to the preservation of mental health may impact therapeutic interactions (Plucker, Beghetto, & Dow, 2004). Martinsen further argued that creativity is a productive response to feelings of boredom or despair. Feldhusen & Goh (1995) attributed creative thinking to the ability to adapt and therefore achieve personal goals that are set beyond an individual’s current skill level. In this case, creativity is linked to a way of seeing or problem finding. Creative strategy application may lead to both individual success and a broader feeling of personal satisfaction (Treffinger, 1995; Sternberg 2003; Plucker, Beghetto, & Dow, 2004).



On an even smaller scale, a body of research connected enhanced creativity in students and improved academic achievement. Fortner (1986) found that a group of students with learning disabilities demonstrated improvement in written expression following instruction in creative thinking. Another researcher found a correlation between student creativity and English Language Learner (ELL) academic grades in English class (Otto, 1998). McClusky, Baker, and McClusky (2005) used a creativity training program in conjunction with other services to reach marginalized groups of youth (high school dropouts and Native Canadian inmates) and reported the following outcomes: improved academic success and reduced recidivism. This particular project was simply programmatic exploration, but the authors recommended the use of creative thinking activities in conjunction with more traditional social services to support the success of at-risk youth. Finally, Luftig (2000) studied the effects of an arts program on both creativity and academic achievement and documented a correlation between improved creativity and improved math and reading achievement. Although further research is required, these initial studies support an additional reason to foster creativity in the classroom.

Due to the many and multifaceted benefits of creativity the majority of teachers and schools in the United States have claimed enhanced student creativity as an educational goal (Klein, 1982; Beghetto, 2007). However, in the discourse of schooling and education creativity is often only mentioned in the realm of the gifted child. Students who are measured (often by standardized tests) to be highly intelligent, precocious or talented are pulled into special programs intended to harness these abilities and engage their inquisitive minds. Often these are the only students who receive lessons and training

in creativity. There is a wide and varied debate concerning the implementation of gifted and talented programs in schools. The intention of this paper is not to enter into this debate, but to investigate whether the expansion of creative thought should be included in all classrooms regardless of student abilities. Frequently the exclusion of the majority of students from explicit work with creativity and creative thinking skills is the result of misconceptions about creativity.

Plucker, Beghetto and Dow (2004) argued one widely held misinformation about creativity exists: Some students are creative and others are not—end of story. This idea stems from the study of eminent creative people in history. Research surrounding creative eminence painted a vivid picture of creative giftedness as a rare personal trait or a rare product of genetic endowment (Esquivel, 1995; Plucker, et al., 2004). Also, due to the glorification of these figures, creativity is seen in close relationship with extreme intelligence or brilliance. However, creativity for the majority of people is not a static quality and it does not require off-the-charts intelligence, as demonstrated below (Russo, 2004; Kim, 2005).

In a study that examined the creative abilities of students with an average IQ and students with a high IQ before and after a creativity training program found that it was possible for both groups to “develop and expand their creative thinking skills” (Russo, 2004, p. 9). Therefore, it may be more accurate to conceptualize creativity to be a skill that can be enhanced or inhibited than as a fixed trait. This understanding prevents the exclusion of students from opportunities to engage in creative activities simply based on perceived intelligence. One meta-analysis of 21 studies comparing IQ and creativity found a “negligible relationship between creativity and IQ scores” (Kim, 2005, p. 8).

Although cognitive processes play a role in creativity, a student's creative capacity may not correlate with a standardized measure of their intelligence. The reservation of creative tasks for those who are identified as gifted, incorrectly assumes the remaining students are not capable of improving their creativity.

There is another reason that explicit emphasis on creativity enhancement may be absent from elementary school classrooms. Although teachers may express a value that supports creativity, they often hold attitudes or perform behaviors that demonstrate a bias against creative thought (Scott, 1999; Beghetto, 2007). This occurrence is both unintentional and prevalent. For example, creative thought includes the asking of novel or unexpected questions. One study reported that teachers frequently dismiss this type of question (Beghetto, 2007). Beghetto argued, "Dismissals clearly discourage students from investing intellectual energy in their learning" (p. 1). In some instances teachers may actually reprimand these students for asking questions and consider them inappropriate (Scott, 1999). A cross-cultural study performed by Torrance (1963) found that regardless of country or culture most teachers "may be unduly biased against creative children" (Scott, p. 321). One study asked both teachers and college students to rate fictitious case studies of different students. The teachers rated highly creative students as more disruptive than average creative students, but the college students did not (Scott, 1999). Finally, Westby and Dawson (1995) found that teacher lists of least favorite students often included their most creative pupils.

The teacher attitudes and potential biases described above illustrate the commonly held belief that creativity is a form of deviance or misconduct. Indeed thinking outside the box is clearly oppositional to conformity—a prized value of many schools and school

systems. Creativity is not simply unique or bizarre ideas. Absurd ideas that do not relate to the subject at hand or provide a solution to the problem in question are not creative. Creativity is bound in two ways (must be both novel and useful) and cannot be entirely separated from the social context within which norms are formed.

Different authors on creativity explained its complexities using frameworks of influences, resources or systems. For example, Jalongo (2003) identified seven forces that influence the development of creativity. These include: cognitive processes, social and emotional processes, family, education (formal and informal), the domain and field, sociocultural context and historical context (p. 4). Sternberg and Lubart (1999) argued that “creativity requires a confluence of six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment” (p. 11). There are several overlapping features of Jalongo’s influential forces and Sternberg and Lubart’s required resources: cognition relates to intellect; social processes relate to personality; and family, education, domain, social context all comprise a person’s environment.

Csikszentmihalyi (1999) proposed a third approach, he argued for a systems approach to understanding creativity. He emphasized that it is the social context or cultural rules which inherently define both what is novel and what is useful. Social systems can be more or less accepting of the generation of new ideas depending on the specific domain where the innovation is happening. Additionally social and historical events allow different members of society access to “the various symbolic systems” (Csikszentmihalyi, p. 333). According to Csikszentmihalyi, to focus and consider only

the individual misses the point. The forces that allow creativity to take place grow or lie in the community.

These three perspectives are part of a larger body of recent creativity research that considered environmental influences in the development and sustainability of creative thought. These psychologists and social scientists moved the debate about creativity away from the individual and towards the broader social context. This shift in thinking supports an investigation of the classroom community and the ways it might shape creativity. A key player in this social context is the teacher. Csikszentmihalyi (1999) described teachers as one type of professional gatekeeper. Gatekeepers in any field determine what is a creative idea and what is simply novel. In broader society gatekeepers determine which ideas will alter culture by impacting or changing a specific field. Teachers hold a special power as gatekeepers in the systems theoretical perspective of creativity. Assuming that the vast majority of students have the potential to improve their creative capabilities, the role of the gatekeeper is significant. Teachers may value creativity but also hold contradictory or misinformed beliefs. Therefore this paper examines teaching practices and student creativity. Specifically, what are the effects of teacher attitudes and strategies on student creativity?

Teachers operate within the broader context of schools and society. However, the central question asked above is concerned primarily with actions and choices that are directly within the teacher's power. For example, a teacher chooses the manner in which he or she provides feedback and evaluates student learning. Social psychology researchers agree that intrinsic motivation and the development of an internal locus of control may be behind both the persistence and enjoyment of creative production

(Amabile, 1982, 1984, 1990; Hennessey, 2003). Additionally, some members of the research community have argued that extrinsic motivation or the use of external incentives or rewards may actually be detrimental to creative development (Amabile, 1982; Lepper & Greene, 1975). There are many different, subtle forms of teacher evaluation and this paper explores the varieties of evaluative practices and their impact on student creativity.

A teacher is also responsible for framing the work that students perform. This question addresses the impact of different approaches to creating and maintaining this task context. Certain tasks do not allow for the expression of creativity regardless of the context. The type of task that allows for creativity is heuristic. These tasks “allow room for flexibility in response . . . the path to the solution or method of completion is not predetermined or straightforward for the individual and, hence, some exploration is required.” (Amabile, Goldfarb, & Brackfield, 1990, p. 8). Within this described realm of heuristic tasks there are many possible frameworks. For example, different contexts allow for increased or limited student choice or are offered with particular instructions. What is the effect on student creativity when they are given choices or when the tasks are framed with specific types of instruction?

#### *Definition of Key Term*

Plucker, et al. (2004) performed a meta-analysis of multidisciplinary articles about creativity released in the two years prior to their study. They concluded that (a) the field of creativity research is in dire need of an agreed upon definition of creativity and (b) that by synthesizing the most frequently used definitions a prototype could be created. This paper utilizes their definition of creativity:

Creativity is the interaction among *aptitude, process, and environment* by which an individual or group produces a *perceptible product* that is both *novel and useful* as determined within a *social context*. (p. 90)

The key features of this definition are: creativity is active rather than static, the environment has a role and creativity is rooted within a specific context. These features add dimension to the more commonly cited definition: novel and useful.

#### *Statement of Purpose*

This paper examines the research literature concerning the social influences on creative aptitude, process and product. Creative thought has high societal and individual value and every student has creative potential. Teachers play an important role as gatekeepers within the creative domain of the classroom. Therefore, this paper investigates the effects of teacher attitudes and behaviors on student creativity and student perceptions of creative classroom climate.

#### *Summary*

Chapter one examined the social, individual and educational benefits of creativity. It described the theoretical understanding of creativity and highlighted the impact of the environment on an individual's creativity. Considering this theoretical foundation it questioned the role of the teacher in the enhancement of student creativity. It identified general teacher attitudes and behaviors that may affect the development of a creative classroom climate. The next chapter considers the historical development of creativity research in conjunction with related educational movements in the United States during the latter half of the twentieth century. Chapter two will provide the historical background for the body of research that is examined in chapter three.

## CHAPTER TWO: HISTORICAL BACKGROUND

### *Introduction*

Chapter one highlighted the recognized social, individual and education benefits of creativity and stated the purpose of this literature review. This chapter outlines the historical background of the research reviewed. The history of creativity research and its relationship to student learning is intertwined with a variety of movements and trends within the history of education in the United States. The understanding of what creativity is and how it may be measured has also changed significantly, even within the last one hundred years. This chapter examines the evolution of both a definition of creativity and the receptiveness of schools to the concept of student creativity. Chapter three critically examines the recent research connected to creativity and education.

### *Creativity, Divinity and Genius*

The early Western perspective and historical record of creativity is closely related to divinity. The creative person received divine inspiration and the mystical power to create. The Greek concept of the Muse is an apt example of this belief—one that is still referenced today (Sternberg & Lubart, 1999). Creators, poets, and artists relied on the Muse to feed them the ideas and talent they need to generate their craft. An inability to create or a stall in the creative process could only be overcome by appealing to the Muse. Creativity was a divine gift for a chosen few.

The idea that certain individuals were divinely selected for creative pursuits is echoed in the popular belief that creativity is the domain of only a handful of geniuses whose ideas, theories or works of art are responsible for a revolution within their fields of study (e.g. Mozart, Einstein, Darwin, etc.). Out of this belief surfaced a method of



creativity research that examined the lives and works of eminent creators in an attempt to discover patterns. Galton conducted and published an early study of eminent creativity in 1870. He investigated the characteristics of distinguished creators through an analysis of their biographies and autobiographies (Hennessey, 2003).

In the 1920s, in the United States, Catherine Cox studied 300 renowned men of history in an attempt to uncover clues about how to determine creative potential in children. Through her careful, laborious work she determined that “youths who achieved eminence are characterized not only by high intellectual traits, but also by persistence of motive and effort, confidence in their abilities, and great strength or force of character” (cited in Albert & Runco, 1999, p. 27). These characteristics that were unearthed by Cox’s historiometric approach continue to influence thinking about creativity in recent times (Albert & Runco). Galton, Cox and many researchers for the next several decades fixated on the internal rather than the external factors that determine creativity (Hennessey, 2003). Hennessey highlighted this theoretical orientation to decontextualize creativity as the main reason there was no research that explored the impact of social forces in the development of creativity during this time.

Dewey, an educational philosopher wrote several books during this time period critiquing American schooling. Many of his ideas linked the act of creation with the act of learning despite his lack of direct involvement in creativity research (Welle-Strand & Tjeldvoll, 2003). His potential insights fell on the deaf ears of behaviorist social scientists and psychologists who researched human phenomena and education during that time.

*Guilford and Sputnik*

It was not until 1950 that the field of creativity research began to take shape. Guilford (1950) presented a call to psychologists to investigate creativity and highlighted both its marginalization as a field of study and its significant value in relation to discovery, industry, science and leadership. His speech and its subsequent publication have been frequently cited as a turning point for creativity research (Hennessey, 2003; Kaufmann, 2003; Plucker, et. al, 2004; Beghetto & Kaufman, 2007). Researchers who focused on eminent creativity continued to contribute to the field, but a new body of work emerged that invested everyday, garden-variety creativity. During the 1950s there was a growing interest in the psychological community in both types of creative acts: those that alter society and those that are novel and useful ways to approach daily, social context-based obstacles. They labeled broad, global creativity: big C Creativity, and they called the pedestrian creativity: little c creativity (Beghetto, 2007; Beghetto & Kaufman, 2007; Cropley, 1990).

A major turning point within the history of US education also occurred during this decade and influenced creativity research. In 1957 the USSR successfully launched Sputnik I into orbit (Spring, 2007). This symbol of Soviet accomplishment stirred a flurry of concern about the American educational system. The US government decided education would be the means by which the US would make advances in science and technology that would rival those of the Russians. In an attempt to mandate educational reform Congress passed the National Defense Education Act in 1958 (Esquivel, 1995; Spring, 2007). This act provided federal funding to alter the method of instruction of math, science and foreign languages (Spring, 2007). It also included mandates for

improving the teaching of the creative arts (Esquivel, 1995). The National Science Foundation led efforts to implement this reform. Educators began to examine traditional assumptions about education and experiment with approaches that included attempts to stimulate creativity (Esquivel, 1995).

#### *Open Classroom Movement*

During the late 1960s and early 1970s a progressive educational movement called open classroom, offered an alternative to the traditional paradigm (Spring, 2007). Some creativity research during this time period focused on comparisons between traditional and open classrooms, due to the fact that the open classroom movement stated enhanced creativity as one of its main objectives (Esquivel, 1995). Researchers did not share a common definition of either creativity or open classroom, which led to biased and confused research methodology. Nonetheless this gateway research opened up the path for further investigations concerning classroom climate and student creativity.

#### *Gifted Child Movement and Creativity Tests*

During this era psychologists developed and used creativity tests. Researchers constructed these tests in an attempt to standardize the measurement of creativity. However, educators also used them diagnostically, in conjunction with IQ tests, to identify intelligent, creative children. Schools developed enrichment programs to accommodate the needs of these gifted children and these programs offered creativity training programs or activities (Esquivel, 1995). The Special Projects Act (P.L. 93-380 defined giftedness and included demonstrated achievement or ability in creative or productive thinking as one of the potential qualifying features in identifying gifted students (Bonner, 2000). The test and the programs developed during this time focused

primarily on the concept of divergent thinking. Test subjects created lists of words or potential uses of everyday objects. The test proctors compared these responses to the answers of previous test subjects and rated them based on quantity and uniqueness.

The most commonly used creativity test, both nationally and internationally, is Torrance's Tests of Creative Thinking (TTCT) (Plucker & Renzulli, 1999). In this test students are given visual or figural prompts and they are required to offer as many responses as possible (Plucker & Renzulli). The answers are scored based on four measures: fluency, flexibility, originality and elaboration. Both psychologists and educators question the validity of these instruments due to variations in the manner in which they are administered (Crockerberg, 1972). Also, many researchers questioned whether paper and pencil tests of word association or trivial hypothetical situations are true measures of potential creative performance in the real world (Crockerberg, 1972). The use of creative thinking tests meant that the pulse of creativity research was focused primarily on individuals and their capabilities and thinking processes. However, the use of creative teaching within gifted programs suggested a broader understanding that some aspects of creativity are teachable.

#### *Equity and the Social Psychology of Creativity*

The ways of thinking about creativity changed in scope and complexity through the last quarter of the twentieth century. Critics of the divergent thinking tests argued that the tests ignored key aspects of creative thought including problem solving and evaluative thinking (Plucker & Renzulli, 1999). Equally important characteristics of creativity that are not necessarily measured by these tests include personal affect and

attitudes. True creative production, for example tangible ideas with real life applications or artifacts are also not a part of this assessment process.

