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The project seeks to describe how a group of exemplary teachers conceive of creativity and their duty to develop the capacity. Creativity has emerged as a capacity integral to success in the 21st Century as exemplified by the US Congress' formal recognition of creativity as a skill that schools should work to develop in students with the passage of the 21st Century Readiness Bill (House Bill 347). The project was motivated by an assumption that a deeper understanding of creativity can be achieved by analyzing the conceptions of creativity by those who are called upon to develop it. The importance of the project can be summarized by the notion that the concept that might be viewed as the pinnacle of human cognition (Krathwohl & Anderson, 2010), absolutely key to human self-actualization (Maslow, 1959) and crucial to our economic survival (AMA, 2007) may also be the least understood within public education. The hope of the project is that it might contribute to our understanding of creativity by capturing the descriptions of certain exemplary teachers' conceptions of creativity through their day to day experience in attempting to develop the capacity.

The study employs a strategy of mediating a three-way conversation between the (a) existing conceptions of creativity found in the literature, (b) the perceptions of a group of exemplary teachers, and (c) the standards that the teachers are directed to teach (Common Core State Standards). The mediation of the three-way conversation resulted in the conception of a working model of creativity that expressed several themes that emerged from the study. The study expressed the creative contribution as the product of

certain tensions inherent in the creative process. Teacher descriptions of their attempts to navigate these tensions within their schools were obtained by a series of open-ended interviews. The analysis of the interviews in light of the existing research on creativity and the Common Core State Standards resulted in several findings. The findings include: (a) support by the teachers of the Common Core State Standards as an ally in their efforts to develop creativity; (b) recognition of an unyielding resolve on the part of the teachers to develop the most appropriate context for the development of creativity; and (c) the affirmation that domain relevant skills (content knowledge and analytical ways of thinking) and creative ways of thinking are *both* essential to the overall creative process.

CREATIVITY: CONCEPTIONS OF A GROUP
OF EXEMPLARY TEACHERS

by

Kenneth Aaron Scott

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Approved by

Carl Lashley
Committee Chair

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In honor of my Lord, Jesus Christ

In memory of my father, Herman Scott Jr.

In gratitude of my mother, Jacqueline Scott

In appreciation to the exemplary teachers who participated in the study

Dedicated to my little girl, Kennedy Autumn

APPROVAL PAGE

This dissertation, written by Kenneth Aaron Scott, has been approved by the following committee of The Graduate School at The University of North Carolina at Greensboro.

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I would like to thank the exemplary teachers who offered their time and attention to the study. My appreciation for the work with which they are committed and the passion in which they pursue their work has left a lasting impression on me. It is my hope that such exemplary teachers will take the lead in the transition of public education from its current state to one that is more responsive to our current age and more relevant to the needs of our children.

I have dedicated the study to my little girl because no other person has spent as much time with me during the process. She has been constant companion on numerous trips to the library and frequent company as I worked from home. Whether patiently playing with her toys as I worked or impatiently climbing and bouncing on top of me as I tried to work, she has been a source of joy and inspiration throughout the process.

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CHAPTER I

INTRODUCTION: THE ERA OF CREATIVITY

Purpose

The purpose of this study is to describe how creativity is understood within the context of public schools. Attempts to describe creativity are prevalent within existing literature. Interest in creativity has intensified over the past 70 years. Numerous studies have attempted to identify and isolate the mental processes that are involved in the development of creativity (Guilford, 1986). Other studies sought to examine the lives of preeminent creative individuals such as Picasso and Einstein to determine if common attributes or influences would emerge. Very few studies however sought to describe the perceptions of the people who would be largely called upon to develop in others the capacity to create. My assessment that teacher perception regarding creativity has by and large been left out of the discussion was a primary motivation for conducting the research project.

A secondary motivational factor was that I perceive a phenomenon to exist in education where teachers use complex and multifaceted terms like creativity in such a manner that would lead an outside observer to conclude that everyone shared a common understanding of what is meant by the term. As a result of numerous conversations with teachers, teacher interviews, and teacher observations, I perceive that while the development of creativity is something teachers intuitively believe that they are supposed

to value and something that they are supposed to do, there appears to be little consistency in exactly what creativity is and much less how it can be developed. As a result, the primary intent of the project is not to provide an accounting of all the strategies that teachers employ to develop creativity. The project is based on an assumption that there does not exist a consistent conception of creativity in the first place. Even though numerous accounts of strategies employed by the participants of the study in an effort to develop creativity are included in the study, the inclusion of such strategies do not in and of themselves represent the central focus of the study. The strategies included within the study will be used as but one means of *drawing out* what the participants mean by the term creativity.

A consistent description of creativity has eluded philosophers, scientists and psychologist for centuries, so I do not hold any delusion that this study will unlock the mystery. It is the goal of this study to in some measure add to our understanding of creativity by attempting to understand what the practitioners in the field of education think creativity is. Even if a consistent definition of creativity will forever elude teachers, scientists, artists, and psychologists alike, I strongly contend that the conversation regarding the development of creativity will cause teachers to think about “thinking” differently or more deeply than they might have otherwise. It will cause teachers to question the role of education and can emerge as a motivation for the change that I perceive is absolutely necessary in the rapidly changing knowledge based age in which we find ourselves today. This study will add to existing literature by describing the perceptions of exemplary teachers regarding the development of creativity. The study

seeks to extend the conversation by engaging those that have by and large been omitted from the discussion.

It is my intention as a researcher to faithfully record the impressions of teachers regarding the meaning that they pour into the idea of creativity and to compare and contrast their conceptions with the conceptions of creativity found in the existing literature as well as the curricular expectations that are found in the Common Core State Standards.

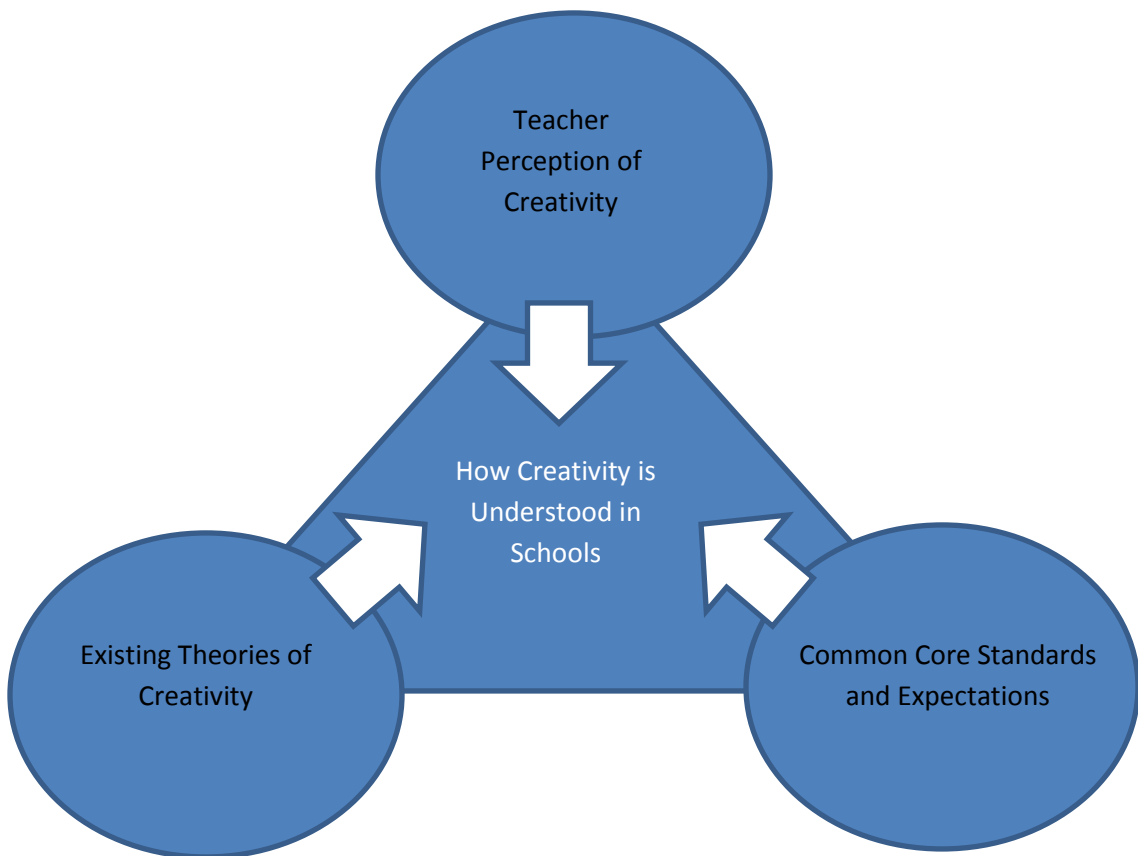


Figure 1.1. Theories, Perceptions, and Expectations.

As represented in Figure 1.1, it will be my task to mediate a conversation between teachers, the existing literature, and the Common Core State Standards. I thought that a strategy of engaging all three of these voices would provide a promising means of dealing with the ambiguity and complexity that is inherent in the concept. As a result, the participants' description of creativity will be analyzed in light of the ideas contained within the existing literature and the instructional requirements imposed on the teacher by the CCSS. All of this was done in an effort to gain some clarity regarding the varied manner in which teachers describe creativity and to add their voices to larger discussion regarding how creativity is understood which at some point might lead to clarity regarding how it can be developed.

I have included within the present chapter a working definition of creativity that will serve as a starting point for the project and will be used to guide the ensuing discussions contained in the work. After the working definition I included a section detailing what I perceive to be the importance of the research project. And by doing so, I provided a rationale for why an understanding and appreciation of creativity should be a priority in public schools. I concluded the chapter with a section that extends the conversation by considering the impact that creative thinking could have on the entire system of public education.

Definition

It is important at this point in the discussion to present a general definition of what I mean when I use the word *creative*. Ideas are deemed creative by their propensity to change or influence a given domain or context. It would make sense then that if an

idea is to influence a domain, then the idea must of necessity differ in some manner from what has gone before and it must be relevant in some manner to the domain or context in which it is conceived. As a result, researchers of creativity generally agree that in order for an idea to be considered creative it must be both *new* and *meaningful* (Klausen, 2010; Sternberg, 2007; Csikszentmihalyi, 1996).

Historical figures like Edison, Einstein, and Picasso often come to mind when we think of people who were able to significantly alter a domain and/or break free of an entrenched way of thinking. But if this is what it means to be creative, then it would seem that only the most elite thinkers, with the right training and support, born at the right time, in the right place can possibly hope to be creative. What about the rest of us? How can children possibly be creative if we use the definition proposed here? To answer this question, varying levels of creativity have been conceived within the literature. For instance even though an elementary age student is not likely to contribute an idea that is new and meaningful to the domain of mathematics, the student may be able to create an idea or a novel way of solving a problem that may be new to him or her. This constitutes creativity as a pedagogical strategy where teachers would attempt to use creativity to as a vehicle to teach a predetermined concept.

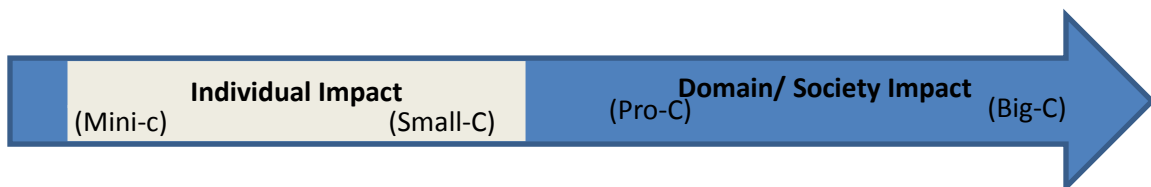


Figure 1.2. Levels of Creative Production.

As represented in Figure 1.2, this type of creative thinking, “Mini-C,” along with the Einstein type of creativity, “Big-C,” were conceived as serving as opposite ends of a creative thinking continuum; with everyday type of creativity characterized by improvising (Small-C) and the professional level of creativity (Pro-C) falling respectively in the middle. The varying levels of creative production will be addressed in more detail in Chapter II.

Importance of Research

The importance of the research is two-fold. First, the research is important because it is based on a contention that creativity is crucial to the core purposes of education. If the goal of education is to pass along knowledge and ways of thinking that will increase the likelihood of our continued survival and at the same time is to develop within the individual ways of thinking that increase the quality of our survival, then creativity has to be seen as pivotal in this endeavor. Secondly, the importance of this research is based on the assumption that the people who are called upon to develop such ways of thinking have been by and large absent from the discourse and that by engaging these individuals in the discussion we will achieve a better understanding of creativity. The following sections will suggest that creativity has emerged as a way in which the brain was designed to think, a way in which people want to think, and a way of thinking that appears to be increasingly crucial to our physical and economic survival. But the concept may also have emerged as one that is least understood and discussed within public education.

Creativity and Economic Need

If we are to make real strides in boosting the creativity of scientists, mathematicians, and all upon whom society depends, we must arrive at a much more detailed understanding of the creative process . . . The study of creativity must be seen as a basic necessity. (Amabile & Hennessey, 2010, p. 570)

The assertion that creativity is necessary for physical survival is based on the emphasis that is being placed on creative thinking within business and industry. In the latter half of the 20th century, education has progressively come to be established as a major driver of the United States economic survival. The creation of the U.S. Department of Education is considered to be an acknowledgement of the critical role that education plays in the economic well-being of the U.S. (Bray, Coneelly, & Green, 2012; National Center for Excellence in Education [NCEE], 1983). Robert Reich (2008), former Secretary of Labor, is often credited with remarking that “we are trying to prepare students for jobs that do not exist yet, using technologies that have not been invented yet, to solve problems that we do not know are problems yet.” Nearly a century earlier John Dewey made a similar observation. Dewey (1926) asserted that “with the advent of democracy and the modern industrial conditions, it is impossible to foretell definitely what civilization will be in twenty years. Hence, it is impossible to prepare children for any precise set of conditions” (p. 18). Such comments suggest that the type of thinking that sustained us over the past centuries will be inadequate in our current rapidly changing and unpredictable age. Ken Robinson (2001) asserts that “education sorts people based on a certain view of intelligence. The problem that we face now is that the

economic assumptions are no longer true and the intellectual filter screens out some of the most important intellectual abilities that children possess” (p. 3).

The Partnership for Twenty First Century Skills (P21) lists the development of creativity as a skill that will be crucial for success in the 21st Century within their recommendations for the re-authorization of the Elementary and Secondary Education Act. The partnership recommends that the reauthorization define college and career readiness as “mastery of core content knowledge *and* competencies in essential, higher-order thinking skills. The act should specify the fusion of the full range of core subjects *and* essential skills, such as critical thinking and problem solving, communication, collaboration, and *creativity and innovation*” (P21, 2010, p. 6).

The American Management Association (AMA) contends that success in the 21st Century will be dependent upon the development of skills beyond the 3 *Rs* of reading, writing, and arithmetic. The AMA includes *creativity* along with *collaboration*, *communication*, and *critical thinking* (the 4 *Cs*) as skills absolutely necessary for success in the 21st century. The AMA joined forces with the P21 to conduct a survey of 2,115 managers and executives. According to a survey, 93% of the employers surveyed identified creative thinking as “most important” or “somewhat important” in helping to grow their organizations (AMA, 2010).

Richard Florida, author of “The Rise of the Creative Class” considers the age that we are entering the *Age of Creativity* “because the key factor propelling us forward is the rise of creativity as the primary mover of our economy” (Florida, 2006, p. 26). Florida placed the importance of the development of creativity in the following context:

The United States is currently undergoing a dramatic economic transformation, more dramatic even than the previous transformation from a farm-based economy to an industrial economy. This has been variously described as a transformation to an “information economy,” an “internet economy,” a “technology economy,” a “high-tech economy,” a “knowledge economy,” or even a “post-industrial society.” Those are all wonderful terms, but I prefer the term “creative economy” because, intuitively or emotionally, I find it more inclusive. Every single human being is creative. The great challenge of our age is to tap and harness all of that creativity. (Florida, 2006, p. 22)

The New Commission on the Skills of the American Workforce developed a report which forecasts what the US economy would look like in ten years “if all goes well” (NCEE, 2007, p. 6). The commission contends that “The best employers the world over will be looking for the most competent, most *creative*, and most *innovative* people on the face of the earth and will be willing to pay them top dollar for their services” (NCEE, 2007, p. 7). The report establishes creative work as the key to the country’s continued prosperity.

As Figure 1.3 illustrates, the factory line workers that sustained the economy during the Industrial Age are rapidly being replaced by automation. The figure illustrates that the majority of the routine work available in the near future will be either done by machines or outsourced to less developed countries; which would render success in more developed countries dependent on capacities that cannot be completed by a machine or easily outsourced. Such capacity is increasingly becoming recognized as the capacity to create.

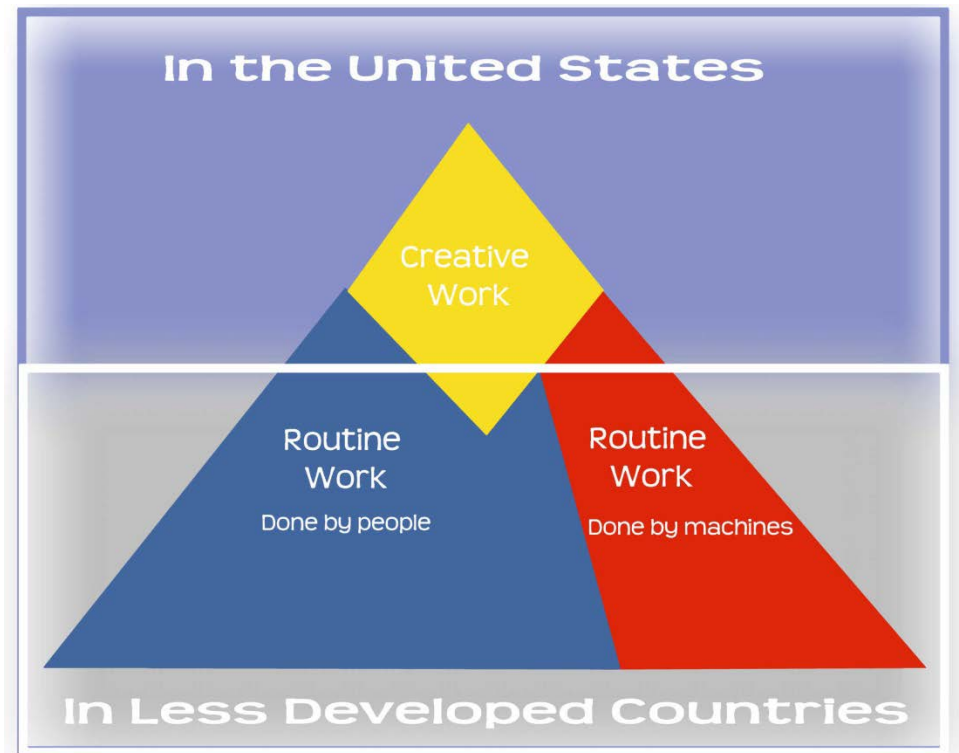


Figure 1.3. NCEE Forecast.

The routine worked depicted in Figure 1.3 is illustrative of the type of work that was required to run the Industrial Age Economy in the US during the 19th and 20th Century. Education responded to the needs of the industrial complex by producing vast numbers of line workers who could be counted upon to do largely routine and unthinking tasks. As a result the public schools in the United States not only produced the type of workers that were required of at the time but by and large the schools reflected the same type of assembly line model of productivity that existed in the Industrial Age factories. It is a system that has for the most part gone unchanged as we enter a new age with vastly different demands (Cuban, 2010; Senge, 2004; Robinson, 2001). Stephen Heppell (2007), a critic of contemporary education, may have best characterized this phenomenon

when he asserted that “we have spent the entire 20th century perfecting a 19th Century model” (YouTube video). Figure 1.4 illustrates how creativity might be seen as taking on an increasingly prominent role in the U.S. economy.

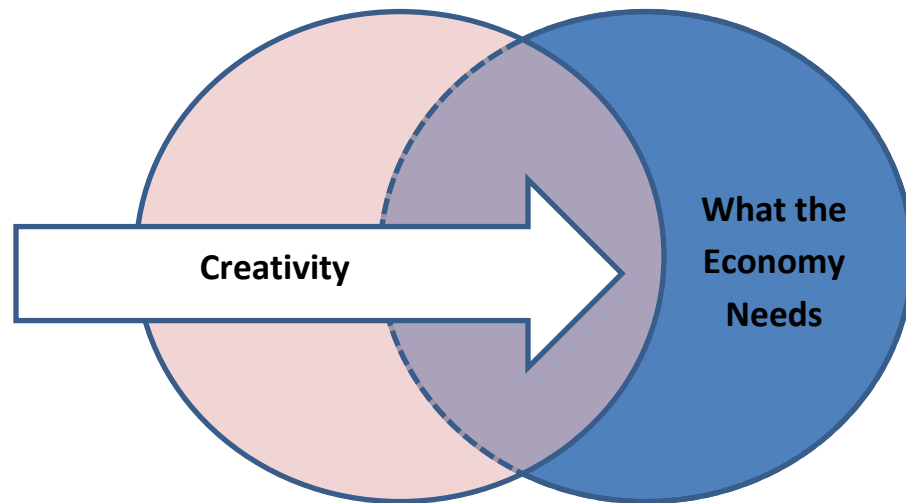


Figure 1.4. Creativity and Economic Need.

Creativity and Cognitive Need

Conversations about creativity and a better understanding of the nature of creativity within K-12 education are important because creative thinking may constitute a basic way of thinking that has been neglected within public schools. John Dewey is often credited with remarking that one can have facts without thinking but one cannot have thinking without facts. He is suggesting here that while facts may be important it is the thinking that we are ultimately after. Cognitive psychologist Robert Schank (1988) argues that “schools need to focus on cognitive abilities, not scholarly subjects” (p. 13). We can therefore conceive of education in its most general terms as helping people develop the capacity to think. If we accept the view that the development of thinking

skill is the educator's major objective, then any discussion regarding the role of creativity in education must consider what relationship might exist between thinking and creating.

The relationship between intelligence, domain specific skills, and creativity has been the source of much debate within the research. The majority of researchers indicate that intelligence and domain specific skills are necessary but not sufficient for the development of creative thinking (Amabile & Hennessey, 1987). On one hand knowledge of a particular domain can be seen as detrimental to creative thinking in that the thinker is immersed in the existing domain knowledge to an extent where it will be unlikely for him or her to see the domain differently and move it in a different direction (i.e., the novelty factor is at stake in this scenario). On the other hand if a person possesses very limited knowledge of a particular domain then the idea that is conceived may not practically work, be of any value or may not make any sense whatsoever. In the later scenario "meaning" is sacrificed. Researchers Teresa Amabile and Beth Hennessey (1987) support the claim of domain specific skills are necessary for creative production. They see a direct correlation between the level of domain relevant skill and the potential to create.

Domain relevant skills which include factual knowledge, technical skills, and special talents, can be seen as the set of cognitive pathways one can take to solve a given problem or do a given task. The larger the set (of domain specific skills), the more numerous the alternatives available and the greater the possibility of producing something new, of developing a new combination of ideas. (p. 10)

High levels of cognitive processing and intricate understanding of a given field are necessary for a creative contribution but something else has to grow alongside of the

development of domain specific skills if one is to avoid entrenchment and develop the capacity to create (Csikszentmihalyi, 1996; Weisberg, 1999).

Even if a teacher sees his/her primary goal as ensuring that students understand a particular concept, he or she may still design instruction in a manner that requires a level of creative thinking on the part of the students. Such a strategy may not only yield a deeper understanding of the concept at hand but may also tend to develop creative thinking, which students may use later in life to solve the sort of problems that do not have pre-determined solutions. As teachers conduct lessons that require students to use creative thinking in the pursuit of a deeper understanding of content, they may be simultaneously developing within their students the capacity that will allow them *to solve problems that we don't even know are problems yet* in the future (Ruscio & Amabile, 1999). In other words, *how one learns to learn* may constitute the difference in those students who develop the capacity to create as adults and those students who may be equally intelligent but fail to develop the capacity to generate new and meaningful ideas later in life. Hence, one is learning to be creative by *creatively learning* (Torrance, 1969).

If students learn by habitually asking questions, wondering, considering, reflecting, criticizing, and imagining alternate possibilities, then these habits may affect their approach to their work later in life. So, in the context of the classroom, an appeal to creative thinking can be viewed as a strategy in service of deep understanding so that later in life such deep understanding (along with the manner in which concepts were understood) will place “understanding” in service of creativity.

The fact that Krathwohl and Anderson (2010) placed “create” at the top of their revision of Bloom’s Taxonomy implies that all of the other processes are necessary for creative thinking to occur. One must thoroughly understand a concept and engage in the higher order processes of application and analysis if he or she is to have a chance of creating something that is both new and meaningful. A thorough understanding of a domain is necessary in order to know which ideas can move the domain in a different direction. But if this is true, one may ask how we can in such a case guard against entrenchment. An understanding of the relationship between analytical ways of thinking and creative ways of thinking within the context of education may hold the answer to this question. Educators who are able develop analytical ways of thinking through a process of allowing students the opportunity to creatively construct their own understanding of subject matter, would conceivably help their students develop the ability to step outside of the proverbial box (domain) since they were the ones who constructed the box. If indeed knowledge of the proverbial box is accomplished by questioning, wondering, considering, reflecting, criticizing, and imagining alternate possibilities, then the “box” may tend to be viewed as much less confining as might otherwise be the case.

Certain cognitive psychologists contend that the act of learning itself is a creative act (Prinz & Barsalou, 2002; Schank, 1988). They believe there to be a natural tendency of the human mind to dream and imagine possibilities when one encounters a gap between where they currently are and where they believe they ought to be. Or when there exists a gap between what was expected to occur and what actually transpired (Csikszentmihalyi, Feldman, & Gardner, 1994; Schank, 1988).

Social psychologists, cognitive psychologists and theologians all affirm Aristotle's scientific contention that nature hates a vacuum. Humans possess a unique quality which allows us to identify gaps and to imagine means of bridging gaps (Lewis, 1952). Cognitive psychologist Roger Schank (1988), for instance, asserts that learning itself only occurs when expectations fail, when there is a gap between the phenomenon experienced and the phenomenon expected.

The mind, Schank contends, is motivated to learn in order to make sense of an unexpected phenomenon in order to be better able to predict future occurrences. It would of necessity require a measure of creative capacity to imagine avenues by which such gaps can be closed. Certainly environmental and cultural influences may provide for a more generally conducive creative atmosphere, but in order for any specific emergence of a truly creative act there must exist above all else a level of misalignment or tension between what is and what ought to be that allows for an individual, a particular domain or culture to be ready for a particular contribution (Guilford, 1959; Lewis, 1952).

Whatever the mind is; it is interacting within the context of a universe of infinite phenomenon which provides the raw material on which the mind questions, imagines, hypothesizes, and tests in an effort to make to make sense of what is perceived. Helpful generalizations, predictions and innovations that result from such thinking increase the likelihood of our continued survival in the physical universe and also produces an inner universe that is alive with thoughts that seem to relish the cycle of the tension and satisfaction that is experienced when gaps in understanding are discovered and when gaps in understanding are closed.

Ward et al. (1997) describe the mind as an “enormously creative instrument.” Ward explains that “our ability to go beyond concrete experiences to produce novel ideas is one of our most salient characteristics” (Ward et al., 1997, p. 1). The desire to engage the mind in creative problem solving may be such an integral part of the human mind that there is strong indication within the literature that our brain is busy solving a problem at times when we are not consciously aware that such cognitive work is taking place.

Figure 1.5 illustrates how creativity is becoming increasingly considered as a capacity that influences how people think, solve problems and construct meaning.

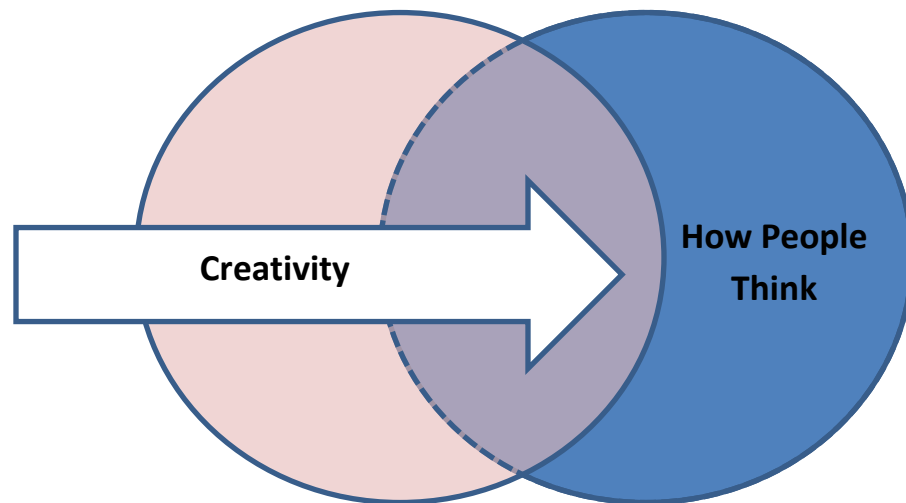


Figure 1.5. Creativity and Thinking.

Creativity and Self-Actualization

I do not assume there to necessitate a huge leap in reasoning to suggest that if the brain is wired to create then a certain level of satisfaction must exist when the brain actively engages in the process of creation. Milton (1667) asserts in lines from *Paradise Lost* that “the mind is its own place and can make a heaven of hell and a hell of heaven”

(lines 251 & 252). Milton is suggesting that individuals have the ability to create their inner world and their happiness is dependent upon the quality of this world. Abraham Maslow continues with an incredible conclusion. He states that his feeling “is that the concept of creativeness and the concept of the healthy, self-actualizing, fully human person seem to be coming closer together, and may perhaps turn out to be the same thing” (Maslow, 1967, p. 43). Studies conducted of individual accounts of moments when they were deeply involved in a creative process reported feelings of loss of time, ego and fear (Csikszentmihalyi, 1996). Where fear is lost and the ego is driven away, work ceases to be “work” and becomes for the person immersed in such activity as a thing that he or she “can’t afford not to do” (Senge, 2004, p. 135).

There is little doubt in my mind that the Industrial Age machine that was perfected in the 20th Century yielded unparalleled prosperity for a great portion of people. In a strange way however, this success of traditional analytical type thinking skills in essence kicked the door open for the entry of the creative class (Florida, 2005). Now that the day to day survival of much of the population seems secure, the craving for transcendence, meaning, and self-actualization is emerging as center to life in the 21st Century (Pink, 2005; Senge, 2004). Teachers who ascribe to such a view may see their role as extending beyond that of preparation for a career and into the business of helping students secure skills that will allow for continuous learning, curiosity, and creativity that they may think leads to a more meaningful life. Figure 1.6 illustrates how creativity is increasingly being considered as a factor that greatly contributes to a sense of accomplishment and self-actualization.

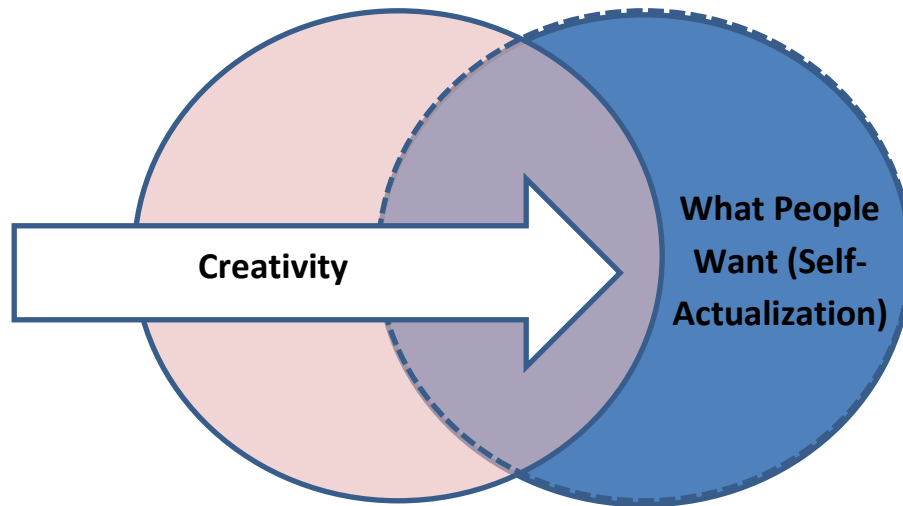


Figure 1.6. Creativity and Self-Actualization.

Creativity and the System of Education

If there exists both an economic rationale and a self-actualizing rationale for the development of creativity, then one might ponder why creativity is not emphasized in public schools. The answer to this question constitutes a central motivation for this project. The project is largely based on the assumption that one of the major reasons why creativity is not emphasized is that there exists little cohesion regarding what it means to create. Even though the term is routinely employed within the context of public schools there appears to be a gap between what is stated and what is commonly understood and practiced. Creativity leads to changes in direction (Sternberg, 2007). It can prompt a deep reevaluation of current practice (Sternberg, 2007). Such thinking and motivation can be threatening to a system like education. As a result another reason why there exists little cohesion regarding creativity may be that such thinking is dangerous to the system. If teachers are developing creative thinking with their students, then such creative

thinking may not be easily contained within the classroom. Teachers who value creativity may begin to impact the established business as usual in education in which so many people are invested (Chubb & Moe, 1990). Creative thinking therefore is not only important to the development of the child but such thinking can impact the entire system of education.

Motivation for the present research is also couched in a belief that we have hit the top of the “S” curve that Frances Duffy (2010) spoke of in her book “Dream! Create! Sustain!” Duffy speaks of the notion that we have hit the apex of the capabilities of the current system and are beginning to descend. Much has been made of the stagnant progress and perceived decline of American Public education (NCEE, 1983).

Reforms to public education are frequently heralded by legislators and policy makers and are sold to the public as the solution to our nation’s challenges. However, the reforms generally take on the form of doing the same thing but at a higher level where meaningful change to the system rarely occurs (Cuban, 2010; Robinson, 2001). Creative thinking holds the key to our ability as educators to initiate real change to the business of public education. More than ever we need a group of educators that Robert Sternberg (2007) termed *re-initiators*. Our nation is in need of educators who are willing and able to question their assumptions and start over.

Dewitt Jones (2010), acclaimed photographer for National Geographic offered a compelling vision for the leadership of any organization by stating that “patterns unchecked can become prisons.” I believe that we have entered a critical stage in the history of our world where no activity or pattern of thought can be left unscrutinized.

Jones (2010) suggests that we should question everything, even when things appear to be going well. The essential question is how we can see our business with new eyes and how we can transform such an entrenched bureaucracy as opposed to simply tinkering around the edges and adding additional layers of reform. Makinnon (2002) describes the willingness to see a problem where others do not as one of the “salient traits of a truly creative person” (p. 124). A constantly questioning attitude,” he continues “is not an easy one to live with, yet in its absence many problems will not be sensed and consequently creative solutions to them will not be achieved” (p. 124). Roger Schank (1988) follows up this notion with the idea that we should question everything; especially those things which everyone thinks they know the answer to.