The education community began to scrutinize gifted programs during the 1990s. They criticized the elitist nature of these programs and the inequitable selection process (Esquivel, 1995). The federal definition of the gifted released in 1993 included a concluding statement that attempted to counteract the imbalance present in gifted programs, “Outstanding talents are present in children and youth from all cultural groups, across all economic strata, and in all areas of human endeavor” (Bonner, 2000). The definition also noted that gifted children may be identified based on accomplishment above those peers who share their age, experience or environment (Bonner, 2000). The public and school officials examined schooling as a whole during this time—specifically any unequal treatment of marginalized populations of students. Several schools responded by eliminating special gifted programs and focusing on school-wide creativity enrichment. The growing body of research in the social psychology of creativity influenced these reforms.

Amabile (1996) conducted seminal research concerning the social psychology of creativity during the 1980s and 1990s. She developed a theory that argued that intrinsic motivation was one of the three key factors that tie into a person’s ability to persist in the making of a creative product. She studied the production of collages and poetry in a variety of experimental settings that considered the influence of evaluation, surveillance, competition and the degree of choice in a given creative task. Her work expanded the exploration boundaries of creativity research by incorporating social influences on creative production. In her studies experts in the particular domain rated each product.

Rather than simply testing for a static creative ability this research recognized that there are social influences that play a role in the creative process. By virtue of her experimental design, this work recognized the potential impacts of teacher behavior and evaluation on student creative thought.

Amabile's (1996) work has influenced the development of several recent theories of creativity and methods of creativity research. The confluence theory of Sternberg and Lubart (1999) and the systems theory of Csikszentmihalyi (1999) both accounted for the influence of many different resources or environmental circumstances that can provide for creative development. Sternberg and Lubart's work focuses on the combination of three forms of thinking: analytical, practical and creative—the triarchic theory of intelligence. Within the realm of creativity he argued that it is the result of a confluence of six different resources that are all interrelated. Csikszentmihalyi further broadened this discussion when he created a detailed theory about how “intellectual activity is accepted as creative accomplishment” (Plucker, Beghetto, & Dow, 2004, p. 84). He argued that the social context of creativity cannot be ignored because it acts as a major force in determining what ideas are accepted as both novel and useful.

### *Crisis of Definition*

The turn of the century marked a period of reflection for many researchers working in the field of creativity. They questioned what exactly had been learned or discovered in the last fifty years and pointed out areas where more research was still necessary. One of the most commonly stated sentiments among the current group of creativity theorists and researchers is that the field cannot even agree on a common definition of creativity (Kaufman, 2003; Beghetto, 2005; Cropley, 2006). The researchers

expressed concern that without this common ground of what exactly binds the field together creativity will continue to be misunderstood. When it is approached from so many different angles it becomes impossible to compare research outcomes. The following literature review quickly reveals that this concern is valid. Even within the relatively small sample of articles reviewed in this paper there is little consensus in terms of how creativity is defined or measured. This confusion within the field, coupled with the drastic increase in the use of standardized achievement tests in kindergarten through eighth grade education as part of the No Child Left Behind Act, has pushed creativity to the periphery of the educational landscape (Beghetto, 2005).

#### *Summary*

Chapter one identified teachers as influential figures in the development of students' creativity. This chapter traced the understanding of creativity as it shifted from a mysterious, rare, static trait to a more everyday conceptualization that creates space for it to be developed or enhanced by a variety of environmental factors. It outlined how creativity research in the past sixty years investigated different conditions that may support or inhibit creative development. Depending on the educational climate creativity theorists and educators understood the relationship between creativity and learning in different ways. Chapter three examines the recent body of creativity research related to the effects of teacher attitudes and behaviors on student creative performance.

## CHAPTER THREE: CRITICAL REVIEW OF THE LITERATURE

### *Introduction*

Chapter one provided the rationale for investigating creativity in the realm of educational practice and specifically identified teachers as gatekeepers of student creativity. The last chapter explained the recent history of educational movements in the United States that corresponded with the shifting tides of creativity research in the last sixty years. Chapter three reviews the seminal and recent research concerning creativity and teaching. The research is used to examine the effects of teacher attitudes and strategies on student creativity. The research used in this chapter is organized into three main sections: Intelligence and Creativity, Teacher Attitude and Perception and Teacher Behavior and Instruction. The initial section reviews research that identifies creativity as both distinct from other components of intelligence and developable. The second section traces research that explores teacher conceptualizations of creativity and creative students. The third section contains the bulk of the research reviewed and is further divided into four subsections: Classroom Climate, Evaluation, Reward and Competition, and Task Framing. This section reviews research that investigates specific teacher behaviors and their impact on student creativity. This chapter summarizes and critiques the methodology and findings of each study included.

### *Intelligence and Creativity*

The first set of studies reviewed in this paper examines the relationship between intelligence (as measured by IQ) and creativity. The first two studies investigated specific groups of students, their creative performance and IQ scores. The third is a meta-analysis of twenty-one studies that included both IQ and creativity measures. The fourth is an



example of a school-based intervention that improved student creative performance. The first three studies argue that IQ is not a prerequisite for creative thought. Russo (2004) determined that both average-IQ and high-IQ students benefited from creativity training. Niu (2007) found that IQ was as significant a source of variance in predicting creativity as the social environment or individual factors. Finally, in a quantitative synthesis of 45,880 subjects Kim (2005) found a minimal correlation between IQ and creativity scores. Grigorenko and Sternberg (2002) demonstrated that a school intervention program focused on three types of intelligence (practical, analytic and creative) improved student creative outcomes. These studies support the rationale of this paper by demonstrating that creativity is not a rare trait nor should its development be limited only to the students with the highest scores on intelligence tests. The research of Niu, Russo and Grigorenko and Sternberg also supported the argument that the social environment, including the classroom, influences student creativity.

In a quantitative, one group pretest/posttest design study Russo (2004) investigated the effect of a problem-solving after school program on the creative thinking of fifth and sixth grade students ( $N = 37$ ) with average and high IQ scores. The researcher found that IQ did not correlate with creativity measures and that both high-IQ and average students can develop their creative thinking skills.

The researcher administered a Verbal Torrance Test of Creative Thinking With Words (TTCT), Form A and a Figural Torrance Test of Creative Thinking With Pictures, Form A as a pretest at the beginning of the after-school program. The school provided access to the students' Cognitive Skills Index (CSI) scores, which allowed the subjects to be grouped into high and average IQ groupings.

Every week, for six months, students attended a 90-minute session of the Future Problem Solving after school program. They worked on three problems using a six-step creative problem-solving process; they used two steps the first seven weeks, then four steps the next seven weeks, and all six steps for the remaining seven weeks. The researchers administered a Verbal Torrance Test of Creative Thinking With Words, Form B and a Figural Torrance Test of Creative Thinking With Pictures, Form B at the end of the program as a posttest.

The researcher claimed statistical support for gains in fluency, flexibility, originality and elaboration as a result of participation in the program for both groups, but neglected to provide sufficient numerical evidence to support this claim. She found significant interaction between creativity measure and IQ over time for verbal fluency ( $F(1,35) = 5.37, p = 0.026$ ). That is, the high-IQ group performed better than the average-IQ group in measures of verbal fluency, but not across all types of creative thinking. For example, the average-IQ group scored higher on figural elaboration. The author found no significant difference between the two groups in terms of problem identification and problem solution for variables of fluency, flexibility, originality, and elaboration, and concluded that IQ does not correlate with creativity.

The study outlined a very specific procedure, including the versions of the Torrance tests used and example questions—therefore the study is both consistent and repeatable. The researcher variation in IQ score did not correlate with all creativity measures or amount of creative development over time. This study drew from a small sample size, with multiple ethnicities represented; the results may be generalizable with caution to other settings with a similar demographic of students. The subjects'

participation in this particular program may be confounded with the simple fact that they participated in an after school program. A follow-up study could include a control group that also is attending a program ninety minutes per week that does not focus on creative problem solving. Additionally, the creativity tests and the IQ tests used rely heavily on verbal skills; this could interfere with the results being generalized to additional measures of creativity. Despite the limitations of this study, the general result, that IQ and creativity tests measure two different types of performance, is similar to that found by other researchers. The following study attempted to pinpoint other explanatory variables for an individual's creative performance.

In a quantitative, correlational study of high school students in China ( $N = 357$ ), Niu (2007) determined that creative performance was most closely correlated with social environment (including type of school), IQ and individual characteristics. This study provided empirical evidence to support the confluence theory of creativity, that is, that creativity in individuals is influenced by a confluence of different variables including the social environment (Amabile, 1996; Sternberg & Lubart, 1999). This evidence that the environment is a contributing factor to creative outcomes adds to the argument that the classroom can be a site for creative development.

Over the course of two afternoons the students completed several tasks and measurements. The researcher measured the creativity of each student in three different ways: product (a collage task and a creative writing task), divergent thinking (two modified tasks from the Torrance Tests of Creative Thinking-Figural), and attitude (self-assessment inventory using a 7-point scale of attitude toward new ideas and engagement in creative activity).

The experimenter also measured different individual characteristics for each student. These aspects included general intelligence with the Cattell Culture Fair Intelligence Test (Scale 3), motivation using the Work Preference Inventory (WPI), which has scales for both extrinsic and intrinsic motivation, and student personality with Gough's The Adjective Check List—Five Big Factors and Creative Personality Scale (students asked to indicate which adjectives in a list describe them). Finally, the subjects filled out Sternberg's Thinking Style Inventory to determine thinking style.

The researcher distributed a parent questionnaire and teacher questionnaire for each student. The parent questionnaire focused on socioeconomic status (SES), the family's financial commitment to the student's education, and the amount of support and autonomy the student receives from parents. The teacher questionnaire asked for the students' scores in Chinese and mathematics and other information relating to the social relationships that the student had with peers and teachers.

The researcher used Cronbach's coefficient alpha to test for inter-judge reliability on the creative measures. For the collage  $r = 0.86$ , for the story task  $r = 0.74$ , for the picture completion task there was a range of 0.75 to 0.89 and for the circles task  $r = 0.91$ . All are considered high reliability scores. There were some missing values. They performed the SPSS Missing Value Analysis (MVA) and the Little's MCAR test was non-significant ( $\chi^2(17665) = 17665, p = 0.28$ ). This indicates the data was missing at random. Therefore, Niu (2007) used the Expectation Maximization method to statistically insert missing data and use the full sample of 357 students.

The author created a factorial score drawn from all five measures of creativity and labeled it: overall creativity and regression analysis to discover the relationship between

the independent variables and creativity. Niu (2007) determined that the following significant variables explained 45.5% of variance: environmental factors (type of school, parent education, father's occupation), intelligence, intrinsic motivation, knowledge, extroversion and thinking styles. The researcher also performed a hierarchical regression analysis, the results indicated that environmental factors could explain 16.1% of the total variance, IQ explained 15.4% and the individual factors explained the remaining 14.0%. Niu argued these findings indicate that the social environment can impact creativity, perhaps even more than individual factors.

The researcher acknowledged that this is not a random sample. The sample size is larger than the majority of the samples utilized in the quantitative creativity studies reviewed in this chapter. The sample is from China; the possibility of cultural differences in how creativity is perceived and developed weakens the generalizability of these findings to the United States. The findings are consistent with Sternberg and Lubart's theory of the six factors that influence creativity (Sternberg & Lubart, 1999). The result that environmental and individual factors predict variance as much or more than IQ is consistent with Russo's (2004) findings.

In a quantitative synthesis (meta-analysis) of twenty-one studies that included both IQ information and creativity test scores for 45,880 subjects, Kim (2005) concluded the relationship between the two measures is negligible. The researcher found that age and type of creativity test contributed to the relationship between creativity and intelligence.

Kim (2005) reviewed over one hundred studies published between 1961 and 2004 and narrowed down the selection to twenty-one studies that thoroughly reported

procedures, findings, and correlations among measures of intelligence and creativity. The author uncovered 447 correlation coefficients in the twenty-one studies, the researcher weighted these correlations based on sample size—more weight was given to larger samples due to the potential increase in error possible in small sample sizes. The author found the mean value of the correlation coefficient prior to weighting by sample size ( $r = 0.137$ ) and after weighting ( $r = 0.174$ ). The researcher judged this to be both small and statistically significant. The researcher performed a weighted multiple linear regression to determine the independent effects of explanatory variables and determined that the variance in correlation coefficients was significantly explained by different creativity tests ( $p < 0.001$ ) and age ( $p < 0.0001$ ). The researcher found a significant difference between two types of creativity test: one that is administered in a game-like atmosphere and one that is administered in a test-like manner. The mean correlation coefficient between the game-like test and IQ was smaller ( $r = 0.116$ ) than the same value for the more test-like version ( $r = 0.250$ ). Additionally, the older the group of participants the more closely related the IQ and creativity scores.

As was further elaborated on in the previous studies, this meta-analysis indicated that there is a negligible relationship between intelligence scores and creativity scores. Kim (2005) further concluded that these results indicated, “that even students with low IQ scores can be creative” (p. 8). This study provided a quantitative review of the intelligence and creativity literature available. It included detailed and thorough descriptions of the data analysis performed. The author tested several potential moderator variables including age and gender. The author was unable to test for the potential moderator effects of SES or ethnicity due to the lack of demographic reporting in the

studies reviewed. The article argued that the threshold theory was not supported by this analysis. This is a theory that IQ and creativity are only related up to an IQ of 120. However, only 79 of the 447 correlation coefficients investigated included specific IQ scores, so the author concluded that the analysis of the threshold theory might not be generalizable.

Grigorenko, Jarvin, and Sternberg (2002) performed a two year quantitative, non equivalent control group design study that examined the effect of an instructional program that focused on creative, analytical and practical skills (triarchic condition) on the reading comprehension and vocabulary scores of fifth grade students ( $N = 708$ ). They found that students who were taught using the triarchic model achieved larger gains and generally higher scores on the posttest than those taught using the traditional (control) instruction. Specifically, those who began the program with the lowest standardized reading achievement indicator (DRP) typically gained the most for the triarchic intervention.

The researchers developed an experimental set up that divided the students into two conditions: memory traditional instruction (control) and triarchic instruction (experimental). Teachers attending training sessions specific to the condition in which they were assigned following the initial pretests. All pretests and posttests used the same basal reader stories and were administered in the same manner for all students. An additional performance indicator was the standardized reading test scores for each student from the previous year (fourth grade). All instructional materials were developed by the researchers and used in the classroom. The materials used in the experimental condition “showed teachers how to teach traditional language-arts skills so as to call into play and

develop students' analytic, creative, and practical abilities and achievement" and teach specific skills related to these abilities for application in other areas. The materials used in the control condition focuses on developing and applying mnemonic strategies to the language-arts material. To ensure the quality of the interventions the teachers' classrooms were visited and monitored at two different random times during the intervention period.

The standardized test scores from the Connecticut Mastery Test (CMT) taken by the subjects the previous year provided two relevant scores: Degrees of Reading Power (DRP) and Holistic Writing. The DRP and Holistic Writing scores of the triarchic group were significantly lower than those of the control group. However, the pretest, which included all three types of assessment: memory-analytical, creative and practical, administered at the beginning of the intervention revealed no significant difference between the two groups. The two groups were also comparable in terms of gender composition but did differ in terms of ethnic background composition.

Data analysis revealed a significant time x group effect. That is, they found a statistically significant difference in the performance score changes over time between the two groups. The triarchic improved and outperformed the control groups in all three measures: memory-analytic ( $t(449) = -4.5, p < 0.001$ ), practical ( $t(449) = -10.9, p < 0.001$ ) and creative ( $t(449) = -3.5, p < 0.001$ ). Whereas, the control group remained about the same on the memory-analytic task ( $t(254) = 1.6, p > 0.05$ ), improved on the practical ( $t(254) = -5.0, p < 0.001$ ), and a small decline on the creative task ( $t(254) = 3.5, p < 0.001$ ). Therefore the researchers found that triarchic training had a significant impact on performance over time.



In this study a change in the independent variable (type of instruction) resulted in a change in the dependent variable (performance scores, including creativity measures). The study included two trials (year 1 and year 2) and a much larger sample size than the majority of other studies reviewed. The researchers included detailed SES and ethnicity data and performed analysis on whether these variables had a main effect on the results. The intervention took place from February to June and occurred within the classroom setting—the length of the intervention and real world setting strengthen the ecological validity of the study. The researchers described the procedures in detail and included examples of the types of assessment questions and instructional homework employed in the intervention. They repeated the process in two additional studies with older students and found similar results.

The first three studies in this section found only a weak relationship between IQ and creativity. Both Niu (2007) and Russo (2004) demonstrated that environmental factors could influence creativity outcomes. Grigorenko and Sternberg (2002) provided evidence for the effectiveness of a school-based program in teaching creativity. The remainder of this chapter focuses on the specific social environment of the classroom. The next section reviews studies that examined teacher attitudes and perceptions. The remaining sections investigate teacher practices and behavior in relationship to creativity development in students.