Unquestioned adherence to measurable routine procedures in an effort to increase productivity in education is characteristic of an Industrial Age model. Such a model encourages ever evolving strategies of obtaining the bottom line, which usually entails employing whatever strategies are necessary to get as many students as possible to achieve a basic level of proficiency as measured by multiple choice standardized tests. It is an efficiency based model that demands an allegiance to schedules, pacing guides, benchmarks, etc. in which all students (or as many as possible) are to fall in “line.” Even in the age of hyper-speed communication and seemingly boundless, instantaneous and easily accessible information; easily monitored and replicated practices seem to be as prevalent in our schools today as they were during the Industrial Age. As former Secretary of Labor Robert Reich suggested, since our current age is becoming characterized by repeated innovations that greatly impact the entire culture, any

assessment of what the future that we are (supposedly) preparing our students for will look like would be impractical at best. The fact that no one can predict with any degree of certainty the future that the next generation will inherit may provide educators with the opportunity to do what I conceive to have been in the best interest of students all along. And that is to develop each child's ability to think intently as well as creatively rather than adhering to the demands of a system that may very well be obsolete and not in the best interest of the student or the economy.

The motivation for the research is in large measure based on what Guilford (1986) posits as the beginning of the creative process, which is a feeling that something is not quite right. The manifestation of such a failure is (in the words of Ken Robinson) "that we have many highly intelligent people who have passed through education feeling they aren't" (Robinson, 2001, p. 7). Furthermore, we have legions of teachers who may at least intuitively value the development of creativity but think that they are not expected or permitted develop the capacity. As a result there appears to be a substantial gap between what we are currently doing in education and what I assume educators intuitively believe we ought to be doing; a gap between the skills that schools have traditionally valued and the skills that 21st century industry is demanding; between a relatively limited view of how the brain operates and a more comprehensive view; as well as a gap between the activities that educators have traditionally employed to lead students and the type of activities that students innately gravitate toward.

The research regarding creativity has led me to view creativity as a key factor in bridging these gaps. The emergence of a discourse in creativity along with certain basic

agreement about the meaning and value of creativity within the walls of our schools will certainly increase student performance and engagement. But the impact of such discourse would not stop at the threshold of the classroom. A rich discussion about what it means to create may also prove to be a key factor in real and ongoing institutional change within the business of education.

It is the human capacity for creative thinking which allows us the ability to refuse to settle for the solutions, ideas and paradigms that sustained us in the past. If Maslow is correct regarding the immense influence that creativity has on the self-actualized human being; if educational researchers Krathwohl and Anderson (2010) along with cognitive psychologist Roger Schank (2011) are correct regarding creativity's significance in the manner in which humans think and if economic forecasters such as the AMA are correct regarding the necessity of creative thinking to economic progress, then it is imperative that educators achieve a better understanding of how creativity can be developed. In this way creativity can be seen as instrumental in fulfilling education's mission of helping to develop within individuals the tools necessary for physical survival along with the habits of mind and development of a culture that makes life worth surviving. We may have arrived, as Figure 1.7 illustrates, at a time in history where the needs of the economy, the desire of the human will, and the manner in which the mind processes information are beginning to merge.

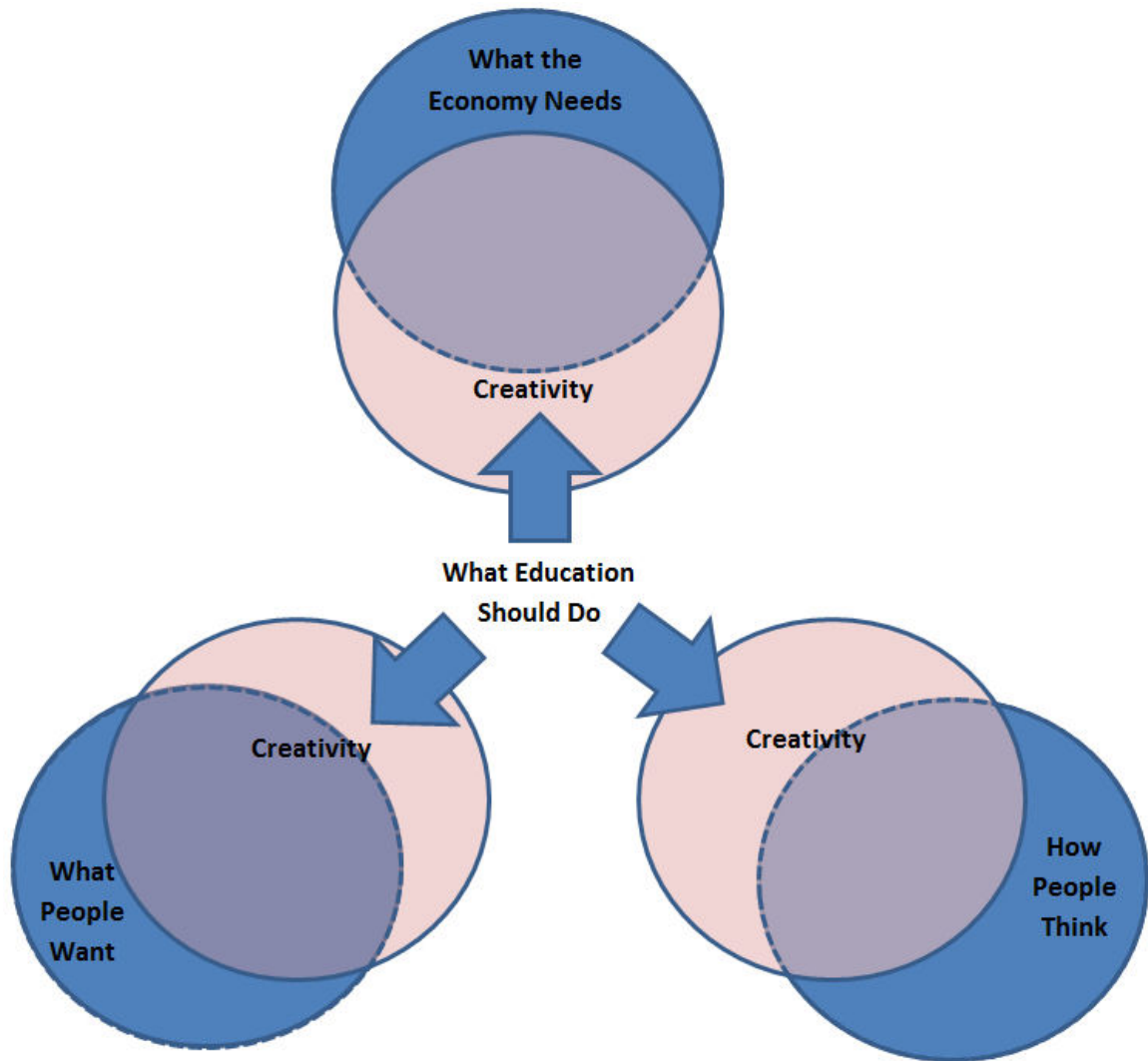


Figure 1.7. Importance of the Project.

The hope the project is to increase our understanding of creativity by adding the voices of teachers to the discussion. I conceived of a strategy of triangulating the perceptions gained from the teachers with the current research on creativity and the newly adopted Common Core State Standards in an effort to account for depth and diversity that I believe to be inherent in the concept. As a result the following chapters

can be viewed as an attempt on my part to mediate a conversation between teachers, the existing research on creativity and the Common Core State Standards.

The three-way discussion will begin with a review of the existing research on creativity. I sought to provide an array of existing ideas regarding the meaning of creativity found within the research that might prove to be broad enough to account for all of the possible insight that I would later gain from the participants.

Chapter III adds the second “voice” to the discussion by speculating how the writers of the CCSSS may have considered creativity within the standards. I assumed that the standards that teachers are directed to teach would prove to be a major consideration for the participants as they conceived of their perception of the meaning and importance of creativity.

Chapter V adds the third and final voice to the discussion. Chapter V will attempt to draw out what teachers conceive creativity to mean. The methods that I chose to employ in order to account for both the breadth and depth of ideas that might exist within the minds of teachers will be detailed in Chapter IV. The project is concluded in Chapter VI. Chapter VI moves the discussion from what the participants said to what the ramifications of what they said might be for the business of education if their views were to permeate public education discourse.

CHAPTER II

EXISTING IDEAS OF CREATIVITY: A REVIEW OF RELATED LITERATURE

An Introduction to the Complexity and Tension Inherent in the Concept of Creativity

The purpose of this study is to add to our understanding of creativity by including what teachers consider the concept to mean. I conceived of a strategy of mediating a conversation between teachers, the existing literature regarding creativity, and the Common Core State Standards in an effort to adequately analyze the complex ideas that were certain to emerge during the course of the project. The review of the literature is intended to fulfill the objectives of the study by laying the ground work with a review of existing theories of creativity by which the CCSS and participant response will be analyzed. This opening section will attempt to express the complexity that is inherent in discussions of creativity by detailing the multiple lenses in which creativity is studied and by expressing the often competing factors discussed within the literature as the sort of “tensions” that are necessary if a creative idea is to emerge.

The study of creativity emerged within the literature as an extremely complex and multifaceted topic. Broad avenues of inquiry emerged that seemed to encompass at points the whole of human endeavor. The review is not intended to achieve an in-depth account of any of the avenues of inquiry contained within the literature. Rather it is intended to identify a broad spectrum of ideas that might account for the array of ideas in which the participants of the study might promote. As a result, the literature reviewed in

this chapter spans several decades. The majority of the literature cited traces the study of creativity from present day studies back to the late 1950's when the field of psychology began to take on creativity as a legitimate object of study. Since the motivation behind the present study was predicated on an assumption that there exists little discourse within education regarding the meaning of creativity, I assumed that although several of the ideas on the topic may not be new to the discourse in the field of psychology, the ideas would remain pertinent in that they would be new to the discourse within public education.

Researchers generally investigate creativity through one of four lenses. They are the creative person, the creative process, the creative product, and the press. The four considerations or some combination thereof, have been viewed as the objects of study within the literature. Researcher who choose the *product* as their lens attempt to identify the qualities that an idea or product must possess in order to be deemed creative. Researchers concerned with the creative *process* are concerned with identifying the steps or methods employed to produce a creative product or idea. The creative process can encompass any number of steps from the identification of a problem to the communication and marketing of a solution (Amabile, 1983).

Investigators who identify the *person* as their object of study seek to identify qualities that vary from person to person that might account for variance in creative output among individuals. Such research includes investigating the cognitive skill of the individual as well as individual personality traits such as motivation, discipline, work ethic, and willingness to take risks that may affect the extent to which an individual is

creative. And those who study the **press** are concerned with how a culture or domain decides what ideas or products gain acceptance as creative. Researchers concerned with examination of the press are concerned with the nature of the “press” or field itself and the extent to which it is willing to accept ideas that are new. For instance the field of visual arts may be more accepting to innovation than the field of physics. Such researchers are also concerned with attempting to discover factors within a culture that tend to promote or inhibit creative thought. Yet others have focused on the reaction of the observer as the object of creative study. For instance an object is creative if it produces in the observer surprise, satisfaction, stimulation and savoring. It is reasonable to assume that the general definition of creativity applies here as well; in that such reactions may be consistent with any object that is deemed new and meaningful to the observer. Regardless of the lense with which one chooses to study the concept, creativity is at its heart a meaningful leap forward or away from what has gone before (Amabile, 1983).

Given the multiple ways of viewing creativity and the numerous theories that emerge, there appears to be a common thread that runs through the discourse on creativity. The common thread is *tension*. Perceptions regarding creativity within the literature are not only diverse but are often competing. As a result, framing the present literature review around the tension that exists between various conceptions of creativity might represent the best manner of analyzing the theories on the subject. I use the word tension because conceptions regarding creativity encompass ideas that often seem polarized; with numerous ideas and theories falling some place on a continuum between

two poles. Upon reflection it is of little wonder as to why such competing views of creativity might exist. The nature of the concept, as it is most often described within the literature, is a manifestation of the ever-present tension that exists within a society and within the individual between what currently “is” and what “could” or “ought” to be. The explanation of these tensions within this review will be critical to the subsequent analysis of participant response.

Physicist and scientific historian Thomas Kuhn’s (1991/1959) assessment of scientific breakthroughs represents a good example of the tension that exists within the discourse regarding creativity. Kuhn concedes that certain aspects of creative thinking lie at the core of the most significant episodes in scientific discovery, but asserts that convergent thinking is just as essential. “Since these two modes of thought,” he adds, “are inevitably in conflict, it will follow that the ability to support tension that can occasionally become unbearable is one of the prime requisites of the very best sort of scientific research” (Kuhn, 1991/1959, p. 140). The importance of Kuhn’s statement to the present research is that it is indicative of the complexity of creativity in that the integration of seemingly diametrically opposed constructs such as convergent and divergent thinking may be essential to the development of creative ideas.

As a result, the review that of the literature that I have included in the present chapter will be structured around the theme of tension. The chapter will explain the tension that exists between the accumulation of the existing knowledge contained within a given domain and the skills necessary to change the direction of the domain. The chapter will detail the tension that exists between the would-be creator and the context in

which he or she operates. The chapter will also describe conceptions of how these tensions might be dependent upon each other as I will detail certain confluence models of creativity found in the research. The chapter will conclude with a section that attempts to explain conceptions of a tension that exists between conscious and unconscious effort in the production of a creative idea. But first, I intend to underscore the complexity of the idea of creativity by expressing a tension that challenges the very base definition of creativity that I proposed in Chapter I.

Definition Challenged

I proposed a very general working definition of creativity in Chapter I, which I hoped would serve as a starting point for the present discussion. It was my intention to conceive of a working definition that would be broad enough to encompass virtually all conceptions of the term. Even this task proved to be difficult. At the onset of the discussion lies a fundamental tension regarding the basest definition of the term. The majority of the research narrows the components of the creative product to two indispensable characteristics. The creative product or idea is most often considered to have to be both *new* and of *value*. This view is not without objection within the literature. While retaining the newness criteria, cognitive psychologist Weisberg (1999) discounts the criteria that a creative idea has to be valued. Weisberg's (1999) major contention with the value criteria is that it is subject to the discernment of a given field or society within a particular place and time. Such a criterion would, in Weisberg's estimation, allow the creative status of an idea or product to change as the field's tastes or

temperament changes over time. He therefore defines creativity as a product or idea that is novel for the creator and produced intentionally.

As Weisburg asserts, the values of a particular field and/or culture are obviously subjective. They change pending on both time and place. Weisburg (1999) does however suggest that his definition “does not mean that all creative works are equivalent” (p. 70). One of the ways, he claims, that creative works can be distinguished is by their impact on the existing field. In my estimation, *value* judgment is implied in any assessment of non-“equivalence.” It may be therefore more agreeable to Weisberg if we define value as the extent to which a creative idea influenced the field at a particular point in time. In this way, a creative product or idea cannot lose its status as creative in the estimation of later generations of gatekeepers. This is because even if an idea is scrutinized by new knowledge and different tastes, one would still not be able to remove the influence that the idea had on the domain or field at the time. Unvalued ideas can however by this definition achieve creative status in light of new information and changing values. Such an idea simply would have taken longer to influence the field. Value in my estimation then is implied if an idea is to move or influence a domain. As a result, for the purposes of this research, I will use the most established definition of creativity which encompasses both novelty and value. This stance does however (as will be discussed) necessitate consideration of multiple levels of “context” when considering the evaluation of a creative product or idea.

Knowledge versus Special Cognitive Skills

A major source of discussion within the literature is the tension that exists between the accumulation of knowledge and the “special” skills that might be more often associated with creativity. Thinking outside of the proverbial box comes to mind when I consider the tension that exists between knowledge and creativity. This section will explore the tension between the existing box and the skills that afford an individual the ability to think outside of it.

Knowledge

This section will examine some the conceptions regarding the role that knowledge plays in creative production. Knowledge, for the purposes of this discussion will be defined as “domain relevant skills.” “Domain relevant skills” include “factual knowledge, technical skills, and special talents” (Amabile & Hennessey, 1987, p.10).

Weisberg (1999) explores this tension in the following manner:

Since creative thinking by definition goes beyond knowledge, there is implicitly or explicitly assumed to be a tension between knowledge and creativity. Knowledge may provide the basic elements, the building blocks out of which are constructed new ideas, but in order for these building blocks to be available, the mortar holding the old ideas together must not be too strong. (p. 226)

As Weisberg illustrates in the above quotation, the question becomes how an individual can be immersed within a domain and at the same time avoid becoming trapped by the current state of the domain? The tension that is to be navigated here has to do with the question of what cognitive qualities of a person will allow him/her to both *appreciate* and *criticize* existing paradigms. One might ask at what point the knowledge

of a particular domain prevents the individual's from seeing anything other than what is already in existence. And conversely, one might also ask at what point lack of knowledge of a given domain prevents a person from producing anything that would be considered of value to the domain. Cognitive Psychologist Robert Sternberg (2006) pointed out that,

On the one hand, one needs to know enough about a field to move it forward. One cannot move beyond the field if one does not know where it is. On the other hand knowledge about a field can result in an entrenched perspective resulting in a person not moving beyond the way in which he or she has seen problems in the past. (Sternberg, 2006, p. 89)

Numerous psychologists and educational researchers have expressed the necessity of an understanding of the knowledge already contained within a domain in order to think, solve problems and create (Csikszentmihalyi, 1996; Weisberg, 1999). John Dewey is often credited as stating that “you can have facts without thinking but you can't have thinking without facts.” The Common Core State Standards, as will be discussed in Chapter III, detail numerous fact based standards but also identify specific thinking habits and practices that should be developed as the students work to achieve the standards. The way that the Common Core State Standards are conceived appears to support a certain synergy that exists between the acquisition of knowledge and thinking skill that progressively enhances both constructs. The more knowledge of a given domain that a person receives provides that person with more resources with which to “think.” And the more one thinks about the facts of a given domain, the more facts the individual is likely to research and employ in his/her thinking (Schank, 1988).

Bransford, Sherwood, Vye, and Rieser (1986) cited research by Bryant and Trabasso (1971), Rieser and Heiman (1982), Donaldson (1978), Siegler and Shrager (1984), and Carey (1985) to make the point that there exists a relationship between factual knowledge and mental processing activities such as “inferencing, organizing, conserving, decentrating, and so forth” (p. 1080). He suggests that higher level thinking abilities “are not simply added on top of existing domain-specific competencies. Instead, competencies in a domain and the ability to think about that domain seem to develop hand in hand” (Bransford et al., 1986, p. 1082). Mathematician Henri Poincare suggested a series of process that lead to a creative idea: preparation, incubation, illumination, and verification. One would assume that implicit in the first stage (preparation) would be the accumulation of domain specific knowledge (Ghiselin, 1952).

Numerous researchers have taken this line of thinking one critical step further by suggesting that such deep thought about a given domain can lead to the emergence of creativity. In doing so they concluded that there exists a direct correlation between the quality of the creative idea and the knowledge of the particular domain (Amabile, 1983; Boden, 1990). Scientific historian and physicist Thomas Kuhn (1991/1959) follows the same reasoning by asserting that “only investigations that are firmly rooted in the contemporary scientific tradition are likely to break that tradition and give rise to a new one” (p. 140). Those who hold such a view could conceivably add another layer to Dewey’s reasoning regarding the necessity of facts to thinking. They might contend that you can have thinking without creativity but you cannot have creativity without thinking.

Such a stance would situate the accumulation of facts as well as how one goes about “thinking” about those facts as indispensable to the creative process. Several researchers suggest that this may be the case. As mentioned in Chapter I, Krathwohl and Anderson (2010) situated the verb “create” at the pinnacle of their revision of Bloom’s Taxonomy of Cognitive Skills. They situated remembering at the bottom with more advanced processes of application and analysis in between. Osborn (1953) conceived of mental capacities to fall within four broad categories. In the most general terms he asserts that our mental capacities include the ability to observe and apply attention (absorb); the ability to memorize and recall information (retrieve), the ability to analyze and judge (reason) and the ability to visualize, to foresee and to generate ideas (create).

Also, Ruscio and Amabile (2010) contend there to be “a number of theories indicating that the nature of domain-relevant information and the way in which it is stored can make an important difference in creative performance” (p. 252). Such conclusions suggest that “remembering” facts are necessary for higher level thinking and that higher level thinking may be necessary for creative ideas to emerge. “The larger the set (of domain specific skills), the more numerous the alternatives available and the greater the possibility of producing something new, of developing a new combination of ideas” (Amabile & Hennessey, 1987, p. 10). Such researchers hold the accumulation of knowledge and intelligence (as it is traditionally assessed) as necessary but contend that “creativity and intelligence are by no means synonymous” (Getzels & Jackson, 1962, p. 125). They assume there to be a distinct capacity that allows one to extend beyond that which is presently known or accepted.

It has been difficult for researchers to determine a clear correlation between general intelligence and creativity. This is because like creativity, there exists little consensus regarding exactly what constitutes “general intelligence.” Correlations between intellect and creative output have generally posited IQ test performance as the intelligence variable. IQ tests such as Stanford-Binet are generally validated by subsequent student success in school, where school success in general a function of the types of convergent and analytical skills that schools tend to reward with good grades (Guilford, 1986). As a result many researchers, educators and psychologist alike have called for a more expansive and inclusive view of intelligence (Gardner, 1982; Guilford, 1986; Sternberg, 1997). One can argue that creativity is a function of very different cognitive skills which traditional IQ tests fail to measure and skills that the traditional education system fails to reward. In order for creativity to be considered a function of general intelligence, it would seem that we would need a more inclusive conception of what it means to be intelligent. The traditionally narrow conception of intelligence may be the reason why few researchers have found a clear correlation between intelligence and creativity (Getzels, J., & Jackson, P. (1962).

Catherine Cox (1926) is one researcher who attempted to demonstrate a correlation between creativity and level of education. Cox used Catell’s (1903) ranking of 301 eminent geniuses. The group of geniuses were divided into two groups: eminent leaders and eminent creators. Cox used each individual’s education level as the variant. Of the eminent leaders within the 301 studied, Cox found there to exist a linear negative correlation between eminence ranking and education level (high school, bachelors,

master's, doctorate). As the level of education increased among the leaders, their ranking decreased. In the case of creators however a curvilinear pattern emerged with the eminence ranking reaching its peak between the junior and senior year of college and then tapering off to the point where eminence ranking of doctorate degree individuals were commensurate with that of individuals who only held high school diplomas (Simonton, 1987).

Lewis Terman (1959) conducted an influential longitudinal study of intellectually gifted individuals as defined by the Stanford-Binet IQ test. He chronicled the lives of 1,500 individuals who were identified as adolescents with IQs that exceeded 139. Although many of the individuals fared well as adults, their lives were largely undistinguished. A few rose to prominent positions within their given fields but none of the individuals reached the level of a Picasso, Darwin, or Einstein; no account was provided of individuals who produced ideas that substantially influenced the direction of a field (Kaufman, 2009).

The numerous attempts by psychologist to discover a correlation between intelligence and creativity have by and large failed to demonstrate a strong correlation between creativity and intelligence (as traditionally measured). Guilford (1986) seems to draw the same conclusion as Terman. He explains that a reasonably high IQ may be necessary but cannot be construed as the sole predictor of creative ability. Guilford (1986) found that once individuals reached a certain intelligence threshold (around 120 IQ) the correlation between IQ and creative ability begins to break down. Both Guilford and Terman were left to conclude that there was not a perfect link between intelligence

and creative achievement as an adult. A certain level of intelligence may be necessary but it is not sufficient. Other factors must be involved if a person is to make creative contributions to a field.

Special Cognitive Skills

This section will explore the special cognitive skills identified within the literature that are thought to produce a creative outcome which are conceived of as distinct from the thinking skills traditionally accessed by IQ tests and from the skills traditionally rewarded in school. This section will include sub-sections that describe a few of the “special skills” suggested in the literature that contribute to creativity. Those skills include: problem finding, problem solving and imagination.

These special cognitive abilities would constitute in the words of Howard Gardner, “distinctive mental processes that are required to transform knowledge and extend its boundaries” (Csikszentmihalyi et al., 1994, p. 17). A certain tension exists between what might be considered ordinary thinking and the type of thinking that might be more likely to produce a creative outcome. Weisberg (2006) for instance asserts that creative ideas “come about through the use of ordinary thinking processes; creative thinking is simply ordinary thinking that has produced an extraordinary outcome” (p. 102). Others like Teresa Amabile (1983) and John Paul Guilford (1986) clearly identify specific cognitive processes in which they believe promote creative output.

Guilford (1986) is most often credited with beginning the research to isolate and identify the special kind of mental processing that can produce creative solutions. One of the ways in which this is conceived in the research is the distinction between convergent

and divergent thinking. Physicist and historian Thomas Kuhn speaks of an “essential tension” that exists between convergent and divergent thinking that is in his estimation implicit in scientific research. Divergent thinking is defined as the capacity to generate diverse solutions and multiple avenues for exploration. Divergent thinking is a capacity that is often considered to be indicative of creative thinking. Assessments of divergent thinking have been routinely used as a measure of creative thinking (Torrance, 1972). Convergent thinking on the other hand, assumes one correct answer and/or a predetermined set of processes by which one would arrive at the answer. Each of the “special skills” discussed in this section could be considered in a broad sense as divergent thinking since they would constitute capacities that allow an individual to *divert* from an established path.

There are several specific cognitive processes that are thought to be of particular importance to the development of creative ideas. Theodore Lewis deconstructed the meaning of creativity as he considered the concept to be comprised of several processes. The processes that Lewis identified were problem solving, divergent thinking, combination, metaphorical thinking, and analogical thinking (Lewis, 2009). Other types of cognitive skills that are thought to influence the generation of creative ideas include fluency, and flexibility of thinking and sensitivity to problems (Guilford, 1959; Torrance, 1972).

A conception of the existence of special cognitive skill that considers creative ways of thinking as a subset of overall intelligence would acknowledge in the words of Howard Gardner (1993) a “pluralistic view of mind, recognizing many different and

discrete facets of cognition acknowledging that different people have different cognitive strengths and styles (p. 6).” This view posits teachers in control of the process; not only as a proactive developer of creative potential but also as a vigilant identifier of talents and abilities, as well as a appreciator of student diversity (Gardner, 1982).

Problem Finding. *Sensitivity to problems* and opportunities is an example of a special capacity that may be more pronounced in individuals who arrive at creative solutions than in those who do not. In order to solve a problem someone has to first identify that a problem or opportunity exists. The ability to conceive of problems and to be sensitive to opportunities for improvement is considered by many to be a highly creative endeavor (Runco, 2004). It would seem that such an ability or inclination to think critically and (in the words of Roger Schank) question everything would posit such individuals on the ground floor of the creative process. The ability to identify problems would have tremendous implications for educators if we see our duty to prepare students for life in the 21st century. Our economic survival is highly dependent on the ability of individuals to conceive of products that heretofore the consumer had no idea was needed, and our physical survival is just as dependent on the ability of individuals to identify emerging problems that may be beyond the horizon (NCEE, 2007). History seems to hold its highest regard for those individuals who have demonstrated the capacity to identify a problem, opportunity or significant gap in the current way of thinking and to “see problems that other people don’t look for” (Sternberg, 2012, p. 5).

Cognitive Psychologist Roger Schank (1988) considers the ability to question to lie at the root of creative thinking. Questions arise when a gap is noticed between what

an individual expected to have happened does not square with what he or she actually perceives to have transpired at the moment. The tension experienced here emerges when a phenomenon that one expected to happen does in fact not happen. This *expectation failure* is the motivational factor that propels humans to seek a solution that will relieve the tension (Schank, 1988). Similar to Aristotle's conviction that nature hates a vacuum, Schank (1988) considers the propensity of humans to seek to close gaps to be innate.

Schank (1988) postulates that once a question is posed by an individual, then the question remains open until it is satisfied with a solution. The gap between what is and what should have transpired remains alive within the individual's consciousness until the void is filled with an answer. Schank (1988) goes on to suggest that the process of searching for an answer to the question continues unconsciously over time as we engage in unrelated activities. He suggests, as I will discuss later in the chapter, that such unconscious mental processing of problems may be the reason why there exist so many accounts of individuals who have reported sudden "eureka" moments that seemed to emerge out of the blue (Schank, 1988).

The creative act is dependent, in Guilford's words, on "a judgment that things are not all right; that goals have not been reached; or that not everything that is to be desired has been achieved" (Guilford, 1959, p. 145). A sensitivity to gaps or a passion for identifying gaps may be as integral an influencer of creativity as any. In order to illustrate this point, I point to Howard Feldman's research on child prodigies. Feldman stressed that though such individuals exhibit an extraordinary amount of talent they rarely meaningfully contribute to the transformation of a domain. He postulates that such

individual talent yields extraordinary harmony with a domain. However he contends that while “creative work also requires mastery of a domain it does not have mastery as an end point; rather, significant extension and transformation of the domain are its goals” (Csikszentmihalyi et al., 1994, p. 118). Whereas extraordinary talent produces harmony with a domain, a heightened sensitivity to, gaps, challenges and misalignment provide a more suitable context for creative contributions to emerge. Creativity may indeed be an innate human drive, but the drive may be compensated or counteracted by an equally innate desire for stability. In other words, if an individual has been extremely successful in navigating the existing rules of the domain it would stand to reason that the individual would be heavily invested in the status quo and unmotivated to change a domain that has served him/her well. This tension is mirrored in the natural course of things. The reason that nature hates a vacuum is that it loves homeostasis.

When we consider that domains are in essence a chronicling of other peoples’ conclusions and that domains are characterized by establishing predictable outcomes when employing established ways of thinking, a certain paradox begins to emerge. While creative ways of thinking may be a necessary ingredient that allows one to influence the domain, the new knowledge removes the need for further creative thinking. As Schank (1988) contends, “questions lead to new thoughts, answers only to the end of thinking” (p. 40). Systems and bureaucracies alike evolve so that the individuals within the system do not have to think or create anything new, until such time that someone comes along to ask a question that has yet to be asked or a question that everyone else within the domain already thinks they know the answer to (Schank, 1988). It is

conceivable that the initial urge to be creative may be a search for predictability and patterns which would in effect reduce the need for further creativity. Creative thinking could therefore be an urge for survival that has as its end the stability and predictability that it has to initially challenge.

While closing gaps in expectation may be the precursor to learning at any stage of development, Arlin (1975) postulated that readiness for creative problem finding may be most pronounced at a particular stage in cognitive development. Like Piaget, Epstein studied periods of physiological growth spurts which he found to be strongly correlated with Piaget's stages of cognitive development (Epstein, as cited in Teopfer, 1987). However, Epstein found a stage of physiological brain growth beyond what Piaget considered to be the final stage of cognitive development (Epstein as cited in Teopfer, 1987). Whereas Piaget considered formal operations characterized by abstract thinking to develop between the ages of 11 and 14 (and beyond) as sort of the culminating cognitive ability, Epstein found a later physiological growth spurt that transpired between the ages of 14 and 16 (Epstein, as cited in Teopfer, 1987). Arlin has distinguished this span of an individual's development from Piaget's formal operations stage by characterizing it as the stage where creative problem finding begins to develop (Arlin, 1975). Piaget assertion that the main purpose of educators is to match students with their cognitive stage would have serious implications for students in early high school if Arlin's conclusion is true. The early high school years are a time where students are routinely provided with problems to solve as opposed to developing the capacity to find problems, identify gaps and investigate failures of expectation. As a result educators may

be missing a critical piece of the puzzle of developing creative thinking if they are not structuring instruction that optimizes what the adolescent brain is *ready* to accomplish (Toepfer, 1987). According to Einstein and Infeld (1938):

The formulation of a problem is often more essential than its solution, which may be merely a matter of scientific or experimental skill. To raise new questions, new possibilities, to regard old questions from a new angle, requires creative imagination and marks real advance in science. (p. 92)

Problem Solving. Creative thinking not only plays a role in the perception of a problem, gap or opportunity but it is thought to also manifest itself within the actual act of *problem solving*. Whether or not a creative solution will emerge may be determined at the onset of mental consideration of a problem. It may begin with an initial assessment of the problem as to whether the problem is perceived to be either unfamiliar or routine. The motivation or necessity to seek an unorthodox solution to a problem may evoke very different approaches to solving a problem at its onset. For instance the manner in which the mind attempts to retrieve exemplars from memory may impact whether or not one arrives at a creative solution. One must consider not only the quantity of the mental file cabinets (domain knowledge) which the individual has at his/her disposal but one must also consider the ability of the individual to “break set” or to explore a diverse array of mental file cabinets.

An individual’s willingness to investigate a broad and diverse set of possibilities may vary depending on the nature of the problem that is posed. The act of problem solving when the problem is unfamiliar and calls for a novel approach is dependent on the ability to think creatively. The tension that exists here has to do with two polarized

approaches to problem solving—algorithmic and heuristic. The question within the research is which general approach to problem solving, heuristic or algorithmic is more likely to increase one’s overall capacity for problem solving. Studies indicate that instruction emphasizing algorithmic or a formulaic strategy for problem solving increases student ability to solve very similar problems, whereas a more conceptual heuristic approach to problem solving yields increased ability to solve unfamiliar problems and grants them the ability to transfer problem solving skill to other contexts (Mayer, Stiehl, & Greeno, 1975). Such findings seem to suggest that the development of creativity can be influenced by the manner in which problems are presented to students. Seymour Papert, inventor of Logo computer programming language argued that “if children get into the habit of exploring the problems before them—instead of solving the problems routinely like rats in a maze—they might just carry this creative habit into their adult lives” (as cited in Amabile & Hennessey, 1987, p. 16).

As exhibited in Figure 2.1, I have positioned certain “special cognitive” skills around the fringes of the graphic with the traditionally valued skills near the center. This is not to say that the special skills are any less central to what it might mean to be intelligent nor should it be inferred from the graphic that the special skills somehow encompass the traditionally skills. They are situated around the fringes because they exist along the fringes of public education generally relegated to the “elective” or “enhancement” portions of the school curriculum. But more importantly the creative ways of thinking are represented in the graphic as closer to the outer edge because

creativity is often represented within the literature as closer in proximity to whatever else is “out there” (Senge, 2004).

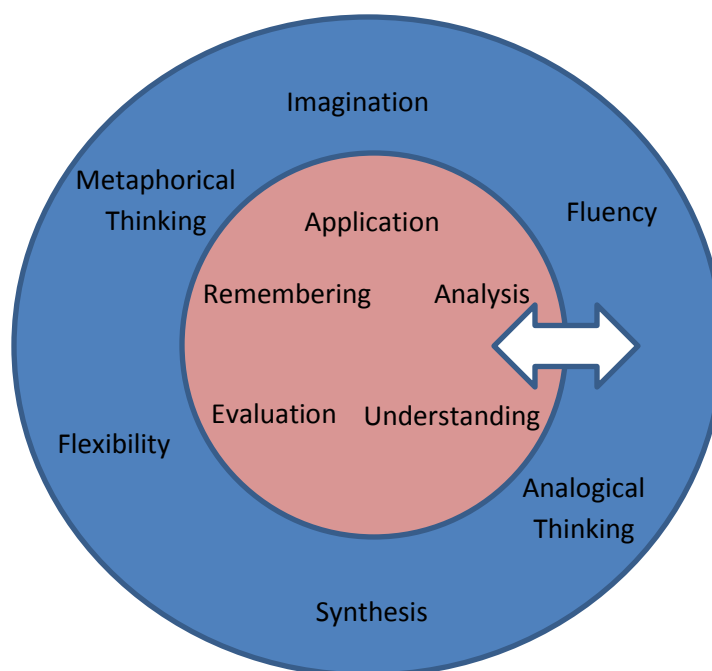


Figure 2.1. Analytical vs. Creative Ways of Thinking.

One of the best ways to conceive of the difference between the traditional skills contained within the inner circle and the special skills around the fringes is that the traditional skills are concerned with *what is* while the special capacities are called upon to manipulate what is in an effort to conceive of *what could be*. Once ideas of what *could be*, are produced they return to the court room of the capacities listed within the inner circle to evaluate and test the reasonableness of the ideas generated. The possible interrelationship between special and traditional cognitive skills is denoted by the double sided arrow.

The special skills come into play once one begins to imagine how an unfamiliar phenomenon or problem encountered may be “like” a known phenomenon or problem after the unfamiliar encounter has been analyzed. In other words a key aspect of problem solving involves the retrieval of a memory that might be analogous to some facet of the problem at hand. In this way, even the manner in which we remember can be tied to creative thinking. And if the way in which we remember affects creativity, then the manner in which information was stored in memory in the first place might also impact creativity (Partridge & Rowe, 2002; Schank, 1988). Furthermore, one could conclude, as will be discussed later in the chapter, that the depth of the analysis in which one engages might positively correlate to the number of ideas (fluency) and the diversity (flexibility) ideas generated.

A two-way street is illustrated in the graphic between the traditional and special cognitive skills, where the special skills can be employed in addition to the traditionally valued skills to achieve a *deeper* understanding and a more flexible system of storage than what might have been achieved by the processing of the traditional skills alone. This is an indication of importance mini-c creativity (using creative thinking in service of learning) in setting the stage for the possibility of higher levels of creative output in the future. Certain researchers assert that the manner in which information is learned (Input) impacts the manner in which the information is retrieved (output). Simonton (1999) suggested that students who are expected to use their imagination to manipulate information deconstruct it and thereby store the information in all sorts of different categories would be more likely to retrieve unique exemplars or analogies that might lead

to a creative solution. Such a capacity would be critical each time a student is faced with a problem where there may not exist an obvious link between the problem at hand and the information stored within the student's memory. The manner in which information is conceptualized and stored (input) would impact the individual's ability to manipulate the information and/ or combine it with other information that would lead to a greater volume of ideas and a greater level of diversity of ideas.

Imagination.

Man's body is faulty, his mind is untrustworthy, but his imagination has made him remarkable. (John Masefield, as cited in Osborn, 1953, p. 12)

Einstein insisted the capacity of imagination to be more important than knowledge. Imagination is defined as the deliberate mental generation of some novel entity (Ward, 1994, p. 2). Imagination as asserted by Wallace Stevens (1957) is "man's power over nature" (p. 204). It is the act of mentally filling the void between what is and what ought to or can be. Rather than accept reality as is, imagination represents the capacity to contemplate how it can be otherwise. Imagination in Einstein's words is "a preview of coming attractions." It is generally characterized by an individual's ability to manipulate images within the mind (visualize) and to cognitively play with any number (fluency) of diverse (flexibility) ideas. Imagination is conceived as the uniquely human capacity to take liberties with reality (Guilford, 1986). Imagination is manifested in the production of "what if" questions. It is the picture of the mind's eye which is not bound by what is presently observable. While experiments and evaluative thinking rely on

reason to answer questions, the imagination may be the capacity that enables us to arrive at questions and avenues of inquiry in the first place.

The special cognitive skills represented in this section are considered “special” because they are not generally the types of thinking skills that are emphasized in public education nor measured on standardized or intelligence tests. Researchers have argued that in effect the skills characterized here may be anything but special. Special skills like imagination may be as automatic as our heart beat. Even though you may have never seen a pink elephant, you cannot resist seeing one in your mind at this moment, can you? In their estimation the ability to initiate flexible and fluent thinking does not lie outside of the way the brain is designed to operate. As a result certain researchers have called for a more comprehensive and inclusive view of what it means to be intelligent (Gardner, 1982; Robinson, 2001). Much of the research demonstrates that such special cognitive skills constitute a co-equal and indispensable partner in the production of knowledge and the generation of new ideas.

Person versus Context

The tension that is inherent in the production of creative ideas is no more pronounced than in the individual’s relationship with the field. This section will address the tension that exists between the potential creator and the context in which he or she is attempting to create. The section will detail three major contextual variables that are found within the research that impact creative production. The variables that will be discussed in this section are the variance in the general disposition of would-be creators that would affect his or her relationship with the field; the general disposition of the field

when it is encountered by a would-be creator; and the level of support that exists within the culture or a particular field that supports creative production. This section will also detail the varying levels of creative impact with respect to how the evaluation of creative contributions is inherently dependent upon the context in which the idea is conceived.

Disposition of the Creator

The tension between the would-be creator and the context within which he or she operates is the source of much discussion within the research. A researcher interested in the creative “person” generally studies the life stories of eminently creative individuals in an effort to discover commonalities and themes that might explain his or her ability to produce ideas and products that are new and meaningful. As alluded to earlier, some researchers tend to focus on the nature of the context as the pivotal factor in creative output, while others see variance in distinguishable personality traits as the pivotal factor that affects creative production (MacKinnon, 1987). Inevitably studies that center on the creative person include investigations into the context; meaning that the study of the creative person and the study of context overlap when the researcher begins to investigate the personality traits that emerge within the creator as he or she encounters the gatekeepers and critics of a particular field.

Many of the traits identified by researchers as consistent with the creative individual have to do with the personality traits that are necessary to challenge the field and persevere through inevitable criticism and resistance generated from the field. The tension that exists here is manifested in the scenario that a certain individual may be capable of summoning high levels cognitive processes that might lead to a creative idea

but may not be motivated to use such ability or may not be able to persevere through the criticism that is implicit in a challenge to the status quo (Boden, 1990; Csikszentmihalyi, 1996; Renzulli, 1979). Conceptions within the literature regarding the disposition of the would-be creator center on the extent an individual is capable of negotiating the tension between the special cognitive skills and the analytical type skills; the disposition of the individual to be either conservative or liberal in his or her evaluation of ideas, and an individual's willingness to challenge the field and his or her resolve to persevere.

Robert Sternberg (1997) identified four overarching qualities of the creative person. Three of the four center on the tension between the creative person and the field. Along with the ability to look at problems in different ways Sternberg contends that the creative person also has the ability to “take risks that other people are afraid to take; have the courage to defy the crowd and to stand up for their own beliefs; and to seek to overcome obstacles and challenges to their views that other people give in to” (Sternberg, 1997, p. 4).

Kirton (1987) conceived of a comprehensive list of propensities that sought to draw personality trait differences between adaptors and innovators—between ones who attempt to seek harmony with the domain (adaptors) and those who tend to challenge the domain (innovators).

Innovators are seen by adaptors as abrasive, insensitive and disruptive, unaware of the havoc they are causing. Adaptors are seen by innovators on the other hand as stuffy and unenterprising, wedded to systems, rules and norms of behavior which are restrictive and ineffectual. (Kirton, 1987, pp. 285–286)

Further, adaptors tend to accept problems and work to solve them, whereas innovators tend to “query problems’ concomitant assumptions”; where adaptors are liable to make goals of means, innovators treat accepted means toward a goal with little regard (Kirton, 1987, p. 285).

Gatekeeper resistance to new ideas is almost implicit in the definition of creativity. A certain level of self-confidence when confronted with such resistance is a likely factor in the development of a creative contribution (Boden, 1990; Sinnott, 1959). Furthermore individual personality traits may not only influence the amount of external scrutiny that the would-be creator is willing to endure but also the amount of internal scrutiny that he or she is able to overcome. Certain personality traits may influence how quickly the analytical functions of the brain dismiss the novel combinations that emerge from the more creative type cognitive processes. Untold volumes of ideas are never brought to the attention of the domain. Just as a domain can be either liberal or conservative in what it accepts as new and meaningful so do individuals vary with regard to the extent which they consider their own ideas as worthy of pursuit. As Physicist and chemist Michael Faraday once stated “The world little knows how many thoughts and theories which have passed through the mind of a scientific investigator have been crushed in silence and secrecy by his own severe criticism and adverse examinations” (Simonton, 1987, pp. 28–29). A key factor in the development of creative thought might be expressed in terms of finding the golden mean between these two competing influences. Negotiating these tensions would then constitute a key pedagogical practice of teachers who are determined to develop creative thought.

Another key personality factor that might vary from one person to another is the factor of motivation. Osborn (1953) claimed that virtually all psychological tests made point to the conclusion that creative talent is normally distributed and therefore all people possess the capacity at one level or another. The variance in creative output he contends is “more in ratio to our output of mental energy than in ratio to our inborn talent” (Osborn, 1953, p. 14). If Osborn’s claim is true then it is reasonable to assume that a person must possess a certain level of motivation that will compel him or her to apply the *mental energy* necessary to produce creative ideas and to persevere through setbacks, mistakes, and the scrutiny that inevitably accompanies the pursuit of something new (Csikszentmihalyi, 1996). The question for these researchers is what personality traits are consistent with motivating the individual to pursue a creative solution.

A discussion of motivation opens the door for a consideration of how human emotion might influence the development of a creative idea (Renzulli, 1979). The emotion of anxiety is written into human DNA to motivate action (Boden, 1990). The level of anxiety experienced by an individual may very well produce the motivation necessary for the individual to commit the mental energy necessary to engage the cognitive skills that would generate ideas. If the emotion of anxiety is indeed written into our DNA then it would stand to reason that we may not be able to completely ignore it. The anxiety that is produced when gaps in expectation persist and problems remain unsolved may constitute the reason why we sometimes go to bed with a problem and wake up with a solution.

Disposition of the Field

To one degree or another, those within a field are invested in the status quo, and the gatekeepers of the field may be the most heavily invested (Chubb & Moe, 1990). One would assume that the more fundamental the shift proposed within a domain the more “sacred” the “cows” the creator is likely to encounter. A domain such as the arts may be by its nature much more open to new ideas and areas of exploration than the field of mathematics for instance. Such distinctions between domains are identified in the literature by exploring the tension between *liberal* and *conservative* acceptance of new ideas. Csikszentmihalyi (1996) suggests that a domains propensity to be either very liberal in its acceptance on one end of the continuum or conservative acceptance at the other has a great impact on the evolution of a domain. Csikszentmihalyi warns of the propensity of a field to be either too conservative or too liberal when affirming the ideas and/or products that will be admitted as creative. A domain, he says can be wrecked either by “starving it of its novelty or by admitting too much unassimilated novelty into it” (Csikszentmihalyi, 1996, p. 44).

The business of education is an excellent site to consider the variance that might exist from one domain to another. Teachers operate in the domain of education but are also a member of the domain of their particular subject. Just as education may vary from other fields with respect to extent that it values creativity, domains within each school vary with respect to the extent to which creative ideas are accepted. For instance teachers may view the domain of visual arts as where creativity is developed on one end of a

continuum and might view math class as a place where creative thinking is generally discouraged at the other.

Levels of Context and Levels of Creative Impact

At this point in the discussion, it will be important to address a conception that is prevalent in the literature which assumes there to exist varying levels of contexts that assign value to creative output. The value that is attributed to the creative act is dependent upon the level of context where the creative act is evaluated. Levels of context would span a continuum from those acts that would be only of value to the individual to those acts that would be of value to an entire culture. As discussed earlier in the chapter, the first gatekeeper is the would-be creator him/herself, but once the idea moves beyond the individual, the idea could encounter resistant from gatekeepers that represent varied levels. Such scrutiny might progress from the level of one's peers, to the level of a profession or organization, to the level of an entire culture. This consideration of varying levels of gatekeepers allows us to consider the possibility that a person may possess both the analytical and creative ways of thinking discussed in the previous section that are necessary for creative production, but may never conceive of an idea that is deemed creative.

Kaufman (2009) is one who made a distinction between eminent creativity and everyday creativity. Kaufman conceived of four levels of creativity; with the eminent (Big-C) sort of creativity being characterized by ideas that break from existing paradigms and alters the direction of an entire domain on one end of the continuum and the sort of creativity that might be employed in learning about a particular domain on the other end

(Mini-C). Kaufman placed two levels of creativity on the continuum between the two poles which he labeled Pro-C creativity, and Small-C. A conception of varying levels of creative output is extremely important because ideas that may not be new or of value to the culture as a whole may indeed be very new and valuable within a much smaller context.

Such a distinction between levels has huge ramifications in the way that creativity can be understood, appreciated and developed within public schools. No one expects a student to be able to produce an idea that adds substantially to an existing domain such as physics or mathematics; much less do we expect students to arrive at an idea that would influence an entire culture. A fifth-grade student can, however demonstrate creativity within the micro-context of his or her classroom. A fifth grader's approach to solving a particular problem may not be novel to the domain as a whole but may be very novel within the context of his life experience and within the context of the classroom. The gatekeepers in this context; the people who are tasked with the responsibility of determining whether an idea or product is creative would be the teacher and the students. Within this context it is the teacher's responsibility to evaluate students' attempts at constructing new knowledge and to bring such thinking in line with what is currently accepted by the contemporary mathematics community (Harel, 2008).

While works of Beethoven, Picasso and Einstein come to mind when considering exemplars of the eminent type of creativity, Pro-C creativity would be the sort of engineering and design that would certainly have an impact on an existing domain but would not break substantially from the direction in which the domain was proceeding,

nor would this type of creativity accelerate the progress of the domain in any significant manner. Pro C creativity would seem to be the level of creativity that industry is beginning to demand (NCEE, 2007). Pro-C is the picture of the individual who is able to invent the proverbial “better mousetrap.”

Small-C creativity would constitute the everyday sort of creativity which may manifest itself in the sorts of problem solving and unconventional uses of tools that do not have much of an impact beyond the individual. This level is characterized by psychologist Ya-Hui Su. He suggests that “it becomes indispensable to ordinary people who need to extend, adapt, replace or integrate existing knowledge to meet challenges of uncertainty and change” (Su, 2009, p. 709). While the classical concern around the development of creativity is derived from an instrumental human interest to design or invent things that will change human life, Ya-Hui Su emphasizes the human need to create in order to produce ideas necessary to deal with the unpredictability and every day challenges of a knowledge based society. Creative capacity may be crucial to each individual if he or she will be able to adapt to the flood of new technologies that characterize the current age (Runco, 2004). Small-C creativity then is not characterized by the individual being able to create a new and useful item but is characterized by the individual’s ability to use an item in an unusual way to meet an immediate need. While Pro-C may be conceived as invention of a better mouse trap, small-c creativity may be conceived as tossing a shoe at a mouse.

The final level of creativity is the sort of creativity that is inherent in the learning process and is employed to achieve an understanding of a particular concept. Kaufman

and Behetto (2009) write, “Central to the definition of Mini-C creativity is the dynamic, interpretive process of constructing personal knowledge and understanding” (p. 3). The implications for educators, as alluded to earlier, is that creativity can be developed by the manner in which students are presented with problems. If students are encouraged to employ creative ways of thinking as they construct meaning; if they are allowed to imagine and explore multiple avenues for arriving at a conclusion, then students would be learning to be creative as they are learning whatever standard or concept that is expected at the time. If information is constructed in a creative way it is reasonable to conclude that the information may be retrieved in the same way when confronted with a real-world problem (Schank, 1988).

This line of thinking in the research establishes the possibility that individuals of all age levels can be creative. Since creativity is dependent on the context in which the individual operates, a first grade student who discovers that $3 + 5$ is the same as $5 + 3$ has created knowledge that is new to him/her but is certainly not new to the domain of mathematics. Creative individuals may arrive at ideas that are of personal value and that are new to them but do not (at least at the present time) alter the field in any meaningful way. Mini-C and Small-C creativity may have tremendous self-actualizing value to the individual and might set the conditions within the individual that may lead to their eventual production of ideas that would be accepted by the field at a point in time, but until such time the impact of the idea remains at the individual level.

As a result, of a consideration of varied levels of creativity we can assuage Weisberg’s concern with the inclusion of value as a necessary consideration. An idea can

be creative if it is new and valuable to no one other than one's first grade classmates. Consequently, a person that exhibits the type of thinking (fluency, flexibility, analogous thinking, etc.) that may be deemed necessary for the production of a creative idea may in fact never develop anything that moves the influences the field in any meaningful way. However any individual can be creative in their approach to learning (Mini-C) and in the act of improvising in their everyday lives (Small-C). However, the Big-C and Pro-C levels of creativity would be reserved for those ideas that meaningfully influence a field or domain (Csikszentmihalyi, 1996; Kaufman, 2009).

Contextual Support

Historians have noted that the existence of eminently creative people is not evenly distributed across time and place. On the contrary, there often appears to be more of an existence of pockets of genius that is concentrated at particular places in time (i.e., Athens from 440 BC to 380 BC; Florence, from 1440 to 1490; and London from 1570 to 1640). Certain researchers have attempted to explain why such a phenomenon might exist (Banks, 1997; Simonton, 1987). Such an assessment certainly would lead researchers interested in creativity to investigate contextual factors that would have produced a Michelangelo, Leonardo, and Machiavelli in such a concentrated space and time (Banks, 1997).

Csikszentmihalyi (1996) contends that the explosion of creativity that took place in Florence during the early 16th century could largely be traced to the context in which the innovations in art, science, and architecture were developed. He states that "leading citizens as well as the common people were pushed to perform beyond their previous

limits” (p. 34) He used the example of the dome over the Cathedral in Florence to illustrate this point. He states that “without the constant encouragement and scrutiny of the members of the opera, the dome over the cathedral would probably not have been as beautiful as it eventually turned out to be” (Csikszentmihalyi, 1996, p. 34). One reason why creativity in Florence was so bountiful was that the field was “proactive,” meaning that creativity and innovation were demanded by the field(s).

Statistician David Banks (1997) at Duke University questioned how certain pockets in history seemed to produce a high density of creative geniuses. He hypothesizes a factor that would have serious ramifications for public education. There would certainly seem to be a whole host of contextual factors that are thought to influence creative output in students. Influences that range from the use of certain tools and technologies to the prevalence of certain attitudes within the school climate regarding the value that is placed on creativity to the existence of a stimulating physical environment have all been considered to impact the expression of creativity in schools (Runco, 2004; Rutland & Barlex, 2008). But Banks’s findings suggest a more structural influence regarding the manner in which students are educated which would affect creative production. He noted that many of the eminently creative individuals benefited from the manner in which they were educated. These individuals were the beneficiaries of individualized instruction. They were often the select and few individuals who were afforded tutors while the vast majority of the population were either trained as apprentices for particular sectors of the economy or were communally trained for work in a factory.

Contextual factors can also inhibit creative production. Drucker (as cited in Pink, 2009) conducted a popular study that illustrates this point. Drucker found the ability to break set or see problems in a new way to be heavily influenced by the type of motivation employed. When participants were motivated by extrinsic factors, Drucker found that it took substantially more time to arrive at a creative solution than those participants who were intrinsically motivated. Such findings might be particularly relevant to the business of education in that the manner in which legislators and bureaucrats have attempted to motivate teachers have tended to be extrinsic in nature. Higher standards and basic skills, with the resulting standardized assessments have been the order of the day for the past few decades in public education (Cuban, 2010; Robinson, 2001). With the passing of No Child Left Behind the federal government imposed sanctions on schools not meeting certain benchmarks. Furthermore several states also awarded monetary rewards to teachers based on student performance on standardized tests. If Drucker's findings are generalizable to the business of education then such a reliance on a carrot and stick approach would have serious implications for the development of student creativity as well as the exercise of teacher creativity. Drucker demonstrated that extrinsic rewards and punishments work very well when there is a clear route to a fixed goal. But when the problem calls for much more complex thinking then carrot and stick approaches actually have an adverse effect on progress toward goals (Pink, 2009).

Teresa Amabile (1983) asserts that factors such as time pressure, fear of failure and failing to allow a measure of autonomy in problem solving tend to negatively impact creative output (Amabile, 1983). It would seem that Amabile had the business of public

education in mind when she made the list. This list constitutes a particular problem in public education whereby the conveyor belt of programs and instructional strategies seem endless, resulting in the means becoming the goal. The assembly line production paradigm is so ingrained in our conception of schooling that we cannot even speak of schooling apart from grade levels and time oriented benchmarks. Further, teachers have a special level of investment in their business that would distinguish them from other professionals. Educator's disposition to be liberal or conservative in what they accept as creative may be influenced by the fact that educators have spent virtually their entire lives in the school context (as a student, teacher and/or administrator). It is little wonder then why education critics like Larry Cuban (2010) and Ken Robinson (2001) would claim that the basic structure of education has remained unchanged. In addition, if researchers like Amabile are correct in their assessment that risk taking is essential to creative production then education has another systemic problem; in that if students and teachers learn anything within the context of school they learn to avoid failure at all costs. A context that allows thoughtful risk-taking and one that is characterized by intrinsic motivation, autonomy, and self-determination are absolutely necessary for "radical-creative innovations" (Marginson, 2008, p. 287). "All else being equal, the more complete is the element of self-determination, the larger is the scope for creative work" (Marginson, 2008, p. 270).

Context Summary

Many are accustomed to hearing the phrase "an idea whose time has come," or hearing a person described as "ahead of his/her time." Such phrases all have to do with

the importance of a context that is ready and supportive of a novel idea. The influence of context offers an answer to the question of why a highly motivated and talented person may not necessarily make a creative contribution. In order for any specific emergence of a truly creative act there must exist a level of misalignment or tension between what is and what ought to be that allows for a particular culture or domain to be ready for a particular contribution (Guilford, 1959; Lewis, 1952). As a result, a misalignment that may exist within a particular domain not only has to be perceived by the potential creator, but the particular domain also has to be ready to receive the idea as new and meaningful. Certain creative ideas that are “ahead of their time” may not be designated as new and meaningful until a domain evolves to the point where the idea would be considered creative in hindsight.

Confluence Model of Creativity

As alluded to in the previous section the lenses with which researchers choose to study creativity often overlap. Even though a researcher may choose to study creativity via a particular lens they generally concede there to be numerous factors that influence the production of creative ideas (Csikszentmihalyi, 1996). As a result several researchers have attempted to study creativity as a construct that is comprised of an interdependent relationship of several factors. In such a system, Sternberg (2007) points out, factors that affect creative production can exist that might not only be considered interdependent but also compensatory. A strong factor may compensate the implications of a weak factor. For instance, if a particular context is not supportive of a particular idea, then a high level

of personal motivation may be able to overcome the limitations of such a resistant environment (Sternberg, 2007).

One of the pioneers of this conception of creativity is Mihalyi Csikszentmihalyi. Csikszentmihalyi (1996) conceived of an overall structure where the individual's motivation, domain specific skills (attention) and the context in which he/she works to be interrelated factors that influence creativity. Researchers that look for a confluence of factors impacting creative production are interested in the interplay of the varying factors. Such a researcher might simultaneously consider what personality factors would cause a person to be more open to seeking creative solutions; what cognitive factors account for the originality and complexity of the types of exemplars, analogies and metaphors that are retrieved from an individual's mind; and the contextual elements that influence the production of a creative idea (Csikszentmihalyi, 1996). Csikszentmihalyi conceived of such a model as represented in Figure 2.2.

Figure 2.2 illustrates Csikszentmihalyi's (1996) idea that when the individual's attention, motivation and context gel then a state which he termed "flow" is experienced. Csikszentmihalyi describes the state as characterized by an experience of creative energy flowing effortlessly from the creator. The state may constitute an example where, in essence both conscious and unconscious efforts seem to work in tandem. The Flow state is considered by Csikszentmihalyi (1996) to represent the optimum frame of mind for the creative production. As represented in Figure 2.3, Csikszentmihalyi (1996) explains that the state of Flow is dependent upon the challenge of a given task being compatible with the ability level of the individual.

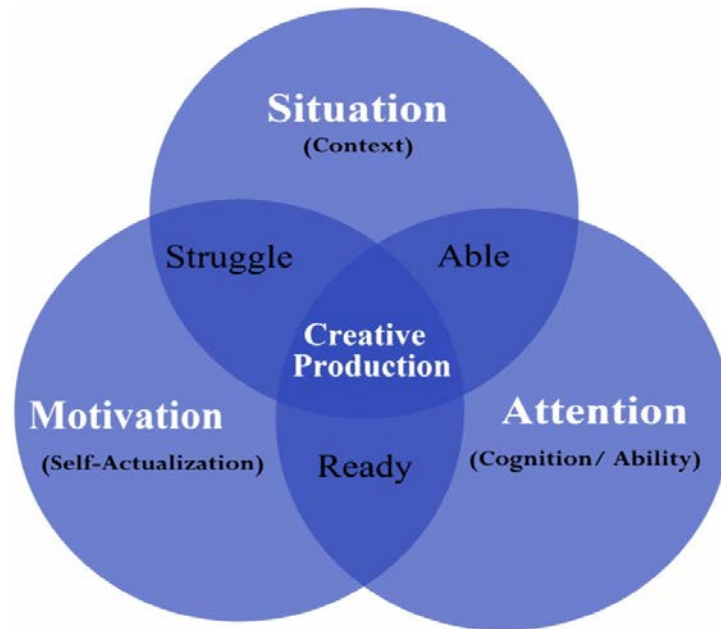


Figure 2.2. Csikszentmihalyi's Confluence Model (Adapted).

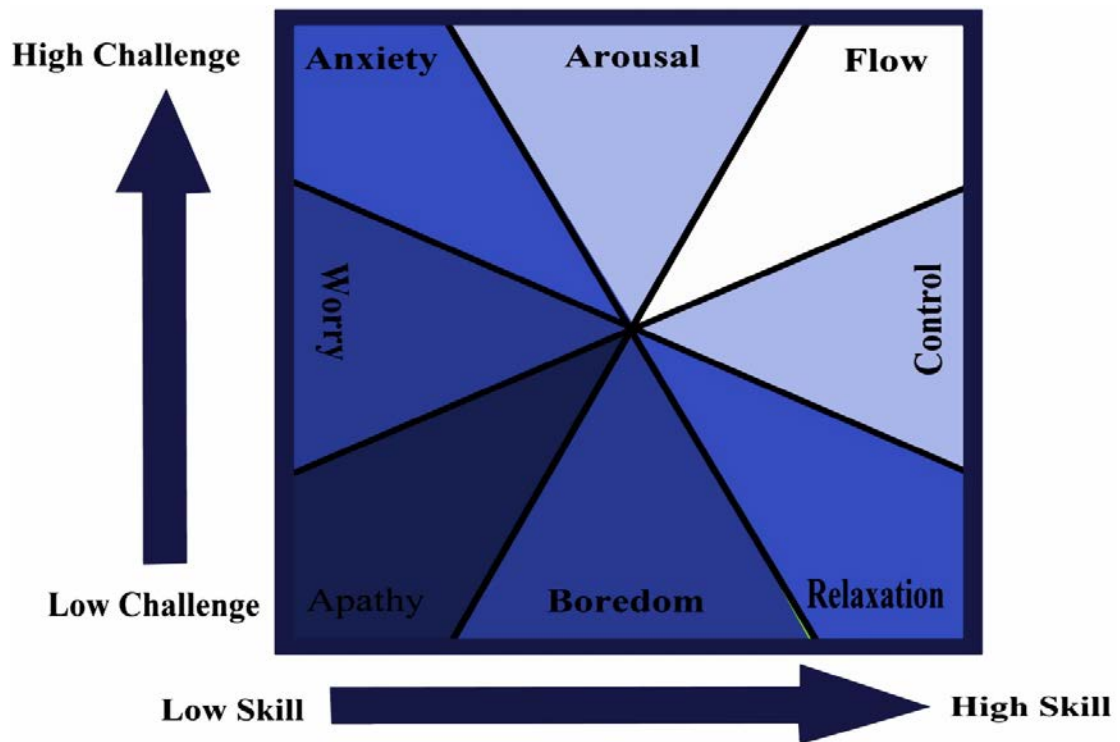


Figure 2.3. Ability vs. Challenge.

But pertinent to the present conversation is Csikszentmihalyi's (1996) description of the experience of the individual during the Flow state. Csikszentmihalyi used his confluence model to illustrate the effect experienced by the creator when each of the three factors coalesces at a point in time. Figure 2.3 illustrates how a state of great creative expression is achieved when the challenge of a task is commensurate with the skill level of the creator. According to Csikszentmihalyi's conception of the Flow state, the most promising context for the expression of creative thought is a context where an appropriate level of rigor serves as the motivation for the individual to apply a high level of attention to the problem at hand. Csikszentmihalyi characterizes this level of attention in almost metaphysical terms by describing the Flow state as accompanied by a loss of ego, fear and time. Csikszentmihalyi (1996) contends that the Flow state produces for the creator a distorted sense of time. Grammy Award winning musician Wynton Marsalis attempts to illustrate the effect that emerges when various personal and contextual factors seem to perfectly interrelate in the following statement:

Swing time is a collective action. Everyone in jazz is trying to create a more flexible alternative to actual time. Bass and drums become the foundation of swing time, and the rest of the band interprets the swing from their viewpoint. Some rush, some slow down, some play right on the beat. But all shift back and forth, trying to find and maintain some common ground. You're in time when your actions *flow* inside that ultimate constant—swing. (Marsalis, 2008, p. 17)

Conscious versus Unconscious Effort

The previous quote from Wynton Marsalis foreshadows to a certain extent the final consideration contained within this review. Marsalis is not alone in his illustration of creativity that extends the nature of creativity beyond that which might be consciously

directed. As will be discussed later in this section artists and scientist alike describe creative in terms that suggest an unconscious if not metaphysical influence. As a result, it is important for the present research to review the tension that exists between conceptions of the conscious and unconscious mind with respect to their role in creative production.

One reason why creativity might not be completely understood is that creativity may not be completely *understandable*. Language exists within the literature that foreshadowed the likelihood that I would receive accounts of creativity from the participants of the study that include language that hints at an unconscious or metaphysical influence. Researchers have attempted to explain the unconscious mind's role in the production of a creative idea. At one extreme might exist a conception of creative thinking as a logical progression of ordinary thought processes and the purposeful retrieval of information from memory until an appropriate solution is achieved. At the other extremity would exist the conception that ideas have a life of their own and that ideas flow *through* an individual as opposed to being generated by the individual (Dow, 1959). Somewhere in between the two poles would be a conception that a major task of the human mind is to constantly take liberties with reality and to signal such possibilities to the conscious mind (Csikszentmihalyi et al., 1994). This section will attempt to describe the stages of creative insight as an inter-play between the conscious and unconscious mind. But, it may be helpful to first attempt to explain unconscious effort by providing a few examples of such effort found within the literature.

Examples of Unconscious Effort

As extraordinary as the later pole (discussed above) may seem, the language that creators use to describe the moment of illumination often positions themselves as but conduit for what is *seeking to emerge* (Senge, 2004). The literature on creativity is inundated with tales of inspiration by individuals who claim sudden insight and illumination to have appeared from out of nowhere. For example, author Ann Lamott went as far as to describe herself as “the designated typist” (Lamott, 1995, p. 56) and advises aspiring writers to get out of the way and allow what wants to be written to be written. Mathematician Jacques Hadamard gave a similar account. He recalled

on being very abruptly awakened by external noise, a solution long searched for appeared to me at once without the slightest instant of reflection on my part—the fact was remarkable enough to have struck me as unforgettable—and in quite a different direction from any of those which I had previously tried to follow. (Ghiselin, 1952, p. 15)

Another example would be Amadeus Mozart’s account of the creative process. In a letter Mozart recounted

When I am, as it were, completely by myself, entirely alone, and of good cheer—say travelling in a carriage, or walking after a good meal, or doing the night when I cannot sleep; it is on such occasions that my ideas flow best and most abundantly. Whence and how they come, I know not; nor can I force them. (Ghiselin, 1952, p. 44)

Education researchers Brad Johnson and Carol Mullen explicitly illustrated this as they described how “Vague or previously hidden ideas germinate and take shape; mental

vistas appear, allowing a *sudden* view of the entire landscape for an unwritten article or book” (Johnson & Mullen, 2007, p. 50).

Further, Einstein is reported to have come up with solutions to problems while playing the violin (Isaacson, 2008). Kekule’s discovery of the structure of benzene follows a similar pattern. He recalls that the discovery of the structure of many carbon-based compounds to have occurred to him as he was in a “dream-like” state when a metaphor of a snake seizing upon its own tail provided the basis for his conception of that the carbon atoms of benzene formed a closed ring (Ghiselin, 1952). These accounts are also representative of the creator who claims to intuitively know what the answer to a problem is before actually engaging in the work (model, test, evaluate) necessary to prove his/her solution as viable (Simonton, 1987). Even though such accounts seem to occur beyond conscious deliberation they do not have to be considered of metaphysical influence; they may be the result of what Henri Poincare describes as unconscious processing where an individual may be thinking about a problem unconsciously while he or she is engaged in some other activity (Ghiselin, 1952). Such voices suggest that access to the unconscious realm is necessary if we are to account for all ideas that prove to be new and meaningful.

Preparation, Incubation, Illumination, & Verification

Henri Poincare may have most notably addressed the interrelationship between conscious and unconscious processing as he concluded that a meaningful idea must be preceded by conscious thought (the acceptance of the content of a particular domain)

and be followed by conscious thought (the evaluation of the idea), with an incubation period transpiring often unconsciously in between (Ghiselin, 1952).

The preparation stage is characterized by the accumulation of domain specific knowledge with which the would-be creator has to work. Such knowledge is stored within mental file cabinets to be retrieved when required. Variance in the ability to conceive of new ideas may be a function of extent and complexity of our mental filing system but may also be a function of the extent to which our *files cabinets* are secure. Certain researchers have theorized that when we enter a relaxed or even dream-like state, those filing system become less secure, allowing for the combination of ideas and the production of analogies that would have never been consciously explored. As mentioned earlier in the chapter Drucker indicates that the converse of this phenomenon may also be true. In that high pressure situations may render our “file cabinets” more rigid and less accessible.

Another factor during the preparation phase that would affect the quality of an idea would be the depth to which one is willing and able to descend into the file cabinets. Such a view holds that a shallow investigation of a problem would yield a more limited set of possible avenues for a potential solution. Schank (1988) identifies such a possibility as a tension that exists with respect to the retrieval of either abstract or specific exemplars in service of creative production. The more abstract or deep the exemplar the more avenues exist for a creative contribution, but as will be discussed in Chapter III, the more resistance from the field the idea is likely to encounter. While specific exemplars would present the mind with a more limited number/variety of ideas each of the ideas

might experience less scrutiny from the field than would be the case if a deeper more abstract idea were generated.

Figure 2.4 represents a conception of the levels of scrutiny that the creative idea might encounter in route to acceptance. The figure illustrates a conception of the gateways that novel ideas might encounter beginning with “all possible combinations of ideas” and ending with the ideas that survive the scrutiny of the field. The figure implies that there might exist any number of ideas with which our mind (unconsciously) has access that are never acknowledged by the individual. The figure also illustrates that even fewer of those ideas survive the conscious scrutiny of the individual creator and go on to be proposed to the field for evaluation.