### *Teacher Attitude and Perception*

An understanding that creativity can be taught to the majority of students is a belief held in common by many teachers. Yet how do teachers define creativity? What are their beliefs about creative children? And what do they believe is their role in the

development of student creativity? The following seven studies examine teacher beliefs and conceptualizations of creativity, creative students and creative teaching.

The initial study in this section, by Lee and Seo (2006) identified that many teachers do not hold a multi-faceted perception of creativity and frequently confine it solely to the cognitive realm. Alughaiman and Mowrer-Reynolds (2005) also found that teacher definitions of creativity differed from those of creativity experts in terms of depth or thoroughness of conceptualization. They found that teachers maintained a generally positive outlook on creativity and the creative potential of students. Diakidoy and Kanari (1999) found that student teachers could more readily identify certain aspects of creativity over others, however they were able to identify the creativity-enhancing potential of certain types of tasks. In an exploratory qualitative study Fleith (2000) examined the beliefs of teachers, students and experts and found that their conceptualizations of creativity differed, yet all acknowledged the influence of the classroom environment on creativity.

The final three studies in this section focused more directly on teacher perceptions of creative students in relation to student behavior, and shed light on some of the contradictions between teacher beliefs and the perception that the traditional school environment dampens creativity. Chan and Chan (1999) found teachers listed characteristics of creative students that could be seen as disruptive by some teacher including: constant questioning, quick responses, and activeness. In order to determine if this was a perception unique to teachers, Scott (1999) compared teacher anticipated behavioral characteristics of creative students with those of college students—the college students were less likely to identify creative students as behaviorally disruptive. Finally,

Brandau, et al. (2007) examined fluency and flexibility scores (two measures of creativity) of students and found a correlation between high creativity scores and high teacher-rated measures of active, extroverted and impulsive behavior.

Lee and Seo (2006) examined the understanding of creativity by Korean teachers specifically working in elementary gifted education using a “qualitative content analysis method” (p. 238). The researchers credited Urban (1995) who identified the three components of creativity used in this study: cognitive, personal and environmental and used these categories to determine how many of the teachers surveyed ( $N = 42$ ) maintained a “balanced” view of creativity. They found only two of the participants explained all three facets of creativity.

The researchers randomly selected the sample from a summer teacher-training program for gifted educators in elementary science. Participants in the training program traveled from all over the country to attend. The authors surveyed forty-two teachers and the questionnaire asked them to write down their personal definition of creativity. They used each teacher’s entire response as the unit of analysis. They coded it by identifying key words and assigning each key word to one of the three components. The two researchers did this coding independently and initial agreement was 95 percent. They discussed the disagreements and reexamined all answers before they performed additional data analysis. The authors created categories for the different views held by the teachers: balanced view indicated that the teacher’s answer included all three components, intermediate view included two components and biased view included only one.

The authors found that 38.1% of teacher surveyed had a biased view, 57.1% had an intermediate view and 4.8% demonstrated a balanced view. All but one of the participants recognized the cognitive component of creativity and only two recognized the personal component. Consideration of gender and years of experience of the subjects revealed additional trends. Eleven female teachers participated in the study and they all had an intermediate view of creativity. The six new teachers (less than six years experience) in the sample exhibited an intermediate view and twelve of the sixteen subjects who had a biased view had fifteen or more years of experience. The authors noted that these are preliminary results from a small sample size and additional research would be necessary to determine if there are differences in understandings of creativity based on gender or experience in the field.

This study investigated the perceptions of a very small sample of a very specific subset of the teaching population: Korean teachers who teach in elementary gifted programs. The authors identified the study as a qualitative research design however they had already determined the definition of creativity and were simply seeing if the teachers' perceptions matched their own. Once they coded the answers to the survey question the remainder of the data analysis was quantitative—focused on which percentage of the respondents explained the full answer. The authors recognized that this was a preliminary study and offered suggestions for further research in teachers' implicit theories of creativity and their relationship to gender, experience, age and cultural background. The general finding, that teacher definitions of creativity are limited in scope is consistent with three of the other studies reviewed (Diakidoy & Kanari, 1999; Fleith, 2000; Aljughaiman & Mowrer-Reynolds, 2005).

In a quantitative survey, Aljughaiman and Mowrer-Reynolds (2005) investigated teacher perceptions of creativity and creative students. The authors distributed a questionnaire to elementary school teachers ( $N = 36$ ) in a northern Idaho school district. The questionnaire included both close-ended and open-ended questions concerning their conceptions of creativity. The researchers concluded that teachers generally had a positive attitude toward creativity and recognized the creative potential of students but did not assume the responsibility for teaching creativity and did not include all facets of creativity in their conceptualizations of the term.

The researchers sent questionnaires to the 48 elementary school teachers who worked in the school district where the study was conducted and each teacher also received a letter from their principal that encouraged them to respond. The researchers gave the teachers one week to return the surveys. Thirty-six responded—a 75% response rate. The researchers categorized the results under three headings: attitudes toward creativity, definitions of creativity, and conceptions of creative students. Each author classified the open-ended questions independently and worked together to analyze any points of disagreement.

According to the authors, teacher attitudes toward creativity were generally positive. For example, they found that over 50% of teachers agreed with the statement: “Creativity can be taught.” And 81% agreed that it could be taught in a regular classroom. However, only 33% of the respondents agreed with the statement: “A regular classroom teacher is responsible for helping students develop creativity,” despite the fact that 78% of the subjects agreed that creativity is essential for enhancing academic learning.

In response to an open-ended question about the definition of creativity eighty-eight percent of teachers identified original ideas as a component of creativity. Teacher conceptualizations also included: artistic production (35%), intelligence (35%), or linguistic production (fluent speech or poetry) (29%). On the other hand, 26% of the respondents identified imagination and self-expression to be components of creativity. And a mere 14% of respondents identified divergent thinking—a key feature of creativity identified by experts. Finally, in response to a question about the characteristics of creative students the top five most commonly listed responses were: thinks differently, imaginative, risk taker, artistic and has rich vocabulary. The researchers noted the difference between these characteristics and those identified by experts: fluency, flexibility and elaboration. Considering the surveys in their entirety, the researchers concluded, “teachers often confuse characteristics of *gifted high achievers* with creative characteristics” (Aljughaiman & Mowrer-Reynolds, 2005, p. 27). They identify the features of students who both achieve in school and are creative artistically, musically or linguistically.

The authors of this study clearly identified the main limitations of their research methodology. The sample is non-representative because participation was voluntary—self-selection of the sample can lead to biased results or a high margin of error. Only elementary school teachers were surveyed—the findings cannot be generalized to middle or high school teachers. The small sample size prevented any examination of clusters of teacher characteristics and corresponding perceptions of creative students. The authors also stated that many of the teachers who did participate complained that they did not have much extra time during the school week and this could have limited the degree of

attention they were able to pay to the survey—potentially limiting the “seriousness and accuracy of their responses” (Aljughaiman & Mowrer-Reynolds, 2005, p. 21). The researchers developed the questionnaire and revised it through series of reviews prior to using it in the study. Initially faculty and experts in the field of creativity reviewed the questionnaire. The authors modified it based on suggestions offered by this review board. Then they had it analyzed by a research class in graduate school at the University of Idaho and responded to the additional feedback they received. Finally they tested it on a small sample of classroom teachers to review question clarity. This careful analysis of the questions asked and format of the survey lends strength to the findings in this study.

In a quantitative, sample survey study of student teacher conceptions of creativity, Diakidoy and Kanari (1999) surveyed students ( $N = 49$ ) attending their final year of a four-year teaching program at the University of Cyprus. The authors found that the student teachers beliefs about creativity recognized it as a broad ability, a basis of individual difference, and primarily focused on novel, but not necessarily appropriate, results. The student teachers indicated that creativity is a fairly common, non-exceptional trait that is greatly influenced by environmental factors. Finally, the majority of the student teachers identified both open-ended and divergent thinking tasks as creativity enhancing for students.

The researchers administered a two-part questionnaire (published with their journal article) to the student teachers. The first part included the majority of the open-ended questions and the second part was not administered until the first was completed so as not to influence the subjects' answers. Two independent researchers analyzed and coded the responses to the questionnaire by placing the responses into different categories

(96% inter-rater agreement). Then two additional evaluators classified each response based on the categories created by the first two, they had an inter-rater agreement of 89 percent.

The researchers found that 65.3 percent of the student teachers “conceptualized creativity as a process leading to novel outcomes or products” (Diakidoy & Kanari, 1999, p. 230). Whereas, only 10.2 percent of the student teachers acknowledged that this outcome needs to be useful or appropriate in order to be considered creative and not simply original or eccentric. A majority (61.2%) of the student teachers did not select intelligence as a requirement for creativity. In contrast, divergent thinking was considered to be a necessary component of creativity by 89.8 percent of the subjects. Ninety-eight percent of the participants identified the environment to be an influential factor in creativity development and selected the following key factors that could enhance creativity: autonomy and independence, discovery learning, intrinsic motivation, room to self-correct, and choice in tasks. And 93.9% of the respondents believed that teachers could help students develop creativity in the classroom. However, 89.8% of the student teachers specified that there are few opportunities for students to demonstrate their creativity in school. Finally, 75.5% of the subjects indicated that good students are not necessarily more creative than average students. A large majority of the participants recognized that creativity helps people solve problems in life but only 55.1% stated that it helps students solve problems in school.

Due to the small, specific sample (all students from one teaching program) these results may not be generalizable to a broader population of student teachers or practicing teachers. The findings are consistent with many of the other studies concerning teacher



perceptions of creativity. In comparison to the previous studies reviewed, these subjects appear to have stronger beliefs about their potential role in developing student creativity. The procedure is clear and repeatable and the authors included a complete copy of their questionnaire. However, they did not report if the questionnaire underwent any trials, reviews or modifications prior to its distribution.

In a qualitative, exploratory, grounded theory study, Fleith (2000) examined the perceptions of both teachers and students about characteristics that stimulate or inhibit creativity in the classroom environment through the use of both semi-structured interviews and written questionnaires. She found that teachers, students and experts had different ideas about what enhanced or inhibited creativity in the classroom, but all three groups acknowledged that the classroom environment does influence the presence of creativity in the classroom. The researcher placed these perceptions into three categories: attitudes, activities and strategies.

The researcher used a qualitative approach that included both interviews and questionnaires. She conducted personal interviews with teachers in different sites: school library, school conference room, and classrooms. She also led focus group interviews with groups of students in three different sites: library, conference room, and school psychologist's room. Finally she conducted creativity expert interviews and sent questionnaires to those she could not meet with in person. She analyzed the data through content analysis where units of meaning were assigned to the collected data (labels or codes). She clustered these units in order to generate the categories and then she established the relationships among categories.

Fleith (2007) found that the teachers ( $n = 7$ ) believed that school environment contributes to development of students' creativity. They stated that a classroom environment that enhances creativity has specific teacher attitudes, strategies and activities. The researcher determined the following shared categories for teacher attitudes: "giving students choice, boosting students' self-confidence, accepting students as they are, not imposing things on students, providing students opportunities to become aware of their creativity" (p. 3). She coded strategies in the following manner: "cooperative groups, cluster groups, free time, arts center, flexible directions, and brainstorming" (p. 4). And activities included: "open-ended activities, hands-on, creative writing, drawing" (p. 4). She concluded from the interviews that teachers believe that a classroom that inhibits creativity also has characteristics in different categories. They described a classroom climate where students cannot share their ideas, ideas are ignored, mistakes are not allowed, and one right answer is required. She coded two activities: drill work and worksheets. And she coded teacher attitudes as controlling. On the whole she determined the following characteristics of the entire educational system that inhibits student creativity according to the teachers interviewed: time testing, structure and schedule, huge curriculum to cover, and lack of time.

Fleith (2000) determined that the teachers defined creativity in terms of process, person and environment. The process included novel or different approaches to problems and tasks and the modification of earlier ideas. The person engages in individually meaningful expression. And the environment is both open and accepting. They identified the following creative student behaviors: "initiative, perseverance, task commitment, language, curiosity and different approach" (p. 5).

The researcher conducted focus group interviews with the students. The student definition of creativity included product and person. The creative product is something new or different. And the creative person has his or her own style and is generally an artist, writer or someone with good ideas. The students identified math, writing, art, reading, science and free time as subjects that allowed them to be creative. Many noted that creative moments were not that common in school and two students reported that they could not be creative in the classroom.

The creativity experts interviewed identified discovery, open-ended questions, variety and an emphasis on student-centered views to be key teaching strategies that enhance creativity. They believed that teachers should encourage a variety of student responses, humor, question asking and risk-taking. The teachers should connect with students in order to find and acknowledge their strengths and interests. And the classroom environment should be “psychologically safe” (p. 5). They argued that an atmosphere that allowed no room for student ideas, held low expectations for student creativity, offered few opportunities for free choice, allowed little peer interaction, limited variety and emphasized extrinsic rewards through fear and heavy competition inhibited creativity.

The study did not include original quotations or actual interview questions which limits its credibility. Also, the use of focus groups rather than personal interviews with the students may have guided individual student responses—the author did acknowledge this limitation in her discussion. Additionally the researcher neglected to mention whether the participants checked the results and determined them to be credible. The use of a convenience sample limits transfer of these findings to broader settings. However, teachers and students with similar SES, age, and schooling characteristics may share

similar perceptions/beliefs. The researcher did not describe the changing contexts that occur in process, which would have strengthened the dependability of this study, particularly because there are few others of its kind.

The researcher tape-recorded and transcribed all of the interviews, so the process and products of data collection and analysis are auditable by an outside party. However the author did not mention any audit process, any search for negative instances or any recorded checking and rechecking process during data collection. All of these factors limit the confirmability of the study.

Chan and Chan (1999) investigated the implicit theories of Hong Kong teachers ( $N = 204$ ) from thirty-eight different schools about the traits of creative and uncreative students. They found that Chinese teachers commonly described creative students as: “always questioning,” “imaginative,” “quick in responding,” “active,” and “high intellectual ability.” Some of the teacher participants also selected some less socially desirable adjectives to describe creative students.

The researchers asked twenty primary school teachers who were enrolled in the Bachelor of Education program at the Open Learning Institute and eighteen secondary teachers known by the researchers to participate in the study. Each of these initial teachers taught in a different school (therefore teachers from a total of 38 schools participated). The authors sent 348 questionnaires to this convenient sample of teachers who then distributed them to their colleagues and 204 were received completed (response rate 58.6%).

The researchers distributed two different questionnaires. They divided this survey into two samples to ensure that the teachers did not simply list opposite characteristics for

creative vs. uncreative. One survey, sent to Sample A teachers, asked them to list the personality and behavioral characteristics of creative students based on daily observations. The second survey asked Sample B to list these same characteristics for uncreative students. The questionnaire explicitly stated that there were no right or wrong answers and that the teachers' views were very important.

Due to the nature of the questionnaire the researchers analyzed two separate samples. Sample A (creative students) included 526 responses with an average of 4.7 characteristics listed per teacher. Sample B (uncreative students) included 407 responses with an average of 4.5 characteristics listed per teacher. The researchers placed these responses into attribute categories (similar characteristics were put into the same categories) which narrowed the responses to 81 attribute categories for creative and 65 attribute categories for uncreative. The authors did not include any category named by 2.5% or fewer of the teachers. They also excluded attribute categories that were listed in both samples. These decisions narrowed the data that underwent analysis to 42 creative characteristics and 33 uncreative ones.

The researchers determined if teacher gender influenced attribute category selection. "Quick in responding" as a characteristic of creative students was the only attribute category that yielded a significant difference between male and female primary school teachers. The females wrote this more frequently than the males ( $\chi^2 = 4.13, p < 0.05$ ). "High intellectual ability" as a characteristic of creative students was the only attribute category that illustrated a significant difference in response between male and female secondary school teachers. The males were the only ones who nominated this characteristic ( $\chi^2 = 4.80, p < 0.05$ ).

For the rest of the analysis, the researchers grouped together the male and female responses due to the lack of significant difference for the vast majority of the attribute categories for both creative and uncreative characteristics. Through a similar analysis they determined that there was not a significant difference between the responses of the secondary and primary teachers. They concluded that the most commonly listed creative characteristics included: “always questioning,” “imaginative,” “quick in responding,” “active,” and “high intellectual ability.” And the most commonly listed uncreative characteristics included: “conventional,” “timid,” “lack of confidence,” “conforming,” and “uninitiative.”

The authors of this study intentionally left the question open-ended rather than simply use a checklist. This allows for a wider variety and more authentic answers. They also separated the question about creative students from that about uncreative students to ensure that the lists were not simply opposites of each other. They analyzed the data to determine significant differences between male/female responses or primary/secondary responses. Most importantly, in their discussion section the researchers acknowledged that the reader should be cautious about generalizing due to the small sample size and the nonrepresentativeness of the sample.