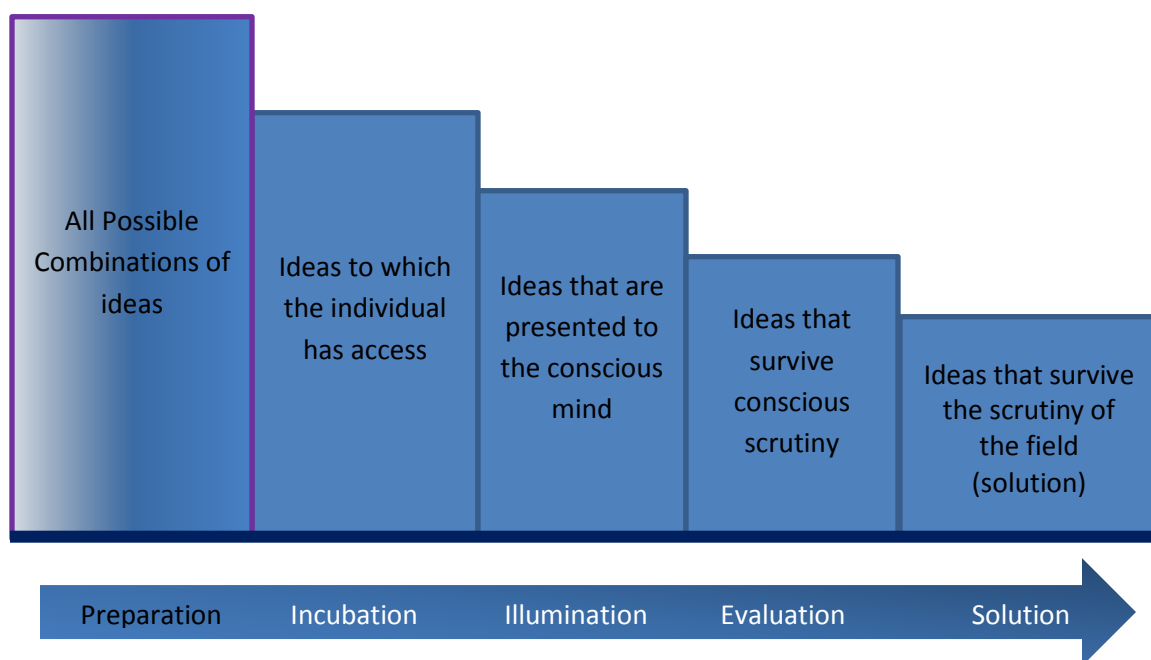


Figure 2.4. Levels of Scrutiny.

In light of the present discussion, the illumination of creative ideas that seem to appear out of the blue may be reasonably explainable. Creative production may depend on a person's willingness and ability (consciously or unconsciously) to look in non-obvious file cabinets. Poincare and others have theorized that relaxed states of consciousness allow the locks on our mental file cabinets to be loosened or removed (Ghiselin, 1952). The removal of the locks allow for increased potential of one arriving at an original solution as a result of being in state where he or she is free from conscious scrutiny; whereas consciously directed efforts would limit the search of file cabinets to only those which the individual deems to most likely possess the answer. Such relaxed states might increase the volume of ideas (and diversity of ideas) that are allowed to flow into the court room of conscious deliberation.

Sudden breakthroughs in the sciences or arts have often been experienced by those who have been greatly immersed in the analysis of the problem at hand. As a result, one may wonder if the creative personality trait of "openness" is really a result of a cognitively explainable habit of deeply abstracting phenomenon so that more avenues are available to both the conscious and unconscious mind. The Darwinian view of creativity espoused by Cognitive Psychologist Scott Simonton (1987) is one such view that holds illumination as rationally explainable. Creative ideas in his assessment emerge from a process of natural selection that is analogous to the natural selection of genetic traits espoused by Charles Darwin. It is conceivable that the billions of bits of information that have at one time or another been archived in the mind can be retrieved in a virtually infinite number of new combinations. The bits may be arranged in groups that represent

the fruit of past conscious efforts to organize the information at one time or another. As Feldman suggests, “On one hand there exists within the mind of the individual an effort to categorize and organize to put things in their place; on the other hand to stir things up and change and expand” (as cited in Csikszentmihalyi et al., 1994, p. 126). Such stirring of bits of information would allow for any number of new combinations. Poincare asserts that it is the conscious consideration of a problem; the conscious attempts to close a gap in expectation or understanding that set thoughts into motion (Ghiselin, 1952). He explains that we often believe that we have made no progress during the time that we consciously work to combine thoughts in a thousand different ways in search of a solution, but that “after this shaking up of thoughts imposed by our will, these thoughts do not return to their primitive rest. They freely continue to dance” (Ghiselin, 1952, p. 41). The mystery of illumination is how and under what circumstances particular “dancers” are conveyed from the ballroom of ideas and into the courtroom of conscious evaluation.

Experiments by Skinner and Epstein suggest that as long as the individual person (pigeon or chimp) has knowledge of the “behavioral components” that are necessary for the solution, then given time and the right stimulus a creative solution can emerge (Epstein, 1991). Skinner and Epstein’s contention that the securing of such behavioral components is supportive of the notion that holds domain specific skills as necessary for a creative solution. This would constitute the *preparation stage* of Poincare’s creative process. Once prepared the would-be creator may consciously search for a solution (Ghiselin, 1952). But even when the individual ceases conscious attempts to solve the

problem, the unconscious mind does not cease its search during what Poincare describes as the incubation phase (Ghiselin, 1952).

Poincare's conception of incubation is like an open case file or is like a vacuum that will not rest until it is filled (Ghiselin, 1952). Csikszentmihalyi et al. (1994) and Funk (2000) illustrate how incubation can proceed during *dream states*, where the mind seems to merge disparate ideas and concepts that would be immediately discarded in a completely conscious state. It is during this stage that Simonton might conclude that *natural selection* takes place; where random ideas collide and only the mergers that have the potential of meeting the requirements of the problem are presented to the conscious mind. This presentation to the conscious mind constitutes the illumination phase of Poincare's theory. Others have described this phase in the process as the "eureka moment" or "aha moment."

Since the illumination moment often happens when an individual is not actively engaged in the search for a solution, the moment of illumination is often perceived to be metaphysical in nature. This is the sort of insight that is often characterized by creators as solutions which they somehow know are correct before the idea is actually tested. Descriptions of eureka moments that are described in supernatural terms abound in the literature. Such descriptions can be traced back to Ancient Greek philosopher Plato. The Platonic view is one where the individual only serves as a conduit for what is *seeking to emerge*. Such a view implies that creative ideas are directed by a source outside of the individual. Those like Simonton (1987) who hold a Darwinian view might concede that the generation of creative ideas is not always consciously directed, but they would

contend that such a fact does not require that the ideas emerge from a source outside of the individual. The Darwinian view holds that all of the raw materials necessary for illumination (the Eureka moment) are already present within the mind even if the necessary combinations are not presently (consciously) known to the individual. The distinction between the two views is represented in Figure 2.5.

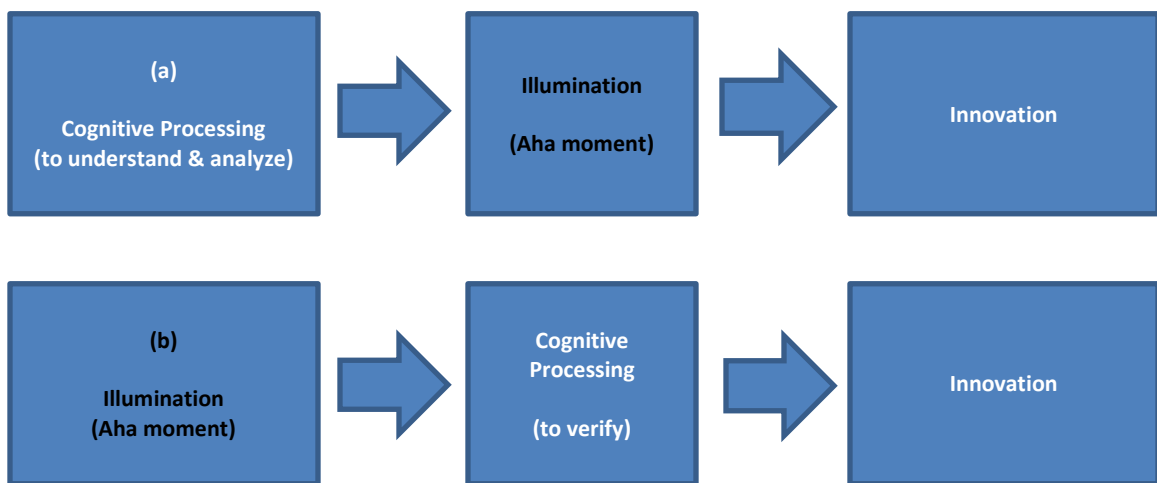


Figure 2.5. Source of Illumination.

Series (a) assumes that domain knowledge constitutes the raw material from which either directed thoughts, random thoughts or external stimuli merge to provide inspiration or the *aha moment*; while (b) assumes that it is at least possible for an “aha” moment to occur apart from any explainable source, thus relegating the conscious cognitive processes to engage after the “aha” moment as a tool to verify the idea.

Creativity in centuries past had been considered to be exclusively a prerogative of the gods (Boden, 1990; Edwards, 2000). As detailed earlier in this section, there also exists contemporary voices in science as well the arts and psychology that substantially

blur the lines between rationally explainable influences of the unconscious mind with influences that can only be characterized as metaphysical (Funk, 2000). Peter Senge (2004) for instance details a process of *sensing* information and then engages in a process of purposefully abandoning conscious effort for a time to allow opportunity for creative ideas to emerge. Senge defines learning organizations as “organizations where people continually expand their capacity to *create* the results they truly desire, where new expansive patterns of thinking are nurtured” (Senge, 1994, p. 3). He used the letter “U” as a symbol to describe a process of deconstruction. As one moves down the left side of the U (letting go) the person reaches a place of “presence” at the bottom of the U where conscious effort is nonexistent and where ideas emerge and begin to crystalize as one ascends up the right side of the U and returns to a place of consciousness deliberation.

Accounts of metaphysical explanations as depicted in (b) of Figure 2.5 were included in the review because of the prevalence of such accounts within the discourse of creativity and as a result may emerge as a consideration of the participants of the study. But as alluded to in this section there certainly exist conceptions of creativity that are not completely explainable but are also not necessarily beyond nature. It is possible to conceive of openness as a cognitive habit rather than supernaturally influenced. The creative individual in such a conception would have developed a capacity that would yield access to a greater variety of information, and a capacity (and willingness) to embark on a more complex search of available information. Also the disposition of the individual and the disposition of a particular context might provide sufficient motivation

for the individual to continue his/her search for a solution even when he/she is not consciously aware that such processing is taking place.

At the onset of the study I expected the teacher responses to the questions posed to remain primarily within the safe confines of rational thought where they are equipped with words such as evaluate, integrate, synthesize, and divergent thinking to describe what they are attempting to accomplish since this constitutes the realm where they can have a purposeful impact on the development of creative thought. However, I was also correct at the onset of the study that at least some of the participants would not remain within the safe confines of the cognitively explainable. This inclusion of unconscious and metaphysical conceptions of creativity in the literature as well as in the participants' accounts (as will be detailed in Chapter V) is indicative of the broad and diverse conceptions of creativity that exist.

Summary

It was the point of this review of the literature to provide a broad overview of the possible ways in which the idea of creativity can be conceived in order to structure a conversation between the varied concepts of creativity within the existing research and the perceptions of the teachers within the study. One of the motivations for conducting the study in this manner was that (as a result of my experience in education) I assume there to be very different conceptions of what teachers mean when they use the term creativity. I found the term creativity often used in mission statements and in the day to day conversations of teachers but found such conversations to be void of any discussion of what is meant by the term. It was as if everyone assumed there to be a common

understanding of creativity and thus no explanation required. If there indeed exists within public schools a common understanding of what creativity means, then public schools would be the only place where such understanding exists. The literature represents creativity as complex and characterized by tensions that are not easily accommodated. Nonetheless the review of the literature provided me with a sort of blueprint of many of the possible conceptions that might be expressed by the participants of the study.

The major limitation of the existing literature is that no one has asked teachers where they stand regarding these competing ideas. Although a wealth of information and ideas exist regarding creativity within existing literature, I did not find studies that attempted to provide a rich description of what public education teachers consider the development of creativity to mean. I think that I obtained a measure of success in opening the lines of communication between ideas expressed in the review of the literature and the ideas expressed by the teachers which will be detailed in Chapter V. The open ended questions that I posed to the participants afforded me with a deep understanding of where the participants stood regarding the various tensions expressed within this review of the literature.

Tensions emerged within the literature that engendered numerous questions with regard to what creativity means and how it might be developed. The answers to such questions would have tremendous ramifications regarding how one might go about developing creative capacity. It was my intention in the present chapter to adequately represent the complexity and ambiguity that exists regarding the concept of creativity. I

attempted to demonstrate the difficulty in arriving at a clear description of the concept by expressing creativity as often resulting from factors that are viewed in opposition to each other; thus creating a tension that could be viewed as the catalyst all creative leaps. Each of the tensions expressed in the chapter could be generalized as the tension between the desire for *stability* and the desire for *novelty*; between a *reverence* of existing knowledge and the desire to *challenge* such knowledge; and most fundamentally between an acceptance of “*what is*” to the uniquely human capacity of imagining “*what if*.”

I trust that the reader will find the review presented here comprehensive enough to account for the diversity of perspectives detailed by the participants in Chapter V. In the end, the questions raised within the project may be unanswerable. But such a possibility does not diminish the ramifications that ongoing contemplation and conversations regarding the development of creativity might have on the practice of teaching. Even if a general consensus regarding the meaning of creativity and how it can be developed may be forever out of reach, I contend that the development of creative thought is of such importance to our physical survival as well as influential to the quality of our survival that conversations regarding the meaning of creativity must continue to ensue and such discussions must include the voices of those individuals who will be called upon to develop it.

Of course teachers are not granted autonomy regarding what is to be taught. In fact a majority of the state legislators have consented toward a move that would move curricular judgment beyond the classroom, district and state level. Forty-Five states within the union have mandated a set of standards that they believe should be “common”

to all students if they are to be college and career ready. If creativity is as important to career readiness as industry suggests, then it is reasonable to assume that creativity would be identified as a part of the core that should be common to all students. Further if I am to draw from teachers the meaning that they attribute to creativity, then it would follow that the standards which they are directed to teach would constitute an indispensable tool to be used in drawing out such meaning. As a result the next chapter will add the second voice to our three-way conversation by exploring some ideas regarding where creativity fits in the Common Core State Standards.

CHAPTER III

CREATIVITY AND THE COMMON CORE

The purpose of the present chapter is to add the voice of the Common Core State Standards (CCSS) to the conversation. What the CCSS have to say about creativity is appropriately situated as the second voice in the three-way discussion which I have attempted to mediate during the course of the project. Since the CCSS are heralded as being influenced by the skills required for success in the 21st Century on one end and are certainly intended to influence what teachers perceive to be their duty in developing such skills at the other, the standards must be considered as an important link in the conversation. The present chapter would then be best described as providing an indication of the extent to which the CCSS standards help establish a link between the increasing call for creativity in the 21st century (as described by the voices in Chapters I and II) and the actual practice of the teacher in the classroom (as will be described by the participants' voices in Chapter V).

It is my intent to use the CCSS and supporting documents (primarily derived from the National Research Council) to speculate how the writers of the standards may have conceived of creativity's role in public schools. After a brief introduction of the standards, the next portion of the chapter will be structured by sections detailing each of three scenarios which I propose the writers of the CCSS may have conceived of the development of creativity. The chapter will include a description of a creative/design

process that integrates certain ways of thinking that are expressly mentioned in the CCSS with other more creative ways of thinking that are more difficult to find in the standards. The chapter will conclude by introducing working a model of creativity that was drawn from the analysis of the existing literature and the CCSS.

Introduction to the Standards

The Common Core State Standards were developed to provide curricular guidance for schools in the areas of Language Arts and Mathematics. The standards are promoted as detailing the skills necessary for students to master in order to be *college and career ready*. The reform is promoted as a real paradigm shift that encourages an emphasis on “ways of thinking” in addition to the accumulation of domain specific content. The standards are hailed as an attempt to influence classroom practice by narrowing the breadth of the curriculum; and as a result it seeks to grant teachers the time and support necessary to help students “think” about the most crucial concepts at a higher cognitive level than the cognitive levels required to simply memorize information or processes.

“A particular standard was included in the document only when the best available evidence indicated that its mastery was essential for college and career readiness in a twenty-first-century, globally competitive society” (CCSS, 2010a, p. 3). If the partnership for 21st Century Skills is correct in its assessment that creativity is an essential skill necessary for 21st careers and success in a global economy, then it should follow that if the Common Core State Standards are to fulfill its globally competitive mission then the standards should develop creativity (AMA, 2010; NCEE, 2007). Since

the CCSS represent the standards which teachers are expected to teach, I assume that the manner in which creativity is addressed in the standards will greatly impact teachers' view regarding the meaning that they attribute to creativity as well as their perception regarding their duty to develop the capacity to create. This section will compare the CCSS with the existing research in an attempt to hypothesize how; if at all the development of creativity is prescribed by the standards.

The word "create" appears a total of 35 times in the English/Language Arts (ELA) portion of the standards and 17 times in the Mathematics portion of the standards. However the frequency of the use of the word "create" might give the impression that creative thinking is a way of thinking that is expressly prescribed by the standards. This is misleading because the word "create" is not used in terms of the development of ideas or products that are new and meaningful, but in terms that are more synonymous with the word "make" or the word "develop." For instance in the K-5 ELA standards students are expected to "introduce the topic or text they are writing about, state an opinion, and *create* an organizational structure that lists reasons." Or in the math standards students are expected to "*Create* equations that describe numbers or relationships" (CCSS, 2010b, p. 62).

The word "creativity" appears only once in the CCSS. But it is placed in a most prominent position. The introduction to the ELA CCSS concludes with the following statement: "In short, students who meet the standards develop the skills in reading, writing, speaking, and listening that are the foundation for any *creative* and purposeful expression in language." The statement seems to conclude with the idea that the

standards are intended to not only develop the skill of communicating and comprehending language but are also concerned with the students ability to add to the domain of literature by creating new and meaningful work (CCSS, 2010a, p. 2).

The above statement is supported by one of the *Key Considerations* that were noted by the writers of the ELA standards. The standards call for the “*creation* of a high volume and extensive range of print and non-print texts” (CCSS, 2010a, p. 3). The word “creation” which appears twice in the standards is used in this instance as the production of something new and meaningful. The writers of the standards go on to state that the need to “produce” media is to be embedded throughout the standards (CCSS, 2010a, p. 4). Given this intention for the ELA standards, one must assume that standards exist within the Common Core that at least are intended to set the stage for the production of new and meaningful media. Nonetheless the standards do not explicitly state how students will be able to create nor do they attempt to connect the dots between the accumulation of facts, analysis, evaluation and that of creation. In other words, even though the CCSS expect students to create, they really do not make any mention of creativity after the ELA introduction and the Key Considerations that appear within the first few pages of the document.

In effect a paradox emerges in that while the traditional skills of analysis and evaluation are explicitly stated within the standards and creative ways thinking are not; nonetheless the expectation that students will produce original work is stated as a “key consideration” in the ELA CCSS. As a result, it may be important at this point to draw a distinction between *creative thinking* and the *creative process*. In this respect creative

ways of thinking can be considered as but one component in the process of creating. Creative thinking would constitute one set of thinking skills that are dependent upon the existence of other ways of thinking if a creative product is to be produced. The analytical ways of thinking that are generally valued and assessed in schools along with the creative ways of thinking that are generally not assessed are both necessary but neither group in and of themselves sufficient for creative production. Such a perspective will allow the possibility that the CCSS can assist students in the overall creative process without ever having to address or develop creative thinking. It is with this lens that we may grant the CCSS greatest benefit of the doubt regarding its intention to develop creativity. The most fundamental question in this sense would be: "What are the processes that allow one to conceive of ideas (imagine possibilities to solve a problem or exploit an opportunity) and transition those ideas from one's heads and into the real world?" If we conceive of the entire process of creation, spanning from the identification of a problem to the explanation and defense of a solution then several domain specific skills and varied ways of thinking would need to be engaged in addition to creative ways of thinking. Creative thinking then is but one way of thinking that is necessary in the process of bringing a new and meaningful idea into the world. Even if the CCSS is successful in developing the content knowledge and analytical ways of thinking necessary for creative production, until such time that creative ways of thinking are engaged the individual would have failed to engage the processing that would allow him or her to entertain alternative possibilities and diverge from a routine path. Such work could not be considered original, but would constitute a product that emerged from existing formulas which

would be in harmony with solutions and paradigms that have already been firmly established.

Consideration of the numerous theories on creativity that were addressed in the previous chapter has led me to conceive of three scenarios in which the writers of CCSS may have considered creativity in their conception of the standards. The first scenario could be characterized by the hope that creative “ways of thinking” can be added on at some future point to the domain specific knowledge and well developed analytical “ways of thinking” that the CCSS are to develop. The second scenario would be indicative of a belief that creativity has more to do with personality traits which may be the possession of a few individuals who will (as a result of innate dispositions and abilities) naturally employ creative ways of thinking. It is assumed here that creative capacity is more a function of individual personality traits rather than a distinct “way of thinking” that can be developed at large. The CCSS would have the role in this case of providing sufficient “raw material” from which an innately creative person can work. The first two scenarios tend to place the development of creative ways thinking outside of the scope of the CCSS. The third scenario however does not. This third scenario is based on an assumption that the CCSS afford teachers the opportunity to develop creative ways of thinking as they work to develop the other ways of thinking that are clearly outlined within the standards. One of the most important considerations regarding the implementation of Common Core was that while “learning” the concepts contained within a particular domain is important, how students learn what they learn is also stressed. It is proposed in this scenario that the habits (ways of thinking) that students

develop as they learn, would constitute an indispensable factor in how they handle new problems and whether or not they will attain the capacity to generate new and meaningful ideas of their own as adults (Willoughby, 1968). This third scenario is based on the assumption that creative ways of thinking are implied within the standards and that teachers are provided the pedagogical latitude to emphasize creative ways of thinking.

Scenario One

The first scenario would establish a sort of assembly line process whereby creative thinking can be added at some point after a k-12 education or that creative thinking can be added on by courses that are generally characterized as “elective” or “enhancement,” or somehow outside of the set of skills that should be “common” to all. One could assume from this scenario that the CCSS places very little value on creativity. However it is also possible to conceive of the standards as establishing creativity as cognitive processing of the highest level; a level of processing that is dependent on the establishment of domain specific skills and analytical ways of thinking that are prescribed by the standards. This conception of the standards would constitute the view that knowledge and understanding are necessary for the higher cognitive processes that are necessary for creative production. The ELA CCSS insist as one of its *Key Considerations* that in order to be college and career ready students must be able to

gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and *create* a high volume and extensive range of print and non-print texts in media forms old and new. (CCSS, 2010a, p. 4)

The list of cognitive skills here, with “create” situated at the end, is reminiscent of Krathwohl and Anderson’s (2010) revision of Bloom’s Taxonomy. It might be construed here that the ability to create would constitute the culmination or evidence that the other cognitive processes have been mastered.

The CCSS recognize the importance of the cognitive capacities which Bloom situated at the foundation of his taxonomy. The need to understand and assimilate the knowledge contained within a domain is exemplified by what the CCSS considers to be one of the eight capacities of a literate individual.” The standards are to help “students establish a *base of knowledge* across a wide range of subject matter by engaging with works of quality and substance” (CCSS, 2010a, p. 4). The standards go on to point out that such students are to “become proficient in new areas through research and study,” and are expected to “read purposefully and listen attentively to gain both *general knowledge* and *discipline-specific expertise*, which they are to “refine and share their knowledge through writing and speaking” (CCSS, 2010a, p. 7).

Researchers Amabile and Hennessey (1987) have held there to be a correlation between the level of domain specific knowledge and creative output. They contend that:

Domain relevant skills which include factual knowledge, technical skills, and special talents, can be seen as the set of cognitive pathways one can take to solve a given problem or do a given task. The larger the set (of domain specific skills), the more numerous the alternatives available and the greater the possibility of producing something new, of developing a new combination of ideas. (pp. 9, 10)

Gathering information may have very little to do with creative ways of thinking in particular but views like those of Amabile and Hennessey consider domain specific

knowledge as essential to the overall creative process. It would be difficult in such estimation for one to conceive of a person as “thinking outside of the box” who has very limited knowledge of what the existing box looks like.

Mathematical Practices	ELA Capacities of the literate individual:
<ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning 	<ol style="list-style-type: none"> 1. They demonstrate independence. 2. They build strong content knowledge. 3. They respond to varying demands of audience, task, purpose, and discipline. 4. They comprehend as well as critique. 5. They value evidence. 6. They use technology and digital media strategically and capably. 7. They come to understand other perspectives and cultures.

Figure 3.1. CCSS Math Practices and Literacy Capacities.

Even though the assimilation of content knowledge is a priority within the standards, it is clear that the writers of the standards regarded the assimilation of knowledge as insufficient in preparing a student to be college and career ready in the 21st Century. Whereas traditional standards may have held the assimilation of facts as the end, the CCSS tend to view facts as the beginning of learning, with the “thinking” about the facts as the end. The standards push past the accumulation of knowledge in an effort to identify practices and ways of thinking (see Figure 3.1) that are to be developed as students assimilate knowledge. The math standards are established not only to help

students gain content knowledge but are also established to help students practice thinking mathematically. The English Language Arts standards explicitly identify ways of thinking that will produce a successfully literate person. Both the ELA capacities of a literate person and the mathematics practices of the CCSS are represented in Figure 3.1.

As Amabile and Hennessey (1987) suggest in the above quote, neither creative ways of thinking nor analytical ways of thinking are sufficient to produce a creative product/idea, but aspects of both of these ways of thinking might be indispensable to the production of a creative product/idea. This first scenario assumes that the writers of the standards considered that developing in their students the capacity to think about *the facts* at the highest cognitive levels would manifest itself in an ability to question, criticize, and deconstruct existing paradigms that would set the stage for at least the possibility that students will at some point conceive of a new idea or a new direction within a given domain.

As the standards attempt to move students toward higher cognitive processes, the skills of analysis and evaluation repeatedly emerge within the standards. The ELA standards utilizes the word “analyze” a total of 94 times with the word evaluate is utilized 40 times. The math standards utilized the verb analyze a total of 34 times and the verb evaluate 19 times. As mentioned, the writers of the standards could have viewed their role in developing creative individuals as equipping them with the analytical and evaluative ways of thinking that would serve as the scaffolding by which creative ideas can be given form, clarity and meaning. Such a position considers truly creative production as impossible without a deep understanding, analysis and evaluation of the

content at hand; and would tend to hold creativity as a logical out-growth of general intelligence rather than a separate construct.

Analysis, for instance can be conceived as a precursor to creativity if the intent is to use the discovery of the essence of a work as providing a foundation by which the student can imagine how the work can be *reconstructed* in a different way. One example within the standards is the expectation that students are to “*Analyze* how an author’s choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise” (CCSS, 2010a, p. 35). This example represents the idea that a thorough understanding and analysis of past creative work may be necessary to set stage for future creative production.

This position is consistent with the idea that exemplars are necessary for creative production (Schank, 1988). The process of analysis may allow exemplars to be discovered that lay beneath the immediately observable phenomenon. The identification of such fundamental exemplars at least create the opportunity for an individual to assume a path back to the “surface” that would be different from the path taken to descend. Hence the aim of the standards move beyond the objective of appreciation of the author’s skill in using the conventions of literature to create and suggests the necessity of engaging in a process of assimilating any number of exemplars from which the student would be able to draw from within his/her own writing. Analysis in Language Arts can be used to understand content but also can be used as examples of how conventions can be used to communicate even the most trite content in a new and meaningful way. Such a

view underscores the necessity to know what others have done in order to question, criticize, modify, and/or elaborate upon existing work.

The idea that content knowledge and certain higher level mental processing are necessary before creative thinking can occur could constitute a calculation by the crafters of the standards that if K-12 teachers help students achieve a deep understanding of content then at least the teachers of the standards have provided a foundation on which creative thinking can be imposed even if creative thinking is not expressly stated as a goal of the CCSS. This notion could conceivably represent a calculation on the part of the writers of the standards that teachers would have their hands full with teaching relatively clearly defined standards rather than worrying about developing a concept that is not well understood or easily measured.

The problem with the idea that creative thinking is something that can be added on later or that it should be completely relegated to the subjects that are considered “elective” as this first scenario assumes, is that a complete focus on the assimilation of domain specific skills and analytical ways of thinking could just as easily move an individual further away from the ability to create. It has been argued that immersion in domain specific skills can also be a limiting factor in creative production. The standards divorced from any “creative ways of thinking” can be seen as pouring the concrete that can provide the foundation (core) for creative thinking but could at the same time provide the material that would immobilize the person and prevent him or her from thinking in any other way. In such cases we “download mental models and see (only) what we are prepared to see” (Senge, 2004, p. 88). Since instruction in school often relies on the

download of domain knowledge in pursuit of solutions to “problems” that have ready-made routes toward a single solution, it produces an atmosphere that is averse to taking risks and could be seen as training students to avoid creative thinking altogether.

Scenario Two

The second scenario is similar to the first in that the development of creative thinking is seen here as also being relegated at best to the periphery of the ways of thinking called for by the CCSS. This second scenario is indicative of an assumption that creative thinking is a natural capacity of a few. Such a view is based on the idea that an individual is either creative or is not. This scenario is aligned with the *personality* view of creativity, where creative ways of thinking are more a function of nature rather than nurture. It is a view where (as with the first scenario) the only impact that instruction based on the CCSS can have on creative thinking is to provide students with plenty of information on which to think along with the development of “ways of thinking” that will allow for the effective analysis of problems and the evaluation of “novel” ideas once they are conceived. The people who possess the personality traits thought to be attributed to the creative person will take the raw material and integrate it in new and meaningful ways to produce new and meaningful ideas; and the individuals who do not possess such personality traits will not. It would be an acknowledgement that a creative personality is necessary but not sufficient for creative ideas to emerge. The domain specific knowledge and analytical ways of thinking emphasized in the CCSS would be necessary if the person with such a creative disposition is going to possess the raw material with which to create.

Viewing the standards in this manner could be construed as assuming that only a few people will become creators—those who may already be predisposed to do so. This view is counter to what the business and industry is calling for. Industry is increasingly asserting that future prosperity and growth in the 21st Century cannot be secured by the talents and contributions of a few individuals who are “born Einsteins.” This view of human potential would be indicative of an old Industrial Age model where prosperity and progress is dependent upon the emergence of a few highly intelligent and creative individuals and the unthinking labor of the rest. As the AMA (2010) and the Partnership for 21st Century Skills (NCEE, 2007) indicate, the challenges of the 21st century require masses of people who have the ability to innovate rather than reliance on a handful of eminently creative individuals. Industry is in need of increasing numbers of individuals who will not necessarily move the entire domain but would possess the ability to conceive of solutions to any number of *unforeseen* problems within a domain.

One would think that since the challenges of life in the 21st Century are so complex and daunting that any set of meaningful set of standards would compel educators to find a way to access human potential on a *mass* scale (Robinson, 2001). If as I have contended, education's goal is to help people develop the habits of mind that will increase the likelihood of physical survival and the habits of mind that will make life worth surviving then it appears that our society has reached the point where creative thinking has to be developed at scale in the current age.

This second scenario is based upon the assumption that the writers of the Common Core considered their role in the creative process as providing all students with

domain specific skills and analytical ways of thinking. And that they assume that innovation will occur when those students who are creative by nature add the domain knowledge and analytical skills explicitly stated in the standards to those creative ways of thinking that they by nature possess. One must consider, however that if the writers of the standards understand creativity as an imperative skill that is needed for the masses in a 21st century economy, then it would seem that the writers of the CCSS would not have left the ability to create only to those who were predisposed to create anyway; nor would it seem that they would relegate such a crucial capacity to courses by which students can “elect” to take or not.

Scenario Three

This brings us to the third scenario. There is little dispute that the CCSS seek to develop the traditionally valued cognitive skills that are represented in the center circle of Figure 3.2. So to the extent that analytical and evaluative skills are necessary for the production of creativity, the CCSS would certainly perform this function. But this third scenario is characterized by the idea that creative ways of thinking are indeed imbedded within the standards if one knows where to look and if one possesses the pedagogical skill to exploit the opportunity. As I have detailed, the CCSS are concerned with the ways in which we think about information and that such higher order thought processes are often considered to be necessary for creative production. However creative production is not produced by merely thinking about the facts but is produced by thinking about the facts in particular ways.

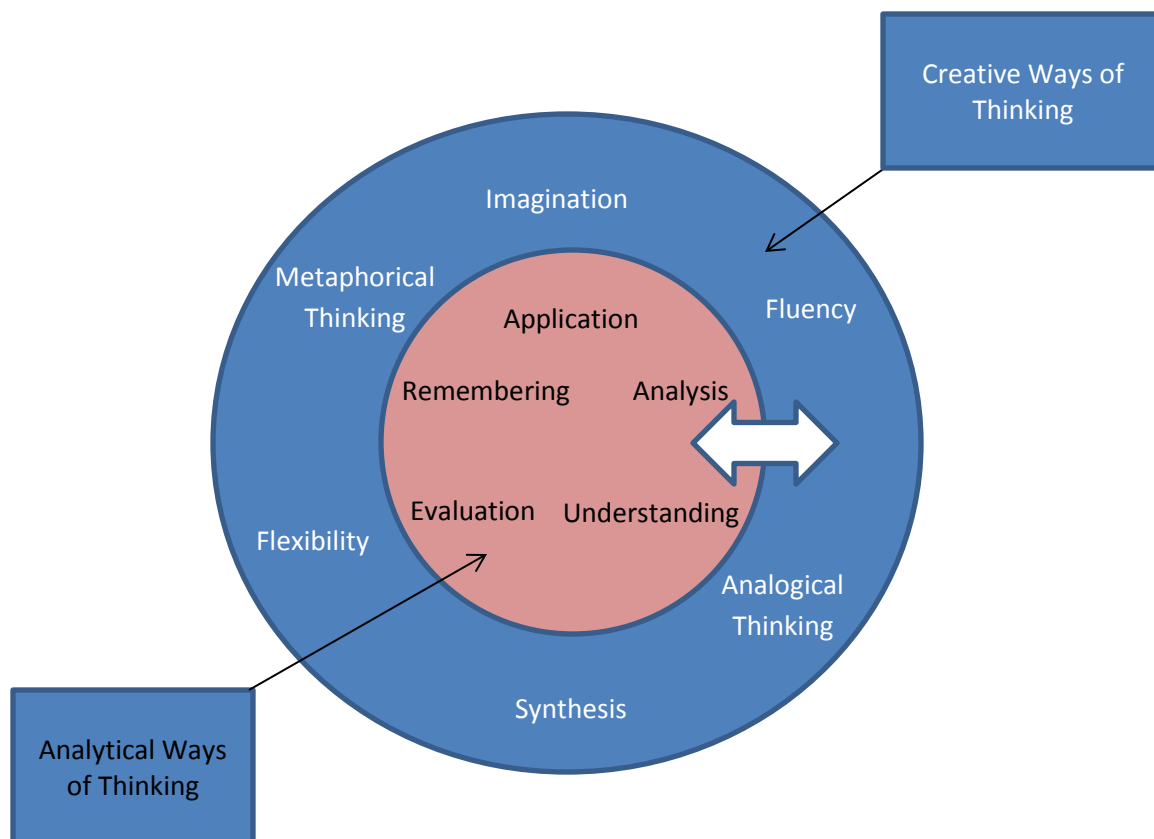


Figure 3.2. Creative vs. Analytical Ways of Thinking.

This third scenario is based on the existence of creative ways of thinking which can be developed alongside of analytical ways of thinking. As depicted by the double-sided arrow in Figure 3.2, scenario three suggests that an interdependent relationship existing between creative ways of thinking and analytical ways of thinking if a creative idea is to emerge.