The authors did not report ethnicity or SES data about the teacher participants. They also did not report whether the teachers taught in public or private schools. The sample selection was based on a specific pool or network of teachers rather than a random selection therefore the results are not generalizable to other populations of teachers. Additionally, there was only a 56% response rate within this narrow network of

teacher leaving the possibility that the implicit theories of the non-responders may differ from those of the responders.

In a quantitative, static group comparison investigation, Scott (1999) compared the perceptions of college undergraduates to those of teachers. She asked both groups to evaluate fictional student records—the only difference between students was their reported creativity test scores. Scott found that the teachers rated the students with high creative test scores as more behaviorally disruptive than the students average creative test scores. The college students did not match this trend.

In phase 1 of her study Scott (1999) developed a measure of teachers' perceptions of children's classroom behaviors: the Scott Teacher Perception Scale (STPS). In phase 2 she sent four fictitious student profiles to subjects ( $N = 277$ ): elementary school teachers ( $n = 144$ ) and university students ( $n = 133$ ). The profiles described fourth grade students. The four different types of profile included: an average creative male, a highly creative male, an average creative female and a highly creative female. The profiles contained additional information that was held constant across all four: age, grade level, basic skills scores and physical fitness scores. The scores hovered between the 70<sup>th</sup> to lower 80<sup>th</sup> percentiles. The researcher asked each participant to rate each child using the STPS. She told each subject that the research focused on how well children changing school districts would do in new classrooms.

Scott (1999) found a statistically significant difference between teacher perceptions of creative student behavior and college student perceptions. The elementary school teachers were more likely to associate disruptiveness with creativity (post hoc  $t = 4.17, p < 0.001$ ). More specifically, teachers rated highly creative students as more

disruptive than average creative students and college students did not. Additionally, all of the participants rated average creative girls as more creative than average creative boys (post hoc  $t = 4.83, p < 0.001$ ). Overall, they rated boys as more disruptive than girls ( $F(1,277) = 59.54, p < 0.01$ ).

A change in the independent variable (group: teacher vs. college student) resulted in a change in the dependent variable (disruptiveness rating of highly creative students). However, the age range of the teacher participants was 25 to 60 years old and that of the university students was 18 to 22 years old. Therefore, a lurking variable may be age of participant rather than teaching status. The author did not report SES or ethnicity of the participants. The teacher participants lived in California whereas the college students resided in Kansas. Geographic location, in addition to age, may influence perceptions of creative student behavior and the author of the study did not acknowledge these possible limitations. The use of more comparable groups (same age and location) would strengthen the internal validity of this experimental set-up.

In a quantitative, correlational study Brandau, et al. (2007) compared the creativity test scores of Austrian children ( $N = 71$ ) with various behavior rating scales completed by their classroom teachers. The researchers found a positive relationship between fluency scores and impulsive/hyperactive and disruptive behavior. They also found a correlation between flexibility scores and more attentive and less introverted behavior.

All of the participants, 33 males and 38 females, attended one elementary school in Austria and were seven to ten years old. The researchers administered the Creativity Test for Preschoolers and Pupils (CT-P) developed by Krampen and based on Guilford's



theory of intellect. Four classroom teachers rated each of the participants using three different scales: the Conners scale for the assessment of hyperactive/impulsive behavior, a questionnaire based on the DSM-IV criteria for inattentive behavior and hyperactive/impulsive behavior, and a questionnaire constructed by the researchers to assess student behavior. All of these scores used a four-point Likert scale.

The researchers performed multiple regression analyses on possible predictors for the Krampen creativity test scores including age, gender, time spent and teacher ratings of behavior. For the fluency test, the more time spent taking the test the higher the fluency score ( $\beta = 0.58$ ) and the higher ratings of inattentive behavior on the Conner's scale the higher the fluency score ( $\beta = 0.44$ ). For the flexibility test, gender and time spent were significant predictors. Females performed better than males ( $\beta = 0.32$ ) and the more time spent the higher the score ( $\beta = 0.30$ ). The researchers also examined the structure coefficients and found that in addition to gender and time, age, score on the DSM-IV inattentive scale and degree of introversion also have significant loadings on the regression functions. Older students achieved higher flexibility scores than younger ones ( $\beta = 0.40$ ). Students rated as more attentive achieved higher flexibility scores ( $\beta = 0.28$ ). Finally, performance on flexibility was lower for students who were rated as having more introverted behavior ( $\beta = -0.32$ ).

The authors acknowledged the potential bias in the teachers' score considering that they were each teacher to one main classroom of students but were being asked to evaluate all students in this study. They attempted to moderate this bias by creating a teacher z-score by subtracting the particular teacher's mean score from the raw score and dividing by that teacher's standard deviation. The researchers also acknowledged the

limitations of their chosen creativity test, which only focused on flexibility and fluency and was created based on specific theoretical assumptions about creativity. They also discussed the limits of using teacher ratings as the sole source of diagnostic information concerning student behaviors.

### *Teacher Behavior and Instruction*

The following collection of studies reviewed moves away from teacher perceptions and attitudes and instead examines the relationship between certain teacher behaviors and student perceptions of classroom climate or effects on student creative performance.

### *Creative Classroom Climate*

Furman (1998) observed teacher behaviors and correlated them with student perceptions of creative classroom climate. He found that a combination of low rates of discipline, assistant behavior and student confusion and high rates of questions, positive feedback and both convergent and divergent tasks correlated with higher rates of perceived creativity. Two additional case studies of university level teachers, one conducted by Cole, et al. (1999) and the other by Lilly and Bramwell-Resjkind (2004). Both found that the theme of close teacher/student connection as a key factor that supports creativity. Additional themes that emerged include: explicit instructions in creativity, choice in assignments and materials, careful preparation by the teacher, and a de-emphasis on teacher evaluation and grading. Both studies found that creativity-enhancing teachers strive to help students feel safe enough to take risks in the classroom and on assigned work. Finally, Hasirci and Demirkan (2003) found a high correlation

between the product and process of sixth grade creators when they happened in the same environment.

In a quantitative, observational study performed in Eastern Slovakia, Furman (1998) inventoried eighth grade student perception of classroom climate ( $n = 600$ ) and observed teacher behaviors ( $n = 18$ ). He determined that the teacher behaviors that have a high correlation with high classroom creativity included: higher rate of instruction, less frequent use of discipline, less frequent use of assistance behavior, higher number of questions, convergent and divergent tasks, higher rate of positive evaluation and lower rate of ironical remarks/absence of feedback and lower rates of student confusion.

The author told the teachers that the purpose of the observation was to code pupils' behavior and other interactions during classroom teaching and learning periods. He also told the teachers that the observations were for research purpose only and would not be available to their supervisors. Initially the researcher observed classrooms for up to five sessions to determine if the teacher's behavior from session to session differed greatly or if two sessions would be sufficiently representative. Each observation period was also recorded on audiotape to check for accuracy and to supplement or correct coded observation of teachers' verbal activities.

The author coded the observation and had an 85% agreement with another trained psychologist observer. The coding and checking of every lesson with audiotape recordings resulted in 90% agreement between two observers. He coded and checked at least two lessons per teacher. The average frequencies per behavior category were counted and translated into percentages of the total number of each particular activity. The author administered an *Origin-Pawn Questionnaire* (OPQ) to all the students two

times—once for math instruction and once for Slovak instruction. The researchers instructed the students to not include their names to ensure confidentiality. The questionnaire asked them to rate their degree of agreement with 28 items on a four-point scale. There are seven subscales of the questionnaire, which are: internal control, goal setting, instrumental activity, reality perception, personal responsibility, self-confidence and warmth. The author did not explicitly mention creativity in any part of the questionnaire.

The researchers found, in general, the questions or tasks that would allow students to be original thinkers, to give their own ideas or express their feelings were very rare. They observed little or no support from the teacher to enhance pupils' questions. The author concluded that the behavioral patterns observed created the expectation that creativity is not allowed during teaching-learning interactions in the classroom.

In math classes there was a higher level of perceived creative classroom climate related to higher rate of instructions given to pupils, less frequent use of disciplining, and assistance behavior. It was also related to a higher number of questions and to tasks of convergent and divergent type. Creative climate perception was higher for those lessons that had higher rates of positive evaluation and lower rates of ironical remarks or absence of feedback. There was also a difference in the category confusion—periods of activity when it was not clear what was to be done connected to low creative climate perception. In Slovak language classes there were significant differences between low and high creative climate perception in the following categories: instructions; directions, warnings, orders; assistance; direct lecturing; teacher's answers; personal and other questions; short positive feedback; criticism, blame; asking pupils to evaluate and confusion. Some of

these findings were opposite of those found in the math class and may indicate the importance of the context/content in determining creative classroom climates.

A major strength of this study is that the author observed a large variety of teacher behavior frequencies to compare with the creative classroom climate perceptions (the OPQ scores). The ecological validity was strong because it occurred in an actual classroom setting. However, this research was a pre-experimental design, the next step would be to try a treatment and observe if creative classroom climate perceptions change. This was not a randomly selected sample, although the author noted that all of Slovakia was working from a nationwide curriculum at this point in history. The author did not report the SES or the ethnicity/race of the participants. Also the author failed to report the p-values or other measure of statistical significance in his findings.

Cole et al. (1999) performed a qualitative case study of a classroom that supports creativity. They found that the intentional development of student/teacher relationships, the explicit instruction of creative techniques, the de-emphasis of grading and the encouragement of choice, freedom and multiple perspectives in tasks and assignments all helped students feel more supported in their creative endeavors.

The researchers studied an advanced level graphics communication course at a large university in the Midwest. Eighteen undergraduate students and one professor participated in the study. The students varied in terms of both class standing and artistic ability. The researchers conducted a document review of the course syllabus, multiple interviews with the professor, six student interviews and several classroom observation sessions. They performed the observations, data collection, analysis and interpretation as a research team and triangulated their findings. That is, each researcher independently

analyzed and interpreted the data before their meeting together as a team to summarize the findings.

The four themes that emerged concerning characteristics of a classroom environment that would support the fostering of creativity: “personal teacher-student relationship, assessment, openness and freedom of choice, and classroom activities” (Cole et al., 1999, p. 283). The researchers summarized their results in a table that compared instructor intentions, implementations and student reactions. One intention was to develop personal relationships with students. The professor implemented this intention by learning student names, holding individual conferences with students and offering a variety of communication options: email, phone, and office hours. The students responded by expressing comfort in sharing ideas and feelings, satisfaction in the relationship with the professor and gratitude for his convenient avenues for communication.

Another intention was the direct teaching of creative processes. He did this by introducing a variety of creativity skills, particularly in divergent thinking. The students stated that it changed their thoughts about the definition of creativity and creative individuals. Some students indicated that they benefited directly from learning the new techniques.

A third intention was that he wanted to encourage multiple, distinct perspectives. He implemented this by writing in the syllabus: “No one right answer!” The students thought this led to both unique expression and risk taking the professor wanted to emphasize choice and freedom. He did this by ensuring that there was an open option for each assignment. The students interpreted this action as an invitation to experiment,

express themselves and try out novel approaches. Finally, the professor attempted to de-emphasize grades. He did this by being clear that his method of assessment did not use standardized tests and that the criteria were effort, creative solutions and reflection. The students indicated that this intention encouraged the creation of lots of ideas, helped them feel comfort and trust, and ultimately allowed them to be more creative.

This study lines up with many of the themes that emerged in the following Lilly & Bramwell-Rejskind (2004) study. Both studies emphasized the student-teacher relationships and the formation of trust and comfort that can lead to risk taking on the part of the students. The authors described in relative detail the context of this particular setting but did not specifically outline the central assumptions that framed their research and therefore did not enhance the transferability of this study's findings. The authors did not indicate whether the participants verified or judged the credibility of the results of this study. The evidence for the themes that emerged is not supported by a variety of quotations. In most of the subsections there were only one or two quotations that are used and otherwise ideas are summarized. The researchers did not describe any changes that occurred in the setting over the course of their study or how these changes altered their approaches; this limits the dependability of this study. Although the researchers described their triangulation process they did not describe in detail any checking and rechecking of data that occurred during the study or any data audits that were conducted following data collection and analysis. Therefore they did not provide evidence to support the confirmability of their work.

In an instrumental case-study design qualitative study Lilly and Bramwell-Rejskind (2004) interviewed and observed a creative teacher, 'Grace', and her teaching

process. They determined that creative teaching for Grace is the result of lengthy, detailed course preparation, connections with students, and dedication to reflection. She indicated inhibitors that include: time, class size and content.

The researchers used an evolving systems approach to the case study method. They conducted five interviews with the teacher over a period of six months (including before, during and after she taught a university course in teacher education on the instruction of diverse learners). The authors coded all interviews with the teacher by noting patterns and themes. Then they clustered these patterns and themes using conceptual grouping. They noted the frequency of occurrence of codes and determined contrasts and comparisons to sharpen the focus of the codes.

Lilly & Bramwell-Rejskind (2004) also conducted interviews with six students at the onset of the course and at its completion. They interviewed the teacher's husband at the end of the class. The researchers created data sets from classroom observations, field notes, personal memos and materials created for the course. The researchers found three main themes that emerged in relation to the overall process of creative teaching: "preparation, connection and reflective teaching" (p. 107). They discovered the following sub-themes or micro-processes as well: "content and temporal constraints; awareness of self and students within the process; feedback from students and colleagues; and values and goals" (p. 108).

The researchers found that creative teaching for Grace was the result of thorough course preparation, intimate teacher-student connections, and dedication to reflective teaching. They determined that her course constraints included: time, class size and content. She told them that she imagined a dialogue between herself and her students



during preparation. She stated that personal values and goals guide her preparation, intuition and feedback guide her connection to her students and self-awareness, paying attention to her needs for improvement, and feedback inform her reflective teaching.

The researchers claimed that this study resulted in findings similar to other studies of creative people and creative teachers. They often only included one quotation for each emergent theme or sub-theme. The researchers did describe the process by which the data was collected, coded and eventually became evidence for the assumptions made. They did not describe any process in which the participant checked the responses. Nor did they indicate if any data audit or checking and rechecking of the data occurred. Therefore the credibility and confirmability of the study are not supported. Additionally, only quotations from the case study interviews are included even though other people were interviewed. SES, ethnicity and age of the participant were not included. The researchers did not report location. Like the Cole et al. (1999) study described below this research specifically focuses on college teaching—may not be transferable to K-12 education.

Hasirci and Demirkan (2003) performed an observational, correlational quantitative study to investigate the overall effect of environment on the creativity of sixth graders ( $N = 24$ ). In two different classrooms from two different schools, the researchers and art teachers determined and recorded the personality traits of the students, and then the researchers observed their creative process, and evaluated their final product. They found a high correlation between product and process when they happened within the same environment.

This study took place in Ankara, Turkey at two comparable private schools. Prior to the art activity, observers and teachers assessed the behavior characteristics of each

student (the ‘person’ aspect of creativity). The researchers used the following main categories: originality, completion, self-courage, sensitivity, negativity, isolation, control, and humor. At each school the students participated in three, forty-minute art activity sessions. The researchers observed during each session and recorded student creative process using the six main categories: originality, self-courage, completion, negativity, identification, and movement. They also informed these characteristic lists for each student through conversations with the teachers.

The researchers asked the students to construct three-dimensional models of the art room and to alter it in ways that would allow them to work more creatively. They told the students to consider where they themselves would like to work in this altered space that they were creating. The students produced a detailed two-dimensional drawing of an art room that they would like—referencing the one they were in as a starting point. Then the experimenters gave them each a three-dimensional, 1/20<sup>th</sup> scale frame models of their current art room to build upon. The teacher gave the students access to any art materials they would like to use and asked them to add to the model to design an environment that would benefit their personal happiness, satisfaction and creativity. The experimenters evaluated the final products (both drawing and model in combination) in terms of creativity, design, and unifying principles. The judges included teacher comments and discussions of the students’ products as part of the rating process.

The authors calculated the mean scores for each student in terms of process, product and person. They compared the two schools by correlating these scores for each environment. They found that the correlation coefficient between process and product for each school was high: 0.921 for school A and 0.830 for school B. Next they performed an

analysis of variance and demonstrated that the three elements of creativity were significantly different from each other: school A ( $F = 46.05, p = 0.000$ ) and school B ( $F = 9.34, p = 0.008$ ). The authors concluded, “the elements of creativity represent a high degree of dependence across person, product and process”. They performed a multiple regression analysis to create a formula that would estimate product creativity given specific student creativity characteristics. For school A,  $\text{Product} = 28.5 + 0.215(\text{Person}) + 0.399(\text{Process})$ , R-sq is 90.2 percent. Whereas, for school B,  $\text{Product} = 46.5 + 0.069(\text{Person}) + 0.251(\text{Process})$ , R-sq is 70 percent. The R-sq indicates the percentage of variance in product and person scores that the equation explains.