The development of creativity in this scenario may hinge on the teachers' ability to exploit the opportunities to develop creative ways of thinking. The writers detailed the standards and left it up to the teacher to determine the method of achieving the standard. The standards state that:

By emphasizing required achievements, the standards leave room for teachers, curriculum developers, and states to determine how those goals should be reached and what additional topics should be addressed. Teachers are thus free to provide students with whatever tools and knowledge their professional judgment and experience identify as most helpful for meeting the goals set out in the Standards. (CCSS, 2010a, p. 4)

The remainder of this section will detail some of the instances where certain CCSS can be conceived as developing creative ways of thinking, particularly when placed in the hands of a teacher who is disposed to take advantage of the opportunity. Even though creative ways of thinking were not stated as an intent of the writers of standards, it appears that several of the standards within the Common Core support the development of the sort of special cognitive skills that tend to lead to the production of creative “ways of thinking.”

The skill of *problem solving* is a skill that is often regarded as requiring creative ways of thinking. Professor of mathematics at the University of California San Diego, Guershon Harel (2008) asserts that students have an intellectual need to solve problems and are motivated to solve puzzles apart from any extrinsic motivation. The extent to which creative thinking is called for depends on the type of problems and the manner in which they are posed. Different types of problems require different “ways of thinking.” Solutions to familiar problems are primarily a matter of remembering the manner in which the problem was solved in the past and applying the formula to the present. Unfamiliar problems however require a different set of skills. If the problems encountered by students are by their nature heuristic and presented to students in a manner where they are called upon to develop a formula or process for solving the

problem, then the generative type process that characterize creative thinking are required. Educational Psychologist, Richard Mayer found that students who were given highly formulaic problems increased their ability to solve formulaic problems but those skills were not transferable to problems that were heuristic in nature (Mayer et al., 1975).

The Math CCSS most notably approach the idea of creativity with its emphasis of modeling with mathematics. The writers of the standards assert that “real-world situations are not organized and labeled.” In other words, mathematical thinking entails constructing avenues for exploration that may not be given. The standards state that the formulation of “tractable models, representing such models, and analyzing them is appropriately a *creative* process.” If students are required to model their own avenue toward a solution rather than being provided an avenue or formula, then the special cognitive strategies of imagination, flexibility in thinking, and fluency of ideas have to become engaged. In this way creative thinking may be implied in such heuristic problem solving. Instruction of this type would be considered a type of Mini-C creativity that leads to a better understanding of mathematics. This type of instruction would also tend to develop the Small-C type creativity that would allow students the ability to solve problems that might arise in their day to day work and activities. Such development of creativity at the Mini and Small-C creativity levels may eventually lead to the capacity to employ creative thinking that can result in new products or in the production of ideas that can influence an entire domain or culture which is characteristic of the Pro and Big-C levels of creative production.

It is therefore possible that the manner in which students learn to solve problems may constitute the difference between those students who develop the capacity to create as adults and those students who may be equally intelligent but fail to develop the capacity to generate new and meaningful ideas later in life. In other words, one is learning to be creative by “creatively learning.” Creativity can be developed by the way in which the teacher chooses to present problems. If students learn by habitually asking questions, wondering, considering, reflecting, criticizing and imagining alternate possibilities as they work to solve open ended problems then these habits may affect their approach to work later in life.

The skill of *problem finding* is another special skill. As noted earlier in Chapter II, Patricia Arlin (1975) concluded that problem finding to be indicative of the culminating stage of cognitive development for which students between the ages of 14 and 16 begin to be ready. The National Research Council (2001) concluded that “although in school students are often presented with clearly specified problems to solve, outside of school they encounter situations where part of the difficulty is to figure out exactly what the problem is” (p. 124). Even though the National Research Council was influential in the writing of the standards it is unclear where *problem finding* was to be developed within the standards.

The ability to vary one’s *point of view* is a theme that is frequently expressed within the literature as a way of creative thinking (Lewis, 2009). Flexibility in thinking is increased and functional fixedness is diminished when one is able to vary their point of view. The CCSS expect students to achieve this ability. The ELA CCSS expect students

to actively seek to understand other perspectives and cultures through reading and listening. The standards expect students to be able to communicate effectively with people of varied backgrounds and “evaluate other points of view critically and constructively” (CCSS, 2010a, p. 7). Similarly, the Math CCSS expects students, as they work to discern patterns that they will be able to “step back for an overview and shift perspective.” A student who has learned to vary point of view is more likely to be flexible in his/her thinking and thereby make connections that are not obvious and arrive at solutions that are original.

Another area within the CCSS where creative thinking may be implied is in the formulation of *analogies and metaphors* (Hummel & Holyoak, 2002; Pink, 2005). One way to consider the process of solving problems where a clear “standard” path toward a solution is not known is to retrieve exemplars that are similar or *analogous*. The formulation of analogies and metaphors are present within the standards and are thought by much of the research to be essential to creative thinking, in that the first step in making meaning is to re-cognize (Schank, 1988). When confronted with a problem where an immediate solution does not exist within the memory, one begins the process closing the gap with an exemplar that would be similar to the phenomenon at hand. This usually entails the necessity to deconstruct the phenomenon to a more basic level. That is to say that one must deconstruct an unfamiliar situation to a point where the resulting thought can be placed in a category that has already been cognized, thought about or established (Schank, 1988). “The crucial issue for the productive or insightful thinker was to be able to use past experiences on a general level, while still being able to deal

with each new problem situation on its own terms” (Weisberg, as cited in Sternberg, 1997, p. 228). The intent here is not only to identify what is there, but to establish a new starting point beneath the obvious and observable from where an individual can reconstruct what *could be* (Sternberg, 1997). Deconstruction is based on the notion that if a formula does not exist in memory then a strategy of reducing the problem or phenomenon experienced to a more basic level can set the stage for the resulting exemplars to be applied to a new situation. Once the basic structure of a phenomenon has been determined then we have in essence identified a new starting point from which one can conceive of analogies and begin to move in a different direction. We now have the vantage point from which to consider a multiplicity of avenues which may not have been apparent to us prior to deconstruction.

Deconstruction seems almost indispensable in heuristic problem solving whereas formulaic problem solving indicates that the *creative* work of conceiving of a path toward a solution has already been accomplished (by someone else) and it is simply a matter of applying someone else’s “creative thinking.” The goal in Sternberg’s (1997) conception of deconstruction involves the application of the regular mental process of analysis, but analysis with the intent of reconstructing something new. At this point it is a matter of imagining numerous avenues of exploration and choosing the ones that hold the most promise. The Math CCSS expressly state that students should “plan a solution pathway rather than simply jumping into a solution attempt and that they should consider *analogous* problems, and try special cases and *simpler* forms of the original problem in order to gain insight into its solution” (CCSS, 2010b, p. 6).

The CCSS math practice of Reasoning Abstractly and quantitatively constitutes a sort of deconstruction. The standards expect students to develop the ability “to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents” (CCSS, 2010b, p.6). Generally the objective in math instruction is to arrive at one predetermined answer utilizing one predetermined path; processing that would not engage creative thinking. However, reasoning abstractly may incorporate certain creative thinking skills pending upon how the problem is posed to the students. Creative thinking can be developed if students are expected to engage their imagination to abstract the problem at hand and use the resulting information to chart their own course toward a solution, as opposed to being guided through one specific algorithm toward a solution. Even though a clear path toward a solution may exist within the domain of mathematics, providing students with the established path robs them of the opportunity for both deep analytical and creative thinking. A teacher who is able to exploit the opportunities for creative thinking would in the process of teaching students an established formula allow students the opportunity to arrive at the formula themselves through a process of deep analysis combined with a process of imagining different avenues toward a solution as they model and evaluate those avenues throughout the process. The formula, of course would not be new to the field of mathematics but it would be new to the students, and thereby can be construed as creative within the microcosm of the classroom. This sort of pedagogy would be an example of Mini-C creativity, where creative thinking is called upon to teach students a concept through their own discovery. If students are allowed to abstract a real

problem, imagine possible avenues for a solution and to represent possibilities in symbols and forms that can be manipulated and evaluated then they may be more able to adopt similar ways of thinking in their adult/professional lives for problems that do not have an established solution. The recognition of Mini-C creativity as practice for the Pro-C or Big-C levels of creativity would place the development of creativity within the grasps of the math teacher attempting to implement CCSS.

In this respect, creativity can be implied in the learning process itself and the manner in which concepts are taught might affect the level of subsequent creative output (Prinz & Barsalou, 2002). The conception of engaging student imagination in the construction of knowledge (Mini-C) is thought to lead to a deeper understanding of subject matter. In this respect creative thinking can be viewed as a strategy in service of deep understanding during the school years so that later in life such deep understanding (along with the manner in which concepts were understood) will place “understanding” in service of creativity (Pro-C or Big-C).

This third scenario may represent the best attempt of the three proposed here to reconcile the CCSS emphasis on analytical and evaluative ways of thinking and its call for students to be able to “create” original work. It underscores the tension, and interrelationship between analytical ways of thinking and creative ways of thinking. It is this tension between creative ways of thinking and analytical ways of thinking which many conceive to be the process by which all creative ideas emerge. The following section will describe one conception of the creative/design process and how the standards set forth by the writers of the Common Core could play an integral role in the process.

Creativity, Common Core, and the Design Process

In this analysis I have attempted to present the most inclusive way to view the CCSS's impact on the creative process by making a distinction between the creative process and the skill of creative thinking. As stated at the onset of this section the most expansive manner in which to view the CCSS role in creative production is to answer the question of how the standards can have a positive impact on the entire creative process i.e. the process of helping students conceive of novel ideas and convey them from their heads and into the real world. A description of the design process is included in this chapter because the design process is an attempt to translate the over-all creative process into a series of steps. There exist numerous variations of the design process. I have expanded the design process in Figure 3.3 to include elements from the identification of a problem as espoused by Roger Schank (1988) to the marketing of a solution espoused by Teresa Amabile (1997). It is important to the present discussion of the CCSS because it offers an illustration of how the domain relevant knowledge, analytical and evaluative skills expressly sited in the standards are integral to the process of drawing out ideas and conveying them into the real world.

As represented Figure 3.3, I have labeled some of the steps in the process as *analytical ways of thinking* and others as *creative ways of thinking*. Even if the CCSS only seek to develop analytical ways of thinking as the first two scenarios suggest, then such a representation of the entire creative process would validate such thinking as indispensable to the expression of creativity. The third scenario of course suggests that the CCSS has included "creative ways of thinking" as an expectation even though they

are not expressly sited as such. In order to demonstrate the possible relevance of the CCSS to the over-all creative/design process, I have inserted certain anchor standards and ways of thinking in the illustration that are called for within the CCSS that are integral to the design process.

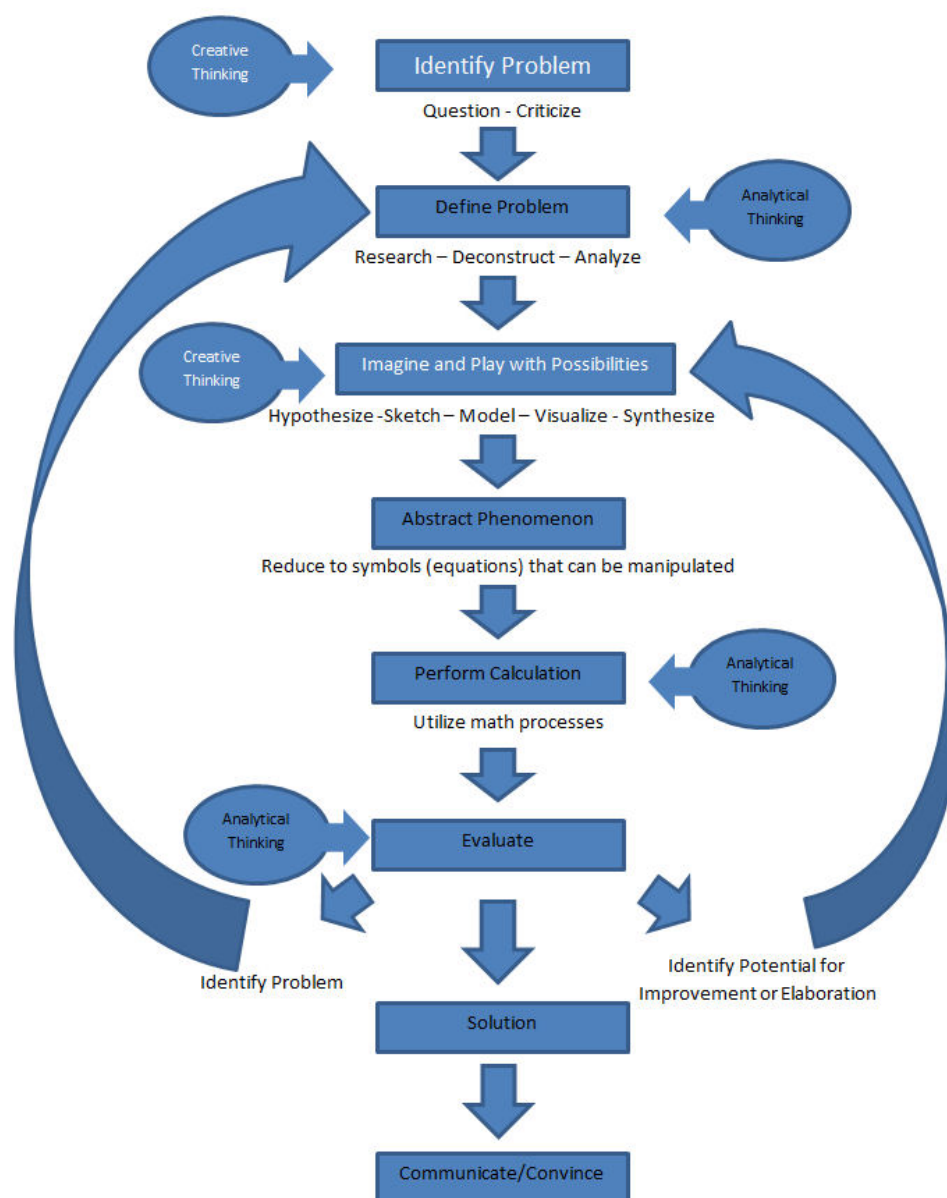


Figure 3.3. The Design Process.

In this way the CCSS can be seen as expanding the scope of what students are expected to be able to do and the ways in which students would need to think in order to be prepared for 21st Century careers. The performance of calculations in mathematics, for instance would neither constitute the beginning nor the end of instruction. Given a complete conceptualization of the creative process, playing with ideas and modeling them toward a solution would often transpire before students would engage in any calculations. After calculations have been performed a process of evaluation, elaboration and justification might ensue before a final solution is proposed. Such a process would relegate the performance of calculations toward the middle of the process rather than constituting the whole of student engagement in the process of mathematics. It is therefore important to point out that the CCSS seeks to extend the thinking in both directions as represented in Figure 3.3. Important ways of thinking are involved before and after the calculations are performed that are crucial to mathematical ways of thinking and integral to the overall process of creation.

The CCSS Math practices assert that “Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution” (CCSS, 2010b. p.6). This can be accomplished by employing analytical ways of thinking in order to deconstruct the problem. Once the problem has been deconstructed the student can be compelled to engage creative thinking (divergent generation, analogy and metaphor formation, visualization) to imagine how the deconstructed phenomenon can lead to novel (at least novel to the student) and viable pathways toward a solution.

Both the math standards and the ELA CCSS call for the consideration of multiple points of view and the consideration of analogous exemplars. These considerations can constitute points of divergence. The math standards express the process of considering analogous exemplars after a process of deconstruction, by stating their expectation that students are to consider analogous problems, and try special cases and *simpler forms* of the original problem in order to gain insight into its solution. The ELA CCSS repeatedly encourage the analysis of text in order to produce analogies and metaphors that could conceivably set the stage for original work. It is at this stage where one begins to play with and model possible solutions.

Once a problem has been analyzed and avenues toward a possible solution have been imagined, the avenue toward a solution has to be (at least in the case of mathematics) abstracted into symbols that can be generally manipulated. The standards expect the mathematically proficient student to be able to abstract a given situation, represent it symbolically and manipulate the resulting symbols. The standards indicate that students will be able to abstract the problem into malleable symbols and numbers (CCSS, 2010). In this respect the calculation process becomes a mechanical, algorithmic exercise that may rely as much on one's ability to remember math processes than anything else. In other words, the equations that are presented to students as "problems" in this respect are solutions that simply have not been mathematically simplified; the higher order thinking has already been engaged to arrive at the equation. In domains other than mathematics the would-be creator would deconstruct to a point that would

allow for the maximum number of diverse avenues to be considered and manipulated before determining a viable path toward a conclusion.

After a possible solution has been produced, the evaluative ways of thinking of the would-be creator engages in order to test the quality of the solution. Any number of criteria might be employed to evaluate the quality of the solution. Factors such as usability, aesthetics, sustainability, and/or whether the solution is ethical or not might be considered depending on the domain and/or the particular criteria of the problem at hand are examples of possible criteria. As Dewitt Jones (2010), acclaimed National Geographic photographer asserts, there is often more than one right answer. So the evaluation of any solution can be recycled back through the process to refine or search for a more suitable one.

Once the solution passes the scrutiny of the creator then it is presented to the field for its evaluation (and possibly to market). Such presentation would be highly dependent on the creator's capacity to defend and effectively communicate his/her ideas. This notion reinforces the necessity of the individual to develop the skill to justify and effectively communicate ideas. Such a skill is considered an anchor within the ELA CCSS. The ability to justify and defend solutions is called for within the Math CCSS as well, with the expectation that mathematical proficient students will be able to "justify their conclusions by constructing viable arguments and critique the reasoning of others" (CCSS, 2010b, p. 7). This ability to effectively communicate and defend novel ideas is crucial to the acceptance by the field.

Figure 3.3 represents an attempt to detail how the analytical and creative ways of thinking are interdependent as ideas are conceived and transitioned into reality. Such a process would posit the job of education as one of “educing” or drawing out individual ideas and talent; one where the pouring in of information is necessary but far from sufficient. In the metaphor of drawing from the springs of human capability, the pouring in of information would be akin to priming the pump.

Even though creative thinking is not stated within the standards as a way of thinking that is to be developed; creative ways of thinking can be developed if a teacher has the awareness and resolve to do so. In effect, the CCSS leaves the educator who is interested in developing creative capacity the job of identifying the skills within the standards that promote creative thinking. Such a job may not be a problem for those teachers who already value creativity, but for the teacher who is immersed in the instruction of the skills that are traditionally valued by schools the standards provide no motivation or direction to alter this outlook.

The dialogue that I was able to mediate between the CCSS and voices contained within the existing literature proved instrumental in this comprehensive illustration of the design process. The dialogue was also instrumental in the conception of a comprehensive working model of creativity. This “Working Model of Creativity” will be detailed in the following section and will be used to help analyze and structure the participants’ conception of creativity that will be discussed in Chapter V.

A Working Model of Creativity

Figure 3.4 illustrates three major ideas regarding creativity that have been discussed in the preceding chapters. First the model suggests there to exist a correlation between domain specific knowledge/skills and the level of creative output. I suggest here that there exists a direct relationship between the depth to which a particular concept is deconstructed and the level of creative impact a resulting idea is likely to achieve. This is not to say that a deeper analysis of a concept or a greater understanding of a particular field render a person more likely to arrive at a creative solution. In fact, one may argue that a depth of understanding might have the opposite effect and hamper the individual's probability of producing a creative idea. The individual can take the path of least resistance back to the surface without challenging the existing domain in any manner. Ward, Smith, and Vaid (1997) used the phrase *functional fixedness* to describe the phenomenon that "when people develop new ideas, those ideas tend to resemble old ones; new ideas do not move much beyond old ones without a good deal of cognitive effort being applied" (p. 23). It is to say that *if* a creative idea is to emerge then a depth of understanding of the domain would likely affect the quality of the creative idea and/or the impact that the idea might have on the domain. In any case it is assumed that then some other type of thinking must be engaged if one is to diverge from the path by which he or she descended.

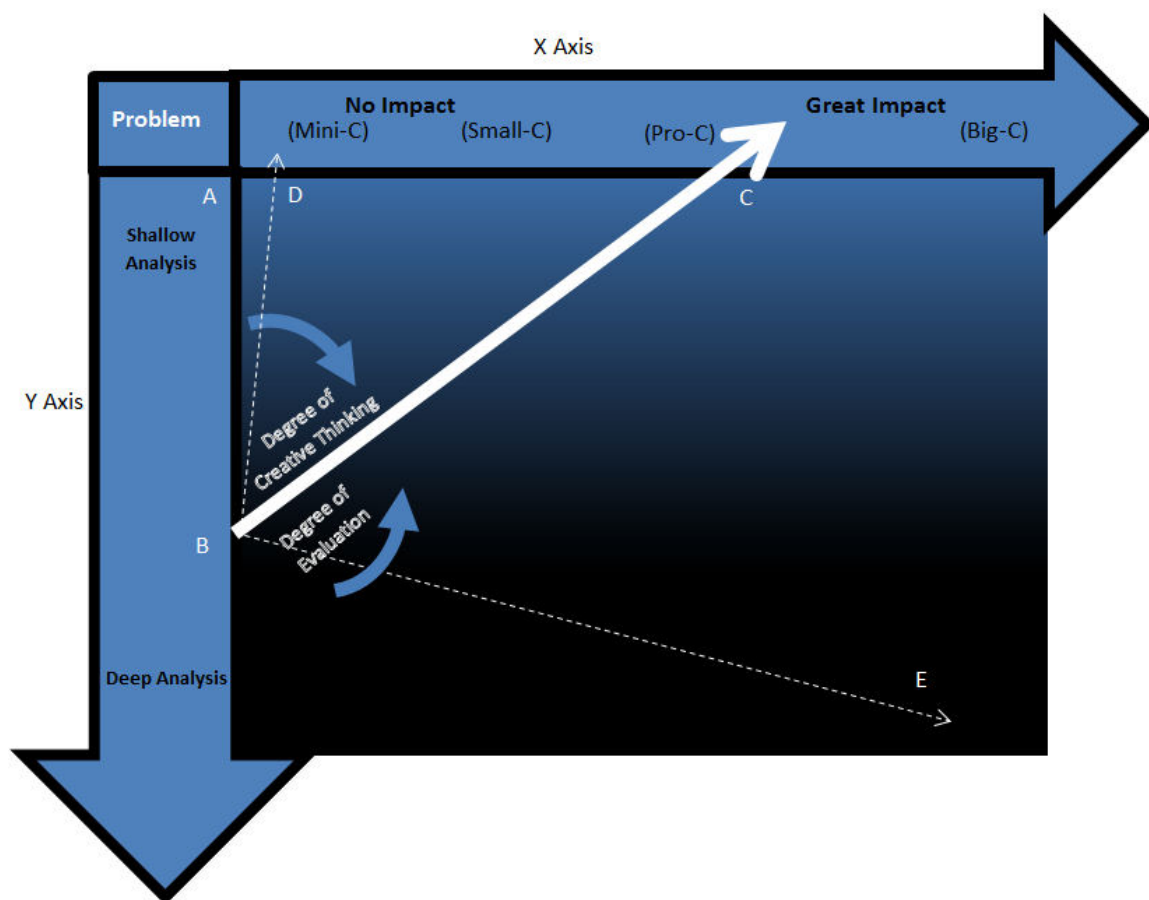


Figure 3.4. Working Model of Creativity.

This brings us to the second factor represented in the model. A degree of creative thinking can be imposed on a domain or concept at any point of analysis or deconstruction. This point of divergence is represented by Angle ABC. This would constitute a critical moment in the creative process. It is the moment of decision where personality factors, motivation, contextual factors and special abilities come into play to determine if an individual is to employ the creative ways of thinking that will allow him or her to break set and chart a different course. Creative ways of thinking are points of divergence which might be encouraged by some of the standards addressed within the

CCSS such as the production of analogies, altering of point of view, and modeling.

These creative ways of thinking are represented in Figure 3.4 by the angle that emerges from the y axis. Once a level of analysis has been reached the measure of angle ABC represents the degree of creative thinking employed (i.e., fluency, flexibility, imagination, point of view). If no creative ways of thinking are imposed then the only route available for the individual is to return to the surface is by way of the well-traveled route in which he or she descended. On the other hand, any degree of creative thinking would allow an idea to emerge at a different point on the x axis (denoting level of creative impact). If we apply a little geometry we can conceive of how a small measure of creative thinking (greater degree of angle ABC) would change the trajectory of the Line BC and would land at a point further along the creative continuum. Likewise an increase in the depth of analysis or understanding would also achieve the result of arriving at point further on the creativity continuum.

The third concept represented by the model has to do with the evaluation of a potentially creative idea. This evaluation is represented in the model at two distinct levels. As described in Chapter II, the evaluation of an idea can transpire at both the level of the individual and at the level of the field. Angle CBE (degree of evaluation imposed) is juxtaposed with Angle ABC (degree of creative thinking imposed) in an effort to represent the tension that inherent in the conception of an idea and the individual's evaluation of the idea. The angle represents the concept of "self-regulation" discussed in Chapter II, where too little evaluation would yield a solution that is outside of what might be possible or applicable, and therefore would not be *meaningful*; and where too much

evaluation would force the idea back toward what is already accepted and therefore would not be *novel*. The would-be creator must strike the right balance between a degree of evaluation that keeps the idea in the real-world but stops short of stripping the idea of its novelty.

The second level of evaluation that is illustrated by Figure 3.4 comes into play when the idea comes into contact with the scrutiny of the field. As was discussed in the last chapter, gatekeepers are present within every domain that are charged with the task of determining which ideas get accepted as new and meaningful. The higher the level of potential creative impact the more scrutiny and resistance the idea is likely to encounter (Csikszentmihalyi, 1996). The amount of scrutiny from the field is illustrated by the length of Line BC which increases in length when either the degree of creative thinking is increased and/or the depth of analysis from which the creative idea emerges increases. It is certainly reasonable to assume that the deeper the deconstruction of a domain or concept, the more fundamental the ideas and *sacred cows* one is likely to encounter. Since the members of the field are likely to be heavily invested in the most fundamental elements of the domain then the deeper the deconstruction, the greater the pressure to conform and reduce the degree of creative thinking, or to relent and attempt a creative departure from a more shallow level of deconstruction.

A study conducted by S. Colum Gilfillan (as cited in Rhodes, 1987) helps to illustrate this point. Gilfillan conducted a study that explored the resistance novel ideas encounter as they make their way to the surface. He studied 19 of the most useful inventions. He found that it took an average 226 years between the time that time that

the inventions was first mentioned and the time that it gained commercial use. As a result the length of line BC in the graphic can represent the difficulty of bringing the idea to the surface. Hence the difficulty of the acceptance of the new idea is in proportion to both the depth of analysis and the degree of creative thinking as represented by the length of line BC.

This model of creativity would situate the standards as playing a role throughout the creative process. This third scenario suggest that the writers of the CCSS not only expect students to develop the skills necessary to deeply analyze existing content as illustrated by the y axis in Figure 3.4, but also expects them to develop the “special” skills necessary to generate novel ideas from such analysis as illustrated by Angle ABC in Figure 3.4. And finally as discussed, the standards expect students to evaluate possible solutions to problems as illustrated in Figure 3.4 by Angle CBE.

Summary

This analysis represents one person’s conception of creativity within the Common Core. But it is an analysis that is based in numerous thoughts and ideas contained within the existing research of creativity. The preponderance of the research which holds the traditional analytical and evaluative skills most explicitly prescribed in the standards as necessary but not sufficient for creative production. As a result, I suggest that the standards can have a significant impact on the development of creativity if the special generative-type cognitive skills are developed alongside of the traditional analytical and evaluative skill. Unfortunately the mathematics portion of the standards speaks of mathematical ways of thinking, and the ELA portion of the standards speaks of the type

of thinking of a literate person, but they make no explicit claim to develop *creative ways of thinking*. As a result the hope of creativity within the context of the Common Core Standards in large measure depends on what the teacher perceives creativity to mean and the extent to which he or she believes he or she is free to teach the standards in such a way that would develop creative thinking. This realization represents a fundamental reason why conversations regarding the nature of creativity would benefit teachers and students if teachers are indeed expected to prepare students to be “college and career ready.” The following chapter will detail the methods that I chose to employ in an effort to engage a group of teachers in a conversation regarding their conception of creativity.

CHAPTER IV

METHODOLOGY

If we are to make real strides in boosting the creativity of scientists, mathematicians, and all upon whom society depends, we must arrive at a much more detailed understanding of the creative process . . . The study of creativity must be seen as a basic necessity. (Amabile & Hennessey, 2010, p. 570)

The purpose of the present chapter is to detail the strategy that I employed in an effort to gain an understanding of the meaning that teachers pour into the idea of creativity. The chapter will begin with the identification of the *problem* that I perceive exists regarding the extent and depth to which creativity is discussed within public education. The problem of course gave rise to the research question of “How do exemplary teachers describe creativity?” The present section will include the questions that I asked the teachers chosen to participate. The section will be followed by an account of the strategy that I employed to select the participants of the study. Later I will detail the methods that I used to collect and analyze the accounts provided by the participants and will describe the methods that I employed in an effort to gain an accurate and rich description of what the participants considered creativity to mean. The chapter will conclude by detailing the strategies that I employed in an effort to increase the trustworthiness of my findings.

Problem Statement

Personal experience as an educator has led me to what I believe to be a “convincing chain of presuppositions” that conclude with a determination that a troubling phenomenon persists within the context of public schools (Creswell, 2007, p. 54). I am concerned that there exists very little meaningful conversation and much less consensus regarding what educators mean by the term creativity. I believe that a phenomenon exists where educators have grown accustomed to using the term creativity in a manner that assumes the existence of a clear and consistent *meaning* of the word within the realm of educational discourse. John Creswell, author of *Qualitative Inquiry and Research Design*, suggests that a good way to “formulate a question that is appropriate to a research study is to determine what bothers you” (Creswell, 2007, p. 47). It bothers me that a concept that might be viewed as the pinnacle of human cognition (Krathwohl & Anderson, 2010), absolutely key to human self-actualization (Maslow, 1959) and crucial to our economic survival (AMA, 2007) may also be the least understood within the walls of our schools. As a result, the present study was motivated by an interest in gaining an understanding of how creativity is defined by teachers within the context of their school community. The purpose of this research project was to *describe* how teachers define the concept of creativity. As a result, the research question that I hoped to answer was: *How do exemplary teachers describe creativity?* I attempted to unpack the essence of each participant’s experience with defining and encouraging the development of creativity within the context of their respective classrooms in an effort to identify what the participants mean when they use the term creativity.

I chose to pursue a phenomenological approach to research for this study. The use of terminology such as *essence*, *describe*, and *meaning* within the problem statement and research question foreshadow the use of this particular methodology (Creswell, 2007). I chose a phenomenological approach because I believed at the onset that the approach held the most promise for attaining a deep understanding of the shared experiences of educators as they struggle to define creativity. Creswell points out that the pursuit of such an understanding of a “common or shared experience of a phenomenon” is a key attribute of a phenomenological approach to research (Creswell, 2007, p. 60). The objective of this research project was to understand the *essence* and breadth of teachers’ experience in defining and encouraging creativity within their classrooms (Creswell, 2007).

I followed a script of open-ended questions in an attempt to gain an understanding of each participant’s conception of creativity. The following questions were posed to each participant:

1. Creativity has become a sort of buzz word within public schools. I have found the term often spoken by teachers and administrators during interviews, conferences, and informal conversations. However, rarely have I found a teacher or administrator explain what they believe to be the meaning of creativity. What do you think the term creativity means? What is creativity?
2. A narrative has emerged within education, as well as within business and industry, that the skills necessary for success in the 21st century will differ

substantially from the skills that were necessary for success in the 20th century. If you agree with this assessment, how can the development of creativity impact a student's success after his/her school career?

3. To what extent do you think creativity is emphasized in public schools? What do you perceive to be the reasons why creativity is not more of an emphasis in public schools?
4. How do the Common Core State Standards affect the development of creativity within public schools?
5. When you think of people like Steve Jobs, Thomas Edison, or Leonardo da Vinci, as compared with your next-door neighbor, how do you account for differences in the ability to develop new and meaningful ideas? Is it possible to develop creativity? (Can all people be creative?)
6. What role does intelligence play in the act of creating? What kind of prerequisite knowledge or skills are necessary for creative thought to occur?
7. Can you give me an example of how you have worked to develop creativity within the context of your classroom?
8. On a scale from one to ten, how difficult do you believe it is for you as a professional to exercise creativity within your classroom? Why did you choose that number?
9. On a scale from one to ten, how much pressure do you feel that you are under to produce quantifiable student outcomes? Why did you choose that number?

10. What can be done to increase the likelihood that teachers will work to integrate the development of creative thought within their classrooms?

Selection Rationale

Participant selection was purposeful. The complex and often competing theories regarding creativity prompted me to assemble a group of participants that would be most likely to reflect this diversity. As exhibited in the research, domains differ regarding what is accepted as creative with some domains tending to be more liberal as to what they accept and some tending to be more conservative. I assumed that the best means of obtaining a diverse sampling of the meaning of creativity within public schools was to choose participants who represented this diversity by way of the subjects that they teach. As a result, the eight teachers who were selected to participate in the study represent a broad spectrum of domains as represented below:

- Secondary Math Teacher
- Secondary Science Teacher
- Visual Arts Teacher
- Gifted Education Teacher
- Career and Technical Education Teacher
- English/ Language Arts Teacher
- Elementary School Teacher
- Secondary Social Studies Teacher

The complexity of the topic also prompted me to assemble a group that might also be more likely to engage in deep reflection of their practice. In order to achieve this, I began

the selection process by considering teachers who were selected as teachers of the year within their respective districts. Generally, each public school faculty within North Carolina will select a school-level teacher of the year to compete at the district level. Each district within North Carolina selects one school-level teacher of the year to represent that district at the regional and then state level. Each teacher chosen for the study was a district-level teacher of the year in North Carolina within the past ten years.

The selected participants were clustered in the North Central Piedmont of North Carolina and represent a total of five districts. Not only did I assume that teachers who have gained such distinction would be more likely to be reflective and critical of their practice, but I also recognized that the teacher of the year selection process generally directs candidates to reflect in writing on their personal philosophies regarding education. In short the diversity of experience along with the likely depth of their pedagogical reflection were the major considerations for selecting this group of participants.

Data Collection

Two sources of data were collected in an effort to gain a measure of understanding of what teachers conceived creativity to mean. The first source of data that I collected was a statement regarding each participant's philosophy of education. I requested the statements that each participant submitted during their Teacher of the Year selection process. The primary source of data however was generated through a series of interviews. I intended to conduct a minimum of two interviews with each participant. The duration of the initial interviews spanned from approximately fifty minutes to two

hours. The initial interviews were conducted in person and a standard set of questions was posed to each participant.

I was able to arrange a second interview for seven of the eight participants. The second round of interviews took place via telephone and with each conducted at least one week after each participant's initial interview. There were several reasons why I believed that a second interview would be beneficial to the richness and trustworthiness of the findings of the study. First, I expected tensions to emerge between varying conceptions of creativity as participants were confronted with the ideas of other participants who teach subjects very different from their own. I also assumed that if each participant were provided with time to reflect on the questions posed during the initial interview and that certain ideas raised in the initial interview would be given sufficient time to incubate. I assumed that new and meaningful thoughts might emerge from reflective practitioners after a period a period of time has elapsed. The second interview provided a platform for further elaboration after such incubation. During the second interview, I prompted participants to clarify and expand on some of the ideas that they suggested in the first interview with questions that were at times influenced by other participants. I assumed at the onset of the study that gaining the perspectives of participants who represent a broad range of subject matter and who may already be predisposed to continuously reflect upon their practice, and by providing them time to allow for such reflection would exponentially increase the richness of the participants' responses regarding their conception of creativity. I found to a large measure that this assumption was correct.

I conducted a pilot project in preparation for the current research. I conducted two interviews of teachers who were selected as teachers of the year by their respective schools. As a requirement for the district teacher of the year selection process each candidate submitted a statement detailing their philosophy of education. I reviewed a total of 26 statements from teacher of the year candidates and chose to interview the teachers who most prominently expressed a desire to develop creativity within their philosophical statement. None of the data from the pilot study are included in the present study, but the pilot study provided me with a basis for several of the assumptions that influenced the direction and structure of the present study.

The participant responses were digitally recorded. The initial round of interviews was transcribed. The tensions that emerged from the initial interviews served as the basis for follow-up questions during the second interview session. I analyzed the data collected through a method of open coding. Once significant statements from interviews were collected I grouped the data into larger themes (Creswell, 2007). As themes emerged, and were analyzed within the text, I included verbatim examples from the interviews as evidence (Creswell, 2007). A description of each participant's work site was also included in an effort to add a measure of context to the participant's responses. I analyzed the actual statements of responders, and reflected on the "setting and context which the phenomenon was experienced" (Creswell, 2007 p. 159). I expected that by engaging in a detailed process of collecting significant statements (textual data) and by couching them in their proper context (structural data) that a trustworthy description of the participants' conception of creativity would emerge.

Once all data was collected and analyzed, I compared the conceptions of the participants with the theories of creativity found within the research and with the standards set forth in the Common Core. The motivation behind the research was to include teachers in a conversation in which they have been generally excluded. The overriding intent of the methodology was to employ an open ended questioning protocol that would allow participants' conception regarding the meaning of creativity and their ability, duty and/or freedom to develop it to emerge.

Trustworthiness

As a result of the complexity of the research topic and the likelihood of multiple meanings attributed to the concept of creativity, I assumed that the collection of multiple sources of data would be essential to increasing the trustworthiness of the study. Therefore the strategy of triangulation was employed in the study. Creswell (2007) defines eight common strategies that qualitative researchers employ in order to increase the validity of their research and recommends that qualitative researchers adopt at least two of the strategies (Creswell, 2007). Along with *triangulation*, I chose the strategies of *clarifying bias* and the provision of a *rich description* of the context of each participant (Creswell, 2007).

Description of Context

I intended to increase the likelihood that the findings of the research would be trustworthy by providing a detailed description of the *context* in which the phenomenon occurred (Creswell, 2007). I provided a detailed description of the site in which each participant works. Demographics of the school population such as race, socioeconomic

status, and the general setting of the school in which the participants work were also collected. Characteristics of each participant such as gender, subject taught, grade level taught and years of experience of each interviewed participants were disclosed. Such a naturalistic approach would be considered to be a key element of qualitative research as well as an established means of increasing the likelihood that readers of the study will find the findings of the study to be trustworthy (Creswell, 2007).

Furthermore, as mentioned earlier, I structured the data collection process in a manner that allowed time for incubation. I allowed at least one week to elapse between the first and second interview session. I assumed that allowing such time for the incubation of ideas would allow participants to further entertain the questions posed during the initial interview and would set the stage for a greater level of clarity and richness during the second interview.

Triangulation

Triangulation was critical to the present research. Specifically, the information that I received from the initial interviews was triangulated with follow-up questions that took place during the second round of interviews and with the data that was collected from the participant's philosophical statements. However in a much more broad sense, triangulation was the intent of the project in as much as I hoped to "check" the existing theories regarding creativity by what the Common Core Standards promote and by what teachers believe to be the meaning of creativity and their perceived responsibility in developing it.

Clarification of Personal Bias

In the interest of increasing the trustworthiness of my findings, it is important that I *clarify personal biases* and past experiences that might have affected my objectivity regarding the analysis of subject responses (Creswell, 2007). Therefore, critical subjectivity is one of the strategies I employed at the onset of the study (Creswell, 2007). I attempted to be cognizant of researcher Alan Peshkin's contention that "One's subjectivity is like a garment that cannot be removed. It is insistently present in both the research and non-research aspects of our life" (Peshkin, 1988, p. 57). Similarly, Csikszentmihalyi contends that creative people "develop a personal approach, an internal model that allows them to put problems into a manageable context" (Csikszentmihalyi, 1996, p. 118). He quotes Nobel Prize Lauriat Linus Pauling as stating that whenever he is faced with a problem, or new piece of information, he asks himself, "How does this fit into my picture of the universe" (Csikszentmihalyi, 1996, p. 118)? I intend to follow Pauling's recommendation by briefly discussing how the idea of creativity fits into the context of my overall view of the purposes of education. There are three major aspects of my life experience that have influenced my choice of the research topic and that undoubtedly influenced my analysis of the results. "The ability to disclose one's own subjectivity and write unshackled depends upon the researcher's ability to mark where her (him) self ends and another begins through the use of self-reflexivity" (Pillow, 2003, p. 182). I attempted to make every effort to remain conscious of how my assumptions, experience and beliefs might affect the questions that I posed and the interpretation of the data that I received.

First, I adopt a Christian world view. This view greatly influences my approach to education and the role of creativity within education. The chief aim of education in my estimation is analogous to what Jesus Christ stated to be his purpose on earth. As recorded in the book of Luke, Christ stated that his purpose was that “they would have life and have it more abundantly.” This statement establishes for me the two overarching reasons for education. Our purpose as educators is to make life (physical survival) possible *and* to make life worth living. Educators in my view are interested in providing people with the skill to survive the physical world and the skill to make our exterior and interior worlds worth surviving. Such a view establishes creativity as the key to unlocking both purposes. This view of creativity as a gift bestowed on a creature from a creator provides for me a rationale as to how Abraham Maslow might conclude that creativeness and “the concept of the healthy, self-actualizing, fully human person seem to be coming closer together, and may perhaps turn out to be the same thing” (Maslow, 1967, p. 43). And a rationale as to why the ability to create might be considered at the pinnacle of human cognition as Krathwohl and Anderson seem to imply in their revision of Bloom’s Taxonomy. It is through this lens that I see creativity as not only the factor that affords humanity the ability to continuously adapt to an increasingly unpredictable environment but also the factor that propels human life beyond the utilitarian concerns of survival and into a realm where complexities such as aesthetics and systems of government can be conceived that render our lives more “abundant.” This view leads me to consider humans to be more than his/her DNA and accumulated experiences and grants the educator the privilege of “educing” or drawing out the unique talents that lie

within each person. Education in this view serves the human by drawing out these self-actualizing capacities and serves humanity by providing form and meaning to the ideas that are drawn out of the individual.

This view also leaves me open to ideas such as that of intuition that might not be completely explainable as well as the idea that it is at least possible that education is a process of drawing out what we already intuitively know. For example, Picasso is quoted as stating “when we invented cubism, we had no intention of inventing cubism, but of simply expressing what was within us” (Amabile, 1983, p. 8). Author and scientist Peter Senge (2004) repeatedly speaks of the necessity of “allowing the inner knowing to emerge” (p. 87). Or as philosopher Jacob Needleman pointed out during an interview with National Public Radio, humans are all “part of a common greatness. Deep down in the human essence is a common greatness that we need to respect in each other and rediscover in ourselves. The human problem is that we have fallen away from that greatness” (Needleman, 2004). The creative capacity of the human mind is the factor that represents, in my view the means of bridging perpetual gap between what we are currently and what we were meant to be; and it is the process of education that can draw out and provide structure to this capacity. The disciplines of language, mathematics, science etc. would not be poured into the individual as much as they would be employed as tools by which ideas can be drawn out and given a form that can be communicated and appreciated.

Another factor that may have influenced my analysis of the data is that I am currently immersed within the *business of education* and have been employed as an

educator for the past 22 years. If we are to account for my elementary, secondary, and post-secondary experience as a student in school then I have been immersed in public education for 40 or my 45 years on earth. Of the 22 years employed as an educator, I served as a school level administrator for eight years and a district level administrator for another nine years. This experience has had a profound impact on my view of the business of education and on creativity's place in it.

Education researchers Chubb and Moe (1990) expressed a concern that is indicative of how my experience as an education administrator might have influenced my approach to the current research. They stated that the path to success in the field of educational leadership does not lie in making innovative decision, but success lies in the process of faithfully managing decisions that were already made for the *leader* (Chubb & Moe, 1990). After 17 years as a public school administrator I assume there to be a direct relationship between ascension through the ranks of education administration and the willingness to follow established rules and paradigms without question. Chubb and Moe (1990) go on to state that “the easiest way to get into trouble in public education is to launch bold, aggressive, *innovative* moves: discretionary acts of leadership are bound to be threatening to the interests of someone, somewhere, in a position of power” (p. 57).

The problem in my estimation is not confined to the ranks of education administrators, as Chubb and Moe (1990) speak of the plight of teachers:

First they are required to follow rules that cause them to depart from what they might otherwise do, and thus to behave in ways that contradict or fail to take advantage of their professional expertise and judgment. Second, they are required to spend time and effort documenting, usually through formal paperwork, that they have followed these rules. (p. 59)

The analysis of the data may be biased by a frustration on my part that educators adopted an Industrial Age model of education two centuries ago and have not adequately questioned and much less relinquished this paradigm. It seems to me that current educators are still trying to do a better job at what they have always done. Even if no one has the answers, educators must at least exercise the freedom, courage and curiosity to ask questions; and it is the act of questioning that constitutes what many consider to be the beginning of the creative process.

The third factor that may have influenced my analysis of the data comes as a result of a relatively diverse set of experiences with the idea of creativity. I earned a Bachelor's of Fine Arts Degree and began my career in education as a visual arts teacher. As an artist, I acknowledge that I am more likely to be predisposed to appreciate creativity or to see creative in a manner that might be different from other domains in that I may be more likely to possess a liberal or inclusive view of what it means to be creative. This experience as a visual arts teacher is juxtaposed later in my career by service as a Career and Technical Education Director for a school district in North Carolina. The two experiences have provided me with a relatively broad view of creativity. I have found that artists seem to prefer the word "create" while people in industry lean toward the word "innovate." The liberal view that may be espoused more predominantly in the domain of art would situate aesthetic appeal as the sole consideration when determining if an idea or product is of value. Likewise usability may be the sole factor that an engineer might consider when determining value.

My perception as a person with both an arts and technical education background leads me to consider a synthesis of the two poles. It is a perception that leads me to believe there to be numerous factors that combine to influence whether a product or idea is deemed creative or not. Value from this viewpoint is determined by the impact that the idea of product has on the domain, and would be based on any number of considerations. In short these experiences lead me to view our society as in need of engineers who think like artists and artists who think like engineers.

My background, particularly as a visual arts teacher, may also render me as one who may be predisposed (if not trained) to take a different point of view and might thus heighten my sensitivity to the bureaucratic Industrial Age systems that I perceive permeate all levels of education. The artist that lies within the confines of an educational bureaucrat produces an acute tension that admittedly causes me to desire but the *possibility* of small pockets of excellence and creativity over the *certainty* of the mass mediocrity which I believe our current system is designed to produce.

All three of these factors sort of coalesce within me to produce a frustration with the current state of education and have greatly influence my view of the importance of creativity if education is to be meaningfully reformed. Francis Duffy (2010), author of *Dream! Create! Sustain!*, pointed out that we may have hit the apex of the capabilities of the current system and are beginning to descend. I acknowledge a bias to see the business of education as in need of *re-creation*; and that I desire to see public education fulfill what I believe to have always been its purpose: to serve the individual by drawing out

self-actualizing talents while serving society by providing form and meaning to the resulting ideas.

I believe that the methods explained in the present chapter proved to be effective in drawing out an in-depth description of the meaning that the participants attribute to creativity. The participants' descriptions of the meaning of creativity and the perception of their role in developing creativity will be detailed in the following chapter.

CHAPTER V
BUT WHAT DO THE TEACHERS SAY?
(AN ACCOUNT OF CREATIVITY AS CONCEIVED BY EXEMPLARY
TEACHERS)

Introduction

Chapter II detailed a wide variety of ideas and attempts by psychologists to describe creativity. Chapter III suggested several possibilities regarding how the writers of the Common Core State Standards (CCSS) might have conceived of creativity within the standards. *But what do the teachers say?* The primary motivation behind the project was to add to our understanding of creativity by including the perceptions of teachers regarding the meaning of the concept. In order to achieve this, the research question that the study attempted to answer was: How do exemplary teachers describe creativity?

While the study of creativity has intensified over the past several decades, teacher perception of creativity is by and large missing from the discussion. It seemed reasonable therefore that an understanding of creativity could be aided by soliciting the perceptions of those who are called upon to develop it. The purpose of this chapter is to relay the perceptions of the participants of the study regarding their conception of creativity and to analyze the participants' conception of creativity in light of the current research on creativity and in light of the expectations that are set forth in the CCSS.

The strategy that I employed in an effort to account for the ambiguity and complexity inherent in the concept of creativity was to mediate a conversation between

the participant's conceptions of creativity, the standards that they are directed to teach and the existing literature on the subject. In Chapter II, I analyzed an array of voices that attempted to describe creativity which emerged from the existing literature and in Chapter III, I analyzed the voices that emerged from the CCSS regarding the standards' possible conception of creativity. In the present chapter I will add the third and final voice to the discussion- the voice of the teacher.

As detailed in Chapter III the selection process of the teachers invited to participate in the study was driven by two concerns. First, I feared that I might not receive a rich description of creativity from teachers since, as the motivation behind the project suggests, teachers have not generally been engaged in such meaningful conversation regarding the meaning of creativity. I hoped to diminish this concern by limiting the participant pool to certain "exemplary" teachers whom I assumed would be most likely to engage in deep reflection of their practice as educators. This is the reason that I decided to limit the pool of participants to Teacher of the Year Recipients. Second I was concerned that given the exceptionally broad spectrum of ideas found in the literature that the participant responses might prove to be limited in comparison. As a result of this concern, I assumed that the most promising strategy for obtaining a broad scope of teacher perceptions regarding creativity would be to broaden the pool to include teachers who represent a wide range of disciplines.

Both concerns almost immediately began to diminish as I was struck by the eagerness of the participants to discuss the topic as well as by the insightful conceptions of creativity that emerged from their responses. I got the impression that the participants

possessed a strong intuitive sense of creativity but were often not sure if they were communicating their conception adequately. It quickly became apparent to me that for the reflective teacher, every day is a research project with each classroom a laboratory. It was their day-to-day experience with helping students think and solve problems that yielded a deep intuition regarding the nature of creativity even if the words to describe the concept did not come very easily. After interviewing the participants I came away with a deeper appreciation of how the day-to-day, real-world interactions with students and their reflection on such interaction can create a level of understanding that is of a different sort than clinical research.

The participant responses covered an extensive range of topics but could be generally situated within three major concerns. The participants care in describing the concept of creativity primarily centered around their (1) attempts to explain differences in creative capacity; (2) attempts to negotiate the tension between their duty to teach domain relevant skills and their desire to develop creative relevant skills; and finally (3) their attempts to negotiate factors within their respective contexts that either promote or inhibit their ability to develop creativity. These concerns were knit together throughout the course of each interview by an overwhelming contention by the participants that the development of creative capacity on the part of their students was something that they believed to be their duty to pursue.

Participant Profiles: Who the Participants Are

The purpose of this section is to provide an account of how I employed the strategies described in Chapter IV in an effort to obtain a deep understanding of the

participants' conception of creativity. The section will include a brief introduction of the participants of the study and a description of the context in which each of the participants worked.

The participants were open and engaging. Their body language, hand gestures, frequent smiles and laughs communicated to me a sort of delight in discussing their conception of creativity. The participants were all recognized as their district's Teacher of the Year. Their years of experience ranged from six years to 26 years. They represented a very diverse array of disciplines that included a participant from the arts, mathematics, science, social studies, language arts, Academically Gifted, and Career and Technical Education. They represented five school districts located in the piedmont region of North Carolina. School district sizes ranged from a district of 11,000 students to a district consisting of 70,000. Participants ranged from each level of public school—two elementary participants, three middle grades participants, two high school participants, and one Early-College High School participant. Their school sizes ranged from 200 students to a maximum of 1,400 students.

The duration of the one-on-one interviews ranged from 50 minutes to over two hours. After interviewing the candidates and analyzing their responses, I contacted them with follow up questions based on their responses to the initial round of interview questions. This second round of questions was conducted via telephone, each lasting no longer than 30 minutes. I was able to gain a deeper understanding and more clarification as a result of the second interview. One participant was unavailable for a follow-up interview.

Furthermore, I was able to obtain a written statement from seven of the participants regarding their philosophy of education. This statement was composed as a part of each teacher's Teacher of the Year portfolio. The two interviews along with the philosophical statements collected constituted the data that I employed to develop the themes detailed in this chapter.

I also asked the participants to rate themselves along two continuums. I first asked them to rate the extent to which they believed that they were able to develop creative thinking within their students. A rating of ten indicated complete freedom to develop creativity and a level one indicated nonexistent freedom. I then asked them to rate the amount of pressure that they felt that they were under to produce quantifiable results with a level one constituting no pressure and a level ten indicating immense pressure.

Each teacher's rating is plotted on Figure 5.1, which is adapted from Seelig's (2012) Matrix. As illustrated, seven of the eight participants are clustered in the upper right hand corner, indicating that they perceive their ability to develop creativity and the pressure that they believe that they are under to produce quantifiable results to be both at a high level. It became apparent to me during the course of the interviews that Seelig's designation of the quadrant as "on a mission" was certainly an accurate assessment of the participants' drive to develop creative capacity within a context that is not always very conducive or supportive of such an endeavor. This phenomenon will be discussed in greater detail later in the chapter in a section that I have entitled "Teacher Power Over."

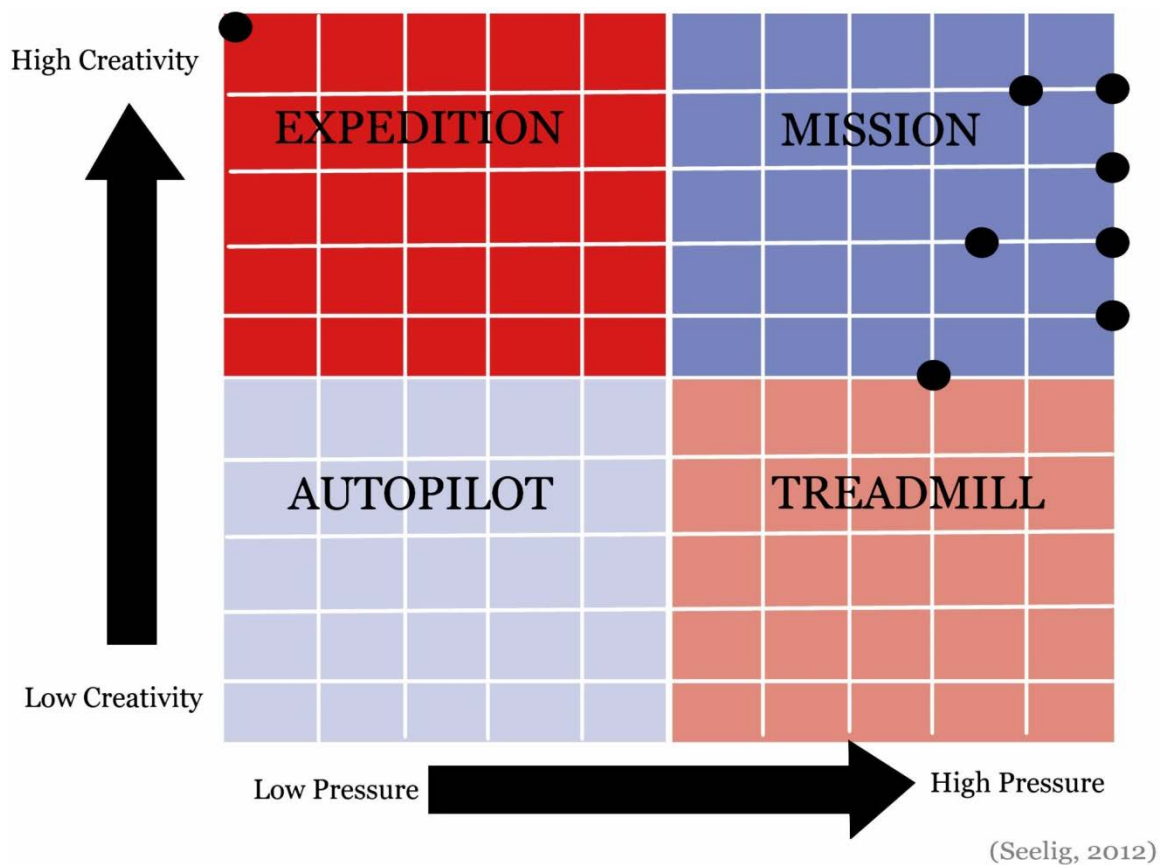


Figure 5.1. Pressure and Creativity (Seelig, 2012).

Ms. Angelou

Students learn best when they are allowed to explore, create, and be an integral part of the learning process.

Ms. Angelou represented the metaphor of a “caged bird” among the group of participants. She illustrated a picture of creativity restrained; how contextual factors can impose a tremendous amount of pressure for individuals to conform to prescribed expectations. Ms. Angelou repeatedly referred to the innate desire of students to create and that all students had the capacity to create; it just needed to be “unleashed.” Even

though Ms. Angelou's responses were peppered with an infectious laugh, it became increasingly evident during the course of the interview that Ms. Angelou herself strongly desired to be "unleashed" as she spoke candidly about the restrictive nature of the data driven; one size fits all production model of teaching which she found herself working under.

Named 2013 Teacher of the Year for her district, Ms. Angelou was born within the county where she works and has remained a life-long resident of the county. Ms. Angelou, now a grandmother entered teaching later in life and has been teaching six years. Ms. Angelou teaches third grade students at an elementary school of just under 500 students. Her school substantially outperformed the state on the 2013 End of Grade test (EOG) with 46.4% proficient in reading as compared with 35.9% for the state and 53.6% proficient in math as compared with 34.9% for the state (Education First, 2013).

Even given the context where she worked, Ms. Angelou did not consider it to be very difficult for her to develop the capacity to create in her classroom. On a scale from one to ten with one constituting the most difficult she rated her ability to develop creativity as a level eight. When asked about the level of pressure she was under to produce quantifiable results, without hesitation Ms. Angelou stated "ten."

Ms. Butler

Every time I hear the word creativity, I think of a professor I had who instructed the class to draw a flower. Everyone in the class drew a flower with a green stem and red pedals with yellow in the center—creativity is the person who would draw a purple stem.

Ms. Butler teaches mathematics to seventh-grade students at a middle school located in a small town in the North-Central Piedmont of North Carolina. The school has a student population of 750 students. The school performed better than the state average in reading 39.1 to 35.9 but performed below state average in mathematics a math 30.7% to 34.9% for the state (Education First, 2013).

The sprawling campus consisted of seven buildings with connecting breezeways. The facility served as the area's high school until it was converted into a middle school in 1991. The long rectangular hallways were subdivided by a series of virtually identical rectangular classrooms. The windows were adorned with the classic industrial strength blinds that were most certainly installed when the school was constructed some sixty years ago.

Ms. Butler could be considered to be the problem solver of the group in that her responses suggested a singular focus on helping her students understand mathematics. It was Ms. Butler's comments that most clearly established creative thinking as a tool in the service of a deeper understanding of content. When asked what creativity meant from her experience, Ms. Butler stated that creativity manifests itself differently pending on the subject matter at hand. She considered the ability to arrive at numerous ways of solving problems to be how creative thinking manifests itself in mathematics.

Ms. Butler felt it marginally difficult to develop creativity which she quantified as six; and considered the pressure to produce quantifiable student outcomes at the top of the range, which she quantified as ten.

Ms. Paul

We've gotta understand how we're wonderfully and fearfully made different, who we are, what our interests and passions and multiple intelligences are.

Ms. Paul named 2010 Teacher of the Year, entered teaching after a career as an accountant. "I yearned," Ms. Paul recounted, "to be involved in education, not from a financial point of view but as an educator who could make a difference in the lives of children." She is a 15-year veteran and life-long resident of the county in which she works. She taught keyboarding and computer applications at the time that she was selected as teacher of the year. She spent one year as a teacher of academically gifted students before assuming her current role as a career development counselor at a high school within the same district.

The school is located in a small town in North Central Piedmont. Ms. Paul worked out of an office that was closer in dimension to a closet. The school was constructed with the same traditional red brick that adorns the nearby crumbling textile plants that employed so many of the graduates of the high school in decades past. A public area was virtually non-existent in the 1954 structure. The campus was made up of a series of rectangular, flat roof buildings, subdivided by standard rectangular classrooms. The school in which she currently works houses just over 900 students. Student performance on the SAT (916) fell below the state average of 1001 and the graduation rate of 67.7% was also below the state average of 76.3% (Education First, 2013).

Ms. Paul considered creativity to be characterized by "one's ability to create something new or have an original thought." She characterized creativity as also the

ability to come up with more than one path to get to a solution. Ms. Paul emphasized repeatedly the necessity to view each student as an individual with specific talents and abilities.

Ms. Paul considered her ability to develop creativity within her students to be a seven and continued the string of participants that considered the amount of pressure to produce quantifiable results as a ten.

Mr. Bass

You have to be willing to let yourself go; to take some risks and be willing to deal with some uncertainties.

Mr. Bass was the rebel of the group. Mr. Bass served as a teacher of Academically Gifted students when he was named Teach of the Year for his district in 2013. Mr. Bass now teaches mathematics to fourth- and fifth-grade students at a small school in the northwest piedmont of North Carolina. The school consists of just over 200 students.

Mr. Bass also entered teaching from a career in business. Mr. Bass served as an industrial and quality engineer for twenty years before entering teaching as a lateral-entry teacher. He began his career as a high school mathematics teacher. He recounted that he taught everything from Algebra to Advanced Placement Statistics. Mr. Bass described himself as always being interested in the achievement of both academically gifted and special needs students. He said as a regular education teacher he had great experience working in inclusion settings where he worked in tandem with an exceptional children's teacher. Mr. Bass returned to school and received a Master's degree in Gifted Education

and in route to obtaining the degree he also received certification in the teaching of Exceptional Children. He eventually obtained a position teaching elementary age gifted students and it was during this time that Mr. Bass was selected as his district's teacher of the year.

The school performed below the state average in reading with 34% of the students proficient as compared to 43.8% for the state. The school scored higher in mathematics than the state average with 47.2% proficient as compared to 42% on the 2013 administration of the EOG test (Education First, 2013). Mr. Bass noted a dramatic increase to over 82% after his first year at the school (2014 results). The main building in which Mr. Bass taught was completed in 1928 with additions added in 1937, 1952 and 1975. The flat roof capped a traditional red brick façade with a series of air-conditioning units spanning its length. The school is equipped with both a gym and auditorium as the facility served as the area's high school until 1964.

Mr. Bass felt that his non-traditional route to the teaching profession may have been a positive for him. He reasons: "Because I am not confined by what I think it should be because I don't know sometime what I think it should be. I think we should look for some people in non-traditional roles and perhaps move them into leadership responsibilities. We haven't drawn from that pool of candidates. That shows creativity on our district's part that they are willing to do that."

When asked to quantify how much freedom he believed he had to develop the capacity of his students to create, Mr. Bass gave the lowest ranking of all participants at a

five. When asked to quantify the extent to which he felt under pressure to produce quantifiable results he indicated a level of eight.

Ms. Kim

I think that certainly, creativity has been pegged a term relative to the arts, but I think that many people can be creative in their own right, in different realms, if that makes sense.

The Early College in which Ms. Kim works is situated on a Community College Campus in the Central Piedmont of North Carolina. An Early College is a non-traditional high school that offers students the opportunity to obtain both a high school diploma and an associate's degree within five years after leaving the eighth grade. A 2013 recipient of her district's Teacher of the Year award, Ms. Kim was not originally trained as a teacher. Ms. Kim obtained a Bachelor of Science degree in Chemistry and gained employment as a science teacher just as she decided to go back to school to take the courses necessary to obtain her teaching license. Ms. Kim has taught science for the past 15 years primarily at the high school level. She has spent a total of six years in her current position, where she also serves as lead-teacher for the school. Ms. Kim has also obtained a master degree in education administration and is currently interviewing for assistant principal positions within the area.

Upon my visit to the school, I was not really sure where the front entrance of the building was situated. The dark brick two-story building was not adorned with any architectural elements; no noticeable ornamentation that would announce to the public "this is the entrance." The building appeared as a classic modern efficiency design of

boxes of rooms contained within a larger box. The classroom where Ms. Kim worked was furnished with rows of the classic black top lab stations. The limited size of the room left me with the impression that the space was not originally designed as a science lab.

The school enrolls just under 300 students. The average SAT scores of the students are slightly above that of the rest of the state. The percent of students achieving proficiency in English greatly outpaced the state average 90.3% to 47.5% respectively. Conversely math achievement lagged behind the state with only 20.8% of the school's student demonstrating proficiency as compared with 36.3% proficient at the state (Education First, 2013).

Ms. Kim may have represented the clearest example of why I contend that we cannot assume that all teachers possess the same meaning of creativity even though the term creativity is often utilized in education discourse. She articulated the clearest evidence as to why ongoing conversations about creativity within public schools are crucial to our understanding of the concept. Ms. Kim very candidly stated: "I was thinking I'm a chemistry teacher, why in the world would he want to talk to me about creativity. In my mind, to begin with I couldn't even put the two together until it's like; I mean really, it was like what in the world."

When asked how easy she considered it to be to develop creativity within the context of her classroom, she indicated a level of seven. She believed that the level of pressure that she is under to produce quantifiable results to be an eight or a nine.

Mr. Michaels

For me it's extremely easy because it's literally on students' plates. You know, I just simply am introducing the general topics and letting the kids run with it in the direction that they want to go with it and then kind of more or less just go around and just serve as a supervisory role and making suggestions here or there on how they can make a stronger composition or how they can improve some things, but really the creativity lies in the hands of the students.

Mr. Michaels was recognized as his district's teacher of the year in 2013. He is a 20-year veteran and teaches four levels of Art along with two of levels of ceramic classes at a high school in the central piedmont of North Carolina. The school enrolls over 1400 students and performs slightly below state average on the SAT with an average score 993 as compared to an average score of 1001 for the state. The school enjoys a substantially higher graduation rate of 91.2% as compared with 82.5% for the state (Education First, 2013).

The façade of the school stands in contrast to the older schools within the study. I learned that the main building was completed only two years ago (2012). The Royal blue drainage pipes along the two-story façade of the building matched the striking royal blue metal roof. The roof along with the accents of color within the brick design represented a postmodern inspired approach to design. No industrial blinds spanned the large tinted windows of the building. The façade included three different colors of brick—eggshell, beige and accents of traditional red. The red brick imposed in the design of the new building represented an obvious attempt to bridge the new with the past, as the new complex was flanked on each side by the modern era flat-roof buildings adorned with the traditional red brick. Otherwise the new wing represented an intentional departure from

what had gone before. The entry to the facility was welcoming. The expansive entry stood in stark contrast to the public spaces of the older models. Upon entry of the building one steps into the midst of a huge open commons area which spanned both stories. The space was approximately 50 feet in length and about 20 feet in width. Such a space would certainly have been considered an obscene waste of space to the efficiency minded architects of the older models.

To the left of the new building stood a large Career and Technical Education (CTE) complex that included areas designated as industrial technology and Agri-Science (with a greenhouse). Situated on the right of the new structure stood the arts department of similar design to the CTE complex. The new complex also masked much more traditional buildings behind the facility. Two gyms one flat roof and one the other barrel roof completed the campus. The new complex was in effect surrounded by structures that, like many of the other schools of the participants in the study could have just as easily been a factory complex.

Mr. Michaels felt that he had complete freedom to develop the creative capacity of his students, which he considered to be a ten. He stated that he was under no pressure to produce quantifiable results, which he quantified as zero.

Ms. Griffin

So maybe you have to think critically sometimes before you can get to the creativity part—possibly.

Ms. Griffin taught Language Arts and Social Studies for 22 years at the middle grades level. Ms. Griffin is the participant in the study who was recognized as the North

Carolina Teacher of the Year. She served four years as an instructional coach at a high school within the same district. She currently works in the Assessment Department of a large school district within North Carolina. At the time that she was recognized as Teacher of the Year, she was employed at a middle school located in the northern piedmont of North Carolina.

The school design where Ms. Griffin worked as a teacher was similar to that of Mr. Michaels's school in that color and design elements were included that were not of a purely functional purpose; which again implied an intentional break from modern era pre-fabrication and efficiency designs. A pitched green metallic roof capped the two story brick building. The lobby extends spans a 30 by 30 foot area and spans both stories of the structure. The bright expansive lobby constituted a clear intention on the part of the designers to position the school as a part of the community. The design elements within and without the school contributed to making the school look less like a factory than its older counterparts. While the school out-performed the state in reading 42.8% to 35.9% the school matched the state average proficiency in mathematics at 34.9% (Education First, 2013).

Ms. Griffin made a clear connection between critical thinking and creative thinking. She expressed a belief that in order to think creatively one has to be able to think critically. Ms. Griffin felt that the only factor that inhibits her ability to develop creativity is her own 'creativity.' She considered her freedom to develop creativity in her students at a level of nine. Like most of the candidates she saw the pressure on her to achieve quantifiable results at the high end of the scale—ten.

Ms. Roberts

I give my students the best that I have, and my students without fail reciprocate by energizing me with thought-provoking comments, creative ideas, a sense of humor, compassion, and challenging honesty.

I characterized Ms. Roberts as the existentialist of the group. While the other participants couched much of their conception of creativity at the Mini-C Level, that is how creative thinking can be used to increase the depth of understanding, Ms. Roberts ventured almost immediately to the Big-C type of creativity. The other participants occasional mentioned creativity at the Pro-C level (creative thinking that can contribute to success in business & industry), but they did not reflect as much on the eminent sort of creativity as did Ms. Roberts. Ms. Roberts was very interested in discussing attributes of what she termed to be great thinkers. While Ms. Roberts affirmed that all people can be creative she attributed the ability to ask big questions and ponder big ideas to be the factor that separates the 'every day' sort of creative person from the eminently creative person.

Ms. Roberts was recognized as her district's teacher of the year in 2011. She has taught English/Language Arts for the past 19 years. She grew up in the Midwest and currently works in a high school located in the North Central Piedmont of North Carolina. The High School is situated in a rural area of the county. Approximately 1100 students attend the school. The school performs close to the state average in the major indicators of high school performance with a 971 average SAT score as compared to

1001 average score for the state and a graduation rate of 80.2% as compared with 82.5% for the state (Education First, 2013).

Ms. Roberts worked in a two story building. The façade was comprised of beige brick and was lined with windows that were not quite as standard as some of the older schools in the study. I would characterize the design of the 1981 structure as existing somewhere between the industrial age complexes and the newer postmodern facilities described here. Attempts to invite the public were evident in the design of an expansive commons area that joined the cafeteria, office area, auditorium and gymnasium.