This research project attempted to evaluate all the different spheres of creativity simultaneously. The authors recognized two main limitations of this study. They identified that the small, non-random sample prevents the findings from being generalized to a broader population and indicated the need to apply this design to a larger, more random sample. They also acknowledged that the art room design project might not be an effective way to measure student creativity. Additionally, the description of the procedure was very unclear, particularly in terms of how the final products were assessed. The authors did not describe the assessment process, identify the judges or report an inter-judge reliability rating. The authors did not offer ideas about why the two schools differed in their scores or any information about the actual art classes and the type of work the students are usually expected to do in this environment.

This collection of research studies tentatively indicated that a creative classroom climate can be influenced by the teacher’s instructional decisions and behaviors. Furman (1998) found that low rates of discipline, assistant behavior and student confusion

correlated with higher rates of perceived creativity. He also proposed high rates of questions, positive feedback and a combination of convergent and divergent tasks correlated with higher student ratings of creative classroom climate. Both Cole, et al. (1999) and Lilly and Bramwell-Resjkind (2004) indicated that close student/teacher relationships, student choice in assigned work, a de-emphasis on grading and explicit instructions in creativity supported student creative performance. They emphasized that students need to feel safe and able to take risks in order to do creative work. Finally, Hasirci and Demirkan (2003) linked product and process in their investigation of sixth grade creators. All of the studies point to the teacher's role in establishing and maintaining a creative classroom climate.

### *Evaluation*

A frequent theme that arose in the previous studies is teacher evaluation and assessment practices. Many educational theorists argued that creativity is inhibited by anticipated external evaluation (Amabile, 1996; Hennessey, 2003). The following studies address this phenomenon specifically. The first two studies, performed by Amabile (1979) and Amabile, Goldfarb, and Brachfield (1990), found that university students who did not anticipate external evaluation produced more creative collages. Whereas, the next two studies created by Baer (1997, 1998) indicated that this effect was much stronger for middle school female subjects compared to male participants and not significant for second graders at all. His studies draw attention to the fact that Amabile's studies only used female subjects.

Baer (1998) also investigated anticipated constructive feedback and found that the presence or absence of this type of assessment anticipation did not significantly affect

creativity measures. Finally, Zhou and Oldham (2001) found that anticipated self-administered assessment correlated with the highest creativity scores when compared to other-administered or no assessment at all. Therefore, this section of studies cast a general trend where external evaluation may reduce creative output (particularly for females) however the type of evaluation and the person administering it might counterbalance or dampen this trend.

In a seminal, quantitative study of artistic creativity Amabile (1979) examined the effects of external evaluation on creativity. Ninety-five female college students enrolled in an introductory psychology course at Stanford University participated in the study. In this static group comparison experiment Amabile investigated eight different conditions in which the participants constructed a collage and found that for almost all conditions, students who did not anticipate evaluation produced more creative collages.

The researcher applied different instructions to each condition. In the five evaluation conditions the experimenter told subjects their collages would be evaluated by graduate student artists from the Stanford and would be critical pieces of data in addition to a mood survey. She told participants in the nonevaluation conditions that the mood questionnaire was the only piece of data that would be considered. Additional conditions varied the level of instruction in terms of what the participants were asked to focus on. The experimenter told one group to focus on the technical aspects of the collage, one to focus on very specific technical pieces, one to focus on creativity in general and one to focus on very specific creative elements. For all of the conditions the researcher found that the non-evaluation (control) groups scored higher on creativity than the evaluation groups, except for the evaluation—specific creative focus group.

Amabile measured the interjudge reliability for creativity rating to be 0.79. The only specific measure that did not have a high inter-judge reliability was balance. She found that the only evaluation group that scored higher on creativity than the corresponding control group was the evaluation—specific creativity focus condition ( $t(14) = 3.88, p < 0.01$ ). In all other comparisons the control groups scored higher: no focus groups ( $t(14) = 9.44, p < 0.001$ ), technical focus groups ( $t(14) = 2.07, p < 0.06$  and specific technical focus ( $t(14) = 3.62, p < 0.01$ ), and creativity focus groups ( $t(14) = 3.79, p < 0.01$ ). The art interest questionnaire included questions that identified degree of intrinsic interest. Amabile predicted that expected evaluation would undermine intrinsic interest. The analysis of variance on all eight groups determined the following overall effect ( $F(7,87) = 2.68, p < 0.025$ ). A series of planned contrast testing the specific trend of non-evaluation groups being higher on intrinsic interest than evaluation groups found an overall effect ( $F(1,87) = 4.08, p < 0.05$ ). But only two experimental-control paired comparisons are statistically significant: nonevaluation—no focus vs. evaluation—no focus ( $t(22) = 2.07, p < 0.05$ ) and nonevaluation—technical focus vs. evaluation—specific technical focus ( $t(22) = 2.77, p < 0.02$ ). Therefore, participants identified higher rates of intrinsic interest when they were not expecting evaluation in general across conditions and specifically between the pairs identified above.

Amabile (1979) described the exact language of the experimenter and the specific procedures and questionnaires used. This study could be repeated and the results are consistent with other research. For each condition there were one or two experimental groups and a control group. The independent variable is the presence or absence of evaluation and the dependent variable is creativity, change in the independent variable

resulted in change in the dependent variable. This demonstrates the strength of its internal validity.

Three subjects did not participate in the study due to artistic experience and this may have resulted in a differential loss of subjects from the comparison groups. Also, Amabile (1979) did not administer a pretest or determine creativity measures prior to the various treatments so it is unclear whether the assigned groups are comparable. The author used a small sample size for this study and selected all of the participants from one university course. She did not report SES or ethnicity data. Also, because this was an entirely female study its results may not be generalizable to the broader population. Time and setting are two variables that affect the ecological validity of this experiment. The author gave the participants fifteen minutes to perform the task in a laboratory setting. In a real world setting people frequently have a much larger span of time to perform creative tasks.

Ten years later, in a pre-experimental, quantitative study, Amabile, Goldfarb, & Brackfield (1990) investigated the effects of social influences on verbal creativity. They found that anticipated evaluation correlated with lower creativity scores.

This study focused on anticipated evaluation and coaction (the presence of others working on the same task, however each person is working independently). They found that the presence or absence of expected evaluation had an effect on judged creativity of the poem that was produced. The no anticipated evaluation group produced more creative products than the anticipated evaluation group. Coaction did not affect the creativity measures in a statistically significant way. Forty-eight female university students

participated in the study. The subjects self-selected to participate and attended Brandeis University.

The researchers told the subjects that the main purpose of the experiment was to develop a new handwriting analysis technique. In order to gather an original handwriting sample the authors asked the participants to write an “American Haiku” and gave detailed instructions. This instruction sheet outlined the form of the five-line poem and provided two examples. The researchers gave everyone the first line of the poem to help structure the assignment but still leave it fairly open-ended. The experimenter informed the participants that their poems would be donated to a high school teacher who would use them in his classroom without their names attached. Half of the subjects sat in a single desk-chair in a corner of the room—the alone condition. The coaction condition assigned the other half of the participants to sit in desk-chair circles of four with three feet of space between each desk. The researchers assigned half of the participants in both the alone condition and the coaction condition to the evaluation condition. They told this group expert judges, who would produce an analysis of both the content and the handwriting and mail it to them, would rate their poems.

All of the subjects completed the task within the twenty-minute time that was allotted to them. After they performed the task the subjects completed a self-evaluation form that surveyed their attitudes about the task and their own performance. Ten poets rated the poems for both creativity and technical merit. The researchers determined interjudge reliability of both measures: creativity ( $r = 0.87$ ) and technical goodness ( $r = 0.31$ ). Only creativity received an acceptable reliability.



The findings demonstrated that the nonevaluation groups wrote poems rated as more creative ( $F(1,44) = 14.14, p < 0.0001$ ) than those from the evaluation groups. However, coercion had no effect on creativity. The researchers also analyzed the self-evaluations and found one major difference between evaluation and nonevaluation groups: reported satisfaction with their poems ( $F(1,44) = 4.28, p = 0.044$ ). The nonevaluation groups reported more satisfaction than the evaluation groups.

A strength of the study is that it maintained internal validity: changes in the evaluation independent variable produced changes in the creativity measures of the poems. Also the study is reliable—the procedures are clear, specific and repeatable and the findings are consistent with the other articles in this section. The article provided data analysis results, which are available for independent investigation. However, because there were no pretest or creativity measures determined prior to treatment it is unclear whether the assigned groups are comparable. The study used a small sample size self-selected from one course at one university and all subjects are female. These details call into question the population validity of the study; therefore it cannot necessarily be generalized to a broader population. Also, the researchers performed it in a laboratory setting and only gave participants 20 minutes to complete the task—time and setting limit the ecological validity of the study.

In recognition that the two previous studies included only female participants, Baer (1997) sought to discover the differences between male and female subjects' creativity when evaluation is or is not anticipated. In this quantitative, one group ( $N = 128$ ) pre-test/post-test design he assigned the eighth grade student participants to two motivational conditions: intrinsic and extrinsic. He found that anticipated evaluation

(extrinsic) corresponded with lower creativity measures. However he determined a significant gender x motivational condition interaction, which demonstrated that this correspondence is much higher for females than males.

The study took place in a racially mixed, Southern New Jersey school. The author required participants to create both a poem and a story based on pre-determined prompts under the two conditions. Both conditions took place in the students' classroom environment and their teachers administered the prompts. In the intrinsic condition (the first round), the teacher emphasized that the stories and poems would not be evaluated or displayed and encouraged the students to enjoy the work. Then in the extrinsic condition (second round) the teacher informed the students that a state expert from the department of education would evaluate their work and that these evaluations would be sent to their ninth grade teachers. Six judges evaluated the poems and stories for creativity on a scale of 1 to 5. The researcher found a statistically significant difference between the creativity of work produced under intrinsic versus extrinsic conditions ( $F(1,378) = 5.91, p = 0.02$ ). Participants in the extrinsic condition produced less creative work than those in the intrinsic condition. However, there was also a statistically significant Gender x Motivational condition interaction ( $F(1,378) = 7.00, p = 0.04$ ). The change in condition affected the female subjects more significantly than the male subjects.

Baer included male and female participants, a racially mixed group, a relatively large sample size, and a natural setting to investigate the effect of anticipated evaluation on student creativity. For these reasons his study may be generalized to a broader population than Amabile's studies described previously. The procedures are described and repeatable. The findings are consistent with other studies conducted by Baer using

middle school aged participants (Baer, 1998a). However, he did not report SES information or specific ethnicity demographics. A change in the independent variable (presence of evaluation) resulted in change in the dependent variable (product creativity) for the group as a whole and particularly for the females in the group.

Only one group from one school was included in this study and they all took the same pretest and posttest (i.e. they evaluated their work for creativity without anticipated evaluation and with anticipated evaluation)—it is unclear whether this sample has a history of creative writing or whether the results were simply the result of having to do a similar task again within a short time framework. Therefore, the testing and instrumentation are questionable because there is no control group for direct comparison. Additionally, the type of anticipated evaluation included a potentially confounding variable. Not only did the students anticipate receipt of the evaluation, as is the case in other experimental set-ups, but the evaluation would also be sent to their future teachers. The extrinsic motivation in this case was very specific to anticipating an academic future. Finally, the creativity judges used a scale of one to five in this experiment, whereas other studies used a wider scale (i.e. one to forty one).

To further investigate the gender difference in the effects of anticipated evaluation on the creativity of school children, Baer (1998a, 1998b, 1998c) conducted three additional quantitative, static group comparison design studies. Study 1 took place in an art classroom in a New Jersey suburban middle school (seventh and eighth graders) (Baer, 1998a). The participants (N = 70) made up four different art classes; he randomly assigned two classes to each condition—intrinsic and extrinsic motivation. This task

motivation assignment did not significantly affect the creativity measures of the group as a whole but did influence the female subgroup.

All subjects received identical sets of collage materials and were instructed to make an “interesting, imaginative design.” The experimenter told the not expecting evaluation classes this was simply a “fun collage-making activity” he or she wanted to try out for future experiments and to not put their names on their finished products. He did not give any indication that they would be evaluated on their work. The experimenter told the expecting evaluation classes he or she was from New Jersey State Department of Education and that their collages would be used to evaluate the artistic abilities of middle school students and these assessments would be sent back to their teachers. They were asked to put their names on the back of their tag board before they began.

Four art educators evaluated all of the collages for creativity on a scale of 1 to 5 (low to high creativity). The author debriefed the students at a later date about the truth behind the experimental procedure and explained the motivation theory of creativity. Motivational condition and gender, considered separately were not statistically significant in terms of predicting creativity scores. However, gender x motivational condition interaction was statistically significant ( $F(1,66) = 4.693, p = 0.034$ ). Overall task motivation was not significant except when considered only for the female sample.

In a similar study, Baer (1998b) examined the effect of anticipated evaluation on the creativity of second grade children. He assigned the students ( $N = 81$ ), from four different public schools in suburban New Jersey, the same task as in the first study—collage making. The author assigned two of four art classes to the intrinsic motivation condition and two to the extrinsic condition. He found no significant effects for the group

as a whole and a positive impact of anticipated evaluation for the boys ( $F(1,38) = 4.142$ ,  $p = 0.049$ ).

Baer (1998c) examined the effect of anticipated specific, constructive feedback on the creativity of middle school students ( $N = 60$ ) in a third study. This quantitative, static group comparison research design had two conditions: expecting feedback (experimental) and not expecting feedback (control). No statistical significant effect was found for gender or condition in this study. The gender x condition interaction was almost significant for the girls ( $F(1,25) = 4.215$ ,  $p = 0.051$ ). For the boys there was no interaction ( $F(1,31) = 0.017$ ,  $p = 0.896$ ).

Baer (1998c) gave the same basic collage making instructions and kits as in studies 1 and 2. For the not expecting feedback group the experimenter encouraged the students to make interesting collages and told them he was simply trying out a task he wanted to use in future experiments. In the expecting feedback group the experimenter told the students that he was an art teacher that had developed a tool to help students receive feedback on their strengths as artists. He stated they would not get a summative evaluation or grade, but they would receive this specific feedback that would offer them guidance. They put their names on their tag boards and asked a few questions about the feedback—the experimenter responded by reassuring them that the feedback would identify their strengths. He encouraged them to make interesting collages.

In all three studies, the researcher described clear and repeatable procedures. All students in the classes participated so there was no differential loss of participants from the groups. The task performed reflects work that the students are likely to do in art class—this is a strength, in terms of ecological validity, of all three studies. These studies

also had some shared weaknesses. There was no control for differences in classroom climate/expectations in the different classrooms. The sample sizes were small and all from one school for each study. Group assignment was based on class assignment, this may result in selection bias if certain groups of students are more likely to take art during different periods. No SES or ethnicity data was provided. These factors limit whether the findings can be generalized to a broader population. In study 3, the researcher identified that an unknown experimenter with no history of giving supportive, nonthreatening feedback might not be trusted by the students in the same way as a familiar teacher who has this history.

Continuing the thread started by Baer (1998c), Zhou and Oldham (2001) investigated the effects of expected developmental assessment strategies and creative personality on creative performance. In this static group comparison, the authors assigned participants to three conditions: self-administered assessment, other-administered assessment and control. All participants completed the *Creative Personality Scale* (CPS) which self measures creative personality. The authors found that participants in the self-administered condition had higher creative performance than the other two conditions. And those with higher CPS indexes demonstrated higher creativity.

The subjects worked individually in a room containing small groups. They listened to standardized instructions from a tape recorder, which described the task: they would play the part of a human resources director of a steel company. They were instructed to construct creative solutions to problems presented in 16 memos. The instructions also defined creative as original and useful. The tape instructed the subjects to read along while the directions were being played using a paper that contained the

same information in writing. These instructions also informed them of the different experimental manipulations depending on the assigned condition. The tape told them to begin their task and to work individually. After 45 minutes the researchers debriefed and dismissed the participants.

The researchers randomly assigned the groups to the following conditions: self-administered condition, other-administered condition and control condition. In the control condition the researchers told the subjects that no one would analyze their solutions. In the other-administered condition the researchers told the subjects that experts would analyze the degree to which their answers were creative in order to help them improve and develop their creative skills. The researcher told the self-administered condition group that there would be assessment in order to help them improve and develop their creative skills, they would be given an opportunity to analyze and assess the degree to which their answers were creative. The researchers told them they would fill out this rating by themselves but the experimenter would be available to answer questions or assist, but not assign the ratings for them.