Ms. Roberts characterized the propensity to consider “big ideas” as one of nine “intelligences” that humans possess in one combination or another. She exclaimed: “They see the big picture,” and when combined with one of the other intelligences “mathematics for Einstein and empathy of Oprah Winfrey can produce eminence.” She rated both her freedom and the pressure that she felt she was under to produce quantifiable results at a level of nine.

Now that I have provided a brief description of who the participants are, it is time to turn our attention to what they said. The reader will notice that the model of creativity introduced in Chapter IV and illustrated by Figure 3.4 will serve as a framework for the organization of the present chapter. The model will be reconstructed one element at a time as I analyze the participants’ experience in attempting to develop creativity and detailed their collective conception of creativity as it begins to take shape.

Levels of Creativity

I think we all can be creative; it's just a difference in degree of our creativity.
—Ms. Angelou

There existed a consensus among the participants that everyone can be creative; but as Ms. Kim stated, “not to the same extent.” Ms. Kim’s comment foreshadows the content of the present section and posits the consideration of varying levels of creativity as extremely impactful to a teacher’s overall conception of creativity. Such an assessment of varying levels answers the question of how it is possible for both a Nobel Prize winning physicist and a winner of an elementary school science fair can both be creative. As mentioned in Chapter II creativity is certainly conceived within the literature as manifesting itself at varying levels. Boden (1990) described levels of creativity as either psychological (P-Creativity) or historical (H-Creativity). “A P-Creative idea is novel to the individual who has it, but an H-Creative idea that is new to humanity” (Nickerson, 1999, p. 400). But as Nickerson explains, “whether P-Creativity becomes identified as H-Creativity depends on factors external to its originator.” Also Kaufman (2009) conceived of creativity as manifesting itself at varying levels. As described in Chapter II, Kaufman termed the levels of creative impact as Mini-C, Small-C, Pro-C and Big-C levels.

Here, the strategy of mediating a three-way conversation between the participant’s conception of creativity, the CCSS and the existing literature proved to be extremely beneficial. Even though the participant’s never mentioned any of the terminology expressed by Boden or Kaufman, they certainly conceptualized varying

levels of creativity in their own words and from their own experience. I found Kaufman's conception of the varying levels of creativity very useful in establishing a framework by which I could analyze the participants' conception of creativity on this important point. The present section will therefore be structured around the participants' descriptions of how creativity might manifest itself at the levels of Mini-C, Small-c, Pro-C and Big-C as conceptualized by Kaufman (2009).



Figure 5.2. Levels of Creativity.

As mentioned, I will use the perceptions of the participants of the study throughout to recreate the working model of creativity proposed in Chapter IV. Figure 5.2 represents the first piece of the model to be included. Figure 5.2 illustrates an affirmation by the participants of the study that there exists varying levels of creative impact.

As detailed in Chapter II and represented again here in Figure 5.2; Mini-C creativity is the use of creative thinking in service of the learning of already established content; Small-C creativity is the use of creative thinking to solve day to day problems and the expression of creativity for the sake of creating. The impact of the first two levels

is confined to the individual. The third and fourth levels are defined by their impact beyond the individual, with Pro-C affecting one's chosen field of work and Big-C as impacting the entire culture. Kaufman (2009), Boden (1990), and Gardner (1999), as well as Csikszentmihalyi (1996), have conceptualized varying levels of creativity as distinguished by the degree of impact; with the levels tending to fall along a continuum from creative production that only impacts the individual at one end and creative production that would impact an entire culture at the other.

The question of how an elementary science student and a Nobel Prize winning physicist can both be creative in the domain of science was answered by the participants who without using Boden or Gardner's terminology spoke of creativity on several levels that tended to span the entire spectrum represented in Figure 5.2. The idea that "everyone can be creative but not to the same extent" constituted a common theme among the participants. The following few sections detail the participants' struggle to express their conception of the levels by which creativity might manifest itself. I have used Kaufman's conception of Mini-C, Small-C, Pro-C and Big-C creativity as a means of organizing and analyzing the participant's expression of this point.

Mini-C Creativity

The participants saw creativity as a tool that could be used to achieve a deep understanding of their respective content areas. This conception of creativity is most associated with creativity at the Mini-C level. The participants considered creativity as fundamental to the learning process itself and thought that by appealing to the natural creative tendency of the brain that they could increase the depth of understanding while

further developing the brain's capacity to create. The participants sited *problem solving* and *discovery learning* in particular as instructional approaches that tended to capitalize on this tendency. The present section will detail the participants' attempts to use the strategies of problem solving and discovery learning as avenues for helping students to achieve a deep understanding of content as opposed to having such content imposed upon them.

In this respect Mini-C creativity could be characterized as a particular way in which knowledge is constructed. The participants spoke of discovery learning and problem solving as an act of creation and in terms of a fundamental way in which the brain is designed to operate. They thought that by using such strategies they could appeal to the natural creative tendency of the brain to construct meaning and thereby increase student depth of understanding and further enhance their natural creative ability. Conversely they insisted that reliance on a routine of simply conveying facts or a standard method or algorithm would tend to yield a more shallow understanding of content and would constrain the natural tendency of the brain to create. This contention by the participants is supported by the National Research Council (1989) who asserts "that a reliance on presentation and repetition 'help students do well on standardized tests and lower-order thinking skills, but they are generally ineffective as teaching strategies for long-term learning, for higher order thinking, and for *versatile* problem solving" (NRC, 1989, p. 57). This line of thinking constitutes an acknowledgement on the part of the participants that the best hope for arriving at new discoveries in the future may be to

allow students the opportunities to employ creative thinking to re-create past discoveries. In particular Mr. Bass asserted “I’d rather my students discover more and me cover less.”

The participants of the study certainly acknowledged their role of transmitting the accumulated knowledge of mankind within their respective disciplines. However, they also understood how their approach to transmitting such knowledge directly impacts the level of conceptual understanding as well as their student’s capacity to create. Ward et al. (1997) seemed to agree with the participants’ assessment. Ward et al. (1997) considered the continual growth of categorical and conceptual knowledge to be at its core a “creative phenomenon.” He explained:

Humans are prodigious builders of cognitive structures. Out of an ongoing stream of discrete experiences we construct a vast array of concepts that bridge the gaps between otherwise separate events and give coherence to our world. When we form these new concepts, or modify or extend old ones, presumably we create new cognitive entities that did not exist prior to those activities. In addition, because these concepts serve the purposes of understanding, organizing, classifying, and communicating about the world, they satisfy another criterion of creativity, namely usefulness. (Ward et al., 1997, p. 3)

Mr. Bass may have been the participant who most explicitly connected *problem solving* with creativity. He did so as he lamented the possibility of the state abandoning the CCSS and drew a distinction between the CCSS and the type of instructional expectations that existed prior to their implementation.

I learned very much to solve mathematical problems through algorithms, a step-by-step procedure, now that’s why I had a hard time doing (word problems), you know, please don’t give us word problems on that test because I could do the algorithms all day long, but actually applying that and using the higher level thinking skills was something that’s hard for students. They don’t get better by us failing to do that. So it greatly concerns me that we’re gonna abandon the

positives in the Common Core, you know, that problem solving, which I think, it looks at creative ways to solve problems because if you look at the emphasis on solving certain math problems in multiple ways, it really values the creativity and different ways of doing it, even if perhaps it isn't the most *efficient* way of doing it. So I'm not sure how it's gonna be replaced, but it concerns me that we're going to abandon the conceptual ideas and we're gonna go back to the way of procedurally doing math, that really troubles me because I think if you don't understand the concept you really don't understand it, you know, we can teach people to do a lot of procedures and that's not very creative, that's not a lot of problem solving. If we teach concepts, those big ideas, you have to be more creative, you have to think more deeply, you have to use problem solving. So you know, we don't know where it's heading but it, I certainly hope we don't go backwards and regress to just the procedural way of doing mathematics.

Mr. Bass also detailed certain problems that he facilitated that he thought were beneficial to his students' progress even though these particular problems had little direct correlation to mathematics. The weeks leading up to the administration of the End of Grade Test are generally a time when most teachers are busy cramming and remediating. Mr. Bass detailed a different approach. Mr. Bass informs his students that "you have everything that you need to be successful (on the test) know and now it's time to have some fun and be creative." He indicated that he employed such problem solving activities to demonstrate to his students that "they are not going to immediately know the answers to the problems on the test- but that they have all of the tools necessary to solve the problem and they simply have to persevere."

The participants stressed the importance of considering diverse perspectives within the problem solving process and the importance of realizing in the words of Ms. Angelou that there's "Not only one way to solve a problem." Ms. Angelou thought that creative thinking along with a practice of helping her students to evaluate their peers varying routes of arriving at the same solution to a problem tended to assist the students

in their problem solving ability by the very practical effect of exposing students to another algorithm for solving future problems that they may have otherwise not recognized. She said “I think that helps with learning since now they have a new idea that they can file away in their system of solving.” She went on to further explain her support of the CCSS in this respect.

I like the Common Core, because children were allowed to create and use new ideas to come to a conclusion with an answer, to problem solve, it didn't have to be one way, we could take all of these ideas together and foster them as a teacher not hinder them, do you understand what I'm saying?

The participants stressed *discovery learning* practices as an instructional strategy to encourage both deep conceptual understanding and creative thinking. Ms. Griffin in particular posed a strong relationship between questioning and creative thinking. Her conception was similar to Roger Schank's conception of the creative attitude. Schank asserts that “questions start the process of creativity, and creative explanations cannot be found without first learning how to ask the right questions” (Schank, 1988, p. 176). Ms. Angelou stressed that she plans lessons that “allow students to manipulate, explore, create and question their environment.” Participants seemed to indicate that if students are allowed to direct their own path toward understanding then they may be more likely to imagine how the concept could have been constructed otherwise. Ms. Roberts used the metaphor of reassembling an engine to illustrate this point.

I have no mechanical ingenuity or talent at all, I can unscrew screws, I can take it apart. Can I put it back together? Do I know how those parts fit together? Absolutely not, so that reveals my understanding. I'm no doctor, but I could cut apart a body, certainly, I could take it apart. Do I understand how to put it back

together? No, no, no, so when you're writing about this piece of literature and you understand, and you identify this particular part, this metaphor, this theme, this conflict, you have to understand how it works in the whole, you have to understand the role it plays in the big, so put the puzzle piece back and see how it connects to everything . . . I think that comes before creativity—to create a piece of literature you need to understand how metaphor can play a part in the whole work of the poem.

Ms. Roberts's statement implied that this strategy of questioning existing content and discovering how others have created might be necessary if one is to reconstruct an "engine" or a piece of literature in a new and meaningful way. Ms. Roberts indicates that the ability to analyze existing literature is necessary if one is to "create a high volume and extensive range of print and non-print texts as the CCSS expects" (CCSS, 2010a, p. 4). If Schank, Ms. Roberts, and Ms. Griffin are correct, then the continued life of all domains of knowledge are dependent on one's ability and willingness to not simply consume and analyze existing content but is also dependent upon one's ability to consistently question the contents of the domain as they assimilate and analyze its contents. Their comments represent a recognition that even disciplines such as mathematics are not static but evolving- and the only way that a domain can evolve is for someone to dare to go beyond the confines of what is currently accepted. The NRC (2001) expressed the propensity of teachers to see their domain as a crystalized body of knowledge rather than a fluid set of assumptions that can be questioned, extended and changed. Teachers, the NRC claims "almost always present mathematics as an established doctrine to be learned just as it was taught. This 'broadcast' metaphor for learning leads students to expect mathematics is about right answers rather than clear creative thinking" (NRC, 1989, p. 57).

Ms. Kim expressed the importance of allowing her students to discover chemistry and stressed the innate desire on the part of her students to question and discover:

I think about this frequently in lab, kids are inherently curious in lab, and with chemistry that can be dangerous—so what I've always told them is don't mix stuff behind my back, you never mix anything behind my back, what you do is you just ask, can you mix it. And they want to be real creative with chemistry and so they'll ask me, what happens, can I see what happens if I put these two together. And what I will tell them is one of two answers, go ahead and try it because in my mind I know what happens, or, you can't put them together because here is what will happen and here is why you can't do it. I think it is incumbent as educators for us to do that.

Ms. Kim's analogy represents an example of how discovery learning practices take advantage of an inherent curiosity which can be used by teachers to help students construct new and meaningful concepts. In Ms. Kim's estimation when students are allowed to discover concepts, the concepts are rendered immediately relevant to the students as the new knowledge would be of their own creation. The NRC echoes this sentiment and warns against attempts by teachers to teach domain relevant skills apart from relevance to the student. The council claims that only some go on to achieve a "retrospective understanding." The Council stated that

many mathematicians and scientists recall that their own education fits this model; rarely is anything learned well until it is revisited from a more advanced perspective. Present educational practices in the United States offers students only one path to understanding—a long, dimly lit journey through a mountain of meaningless manipulations, with the reward of power and understanding available only to those who complete the journey. (NRC, 1989, p. 58)

Ms. Butler in particular detailed a struggle to find the right mix between explicit instruction and discovery based learning. As Ms. Butler stated, "Some things have to be

explicitly taught.” She seems to imply that concepts that have taken mathematicians a life-time to discover, cannot be discovered by a seventh-grade student in one year between the hours of eight and nine o’clock Monday through Friday. Mr. Michaels detailed a strategy of gradual release with students focusing more on technical skill development early in their art classes and gradually obtaining more freedom and opportunity to discover alternative paths as they progress through the higher levels of his art classes. So then a big part of the work of simultaneously achieving a deep understanding of content and the capacity to think creatively about such content is as Ms. Butler suggests, contingent upon striking the right balance between explicitly giving the students a particular algorithm on one end of the continuum and providing them with virtually no guidance at all in discovering a particular algorithm at the other. For instance the laws of perspective eluded artists until the height of the Renaissance period, so a beginning art student is simply not going to discover the laws of perspective between August and December of his/her freshman year of high school; nor is the seventh grade student, as Ms. Butler suggests likely to discover on his/her own the algorithm for dividing by fractions during the time allotted apart from skilled direction from the teacher. Whether art or mathematics, content knowledge emerged from the participants as indispensable to the creative process. Ms. Butler suggested that stopping somewhere short of simply providing the students the algorithm to memorize can deepen understanding. Both the math teacher and the art teacher of the study imply that failure to have access to tools such as the laws of perspective and an efficient algorithm for

dividing by fractions can handicap a student when he or she encounters future complex aesthetic or math problems where such knowledge may be useful.

Without ever using the term “Mini-C” each participant detailed how creative thinking can increase the depth of knowledge of a particular concept (i.e., creative thinking in service of a deeper understanding of content knowledge). They were firm in their assessment that the development of creative thinking and the transmission of content knowledge was not an either/or proposition. They considered the negotiation of the teaching of content knowledge and the development of creative ability to be interdependent; with each holding the potential of greatly enhancing the other under the right circumstances. The participants tended to consider the right circumstances at least in part as characterized by a utilization of discovery and problem solving type instructional practices within the classroom.

Ms. Kim, for better or worse insisted that the manner in which students learn what they learn can impact their ability to solve unfamiliar problems in their professional life.

So I think there are some elements of education that a very restrictive and then we send them out into industry where they say I need you to create this presentation or I need you to do research and development and create a new product or I need you to think in terms of what might be best way to solve this problem or I need you to think of a way to market this product that has been around forever but sales are dwindling and I need you to reach this population—so how are you going to be creative and reach this population? So we have taught them the content but they lack the ability to do those types of things in the real world because they are not allowed to practice or hone those skills.

Certain individuals from the field of psychology tend to agree with the participants of the study in their contention that creative thinking at this most basic level

(Mini-C) is associated with how the brain is designed to operate (i.e., its propensity and ability to fill in gaps when expectations fail, to imagine possible reasons in order to be more prepared for similar future events; Schank, 1988).

As alluded to in Chapter I and depicted in Figure 5.3, the human brain’s natural desire and propensity to employ imagination to “fill in gaps” might represent as good a reason as any as to why accounts of strategies to develop creativity at this most fundamental level factored so prominently in the participant’s responses. Koestler offers the following illustration of this point:

The idea of blind chance deciding our fate is intolerable; the mind abhors gaps in the lawful order as nature abhors the vacuum. Thus virtually any explanation valid or not—which commands belief has a calming and cathartic effect. It can be observed on every level: from the sudden, smiling relief of the small child when some startling appearance is shown to be related to something familiar, and recognized as part of the general order of things—to the euphoria of the scientist, who has solved a problem. (Koestler, 1964, p. 327)

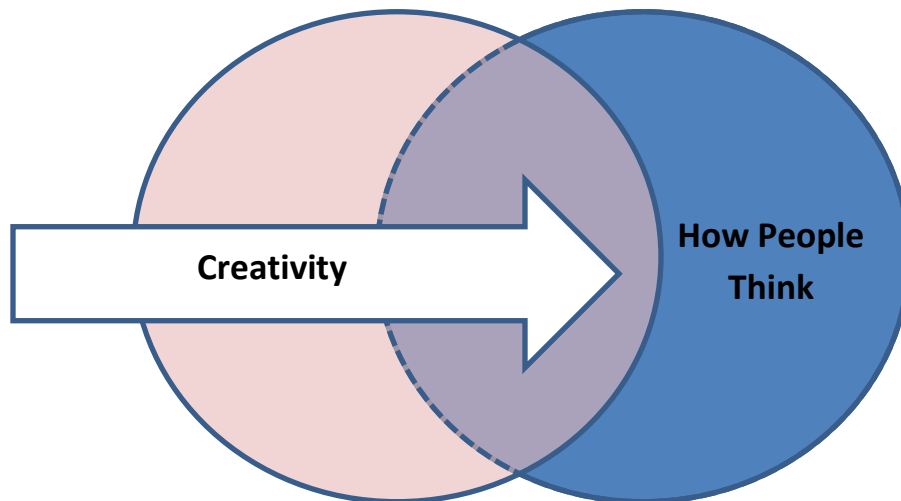


Figure 5.3. Creativity and Thinking.

Paul Torrance (1969) asserted that “the weight of present evidence indicates that man fundamentally prefers to learn in creative ways—by exploring, manipulating, questioning, experimenting, risk-taking, testing and modifying ideas, and otherwise inquiring” (p. 12). Torrance suggests that there exists a strong need to learn creatively. He suggests that “if we sense something is missing or untrue a tension is aroused. We are uncomfortable and want to relieve the tension” (p. 13). Schank (1988) and Torrance (1969) conclude that the individual experiences a certain level of tension when there exists a failure of expectation. In order to relieve this tension the individual is driven to question and imagine alternative possibilities for closing this gap in understanding. It is for this reason that Torrance asserted that “it is so natural for man to want to learn creatively” (Torrance, 1967, p. 58). And it is by way of gearing instruction in a manner that would take advantage of this natural tendency that the participants believed they could greatly enhance student understanding of content.

Ms. Kim offered an analogy to describe her conception of how creativity can be developed as the content of the curriculum is taught which effectively sums up the idea of Mini-C creativity.

You don't want to teach technology for the sake of teaching technology. I don't have a time in the year where I can stop teaching chemistry and teach technology. I need to use technology to drive the understanding of chemistry. So I need to use creativity to drive the understanding of Chemistry.

Koestler saw creative thinking at such a foundational level that he considered this ability to adapt to changing conditions to be built into humans at a cellular level. He says that “even at a cellular level the animal does not merely adapt to the environment but

adapts the environment to itself” (Koestler, 1964, p. 449). As Figure 5.3 depicts, the participants, by way of their emphasis on discovery and problem solving strategies saw creative ways of instruction to be consistent in a meaningful measure with how students think. They by and large saw the learning that incorporates creativity to be influential in the way students both assimilate and think about content.

Small-C Creativity and Self-Actualization

The participants of the study strongly suggested that the importance of creativity to the individual was not limited to the brain’s tendency to fill gaps, predict and make sense of the world, but also asserted that it was an important factor in meeting the emotional—self-actualizing needs of the individual. The participants spoke extensively about utilizing what they conceived as the self-actualizing capacity of creativity as an effective strategy to motivate their students to apply more time and exert a deeper level of attention to assigned tasks. This section will relay the participants’ conception of creativity as means motivating students to apply an enhanced level of attention by appealing to what they considered to be a natural desire to create.

The participants detailed the engagement and interest generated when students were provided opportunities to pursue individual interests and create products that were new and meaningful to them as individuals- regardless of any extrinsic concerns or motivation. Mr. Michaels expressed the power of engaging student interest as he described his role as stepping back as the disseminator of information and taking on the role as a facilitator of student progress.

I've really found as I've made the evolution through teaching that we have stronger compositions because of it, because the students then had a bigger interest in what they're doing because it has more of a personal connection to them. The craftsmanship improves in their work because again, it's something that they want to be proud of. They're the ones that are more involved in this and they're coming up with all the ideas for it. So it's, you know, just all around has helped us create stronger pieces because of the student involvement, the student decision making, and the student creativity.

While Small-C creativity is characterized by the impact that it has on the individual apart from external judgment, several of the participants asserted, such a creative disposition can result in the type of resolve necessary to overcome contextual barriers in route to a creation that may eventually receive external acceptance. Ms. Kim, for example, characterized the desire to create as a drive that has to be feed in the individuals who go on to prominence.

There wasn't that fear of what will people think. I am sure that they had those thoughts but I think that even more was that drive to –I've got to do this- I have to create this something new or something beautiful it's that innate drive that I have to feed.

The task must be in Herbert Simon's estimation "more important for you to immerse yourself in a problem, be preoccupied with it, than to attend to other matters" (Simon, 1967, p. 52). Or in Peter Senge's words, something one "cannot not do" (Senge, 2009, p. 103).

If psychologists like Schank (1988) and Guilford (1986) are correct in their assessment that creativity is something that we as humans are wired to do then it is reasonable to assume as Maslow does that the act of creating is something from which we receive a great deal of satisfaction from. Arthur, Daniel Pink (2005) expressed that the

abundance that we experience in the current age “has freed millions of people from the struggle for survival,” and quotes Nobel Prize winning economist Robert William Fogel as stating that this context has “made it possible to extend the quest for self-realization from a minute fraction of the population to almost the whole of it” (Pink, 2005, p. 35).

The importance that the participants consistently expressed regarding the self-actualizing quality of creativity could have one to conclude that “Small”-C creativity may be mischaracterized, if the word “small” is to be considered “less important.” The emphasis that the participants placed on the students knowing themselves and bringing a part of themselves to the work before them when combined with Pink’s assessment leads one to consider that the ingenuity that has resulted in the products and systems that have secured our physical survival may have simply constituted a means to the ultimate end of allowing our species to consider habits of mind, like creative thinking that make our lives worth surviving.

One of the things that was somewhat surprising was the connection that several of the participants made between the development of a *relationship* with the student and the student’s ability to create. The correlation that the participants described between teacher/student relationship, autonomy, motivation, and creativity will be addressed in more detail in the Context section later in this chapter.

Figure 5.4 raises the question of the extent to which creativity influences self-actualization. Ms. Angelou’s assessment that all students are creative and that we simply have to “unleash it,” along with Ms. Kim’s belief that all “kids are inherently curious,” lend support to Abraham Maslow’s (1967) assertion that “the concept of creativeness and

the concept of the healthy, self-actualizing, fully human person seem to be coming closer together, and may perhaps turn out to be the same thing” (Maslow, 1967, p. 43).

Abraham Maslow’s suggestion would be illustrated by a complete overlap of the circles exhibited in figure 5.4. While the participants did not go as far as to suggest the ideas to be synonymous, they certainly saw them as significantly overlapping.

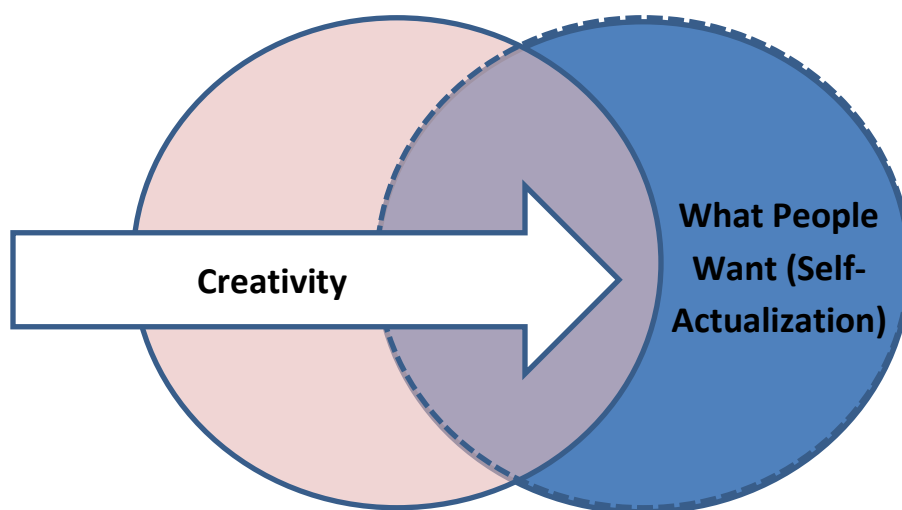


Figure 5.4. Creativity and Self-Actualization.

Pro-C Creativity

This section will detail the participants’ perception of creativity as a capacity that is necessary for their students’ future career success. Such participant descriptions of creativity can be situated within Kaufman’s conception of creativity at the Pro-C level. Kaufman considered the Pro-C level to be the point where the value of the creative production extends beyond individual creator. Pro-C creativity is characterized by the impact that creativity might have on a particular industry. Creativity is often seen as assuming the role of providing humanity with the ability to invent and adapt to an ever

changing environment. The participants certainly saw the development of creativity to be essential to the career related success of their students and important to the overall success of the economy.

The US Congress formally recognized creativity in 2011 as a skill that schools should work to develop in students with the passage of House Bill 347. The Bill, which was termed the 21st Century Readiness Bill, established creativity as a skill necessary for success in a 21st Century Economy. The intent of the bill is stated as follows: “To provide, develop, and support 21st century readiness initiatives that assist students in acquiring the skills necessary to think critically and solve problems, be an effective communicator, collaborate with others, and learn to *create* and *innovate*” (21st Century Readiness Act of 2011 *of section 2*).

The participants’ conception of creative thinking as necessary for problem solving extended beyond the confines of the classroom and was considered to be an essential component of success to problem solving in the workforce. Ms. Roberts repeated the words of former Secretary of Labor Robert Reich: “We are trying to prepare kids for jobs that have not been created yet to solve problems that we don’t know are problems yet.” She considered the necessity of her students’ ability to solve problems (at the Pro-C Level) as absolutely necessary for survival in the 21st Century Market Place.

I think all teachers understand and that is we are preparing students for a world that doesn’t exist, for jobs that don’t exist. We’ve said that a lot in education, and I think we also have the experience of it because we adults who are already in the workforce are taking on responsibilities and doing tasks we never thought we, never imagined we would have. Technology causes things to change so quickly, so I think that teachers have to be creative and imaginative in preparing students for jobs because there’ll have jobs that don’t yet exist. So I think that as teachers

we have to put students in those situations where they have to understand the situation and problem solve using creativity to come up with solutions and plan B's and responses that aren't in the answer book necessarily. Do you know what I mean?

The participants were consistent in their affirmation that creative thinking will play a major role in student success when they enter the workforce. Their perception in this respect was consistent with the writers of the CCSS who clearly affirmed preparation for 21st Century careers by stating that, "A particular standard was included in the document only when the best available evidence indicated that its mastery was essential for college and career readiness in a twenty-first-century, globally competitive society" (CCSS, 2010a, p. 3). Further, the participants' perception of career readiness was consistent with the North Carolina State Board's mission statement reads: "The guiding mission of the North Carolina State Board of Education is that every public school student will graduate from high school, globally competitive for work and postsecondary education and prepared for life in the 21st Century" (NCDPI, 2014, para. 1). It further states as one of its goals that "every student will be enrolled in a course of study designed to prepare them to stay ahead of international competition" (NCDPI, 2014, para. 4). The school's mission statements tended to follow script- holding fast to a belief that at least one of the purposes of their work is to prepare the next generation for a 21st Century economy.

Ms. Roberts affirms the necessity of creative problem solving if a student is to be adequately prepared for a 21st Century workforce as she explained how her journalism

class most closely resembled the type of work environment that the students might encounter as adults. She recounted:

We have to produce a newspaper because businesses have paid for advertising space, we have to get it done, we can't stop the project, so from the beginning we know that we have to come up with a solution one way or the other, and I think that reflects the business world more closely than any other classes that I teach, we simple have to come up with the solution, so that requires ingenuity, imagination, creative problem solving.

Ms. Butler also approached the Pro-C level of creativity as she describe how creative thinking would be necessary for success in the 21st Century as she struggled to detail how both the domain relevant skills of math along with creative relevant skills would be necessary for success. She asserted that:

Creativity is going to play a huge role (in the 21st Century) but I am not sure that the skills needed in the 20th century will not still be necessary for success in the 21st century. Creativity will play the part regarding how far you are going to take those skills.

By this statement, I assume that Ms. Butler associated the assimilation and analysis of domain specific content knowledge with the “skills needed in the 20th Century;” and associated the ability to employ creative thinking as a skill that is more associated with the 21st Century. Her point appears to be (as she will detail in later comments) that the latter is dependent upon the former.

The NRC further established the inability of an education based solely on the memorization of domain specific content to meet the challenges of our current age. They

state that “anyone whose mathematical skills are limited to computation has little to offer today’s society that is not better done by an inexpensive machine” (NRC, 1989, p. 45).

Mr. Michaels also affirmed creativity as necessary for professional success.

I think that a big thing that businesses and corporations are looking for are folks that are able to come in and come up with multiple solutions to a problem and they can then evaluate which solution’s going to work best for that certain situation. Not somebody who’s kind of thinking with blinders on, if you will that there’s only one way to solve a problem. So I think that, you know, through teaching creativity in our schools, it gives students that tool that when they hit the corporate world that they’re able to come up with multiple solutions, multiple answers to a problem and then find the one that best fits the situation.

This brings us to the third major assumption that I detailed in Chapter I: the notion that creativity is a factor that business and industry are demanding in the 21st Century as depicted in Figure 5.5. The participants quickly connected the potential of the encouragement of creativity at the individual level to the capacity for Pro-C creativity as students enter the world of work later in life.

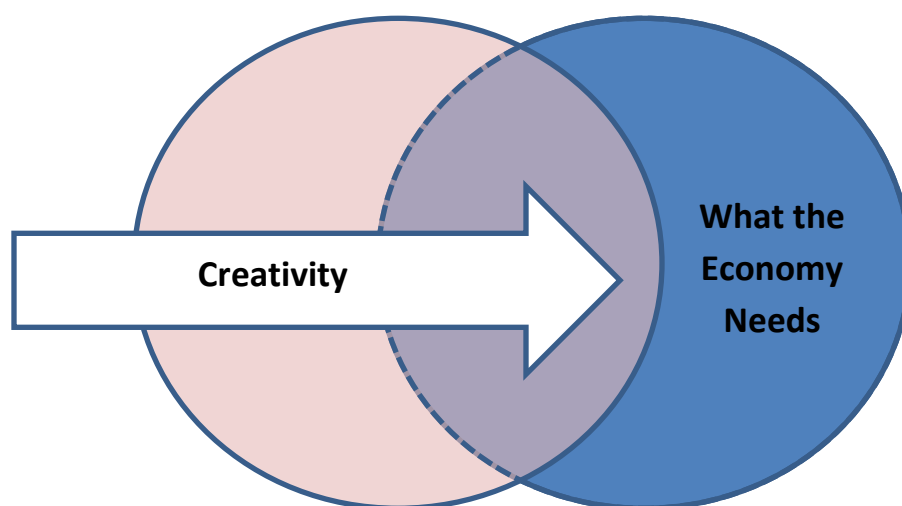


Figure 5.5. Creativity and Economic Need.

Big-C Creativity

Big-C creativity is conceived as creative production at a level that extends its impact beyond the individual and beyond the parameters of any one industry but constitutes a level of production that impacts an entire culture or society. There existed relatively less emphasis on Big-C creativity in the responses of the participants. However this level factored very prominently in the responses of one of the participants. I considered the interview question that would most likely generate participant ideas regarding the variance in level of creativity to be the question of what the participants felt might make the difference between people like Da Vinci, Edison, and Einstein whose ideas and creative contributions altered the direction of our culture and their next door neighbor who is likely to have somewhat less of an impact on culture. For the most part the participants spoke of self-confidence, passion, fearlessness and determination. Ms. Roberts was the exception. She extended the conversation by suggesting that the propensity of such individuals to *question* at the most fundamental levels to be the distinguishing factor. Such individuals would constitute those who would identify the problems that we don't know are problems yet; who would see opportunities that others do not and would seek the answers to questions that have yet to be posed. She mentioned this sort of propensity as one of Howard Gardner's multiple intelligences.

Gardner (1999) made a case for the existence of existential intelligence. He stopped short of adopting it as the 9th intelligence (as of 1999) but made a strong case that the ability to ask questions concerning our existence and our meaning and place in the universe as a possible intelligence. Ms. Roberts, on the other hand is already

convinced that there exists an existential sort of intelligence. In fact she considered this existential “intelligence” as the factor that makes the difference between everyday creativity and the Big-C or eminent variety of creativity.

With this line of thinking Ms. Roberts approaches the idea that the extent to which the individual is able and willing to descend into the depths of the domain the more impactful the creative contribution is likely to be. Ms. Roberts’s comments illustrated this notion as she considered the ability, willingness and/or propensity to consider the most fundamental questions as the factor that distinguishes the eminent level of creator from the rest. It is Ms. Roberts’s conception of the existence of a relationship between the depth of analysis of a given domain or concept and the potential creative impact that opened an extremely important line of communication between the participant’s perception of creativity and some of the voices contained within the existing literature. Ms. Robert’s description of this relationship was also as most instrumental in my illustration of the working model of creativity represented in Figure 3.4 that depicts such a relationship. She further illustrates the point as follows:

I think the cluster is the key. Find your cluster of intelligences. Somewhere along the lines a ninth intelligence was added and that is existential they call it, the big ideas, the philosophers, the great thinkers, and I think that has to be a part of the cluster because Albert Einstein, he had obviously, his part of his cluster was obviously logical, mathematical, but he also was existential, he had big ideas, he was a philosopher. Leonardo da Vinci, Michelangelo, too, wow, that got crazy, he had, I mean I think he was good in all of nine of them, visual, spatial, but he also had that existential, I think that existential, the big thinkers, I think that has to be a part of a cluster.

Affirmation of Ms. Roberts' claim is also suggested in the literature. For instance, according to biographer, Walter Isaacson (2008) Einstein's awe for the beauty and harmony of the universe is the factor that ignited the passion that drove his attempts to unlock the mysteries of nature. Einstein considered "the most beautiful thing that we can experience is the mysterious; it is the source of all true art and science" (Simms, 1989, p. 27). Einstein was quoted by Isaacson as stating that what guided him when judging a theory is to ask himself: "If I were God would I have arranged the world in such a way?" (Isaacson, 2008, p. 551). Ms. Roberts's comments would posit Einstein's ability and willingness to question at the most fundamental levels of a domain to be the defining characteristic of his genius.

Arthur Koestler represented another voice found within the literature that suggests such a relationship: "The artist does not climb the façade of ideas—he is more like a pot holder in search of underground rivers" (Koestler, 1964, p. 325). Koestler goes on to state that "it is becoming increasingly evident that both the questions and answers of contemporary physics," for example "are couched in an elusive symbol-based language that has only a very indirect gearing on reality, and has little to offer to satisfy man's *craving* for glimpses of the ultimate truth" (Koestler, 1964, p. 251). Similarly, Ms. Roberts considered such individuals to be characterized by an "innate desire—an innate sort of perseverance, an innate sort of drive for truth, to pursue great ideas." Ms. Roberts proceeded to identify students by name whom she considered to be great thinkers. She presented one of her students as an example whom she considered to be "hilarious."