Two judges evaluated the creativity of the solutions. They rated the solutions in terms of originality, usefulness and overall creativity. Creative personality was measured using the Creative Personality Scale (19 adjectives presented in list form, the subject puts a check by all the adjectives that describe themselves). An index is developed based on the number of adjectives describing creative people versus those describing less creative people.

The authors found that subjects in the self-administered condition exhibited higher creativity than those in the other-administered ( $t = 2.13, p < 0.05$ ) and control

conditions ( $t = 1.82, p < 0.07$ ). Those with higher CPS indexes also exhibited higher creativity ( $r = .32, p < 0.01$ ). Zhou and Oldman (2001) concluded, “individuals’ scores on the CPS moderated the effects of expected developmental assessment” (p. 164).

However, individuals with high CPS scores (creative personalities) exhibited the highest creative performance when they expected self-assessment ( $t = 4.44, p < 0.01$ ).

The strengths of this study include its mortality rate—there was no differential loss of participants for the comparison groups. Also, they gave the participants a real world problem to solve creatively which improves this study’s ecological validity—the findings are more transferable to non-experimental settings than if the task had been contrived or unrelated to how creativity is actually used on the job. The procedures are repeatable and the study used creative performance judges with an adequate inter-judge reliability rating.

Variations in the independent variable (type of assessment) resulted in different measures of creativity, however the researchers did not administer a pretest, which would determine whether the groups assigned to different conditions were comparable (potential for selection bias). There is little population validity because: sample size was small and made up of students from one course; also the compensation was extra course credit which does not lead to a random sample of students but rather a self-selected group based on credit needs. No SES or ethnicity information was provided.

The previous collection of studies, which examined the effects of evaluation practices on creativity, presented a general trend where external evaluation correlated with reduced creative output. This was particularly true for female subjects. However, the



type and quality of evaluation, in addition to the role of the person administering it in some cases dampened or counterbalanced this trend.

### *Competition and Reward*

In addition to evaluations, classroom teachers frequently employ competition or rewards (or a combination of both) as a technique to encourage students to accomplish a task. The next set of studies considers the effect of competition or anticipated reward on creativity. The first two studies examine the effect of competition for a reward on creativity. Amabile (1982) found that a group of young females competing for prizes made less creative collages than a group that did not compete. Whereas Gerrard, Poteat, and Ironsmith (1996) did not find a significant difference between the creativity measures earned by students competing for a reward and of students who did not. In order to further understand these differing results the following two studies attempted to separate reward and competition to investigate the distinct effect of each condition. Baer (1998) examined the effect of reward without competition. Rather than compete for scarce rewards, he promised all students who created collages in the reward condition extra credit points—he determined that these students made less creative collages than their no-reward counterparts. Shalley and Oldham (1997) investigated the effect of competition (participants informed that their scores would be compared to those of a group but no tangible reward offered for high scores) on fluency and flexibility. The researchers found variable results with no significant main effect for competition.

The final two studies reviewed in this section considered two sequential tasks—a training task and a subsequent transfer task. Eisenberger, Haskins and Gambleton (1999) constructed three different training tasks two rewarded and one not and two different

transfer tasks one rewarded and one without reward. They found different results depending on the combination of training and transfer tasks. Joussemet and Koestner (1999) set up two training tasks. In one they rewarded the participants for being creative and in the other they did not. Then all subjects performed the same transfer task and their subsequent creativity was measured. However in this study age was the only statistically significant independent variable. Therefore neither of these studies provided any strong evidence that there is a significant impact of initial promised reward on future creative performance.

Amabile (1982) investigated another form of extrinsic influence—competition for prizes—on the creativity of young people. In a small ( $N = 22$ ) quantitative static group comparison the researchers examined the effects of competition in a field setting. The experimental group made collages and competed for prizes and the other group simply made the collages. The researcher concluded that the group that competed made less creative collages than the group that did not compete.

The experimenters invited young girls from the same apartment building to participate in art parties held on site. The researchers hosted two parties. In both, after some initial games, the subjects sat at long tables and the experimenter presented them with identical sets of materials. She directed them to make a “silly” design for the experimenter to keep. In the control group she told the subjects that at the end of the party there would be a raffle with three prizes—everyone had an equal chance to win. In the experimental condition, the researcher told them that the four adults present would judge the designs and award 3 prizes for the best ones. They had 18 minutes to work on the designs (enough time for each child to finish).

Seven undergraduate and graduate artists rated the collages independently. They used a 40-point scale. The researcher found the seven artists to be highly reliable (interjudge reliability of 0.77). She also found that ratings of technical goodness correlated with age ( $r = 0.46, p < 0.05$ ), but ratings of creativity did not correlate with age ( $r = 0.04$ ). These judges determined that those children who competed for prizes made less creative collages than those made by the control group. Specifically, the control group showed more variability in the number of colors used ( $F(14,6) = 4.75, p < 0.05$ ), the number of pieces used ( $F(14, 6) = 8.02, p < 0.01$ ), and the percentage of pieces altered ( $F(14,6) = 4.09, p < 0.05$ ).

As in her other static group comparison studies, Amabile (1982) did not use a pretest to determine comparability of the groups. She assigned twice as many participants to the control group as to the experimental group. Also, the sample was very small and all of the subjects came from one apartment building. This, coupled with the single gender of the participants and the fact that she did not include SES or ethnicity information, limits the applicability of this study to broader populations. Although this study took place in the field, rather than a laboratory setting, the apartment building art party is still an unusual, somewhat contrived setting and the results may not be generalizable to the classroom.

Gerrard, et. al (1996) investigated the effect of reward and competition on creativity of third grade students ( $N = 103$ ) and the potential mediation of an intrinsic motivation training session. In this mixed research design, both pre-experimental static group comparison and quasi-experimental nonequivalent control group design, they found that the intrinsic motivation training did not impact the creativity measure but the

group that did not have the intrinsic motivation training and competed for a reward scored the lowest creative measures.

The teachers administered the Coopersmith Self-Esteem Inventory (CSI) to all subjects. The CSI is a list of 58 items—the students answer, “like me” or “not like me” and the scale is used to measure self-worth judgments. The authors randomly assigned the subjects to one of the following conditions: intrinsic motivation training/reward, intrinsic motivation training/no reward, control training/reward, and control training/no reward. The day after the CSI administration all of the subjects attended a training session. The control-training group watched, discussed and did written exercises about a video on American Sign Language. The experimental training group watched, discussed and did written exercises about a video that emphasized intrinsic motivation for doing schoolwork and other activities. The training sessions lasted 40 minutes.

The following day the subjects filled out the CSI for a second time. The day after that, they did the collage-making task. Different experimenters introduced the task than conducted the earlier trainings. The experimenter displayed a prize bag to the reward group and told the subjects that the best 3 collages would receive the prize. The researcher showed it to the no reward group and told the participants that three bags would be raffled off at the end. They had fifteen minutes to make the collages and the experimenter informed them of this time limit when she asked them to finish up their work with one minute left. At the end the researcher announced that he or she had found more prizes and all students were given a prize bag.

Two art professors and one graduate student from the School of Art in North Carolina judged the collages using a 41-point Likert-type scale. These judges did not

have high interjudge reliability (Spearman-Brown measure  $r = 0.69$  and Cronbach's coefficient alpha = 0.69) so 21 teachers of gifted children were asked to rate the collage using an 11-point scale. The authors determined the interjudge Spearman-Brown reliability for the teachers to be  $r = 0.89$  and the Cronbach's alpha equal to 0.92. The authors performed an ANOVA on the creativity measures determined by the teachers for each condition. They found no main effects or interactions. They wrote that the most creative group was the intrinsic motivation training/reward group and the least creative group was the control training/reward group but this difference in mean creativity measures was not statistically significant.

The CSI and paper collage task have been used in previous research. The procedures are clear, detailed and repeatable (many of the steps are described in even more detail in a previous research study that this experiment is modeled after). Using the artist judge measures of creativity, changes in reward (independent variable) produced a change in creativity. For the teacher judges, they found no significant interaction or effect. Therefore the validity of this study is unclear because different creativity judges produced different results. Although the self-esteem inventory was administered twice, there was no pre-test for the creativity measure and therefore no assurance that the different groups are comparable.

This study did provide ethnicity information for the students (79 White, 22 African American, 1 Hispanic, 1 Asian American). However, the small sample size and the fact that all of the students are from one school indicates that there may be selection bias and less generalizability to a broader population. Eight percent of the students asked

did not participate which may lead to additional selection bias. Also, the authors did indicate that the students attended a public school, but no SES information was provided.

Baer (1998d) investigated the effect of anticipated reward (in the form of bonus grade points rather than prizes) on the creativity of middle school children. In this quantitative static group comparison, he assigned two middle school art class to the reward condition and two to the no reward condition. He found the no reward condition received higher creativity ratings than the experimental group. He also determined a more significant difference between the reward and no reward conditions for the female subgroup.

The experimenter gave collage making kits and instructions to sixty suburban New Jersey public school children (see previous description of Baer procedures for complete details). He told the reward group that they had a choice to work on a collage activity or sit and quietly read or do other work. Those who chose to do the collage would be given bonus points in art class for participation. One student chose to not do the project. The no reward group was assigned the collage task without a choice but the experimenter told them that it was just a fun collage activity to enjoy and that he needed to test it out for future experiments. He told them to not put their names on the project and gave no indication that they would be evaluated in any way.

Baer (1998d) performed a 2x2 ANOVA on the creativity ratings assigned to the collages. He found that the motivational condition was statistically significant ( $F(1,45) = 10.943, p = 0.002$ )—the no reward condition received higher creativity ratings. He also determined a gender x condition interaction effect was present ( $F(1,45) = 5.491, p = 0.024$ ). The difference between the mean creativity scores of females in the two groups

was much greater than that for males. He found no significant effect for motivational condition for the male subgroup ( $F(1,24) = 0.4, p = 0.502$ ).

Baer's (1998d) results are consistent with his other studies of extrinsic motivation and middle school student creativity (Baer, 1997, 1998a). In this particular study, variations of independent variable (presence/absence of reward) produced changes in the dependent variable (creativity), especially when just considering the female subgroup of the sample. However, despite random assignment of classes to conditions, there may be selection bias due to who is scheduled for which period of art. Also, no pretest was given to provide information about group comparability. The sample size was small and all of the students were from one school. Additionally, SES and ethnicity data were not included. All of this weakens the population validity of the study and prevents it from being generalized to broader populations. The ecological validity is sound, however, because the students conducted a task that reflects work that the students are likely to do in art class and the reward is one commonly used in school settings. Another strength of this study is that all of Baer's procedures are clear and repeatable.

Shalley & Oldham (1997) investigated specific aspects of competition and their impacts on creative performance (fluency, flexibility and overall creativity) of 75 undergraduates enrolled in an introductory business administration course. The authors examined the following conditions in this quantitative static group comparison study: no competition with others visible or not visible, competition with others present in the room and visible or not visible and competition with absent others and visible or not visible to those present. They found that there was no statistically significant difference between

the creativity measures of subjects in the “present others competition—visible condition” and those in the “no competition” conditions.

The authors presented the following creativity task to all subjects: generate unusual uses for five different objects: brick, newspaper, tire, junk auto and hanger. They instructed the participants to consider two restrictions: cannot repeat a function and the uses must make sense. They all had twenty-five minutes to work on the task. Then they completed a questionnaire and had a debriefing session. The experimenters told the no competition group that the number of uses generated would not be compared to the numbers listed by other participants. They told the competition with present others group that the number generated would be carefully compared and contrasted with the number generated by everyone else in the room and that the results would be sent to them in the mail. They told the competition with absent others group that the number generated would be compared with numbers generated by a group that performed the task the previous summer. The result of this comparison would be sent to them in the mail. The authors assigned all of the participants to an open or a partitioned area. In the open area they could view two or three other subjects; in the partitioned area these people were not visible. The researchers judged the tasks based on fluency (number of uses listed), flexibility (use of different categories of approaches to a problem) and overall creativity (both novel and practical).

The authors performed a 3 x 2 multivariate analysis of variance to examine effects of competition and visibility on the three different creativity measures. They found no significant multivariate main effects and one significant multivariate competition x visibility interaction ( $F(6,132) = 4.53, p < 0.01$ ). They conducted three 2-way ANOVAs



with the three creativity scores as the dependent variables. They found a statistically significant competition x visibility interaction for all three measures of creativity ( $p < 0.01$ ). They found no statistically significant difference between the creativity measures of subjects in the present others competition—visible condition and those in the no competition conditions. However, creativity scores were lower for the present others competition—visible condition than for present others competition—nonvisible condition and the absent others—visible condition. Yet, they did not differ from the absent others competition—nonvisible condition. Creativity scores for subjects in the no competition condition were lower than those in the present others—nonvisible condition and absent others—visible condition. They did not differ from those in the absent others—nonvisible condition.

In this study, manipulation of the independent variables (visibility and competition) resulted in change in the dependent variable (creativity). However, without a pretest, it is unclear whether the different groups are comparable. All of the participants completed the experiment once they began so there was no differential loss of subjects from the comparison groups (mortality) occurred. The experimenter performed manipulation checks, which demonstrated that the members of each group perceived the treatment situation correctly. The inter-judge reliability was acceptable for the creativity judges and the procedures are clear and repeatable. The instructions include entire quotations of experimenter instructions for the different treatments, as well as a description of seating placements in the visible vs. not visible set-ups.

The population validity is weak—all of the subjects came from one course which may result in selection bias and therefore the data cannot be generalized to a broader

population; also their compensation was extra credit which narrows the selection even further to those who want or need credit. No ethnicity or SES demographic information was provided and this also limits generalizability. The ecological validity of this type of experimental set-up is also questionable because divergent uses list generation tasks do not mirror actual creative work in the non-experimental setting.

This study indicated that the presence of competition could have a differing effect on the creative performance of participants depending upon whether the participants' competitors are present in the room at the time of the creative act. If a teacher created a competitive classroom environment the students' competitors would be both present and visible.

In a pre-experimental static group comparison study, Eisenberger, Haskins, & Gambleton (1999) investigated the role of prior experience with creative tasks and promised rewards on the creativity of 283 fifth and sixth graders. The researchers provided all participants with a training task and a transfer task; they found that the presence or absence of reward in either task, as well as the degree of creativity required in the training task had an affect on the creativity measured in the transfer task.

The training tasks included: an unusual use task with the promise of a reward, an unusual use task with no promise of reward or a usual use task with the promise of a reward. For all three training task conditions the experimenter showed one card at a time to the subject—each card contained the name of a common, everyday object. Each participant looked at the same eighteen cards. For those participants in the rewarded and nonrewarded unusual-use conditions the experimenter provided an example of an everyday object and an unusual use for that object. For each subsequent word the

experimenter asked the student to say the word and then to list unusual uses for that object. In the rewarded unusual use condition the participant received five pennies (placed on the table) for each unusual use that he or she said. The experimenter also stated, "That's correct." In the nonrewarded unusual-use condition the experimenter simply stated, "That's correct" after each unusual use offered. If the child gave a usual or impossible answer the experimenter commented on that and asked them for an unusual use instead. If they still could not give an unusual use the experimenter said, "That's incorrect," and moved on to the next card.

For the usual use conditions the question and example given asked about the usual use for an item. The rewarded usual use condition included the same five-penny reward and the nonrewarded usual use condition included the same, "That's correct," response. Once this task had ended the experimenter told the student, "Now I have something else to do. Please wait here and someone else will be with you shortly, okay?" and left the room.

A new experimenter entered the room, unaware of the condition assigned to the child in the first task. The adult placed a sheet with circles on it in front of the subject. The experimenter told the subject to make pictures using the circles on the sheet—the circle should be the main part of each drawing. Those in the reward condition were told that they would receive 75 cents for making pictures from the circles. Once their drawings used sixteen circles the experimenter asked them to describe the subject of each picture. The experimenter wrote down these subjects in case of any ambiguous drawings. The experimenter paid students with the promised reward condition 75 cents.

The researchers judged the creativity of the drawings in terms of the frequency of each picture in relation to the other drawings in the sample. They used the reciprocal of the frequency times 1000. The study used two judges and averaged their scores ( $r = 0.99$ ). Based on these scores the authors found, for subjects in the rewarded unusual-use training condition, promised reward in the transfer task resulted in drawings with higher creativity measures than no promised reward ( $t(277) = 1.65, p < 0.05$ ). For those within the nonrewarded unusual-use training condition: promised reward in the transfer task resulted in drawings with higher creativity measures than no promised reward ( $t(277) = 1.71, p < 0.05$ ). For subjects in the rewarded usual-use training condition: no significant difference was found between the promise of reward or no promise in terms of the creativity measures of the drawings. The experimenters found three significant results within the promise of reward transfer task condition: the subjects in the rewarded unusual use condition received higher creativity scores than those in the rewarded usual use condition, ( $t(277) = 1.91, p < 0.05$ ), participants in the nonrewarded unusual use condition received higher scores than in the rewarded usual use condition, ( $t(277) = 2.53, p < 0.01$ ) and there was no significant difference in creativity between the rewarded and nonrewarded unusual use conditions. So, an unusual use training task with or without reward correlated with a more creative transfer task than a rewarded usual use training task.

In this study, manipulations of independent variables (reward and training task) produced changes in the dependent variable (creativity). However, no pretest was administered to determine baseline comparability of the groups. The researchers drew from a slightly larger sample size than other research studies that investigate reward and

creativity and the subjects attended two different schools—this adds diversity to their participant pool. But selection bias may result from the fact that all subjects were required to be at or above a fourth grade reading level. The researchers indicated that the SES of the participants was varied but did not specific information. This study used money as a reward—the degree to which money is rewarding may depend on a student's financial situation. For this reason social class may be a lurking variable. The authors provided very explicit procedures, including the instructional quotations—particularly comparing promised reward versus no promised reward conditions. The authors noted that the experimenter reversed the order of cards for half of participants in each condition. This experiment is repeatable and uses similar tasks/creativity measures as other researchers. An additional point of critique involves the eighteen objects identified in the training task—who determines which objects are common and everyday? This is another place for potential bias in the study that could affect the outcome.

In this study, an unusual use training task with or without reward correlated with a more creative transfer task than a rewarded usual use training task. This indicates that the training has a larger effect than the reward. In the classroom rewards used might include grades, stickers or periods of free choice time. If these rewards are primarily administered in response to completion of noncreative (usual use tasks) then the students may become trained to perform without creativity.

Joussemet and Koestner (1999) performed a similar training task/transfer task, static group comparison investigation of the impact of promised reward on future creativity. They conducted the study in Montreal with a group of four to seventeen year old gymnasts ( $N = 61$ ). They found that age had a greater effect on the creativity and

appropriateness of drawings and themes produced than assignment to reward or no reward conditions.

All of the subjects participated in two tasks: a training task and a transfer task. Both tasks occurred during gymnastics class. The researchers told the participants that the study was about creativity and would last ten minutes. During the training task the experimenter asked the subjects to create a list of themes for a gymnastics gala. Their gymnastics clubs did a gala each year—a familiar idea for the subjects. The researcher instructed them to write down as many ideas as they could and told the expected reward group, “If you write down some ideas, you will get a notebook and a pencil like this” and the researcher held up the prize for the students to see. The experimenter told the participants, “That’s good, here’s your reward,” when they turned in their lists. The researcher told the no reward group that their work was good once they turned it in but did not mention any prize.

During the transfer task (directly following the training task) the experimenter gave the subjects a sheet of paper with circles on it and asked them to make as many pictures as possible and to use one or more circles in the pictures (similar to the transfer task in the previous study). After the drawing session he or she instructed the gymnasts to go back and write down the topic illustrated under each picture. Then the authors debriefed the reward group. The no reward group was debriefed and during this time the experimenter gave them each the same notebook and pencil prizes as a surprise and to thank them for participation in the experiment.

The researchers used a statistical rarity numerical measure to judge the drawings and list of themes—the reciprocal of each idea’s frequency of occurrence within the

sample population and multiplied by 100. (Example: a theme is listed by 3 of the 61 subjects the score would be:  $3/61 \times 100 = 4.91$ ). Five undergraduates also judged the lists and topics. They judged the themes using a creativity scale of 1 to 5 and an appropriateness scale of 1 to 5. They judged the drawing topics simply using the creativity scale. The authors calculated the mean scores for each item.

Age was the only independent variable that had a significant effect on any of the dependent variables (creativity, rarity, number), the marginal significance of group in the measures all had p-values greater than 0.05 and therefore are not statistically significant for the training task nor the transfer task. This study offered a developmental picture of creativity and creative production and did not demonstrate a positive or negative effect of reward on creativity. It illustrated that maturation or the passage of time may have more of an influence on the dependent variables than the specific group condition.

A weakness of this study is the small sample size that was limited to a very specific population: female gymnasts. This limits its transferability to a broader population. Also, four subjects were excluded from the study and this may have resulted in a disproportionate loss of participants in the comparable groups. However, because the training task was performed at the gymnastics gym and related to planning for a gala that all the participants were familiar with, increases the generalizability of the findings to other real world, non-experimental creative tasks. The transfer task cannot be generalized to a non-experimental setting, but it did have fewer writing requirements and therefore may be more accessible than the training task to the younger participants.

The procedures and materials are described in detail—this experiment is repeatable. The experimenters told both groups, “good job,” but this type of praise,

although rewarding in and of itself, was not assumed to be a true reward or as salient of a reward as the little notebook and pencil. Its findings are not consistent with other research, which has suggested an effect of reward on creativity (Amabile, 1982; Baer, 1998d).

### *Task Framing*

The next and final set of studies reviewed considers the effect of task framing on creativity. First, Chen, Kasof, Himsel, Dmitrieva, Dong, and Xue (2005) examined the effect of explicit instructions to be creative on creativity and found that higher measures of artistic and mathematical creativity correlated with this type of explicit instruction. In the second study, Koestner, Ryan, Benieri, and Holt (1984) investigated the relationship between the type of behavioral limits placed on a painting task and the creativity of the product. Children who received no instruction in behavioral limits or informational instruction produced more creative paintings than those who experienced controlling limits. Amabile and Gitomer (1984) conducted the final study in this section. They set up an experiment that compared the creativity of students who had choice in collage materials and those who did not. Choice in materials correlated with more creative collages. Therefore choice in materials, emphasis placed on creativity in instruction and the type of behavioral constraints instructed are all types of task framing that are shown to influence creative outcomes in this section.

Chen, et al. (2005) conducted a study in which both Chinese and US college students participated ( $N = 526$ ). They measured the potential effects of explicitly instructing students to be creative when performing specific creativity tasks. The subjects



performed mathematical, artistic and story writing tasks. Both cultural groups and all ethnic groups produced more creative outcomes when they had been instructed to do so.

The authors created two groups for each creative task: a standard instruction condition and an explicit instruction (EI) condition. In the EI condition the experimenters explicitly asked the participants to be creative and imaginative (but still appropriate) in their responses. During the verbal creativity portion the researchers asked the subjects to create one story, two poems, and two titles for photographs. Each portion had specific instructions, guidance and time limits. The subjects performed two artistic creativity tasks. Participants had 10 minutes to create eight small drawings with the following titles: “circle,” “rectangle,” “triangle,” “oval,” “contrast,” “person,” “motion,” and “dream.” The experimenter gave the participants 10 minutes to design a chair using a specific set of geometric shapes—the lines didn’t have to be straight and the shapes could be any size or length. The mathematical portion involved two tasks “designed to tap the ability to ‘break set’ and demonstrate flexibility and originality in solving ambiguous mathematical problems” (Chen, et al., 2005, p. 96).

The researchers used three different methods to judge the creative products: the consensual assessment technique, the sorting method, and the coding method. Each of these involved the use of trained undergraduate assistants as judges. The mean interjudge reliability was 0.88. Based on these measures, the authors found clear facilitation effects of Explicit Instruction; in general there was bigger effect for artistic and mathematical creativity than for verbal creativity. Facilitation effects accounted for 1% of variance in the story writing and chair design, but 30% of variance in geometric drawings. They determined approximately one standard deviation differences between standard and EI

conditions for the mathematical creativity tasks. They also found that the EI effects to be very similar for the two countries. The interaction term between instruction and country accounted for less than 1% variance. Additionally, within the U.S. sample they found similar facilitation effects between European and Asian Americans. None of the interaction terms between ethnicity and instruction were significant.

In this study variation in the independent variable (presence or absence of explicit instruction to be creative) produced changes in the dependent variable (creativity measures). The degree of change depended on the creative task. The researchers utilized a large sample size that included people from two different countries and a variety of ethnicities which strengthens the population validity of the findings—may be generalized to a broader population (although all the subjects were university students). The experiment also had strong ecological validity because it involved a wide variety of tasks and therefore is more transferable to the different types of creativity present in non-experimental settings. The procedure was clear and specific and could be repeated. The authors used three different methods of judging creativity.

In a quantitative, static group comparison design, Koestner, et al. (1984) examined the effect of setting different types of limits of behavior for first and second graders ( $N = 44$ ) and the subsequent artistic quality of the paintings they produced. Subjects in the controlling limits condition produced paintings with lower creativity scores than those in the informational limits and no limits conditions.

The researchers randomly assigned (balanced for gender) each participant to one of three groups: no limits, informational limits or controlling limits. The experimenters pulled each individual student, one at a time, into a small room with paper, paints and

paper towels on a table and a chair for the subject. The experimenter stated that he was interested in how children paint things and asked the student to paint a house that he or she would like to live in. The experimenter emphasized that it could be any sort of house and that they could add other people, animals, objects, yards, etc. He told subjects in the informational-limits group that the paints and border needed to be kept clean but also acknowledged probable feelings this instruction would elicit in the child and explained the reason for the limits with statements like, "I know it's really fun to just slop the paint around, but here the materials and room need to be kept nice for the other children who use them," and "I know that some kids don't like to be neat all the time, but now is a time for being neat" (p. 239). For the controlling limits group the experimenter told the student to keep the paints and border clean with phrases like "you must", "you can't," and "don't" and with no acknowledgement of feelings or information about why these rules were in place. At the end he stated, "In general, I want you to be a good boy (girl) and don't make a mess with the paints" (p. 239). The experimenter did not give the no limits group members any instruction regarding tidiness or cleanliness. All subjects were given ten minutes to paint.

Following the ten minutes the initial painting was removed and the experimenter told the student he or she could paint on a new sheet of paper or play with a puzzle set up on another table. A new experimenter observed this free choice time unobtrusively and recorded how many seconds the student spent engaged in more painting. She gave all subjects eight minutes of free-choice time.

Two panels of judges rated the house paintings based on creativity, technical goodness and overall quality. Fifty non-artist undergraduate psychology students made

up the first panel and seven artist judges comprised the second. The non-artists' mean inter rater reliability was 0.83 and for the artist judges, 0.82. The judges rated creativity and other measures. The researchers found a significant effect for limit-setting style for creativity ( $F(2,38) = 6.87, p < 0.01$ ). The authors analyzed planned comparisons and found that no limits paintings were rated higher in creativity than controlling limits ( $F(1,38) = 13.09, p < 0.001$ ). The informational limits category was not significantly greater in creativity than the controlling limits category, but it was in other measures including technical goodness and overall quality. For the artist judges the researchers found a significant effect for limits conditions for creativity ( $F(2,38) = 3.28, p < 0.05$ ). Again, a planned comparison revealed that creativity was greater for the no limits group than for the controlling limits group. Additionally, the researchers argued that the number of minutes spent engaged in painting during free choice time is a measure of the student's intrinsic motivation. Analysis of the time spent revealed a main effect for condition ( $F(2,38) = 3.49, p < 0.05$ ). Subjects in the informational condition spent significantly more time engaged in the painting than those in the controlling condition ( $F(1,38) = 6.65, p < 0.02$ ).

In this study, change in the independent variable (type of limits set) resulted in changes in the dependent variables (creativity and intrinsic motivation). The procedures are detailed, exact and repeatable. And the results are consistent with other studies about various task constraint and creativity, although the additional informational limits added another layer of complexity to the effects of task constraints on creativity.

The researchers used a small sample, from one elementary school and did not report SES or ethnicity data. This is a weakness because it is not clear whether the three

groups are comparable in terms of the type of limit setting their parents use at home. It is possible that all of the subjects are familiar with informational limit setting and it is this comfort rather than the style itself that allowed them to be creative. Parenting style, which may be a reflection of cultural or socio-economic background, could be a lurking variable in this study.

In a quantitative, nonequivalent control group study conducted by Amabile and Gitomer (1984) the researchers asked two groups of daycare students ( $N = 28$ ) to make collages. They allowed one group to choose five different types of materials from a selection of ten types. They simply gave the other group five types of materials with which to work. The students allowed more choice created more creative collages.

Before the experiment, four head teachers at the day-care filled out a short questionnaire about the creativity of each child, each child's interest in art and each child's level of independence in the classroom (inter-rater reliability = 0.71). This survey used a seven-point scale. Using this data the researcher allowed for an equal distribution of perceived creativity and interest in art between the two groups (choice or no-choice). The researcher also limited the random distribution of groups to allow for an even age and gender distribution.

The experimenter conducted the individual experimental sessions in a separate room in the day-care. She asked the child to sit at a table and presented him or her with 10 boxes of craft materials; he or she was told to make a design by pasting the materials onto the cardboard in any way desired. In the choice group, the experimenter had the child choose 5 boxes to work from (removed the other from the room). In the no-choice group the experimenter chose the 5 boxes to be use and removed the other five. The

experiment had a match pairs design: the researcher linked each child in the no-choice condition with a child in the choice condition (the experimenter chose the five boxes that a corresponding choice condition child had chosen). The researcher gave the children ten minutes to complete the task. Two weeks later they collected a behavioral measure of subsequent intrinsic interest in the collage activity. For three different days, they made leftover collage materials available for use for several hours during the day at the daycare as a part of the usual array of art materials. Each child who engaged in any collage activity during free-choice time was noted and timed (discreetly). As in her previous studies Amabile used the consensual assessment technique to judge the creativity of the collages.

Eight artist judges rated the collages (interjudge reliability = 0.79) on a scale from 0 to 40. Each collage received a creativity score that was the sum of all of the judges' scores (a scale of 0 to 320). Amabile found that children in the choice condition made more creative collages than those in the no-choice condition ( $t(13) = 2.81, p < 0.015$ ). The mean score for the no-choice group was 144.57 and it was 183.9 for the choice group. She determined that during the individual collage sessions the two groups spent almost the same amount of time working. During the play session the choice condition children played with the collage materials more than the no-choice condition, but this difference was not statistically significant.

Variation in the amount of choice in materials produced a change in the dependent variable—creativity measure. Amabile and Gitomer (1984) did not use the same type of creativity measures for the pretests and posttests. Teachers determined pretest scores, whereas the first posttest involved artist judges and the second involved

observation of time spent using collage materials. Although the presence of a pretest may have helped make the control and experimental groups comparable, it is unclear whether the resulting difference due to treatment might also be due to the use of a different type of instrumentation. This research question was investigated using a very small sample size selected from one daycare center. However, it is one of Amabile's few experiments that studies young children and both male and female subjects. It could potentially be generalized to other groups of children in comparable settings because she performed the experiment in the classrooms of the day care with a familiar teacher as the experimenter. The ten-minute limit for collage making may not have been enough time for every child to complete a collage to her or his satisfaction. The procedures are clear and specific and could be repeated in another study.

### *Summary*

The research in this chapter examined the effects of teacher attitudes and strategies on student creativity. The initial section supported the rationale for this paper by demonstrating that student creativity can be developed and is distinct from IQ scores or other measures of intelligence. The second section found that teachers hold a generally positive attitude about creativity as a concept but do not have a fully developed understanding of it and do not recognize their role in the development of student creativity. In addition, two research studies found that teachers rate creative students as more disruptive than average creative students. The final section offered suggestions for improving student creative classroom climate perception and found that anticipated evaluation had limiting effects on student creativity in some cases, but that age, gender and the exact type of evaluation frequently mediated this. There were entirely mixed

findings in terms of reward and competition and its effect on creativity—generally slightly negative or negligible. And the research offered guidance in terms of task framing, which suggested choice, non-controlling limits and the simple instruction to “be creative”, all had positive impacts on student creativity. The next chapter will review these findings in more detail and summarize the major strengths and weaknesses of this particular body of research. It will describe the classroom implications of these findings and offer suggestions for future research.



## CHAPTER FOUR: CONCLUSION

### *Introduction*

Chapter one explained the academic, individual and social importance of creativity. It determined that teachers are gatekeepers of student creativity. The next chapter traced the recent history of US educational movements that connected to the historical patterns in creativity research. Chapter three critically reviewed the seminal and recent research connecting teacher practices and attitudes to student creativity. This final chapter summarizes the findings of the literature review, outlines potential classroom implications and strongly suggests directions and methodology for future research.

### *Summary of the Findings*

The literature review in chapter three began with the Intelligence and Creativity section. All studies in this section identified creativity as a distinct trait form that measured by IQ and strengthened the claim that creativity can be enhanced. Russo (2004) determined that creativity is teachable for both average and high IQ students. Although her sample size and neglect to report all of her numerical findings limits the strength of this claim. Through a series of creativity tasks, surveys and self-assessment scales Niu (2007) concluded environmental factors influenced student creativity as much if not slightly more than IQ. The medium sample size and variety of measures and scales utilized add strength to this finding, which provided empirical support for Sternberg's confluence theory of creativity. Unfortunately Niu's subjects self-selected and resided in China, which limit the generalizability of these findings to a United States population. Kim (2005) conducted a meta-analysis of 21 studies that included correlations between IQ and creativity—the analysis of the large sample size found only a negligible

correlation between the two measures. This quantitative synthesis did not provide demographic information for all 45,880 subjects nor any description of how the data was collected in the original studies however the sheer vastness of the sample size and the consistency of its findings with the other studies in the section add weight to the soundness of the study. The strongest study in this section, performed by Grigorenka and Sternberg (2002), found that creativity is teachable and distinct from analytic and practical intelligence. The researchers investigated for two years, two separate trials of a lengthy intervention program. They administered a pretest that established a baseline comparability between the two groups and a posttest that demonstrated growth in creative performance for the experimental group. The sound internal validity of this study, coupled with its school-based setting and detailed procedures create a solid foundation on which to trust its findings.

The following section reviewed in chapter three was Teacher Attitudes and Perceptions. It does not matter how teachable creativity is if teachers do not believe it or hold other misconceptions. On the whole, the studies that surveyed or interviewed teachers about their conceptualizations of creativity found that they had a generally positive attitude toward the concept (Aljughaiman & Mowrer-Reynolds, 2005; Diakidoy & Kanari, 1999; Fleith, 2000; Lee & Seo, 2006;). Each study did report a difference between teacher definitions of creativity and those of experts. Diakidoy & Kanari found that student teachers identified creativity as producing something novel, but only a few acknowledged that the product must be appropriate, as well. Two other samples of teachers did not identify all of the different components of creativity (Lee & Seo, 2006; Aljughaiman & Mowrer-Reynolds, 2005). And while several groups recognized that

creativity can be enhanced by the classroom environment (Aljughaiman & Mowrer-Reynolds, 2005; Diakidoy & Kanari, 1999; Fleith, 2000), many also expressed doubt about it being the teacher's responsibility to help develop it or about the true feasibility of creative development happening in school (Aljughaiman & Mowrer-Reynolds, 2005; Diakidoy & Kanari, 1999).

The majority of these studies used small, convenience samples, which both weakens the findings and limits the opportunity to cluster the responses in terms of demographics like age, years of experience, location, gender or ethnicity. Fleith (2000) conducted the only qualitative study in this section and the teachers she interviewed described a creative classroom as one that allows for choice, safety, confidence, open-ended tasks, brainstorming, flexibility, openness and acceptance. Yet she did not include original quotations, or any descriptions of changing context, participant checks or checking and rechecking the data for potential bias. This reduces the confirmability, dependability, credibility and thus the transferability of the study.

The second half of the Teacher Attitudes and Perceptions section revealed potential teacher biases against creative students. In general they found that teachers often connected creativity with some less desirable student behaviors. Chan and Chan (1999) found that Hong Kong teachers described creative students as: "always questioning, imaginative, quick in responding, active and high intellectual ability". However, the researcher employed a medium-sized, self-selected convenience sample and provided no SES information, which limits the generalizability of the results. Both Scott (1999) and Brandau, et al. (2007) found that teacher ratings of potentially disruptive behavior correlated with creative students. In Scott's study teachers rated fictitious

student who were labeled highly creative as more disruptive than average creative students. College students assigned the same task did not follow this trend. In Brandau's study teachers rated actual students as inattentive or extroverted and these ratings correlated with higher measures of fluency or flexibility. Scott's study is the only quantitative study in this section that attempted to compare teacher attitudes with a non-teacher group however her findings are limited due to the lack of comparability of the two groups—the teachers lived in a different region of the country and were all older than the college students. Scott did not acknowledge these limitations whereas Brandau clearly acknowledged the limits to generalizability of his study.

The third and largest section of Chapter three reviewed articles that investigated the effects of teaching strategies on creativity—Teacher Behavior and Instruction. The first subsection under this theme contained the weakest studies reviewed in the entire chapter. They all attempted to explore teacher decisions and behaviors that foster a Creative Classroom Climate. Cole, Sugioka, and Yamagata-Lynch (1999) and Lilly and Bramwell-Resjkind (2004) examined the teaching practices of university-level professors in two qualitative studies. One study found that clear instruction in creativity skills, a de-emphasis on grading and the encouragement of choice and multiple perspectives all contributed to a creative classroom (Cole, Sugioka & Yamagata-Lynch). The other found that thorough preparation, reflection on feedback from students and colleagues and teaching with values and goals in mind enhanced the creative atmosphere (Lilly & Bramwell-Resjkind). Both emphasized the importance of close teacher/student relationships. Unfortunately these findings are weakened due to the lack of rigor with which the studies were undertaken. Neither study included many direct quotations to

demonstrate how they determined emergent themes. Neither study established credibility by describing a participant check of the responses. They did not detail the ever-changing context in which the research occurred, nor did they acknowledge the unique perspectives that they, as researchers, brought to the study by documenting any data checks or audits.

The two quantitative studies in this subsection should also be approached with caution. Furman (1998) concluded that a classroom with a higher perceived creative climate corresponds with low rates of discipline, assistance behavior, and student confusion. And it correlates with high rates of questions, positive feedback, convergent tasks and divergent tasks. Yet the data presented did not include p-values or other indicators of significance. Nor did the author include a sufficient description of the questionnaire that he used to determine climate perception. In a small scale, observational study Hasirsci and Demirkan (2003) concluded a high correlation between creative product and creative process when they occur in the same environment. The small sample size and vague procedural descriptions limit the validity and reliability of these findings. Both Furman and Hasirsci and Demirkan conducted their studies in private schools in countries outside the U.S., this limits the generalizability of their results to the U.S. K-12 public school population.

The subsequent subsection examined a more specific teacher behavior: Evaluation. All of the research in this section was quantitative and used a similar consensual assessment technique to judge the creative performance of the participants. The first two studies, conducted by Amabile (1979) and Amabile, Goldfarb and Brackfield (1990) found that anticipated evaluation correlated with less creative products. Both studies used female, college-aged participants, this limits the generalizability of

these findings to broader populations. Baer (1997,1998a, 1998b, 1998c) examined the same question with a larger variety of participants and found that the effect of anticipated evaluation was much more significant for middle school girls than middle school boys. Additionally, he found no effect of anticipated evaluation for a second grade population. And anticipated constructive feedback did not correspond with a significant change in creative performance. To follow up on Baer's findings, Zhou and Oldham (2001) found that anticipated self-administered assessment corresponded with significantly higher creativity than no assessment or an other-administered assessment. They investigated this question using a sample of college students. Therefore, these studies suggested that anticipated evaluation may have an effect on creativity, particularly for middle school and college females. But the type of evaluation mediated this result if it was instead constructive feedback or a self-administered developmental assessment. All of these studies were static group comparisons and they did not test for comparability of the groups at the onset, which reduces the strength of the findings.

The following subsection reviewed conflicting findings about the effect of reward and competition on student creativity. Two studies found that students produced less creative collages when they anticipated a reward (Amabile, 1982; Baer, 1998). Amabile investigated the effect of competition for a reward in which seven to ten year old girls competed for a limited number of prize bags, whereas Baer (1998d) examined the effect of simply offering a reward to every student who completed a collage (no competition) and the reward he selected was bonus grade points. Two additional studies found no significant effect for competition on creativity with or without a reward (Gerrard, Poteat & Ironsmith, 1996; Shalley & Oldham, 1997). Gerrard, Poteat, and Ironsmith studied a

group of third grade students and found no effect when they offered a limited in number prize bag reward (similar to Amabile) to the experimental group. Shalley and Oldham conducted a study in which college students competed with each other or with a previous collection of data on unusual use tasks and found no effect for competition. For the size of this study however, the sheer number of different conditions reduced the size of each group really small numbers and increases the potential margin of error for the study. Based on this collection of research it remains unclear if reward and competition affect student creativity.

Two additional studies in this subsection investigated the effect of promise of reward in a training task with subsequent creativity in a transfer task. Joussemet and Koestner (1999) found no significant effect of initial promised reward on future creativity. Their sample was limited to female gymnasts, which reduces the generalizability of this finding. In a larger, broader study of fifth and sixth grade subjects Eisenberger, Haskins, and Gambleton (1999) used money as a reward in training and transfer tasks. They found variable results and also did not find a significant main effect for promised reward. One finding of note compared the creativity in the transfer task depending on the type of training task. A rewarded usual use training resulted in lower creativity in the transfer task than either a rewarded or unrewarded unusual use training. The results of this study should also be generalized with caution because of type of reward used. The researchers used money as the reward in each task and the salience of this type of reward may depend on the students' prior experience with money, the amount of money they already have in their possession or their social class background.

In the final subsection, Task Framing, the researchers analyzed the effect of specific task constraints or contexts on the creative outcomes. All three studies investigated different framings, however as a whole it is clear from these studies that the way in which a task is framed can affect student creativity. Amabile and Gitomer (1984) determined that offering students choice in collage materials correlated with more creative collages. Their study used a small sample size of students from a single day care center, but they did try to form comparable groups by utilizing a teacher rating of student creativity. In a study of first and second graders' responses to adult limits-setting, Koestner, Ryan, Bernieri and Holt (1984) found that the stating of no limits or informational limits on expected task behavior corresponded with more creative paintings than the use of controlling limits. The researcher did not acknowledge the potential lurking variable of parenting style—i.e. the type of limits the child is already accustomed to. Finally, Chen, et al. (2005), using a medium-sized, cross-cultural sample, found that simply instructing college students to be creative on their tasks resulted in higher rates of creative for mathematical and artistic tasks. All three of these studies provide evidence that the way an adult frames a given task can have an impact on the creative product, however because they all measured very different types they do not lend strength to each others' specific findings.

### *Classroom Implications*

The overall findings of the body of research reviewed in Chapter three are limited, varied and tenuous at best. Nearly every quantitative result was critiqued to be restricted in its generalizability to broader populations. This paper does not advise any implementation of classroom practices based solely on the aforementioned findings. That



said; the following section highlights some cautious conclusions that may guide classroom or teaching decisions or at least offer up areas for reflection and further inquiry.

The first section produced the tentative finding that creativity is distinct from IQ and potentially teachable. If the classroom teacher wishes to foster creativity this research supports that effort for all students rather than simply those selected for a gifted program. Additionally, it adds to the multiple other bodies of research that argue for a re-conceptualization of intelligence and classroom support for multiple intelligences. Grigorenko and Sternberg (2002), specifically, offered support for a classroom-based approach rooted in a triarchic theory of intelligence and the materials used in this program could be used in the classroom to support practical, analytic and creative enhancement.

The second section found that many teacher participants hold misinformed or incomplete conceptualizations of creativity. In addition, despite generally positive attitudes toward creativity in general, teacher respondents questioned their role in its development and revealed some bias toward creative students. The lesson that the practicing teacher can draw from these findings is to examine his or her personal beliefs and perceptions about creativity and creative students. Reflection on hidden assumptions or contradictory beliefs is an initial step in reconfiguring biased viewpoints. If a school or classroom has a goal of enhancing creativity it is appropriate, in light of these studies, to question how the leaders define creativity and how they support creative student behaviors. Is active creative questioning viewed as disruptive? Are only the gifted high achievers identified as creative? Is their space for new ideas in the classroom? These and

many other questions can be gleaned from the studies of teacher perceptions and attitudes reviewed in Chapter three.

The third section found a potential effect of anticipated evaluation on student creativity, a mixed or negligible effect of reward and competition and some potential effects of various task constraints. Both the evaluation section and the task framing section pointed towards some general teacher behaviors that may help enhance student creativity. Evaluation that moves away from competitive grading and more toward constructive feedback or self-administered developmental assessment appears to support student creative outcome. If a creative performance is desired for a task than the teacher selection of one of these alternative forms of assessment may allow for a greater creative outcome. The task framing studies pointed toward choice in materials and information limit setting. Allowing for student autonomy and choice in the classroom tasks and providing acknowledgment of student feelings and information about why specific limits are enforced may help foster student creativity. Finally, the simple explicit instruction to “be creative” may be enough to boost some aspects of student creativity. In the classroom this may take the form of a posted statement or a reminder that the teacher expects creativity in the task at hand.

The classroom implications outlined above focus primarily on drawing awareness about creativity into the classroom, reflecting on potential biases and assumptions and framing tasks using informative assessment and instructions, offering choice and being clear about expectations for creativity. However, even these general implications are drawn from a questionable and frequently unconvincing body of research. The following

section suggests arenas for future research. Hopefully further creativity research will strengthen the potential advice that can be taken into the classroom.

### *Implications for Further Research*

The vast majority of the quantitative research reviewed utilized the pre-experimental static group comparison design. If any further quantitative research is done to verify the findings stated in this paper it must implement a trustworthy, internally valid design. Without a pretest to establish the baseline comparability of the two groups the results of the posttest are always subject to scrutiny. The other common design in this body of research was one group pretest/posttest, the findings from this design are also questionable. It cannot be clear if the results directly relate to the treatment or are not simply the result of maturation or a multitude of other potential confounding variables.

In addition to research design, the majority of the quantitative research reviewed studied relatively small sample sizes: between 22 and 128 participants. The complexity of judging and measuring creative outcomes limits the feasibility of working with extremely large samples, yet nearly all of the populations studied were also either self-selected or convenience samples with little or no attempt to randomize the selection process. Further studies must include larger, more diverse samples. They need to document both the SES and ethnicity characteristics of the participants and only generalize their findings to the populations that hold similar demographics.

The crisis of definition introduced in chapters one and two also affects the body of quantitative creativity research. Because creativity does not have an agreed upon definition the way it is measured and analyzed is particularly susceptible to unacknowledged researcher bias. Every creativity measure or test utilized has its roots in

a specific set of theoretical underpinnings; some of the researchers acknowledged this fact, the majority did not. The most common creativity measures used in this body of research included: Amabile's consensual assessment technique or a variation, Torrance's creativity tests, or an adjective check list or scale. In some cases a combination of these measures was used. So, if each researcher holds a different understanding of creativity and each measure tests a specific aspect of creativity, comparing findings across research studies is particularly problematic. As Plucker, Beghetto and Dow (2004) wryly stated, "This is not merely the case of comparing apples and oranges: We believe that this lack of focus is tantamount to comparing apples, oranges, onions, and asparagus and calling them all fruit" (p. 89) In addition the research measured a large variety of creative tasks including poem generation, collage construction, problem solving, divergent thinking, painting, design, drawing and brainstorming. Yet no matter which tasks or instruments were used, every author concluded that they were ultimately measuring "creativity".

The three qualitative studies reviewed in this body of research were all sorrowfully incomplete. The complex and interwoven nature of creativity, the fact that it encompasses process, person, product and environment, make it the perfect topic of study for qualitative research. Rigorous qualitative studies of classrooms or schools known for their creative climates would lend a richness and depth to the understanding of creativity in the educational setting. The shift away from the study of eminent creativity in the history of creativity research led, in part, to an overemphasis on the quantitative psychological studies of the phenomenon. These only offer one limited view of the concept and often do not generalize well to the classroom setting.

Due to the limited generalizability and internal validity of the quantitative research and the lack of robustness of the qualitative research very little can be concluded with confidence about the effect of teacher attitudes and behavior on student creativity. The task for future research includes: design more rigorous studies, decide on a commonly held, appropriate definition of creativity, utilize a consistent and reliable instrument to measure creative outcomes, and perform more research in the field—in classrooms and schools, rather than contrived laboratory settings.

### *Summary*

Chapter one illustrated that creativity is socially and individually valuable. A systems theory of creativity identified teachers as the gatekeepers of student creativity. This paper examined the effects of teacher attitudes and behaviors on student creative performance. The second chapter followed the history of creativity research and any corresponding educational movements in the United States. This chapter concluded with a reference to the current state of creativity research—it suffers from a crisis of definition. Chapter three critically reviewed the seminal and recent research in the arena of creativity and educational practice. The conflicted and questionable findings provided by both the quantitative and qualitative studies lent credence to the crisis described in the second chapter. This chapter summarized and critiqued the body of research reviewed. It offered classroom implications with a degree of caution. The research demonstrated that creativity and IQ are different traits and therefore IQ tests should not be the only determinant of which students receive explicit creativity instruction. One implication is that teachers should reflect on their own conceptualizations of both creativity and creative students. The research supported the use of constructive feedback

or developmental assessment strategies to allow for more student creativity. Finally, it identified possible behaviors that many enhance creativity: offering students choice in materials, non-controlling instructions and simply telling them that there is an expectation for them to be creative. This chapter concluded with a call for more rigorous studies in field settings with a commonly agreed upon definition and measure of creativity.

Credible creativity research must be comparable across studies and investigations of creativity and education should take place in the classroom rather than the laboratory.

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