Great comedians are great thinkers, they're creative, they're great conservationists, they put things together, talk about synthesis which is on the higher end of thinking, they put together, they see the connections, and they're witty, irony, funny connections and he was a great thinker.

Koestler continues with this line of thinking by asserting that

In all the great and generous minds from Nicolas of Cusa down to Einstein, we find feelings of awe and wonder, an intellectual ecstasy of distinctly religious flavor. Even those who professed to be devoid of it based their labors on an act of faith: the belief that there is harmony of the spheres—that the universe is not a tale told by an idiot, but governed by hidden laws waiting to be discovered and uttered. (Koestler, 1964, p. 251)

The participants were consistent with much of the existing literature in their descriptions of creativity manifesting itself at varying levels. The following section will detail the participants' struggle in navigating a tension which much of the literature assumes a fundamental to the expression of creativity at all levels. The section will analyze the participant's conception of the tension that exists between domain relevant skills and creative relevant skills.

Creative Relevant Skills and Domain Relevant Skills

Each participant at some point in their respective interviews grappled with expressing the relationship between the teaching of their content (domain relevant skills) and the development of creative thinking (creative relevant skills). The strategy of mediating a conversation between the participants' perception of creativity, the CCSS and the existing literature proved to be extremely beneficial on this point as well. The concepts expressed in the literature regarding the interrelationship between domain relevant skills and creative relevant skills along with the CCSS' conception of adaptive

reasoning in particular were particularly beneficial in helping me to deal with the complex ideas that the participants attempted to communicate as they described their experience in navigating the relationship.

Ms. Kim was the participant who most notably asserted that there exists an idea among many people that creativity is not dependent on domain specific skills. However each of the participants agreed with the propensity of the research on creativity contending that both domain relevant skills and creative relevant skills are necessary for the emergence of creativity but neither sufficient alone.

As represented in Figure 5.6, domain relevant skills and creative relevant skills made up two of the three factors that Amabile and Collins represented in their confluence model (intrinsic motivation constitute the third factor; Amabile & Collins, 1999). The participants took great care in attempting to describe this tension. If creative thinking at its most basic constitutes a departure from that which is given, then of course the ability to employ strategies that enable one to depart from an established path would have to be a part of the overall creative process. The participants, however by and large tended to view domain specific skills as equally important. This conception would be in harmony with Amabile and Collins (1999) model illustrated in Figure 5.6. Robert Sternberg may have stated the importance of domain specific skills most explicitly as he asserts that “One cannot be creative without knowledge.” He continues: “quite simply, one cannot go beyond the existing state of knowledge if one does not know what the state is” (Gardner, 2003, p. 112).

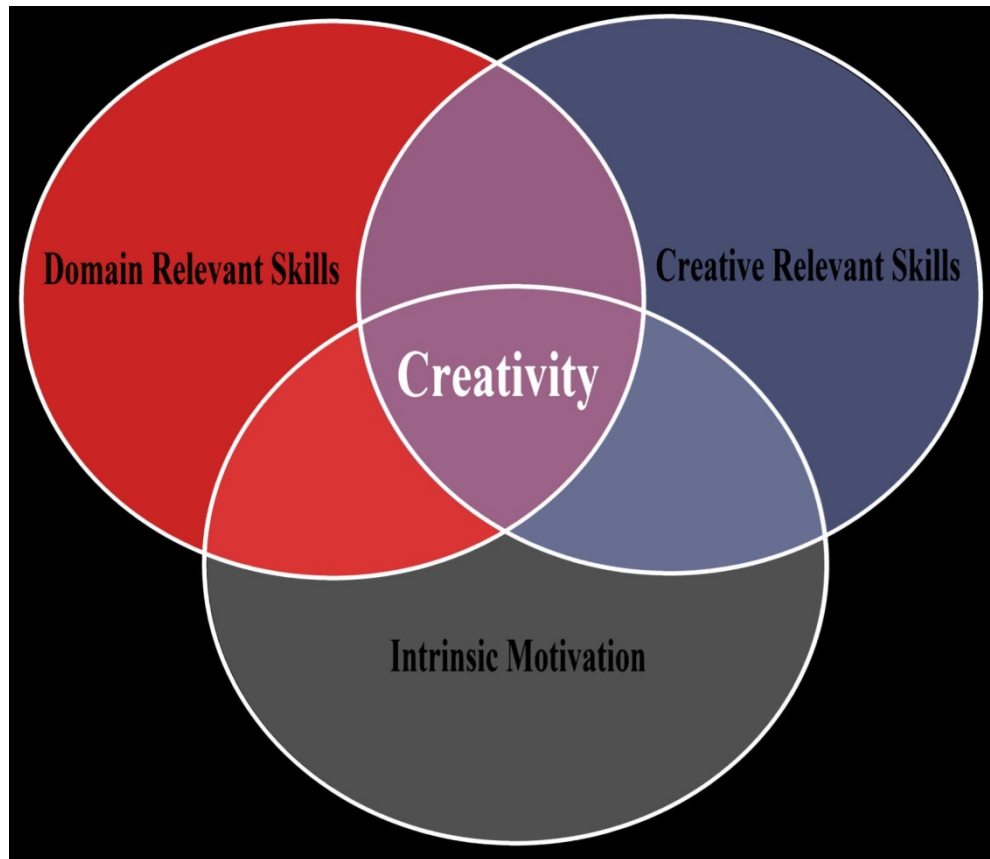


Figure 5.6. Amabile and Collins's (1999) Confluence Model.

Allan Leinwand (2009) provided a great illustration of this tension as he described his conception of the active and engaged classroom. He presented this tension by juxtaposing a series of pairs of terms with the first term in each pair representing what might be considered as indicative of creative thinking and the second in each pair representing more analytical type thinking. He describes the active, engaged, thinking classroom is a “classroom of *questions* and *answers*, of *inquiries* and *explanations*, of *conjectures* and *justifications*” (Leinwand, 2009, p. 93). The quote is illustrative of how both classes of skills are necessary to creative production but neither alone sufficient.

The present section will first attempt to relay the participants' conception of the role of domain relevant skills to the overall creative process, and will then attempt to describe the types of creative relevant skills which the participants saw as necessary if one is to move a domain in a different direction.

Domain Relevant Skills

As one might assume, the math teacher in our study, Ms. Butler, explicitly affirmed the importance of domain relevant content as she asserted that some procedures that just "have to be taught." She attempted to explain the importance of such domain relevant knowledge with one example in particular. Ms. Butler described an instance within her math class where she attempted to have her students solve an unfamiliar problem that required them to divide by fractions without providing them with the content knowledge which she now considers prevented her students from any chance of solving of the problem.

Last year, I would say here's this problem, solve it. Well if I don't show them or give them the basic facts or give them something to base it on then creativity doesn't come into play, they don't have anything to base that creativity on. I mean I think that's the whole thing, I mean you eluded to intelligence plays a role in creativity. Last year we gave them a problem and we said solve it but we left out the part of teaching them how to divide fractions, we left out the part of how to multiply fractions because multiplying and dividing fractions was not the aim of the problem. So—but by leaving those out, we left out a very important part of their steps to build on. They didn't have the basic steps, I mean they couldn't solve it, there was no way, they couldn't come up with an answer. I mean they, I think they've gotta have those skills.

Mrs. Butler continued to detail her struggle with finding the right mix between the explicit teaching of domain relevant skills and the more discovery type approach that is dependent upon creative thinking.

And you can do that with some things but like I said, that one activity I gave them that required them to know how to multiply and divide fractions, something that I take for granted, you've got to teach that first. Does that make sense? I know a lot of people don't. I know I was in a class not too long ago and he (the teacher of the class) was like well, let them figure out how to multiply fractions, well to me that's a procedural thing. I don't know how that they could actually; I think there are certain procedures that they have to be taught.

"You have got to have the facts," Ms. Butler asserted. Ms. Butler's emphatic statement is consistent with Dewey's contention that "one can have facts without thinking but one cannot have thinking without facts." Ward et al. (1997) considered the evidence within existing literature to be clear regarding the "overwhelmingly powerful role that prior knowledge plays in creative endeavors" (p. 19).

Ms. Butler was not alone in her insistence that domain specific skills constitute an indispensable component of the overall creative process. Ms. Griffin also clearly affirmed the necessity of Domain Relevant Skills in the act of creating.

I think if you looked at creative people, even Albert Einstein, there's a knowledge base that they have about something, not that they're smart about everything and have knowledge about everything but they have some kind of knowledge, expertise, or depth of knowledge about some topic or some skill or idea that they have read widely about, interacted with others about that, that helped kind of foster their ideas in those areas.

In order to arrive at a creative solution to a problem Ms. Kim established the necessity of analytical thinking as well: “They have to have the skills to *analyze*—to look at the situation and to create in their minds a fix.”

These comments from the participants are very consistent with much of the research. Nickerson (1999), for example asserted the same sentiment.

Knowledge of a domain does not always lead to creativity, but such knowledge does appear to be a relatively necessary condition for it; people who do noteworthy creative work in any given domain are almost invariably very knowledgeable about the domain. One cannot expect to make an impact in science as a consequence of new insights unless one has a thorough understanding of what is already known, or believed to be true in a given field. (Nickerson, 1999, p. 409)

Ms. Paul suggested there to be no short cut to creative thinking. She asserted: “You have got to have a good foundation. You have got to do your ‘homework’—you have got to put the work in.”

Ms. Paul asserted that there has to exist a depth of understanding before a meaningful creative departure can occur; a departure that she characterized as “putting your own spin on something.”

I personally like Common Core, I do because it takes you deeper, you get a deeper understanding of that specific content knowledge and when you understand it deep, you take it to long-term and you can use it. If we’re on the surface I’ve just got it up here at short-term and I’m gonna let it go. So I like Common Core in that we’re looking at fewer things but we’re going deeper to really get it, but I can take those concepts and I can put a *spin* on them and really have some fun with it

Ms. Roberts concurred as she drew a distinction between the expectations of students in her English classes and the expectations of her students in her journalism class. Much like failure to compute basic math algorithms would represent an unavoidable pediment to deeper and creative thinking in mathematics; Ms. Roberts considered a lack of knowledge of grammar to hamper one's ability to create literature.

We gotta get vocabulary words, we gotta do the grammar lessons, we gotta read the literature, we have to understand literature, we have to learn how to write the essay, so and that's sort of the meat, I mean that's gotta happen, too, that has to happen. I mean that's the bottom part of the thinking skill of Bloom's Taxonomy. But that's gotta happen because if you don't have the words to express it, if you don't have the vocabulary, if you don't read the literature that sparks the idea that gives you the framework for seeing the patterns in life and seeing the connections and if you don't have the ability to write, which is a form of expressing that great idea, then the great thinking has nowhere to go, no outlet, there's no- it just lies latent in the Earth.

Ms. Roberts continued her effort to describe the relationship between analytical type thinking skills and creative thinking as she sketched out a graphic for me that illustrated her thinking on the subject.

It seems like to me that Blooms forks depending upon the task at hand and I don't know if I'm getting this right, analysis, it seems like for any kind of growth we need knowledge, we need to understand, we need comprehension, and we need to apply, right? But then it seems like when they start adding creativity at the end, I understand this but something wasn't sitting right because when I teach my students how to write a great essay, they're really evaluating a work or a piece of film or a piece of art or something and we need that, they're not creating, they're actually commenting on the creation, so I think that it sort of splits because if I'm gonna, if I'm Picasso I need knowledge, comprehension, application, I need to know how, really to put things together in order to create, but then there's the flip side of that same coin, I need to evaluate my creation or the creative works of others, so some, I just, I don't want to abandon evaluation all together because that's really important, I need to evaluate what I've done or what others have done in order to learn and grow from it, and—but, so I think evaluation shouldn't

be lost, I think evaluation and creativity should both be up there, does that make sense?

Ms. Roberts used the metaphor of taking apart an engine to illustrate a distinction between analysis and creativity but at the same time implies the necessity of analytical thinking if creativity is to emerge.

When I start teaching—really getting down to the nuts and bolts of teaching seniors how to write a good essay, I needed them to understand that it wasn't just about isolating the details, putting those details back together. The metaphor I came up with was I can take apart an engine, I have no mechanical ingenuity or talent at all, I can unscrew screws, I can take it apart, can I put it back together, do I know how those parts fit together, absolutely not, so that that reveals my understanding . . . so when you're writing about this piece of literature and you understand, and you identify this particular part, this metaphor, this theme, this conflict, you have to understand how it works in the whole, you have to understand the role it plays in the big, so put the puzzle piece back and see how it connects to everything, and I think that when I first read Common Core, I was like okay, good, they're understanding, they're communicating how social studies and history works together with English, they're making these connections which I love. I think that comes before creativity, you need to see how red works with orange, you need to, in order to create a piece of literature you need to understand how metaphor can play a part in the whole work of the poem . . .

As mentioned, Ms. Butler expressed the tension that exists between domain specific skills and creative thinking by drawing a distinction between her first year in implementing CCSS and her second year. She indicated that during her first year she went too far in the direction of “discovery.” Upon reflection of her first year she realized that explicit instruction was necessary if creative thought were to occur.

She stated that the first year: “We went straight to how many ways can you solve the problem, but without having anything to base it on, they could not come up with many ways.” Ms. Butler said that she found the students to begin to rely on a strategy of

guessing and checking when confronted with such problems during the first year. She continued:

I think that is where it goes from 20th to 21st Century—we have got to do both—but that takes time. Last year was a flop—but I can see this year where they can use what they have learned. Every once in a while they would come up with something and you didn't know where it came from.

One important clarification was achieved from Ms. Butler during her follow-up interview. She did not consider discovery learning and explicit instruction as mutually exclusive. During the follow-up Ms. Butler indicated that she employed discovery type exercises in what she considered to be explicit instruction. She defined explicit instruction as the teacher imparting a specific skill—that can be accomplished by simply providing the students with the algorithm but can also be achieved more effectively by employing strategies that allow students (with teacher direction) to arrive at a working algorithm themselves. Allowing students the opportunity to at least exert some measure of creative effort in realizing specific algorithms would likely develop in them a capacity to solve the sort of complex real world problems that call for the sort of adaptive reasoning that affords students the ability to choose algorithms most appropriate to the problem at hand.

Mr. Michaels who as an art teacher might be considered to have contributed the most inclusive or liberal view of creativity also plainly asserted that “content is an important part of creativity.” However Mr. Michaels began his discussion of the importance of domain relevant skills in a different place than the other participants. Most notably he and our chemistry teacher, Ms. Kim at least initially staked out opposite ends

of the creativity spectrum with Ms. Kim indicating her subject matter as more conservative in what is accepted as creative and Mr. Michaels viewing his subject matter as much more liberal or accepting. Ms. Kim stated that most teachers view creativity as “artsy,” and at least initially seemed to concur with this assessment by questioning why I would want to discuss creativity with a chemistry teacher. And Mr. Michael at least initially seemed to support a perception that would seem to discount the role of domain specific skill in the arts as evidenced by his response to the question of “if there exists any prerequisite skills necessary for creativity”—which he immediately responded “none.” One of his comments tended to validate the comment made by Ms. Kim as he detailed what he perceived to be the general view his co-workers who teach outside of the arts department regarding creativity’s place within the context of the school. He said:

Some folks, I think may view their curriculum area as not lending itself well to creativity, particularly if it’s something more along the lines of analytical thinkers, whereas they think, you know, they think fine arts department, you know, it’s all creativity.

However, as both conversations progressed it became apparent that Ms. Kim became increasingly aware of the creativity that she built into the instructional design and in contrast it seemed increasingly evident throughout the course of the interview with Mr. Michaels that the development of technical skill was an essential component of his art classes. He detailed a process of carrying out several exercises designed to build technical skill with a particular medium before presenting students with the main project. Mr. Michaels went on to mention that his Art I class is heavily involved with the

development of technical skill—with less of an emphasis on techniques as students progress through advanced art classes.

And that's more of a focus (technical skill) in the introductory classes and then once we feel they have that good foundation as they work their way through the program, it's less of a focus on the technical skills and probably more a focus on originality and what we talked about with creativity and composition.

Further, the student work that I was able to view represented strong evidence of the assimilation of technical skill in painting, drawing, and ceramics. It became evident that Mr. Michaels built in more technical instruction than he originally indicated. It was also likely that his approach to instruction motivated students to practice and develop technical skill on their own. In fact Mr. Michaels stated in his philosophy of education statement that “There is no replacing a strong work ethic and attention to detail and craftsmanship.” The phrase “attention to detail” and certainly the term “craftsmanship” suggest the importance of a certain level of domain relevant skill attainment on the part of the student.

Mr. Michaels went further in detailing the importance of certain domain relevant skills to the production of original pieces of art work as evidenced by his description of the progression of his students through beginning art class and the final art class. He detailed a strategy of gradual release as follows:

So when they come in as an Art I student we're very heavy on learning technique. Okay, as they progress through the program, it becomes less of the teacher telling them this is what we're doing for our project and more of, as I said, introducing a general subject area and then they kind of then go off and figure out what it is that they're going to use to make up their composition to the point that once they get to Art IV literally the second half of the semester it's all—the ball's in their court.

They have to come up with a series of six to nine pieces and they make all the decisions. And the biggest thing we encourage them is it needs to be original artwork, they're not just simply copying somebody else's work, but they can incorporate other things, and so I mean it's, it's kind of the culmination of everything they've learned in those four years to a point where they hit that final semester and they're literally making all the decisions about their pieces, creating completing original pieces of work.

He continues by explaining that the Art department itself has struggled over the years to work out the tension between domain relevant skills and creative expression. He detailed that each of the originally five teacher art department had their own philosophy regarding the place of domain specific skills in the art curriculum:

Yeah, and we were the third largest high school in the state at that time, and all of us had our own philosophy on how art should be taught. And some of the art teachers felt that you should be more heavy on technical skills to the point where you were spending almost half the semester just focusing on drawing, because drawing can be such a backbone for some of the other mediums. I came from a different spectrum in that I thought it was more important to introduce a variety of mediums because if you have that students who's not successful in drawing, and they struggle with it, then it's kind of like you're turning them off to art, and they may never take another art class again because of that. So I think yes, I understand the importance of drawing, but then I also feel like you need to make that connection to them by introducing the multiple mediums so that they find something that they are interested in to try to encourage them to take further classes, so it's—I think it really depends on the educator's philosophy as to the importance of technical skills. Where I've kind of settled in where we are now is when we introduce a project we will focus on about four to five exercises specifically using technical skills for the particular medium that we're using. And it usually progresses from the easiest on up to the hardest, so for example if we were doing pencil, we would start off by just doing a value scale, and you learning how to shade the different values, and it will culminate to you taking a sphere and having to use all the values and understanding highlight and shadow to shade in the sphere and the shadow so that it appears to be a three-dimensional form. And then once the students have that good understanding of how to technically use the medium, then we head into the project and they can take what they learned to apply to what it is that they want to make.

Later Mr. Michael re-affirmed that anyone can create, but also affirmed the necessity of domain specific skill by making the assertion after listing a number of art mediums that a student could be technically “good at”:

There are so many more things that make up art whether it be fiber arts or ceramics or collage, sculpture, just so many different things, and I tell them that in our adventure through art, one of the things that we hope to do is find that thing that they feel that connection to that they enjoy, or they’re good at, and then we will have made the connection on what in art that they’re actually good at, but it’s—anybody can create.

Mr. Michaels account was indicative of several of the participants struggle in attempting to express the relationship between content knowledge and its analysis and creative thinking. The struggle to adequately define the tension between the two sets of skills represented as much of a struggle for the teachers as it did for the psychologists who have attempted to describe creativity. The participants by and large seemed to agree with much of the existing literature that the content knowledge and analytical skills (domain relevant skills) that are traditionally valued in school and the creative relevant skills which have enjoyed far less emphasis are both necessary for the expression of creativity and the solving of unfamiliar problems encountered across all disciplines of study.

Ms. Kim extended the necessity for domain specific content knowledge to the teacher if they are going to develop creative thinking in their students. In Ms. Kim’s estimation in order for the teacher to develop creative thinking in her students, the content knowledge of the teacher has to be “second nature.” Expending the mental “attention” that is necessary to establish the basics of classroom management and

conceptual understanding, will not in Ms. Kim's opinion leave much attention available for the development of creative thinking. Ms. Kim's assessment encapsulates a pivotal finding in the project that was representative of all the participants. It is an assessment that virtually mirrors that of Howard Gardner. Gardner explains "those with a greater knowledge base can be creative in ways that those who are still learning about the basics of the field cannot" (Gardner, 2003, p. 113). Only by way of an understanding of the proverbial "box" can anyone expect to make a meaningful step outside of the box. In fact the Math CCSS also echoes this idea by asserting that "a lack of understanding of mathematics prevents a student from ability to deviate from a known procedure to find a shortcut" (CCSS, 2010b, p. 8).

Gardner is suggesting an idea that there exists a correlation between a person's depth of understanding of a given domain and the potential impact that person's ideas may have on the domain. Such an individual would simply have more possible avenues of departure available to him or her as he or she would have access to more fundamental ideas of a given domain than one would with a more shallow understanding. As mentioned earlier in the chapter Ms. Roberts was the participant who most explicitly described this idea from her experience as a teacher:

And you know I can connect things on a superficial level but to have that profound revolutionary creativity I think the connections have to occur much deeper. I think that even in that unconscious area of our brain where so much goes on, because I think you said 'how often have you come up with a solution after a good night's sleep'—our brain keeps thinking even though we are not awake; it is that incubating state, that power-down state that allows the brain to access those deeper areas. I guess that's why I think that deeper thinking, those deep connections that come from that incubation period is necessary for profound creativity.

Figure 5.7 attempts to illustrate the potential relationship between the depth of analysis of a particular concept and the potential creative impact that might result. The Figure represents the second factor of consideration expressed by the working model of creativity illustrated in Figure 3.4. As Figure 5.7 suggests, the first step in the departure from the status quo is at least the demonstration of some level of understanding and analysis of the “status quo.”

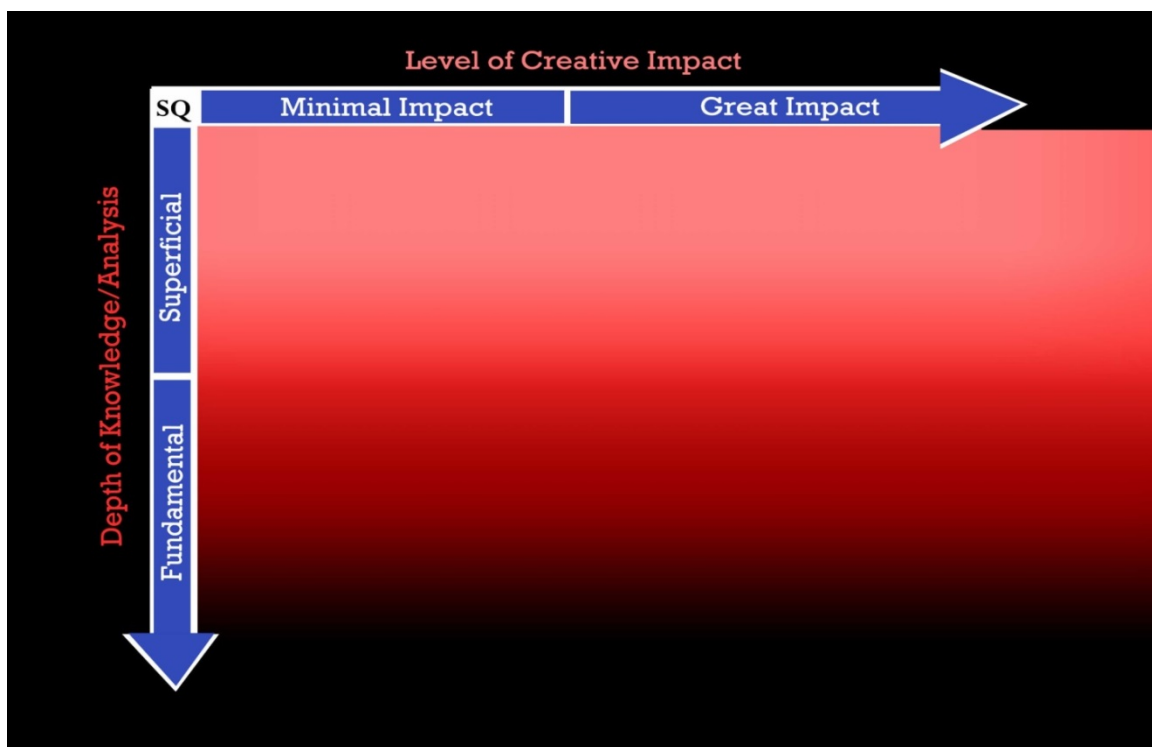


Figure 5.7. Depth of Analysis.

The y axis describes the depth of understanding/analysis of the existing content of a domain existing along a continuum from a very superficial understanding of a domain (or a superficial analysis of some aspect of a domain) to a very fundamental understanding of a domain (or a very deep analysis of a particular aspect of a given

domain). However, if the goal is to move away from the status quo then a descent down an already existing path can never be sufficient in and of itself to divert from the path. In order to avoid ascending back via the same path and to thereby arrive at a position that is different from the status quo, then some other factor must be considered. Hence, no amount of domain specific skill or level of analysis is sufficient for creativity to emerge. In the following section, I will analyze the participants' attempts to describe the uniquely human capacity to imagine the "what if;" to describe the type of thinking that allows the individual in particular and mankind in general to break away from what is currently accepted and chart a new path. The participants will add to the working model of creativity by describing the types of approaches to instruction that they employed that would produce in students the capacity to depart from the y axis (existing knowledge) and thereby "create."

Creative Relevant Skills

Therein lies the key, I think to Einstein's brilliance and the lessons of his life. As a young student he never did well with rote learning. And later, as a theorist, his success came not from the brute strength of his mental processing power but from his imagination and creativity. (Isaacson, 2007, p. 7)

The participants sought to describe some of the actions of the individual (creative relevant skills) that would allow them to depart from an established path. Amabile and Collins (1999) describe creative relevant skills as

(a) the ability to cope with complexities and breaking ones mental set during problem solving, (b) knowledge of heuristics for generating novel ideas such as trying a counterintuitive approach and (c) a work style characterized by

concentrated effort, an ability to set aside problems, and high energy. (Amabile & Collins, 1999, p. 102)

Each of the participants of the study offered examples of how they worked to help students develop the capacity to break their “mental set” during problem solving and detailed certain strategies that helped them to “generate novel ideas.” They also had much to say about the importance of “concentrated effort” within the creative process. This third portion of Amabile and Collins’s definition of creative relevant skills factored much in the participants’ responses, but was spoken of by them in terms of their power over setting the right environment that will produce such concentrated effort, and therefore will be discussed in the section of this chapter entitled “context.”

Ms. Kim held the ability to demonstrate creative thinking skill as necessary for success with meeting the Common Core State Standards. She spoke from her role with working with teachers from all content areas as lead teacher as well as her role as the parent of a ten year old. Ms. Kim expressed how creative thinking was expected to be employed by her daughter as a result of the new standards. Ms. Kim recounted how differently this approach was from the way in which she was taught in school years ago.

What I did see was that the way the Common Core was written; she was allowed much more creative thinking and was encouraged to creatively think about math in a way that I was never encouraged to think at that age. And I can see the ramifications of that down the road as being great and I mean in a good way because she was thinking about truly what the math meant- not just doing the rote steps. And I was truly impressed with that.

In addition, Ms. Kim thought that such creative thinking skills could be developed. She went on to assert:

We all have the ability to embrace the things that we are interested in—the things that we are good at and to step out and use those things to create, and be creative with those things to make the world a better place. It's just that we have to learn to *hone the skills*, learn to have the inner desire to put those ideas out there.

But what are the skills that need to be *honed*? On one hand the question of how ideas are generated is considered by many psychologists to be mysterious if not unknowable (Ward et al., 1997). On the other hand many contend that the skills are virtually written into our DNA (Koestler, 1964). It may indeed be the ubiquitous nature of creative thinking that makes the concept so difficult to define. But as will be detailed in the following sub-sections the participants offered several strategies that they employed within their classrooms which they believed contribute to the development of the creative type of thinking.

Imagination, daydreaming, and play. Play emerged as a strategy employed to begin the process of diverting from an established path-breaking set, promoting discovery and helpful in problem solving. Ms. Angelou spoke passionately about the role of play in her classroom:

That's what they do, and that's what they're good at, they're children, they play. When we're doing a math assignment, I always let them play first. I like to see what they come up with first before I ever start a lesson and say how these could be utilized to solve.

Ms. Angelou continued by asserting that children learn through play. She stated that children are not mini-adults. "They need to play and interact with their environment." Three of the participants used the word "fun" to describe student response to projects that encouraged the expression of creativity. Mr. Bass would tell his students

“It is time to have some fun and be creative.” Ms. Paul makes conscious efforts to take the concepts that the students are supposed to learn and “put a spin on them and really have some fun with it.” Mr. Michaels described how his approach to developing student creativity was fun for both he and his students:

For me this is fun, I enjoy what I’m doing, and I think that sometimes those positive vibes come off to the students and because of what we do and I’m hoping the encouragement that I give them, you know, they’re having fun, too.

The participants not only saw play as a motivational factor but also saw the mind’s desire to play with ideas to be an instructional strategy that can be incorporated to achieve a deep level of understanding and a high degree of creativity. Ms. Roberts characterized the mind’s propensity to play with different possibilities as the “default network.” As detailed in Chapter III, Henri Poincare thought there to exist a period of incubation, where the mind *plays* with ideas—extending them and merging them at an unconscious level (Ghiselen, 1952). This may also be related to what Ms. Butler considered to be the “gelling” of various concepts which she insisted takes time. Ms. Roberts picks up on this idea in her comments regarding daydreaming. She began her discussion about daydreaming as she asserted that the constant access to technology disrupts this “default network.” Ms. Roberts then goes on to describe a phenomenon that is familiar to all innovators; the moment of illumination where the solution to a long sought problem is presented to the conscious mind at a time when one is involved in an unrelated activity.

I've done a lot of research on this where you're constantly interrupted by the beep or by the, you don't make those deep lasting connections which leads to great connections which leads to new ideas which leads to creativity which leads to innovation, those deep connections. I mean have you ever watched House, the TV show? Well, what this show reveals also happens on any of those like Law and Order shows, Criminal Minds, it is in those down moments where House, I mean he's a doctor and he makes these great diagnoses and they always come when he is in his office and he's throwing his rubber ball against the wall and he's just sort of on simmer, he's down—he's on sleep mode or whatever it is, he doesn't have constant stimulus, so his brain, and this is physiological, his brain is able to make those deep connections and so, and then it just comes to him. It's like Newton underneath the apple tree and he's like oh my gosh! Constant stimulus doesn't allow our brain to make those deep connections, so I talked to them, especially my honors students, you can't hurry a great essay, you can't write them the night before, you can't write an excellent essay with a phenomenal piece the night before, you have to allow your brain to sort of go into sleep mode, my best lesson plans I always came across when I was running or in the shower, when you sort of disassociate and let your mind sort of simmer, I don't know if I'm using, I can't find the words to precisely explain it. When I start school next year and I don't want to see the cell phone, if you finish the test early I don't want to see the cell phone, I want you to daydream, I've got four articles about the benefits of daydreaming. Researchers using brain scanning technology found that the default network, the relatively new buzzword for the daydreaming state was significantly more active in a superior intelligence group, I mean do we need to just shut down.

Synthesis. As mentioned earlier in the chapter, Ms. Roberts saw her “great thinkers” as synthesizers of diverse ideas—“they put together, they see the connections, and they're witty, irony, funny connections.” She concurred with much of the research on creativity in her assessment that this ability to put together diverse concepts often results in the production new and meaningful ideas and thereby should be considered as an essential component of creative production. The participant's conclusion that synthesis is inextricably linked with creativity is an important finding because the capacity to synthesize relies on the development of a deep conceptual understanding that is at the same time fluid and flexible. In fact one might note that creativity replaced synthesis in

Krathwohl and Anderson's revision of Bloom's Taxonomy (Krathwohl & Anderson, 2010). As a result the synthesis of ideas and concepts proved to be a point that several of the participants explored as they described the creative act. Ms. Roberts repeatedly affirmed synthesis as a strategy for departing from the given and cites the CCSS as supporting this type of thinking.

I think from my understanding they (the CCSS) support synthesis, a lot of making connections, and I remember when I really started teaching the essay, (students) don't understand the synthesis part and the Common Core does understand the synthesis part. When I started really getting down to the nuts and bolts of teaching seniors how to write a good essay, I needed them to understand that it wasn't just about isolating the details, it was about putting those details back-

Metaphors and analogies. The writers of the English Language Arts CCSS clearly state an expectation that all students be able to “create a high volume and extensive range of print and non-print texts” (CCSS, 2010a, p. 4). Ms. Roberts believes in order to do this students need to understand how elements such as analogy, metaphor, etc. fit into the overall composition of a work of literature to achieve a certain purpose of the author.

However, there was not as much emphasis on the metaphor and the analogy as a significant way of thinking creatively as compared with the emphasis on metaphor and analogy within the literature. Certain psychologists saw the analogy and the metaphor as more than a literary convention. Like synthesis, psychologists saw the production of metaphors and analogies to be a valuable window of opportunity for the departure from an established line of thinking. Ward et al. (1997) in particular saw the Metaphor as essential to the creative leap from the status quo. Ward considers the metaphor to be “at

once evidence of creative functioning in those who produce them and spurs to creative discovery and enlightenment those who hear and read them” (Ward et al., 1997, p. 14).

Questioning, critical thinking, and problem finding. Another important finding regarding instructional approaches that lead to creative production was the important role questioning, critical thinking and problem finding. The participants saw the act of questioning and the process of critical thinking as manifesting itself at multiple points in the creative process. They concurred with much of the research in their estimation of critical thinking as necessary for the evaluation of one’s solution if the solution is to have value and is to meet the requirement of the problem at hand. The critical thinking and questioning that we are concerned with at this point, however transpires at the very beginning of the creative process. Critical thinking in the estimation of two of the participants constitutes the process that actually opens the door for the possibility of breaking set. Ms. Paul insisted that instead of asking “what’s the answer, what’s the answer- we should encourage students to ask themselves what are the possibilities?” In this sense considering the “possibilities” would be seen as inextricably dependent upon the questioning of some established aspect of a domain.

Critical thinking as manifested in an attitude of questioning often results in problem finding. Simply asking a question that has never been posed before can reveal a problem or opportunity that has never been noticed before. Ms. Griffin was the participant who most notably approached the idea of *problem finding* as a creative endeavor. Both Ms. Griffin and Ms. Roberts mentioned Robert Reich’s quote that we are trying to prepare students for jobs that don’t exist yet to solve problems that we don’t

know are problems yet.” Ms. Griffin recognized that the problems and opportunities that Reich alluded to would have to be identified by an individual at some point in time. And it is this identification of such problems and opportunities that might represent the beginning of the creative process. She said that we need people who can “think creatively and produce and *seek possibilities*” With this comment, Ms. Griffin began to link critical thinking with creativity. She stated:

Something I kinda been thinking about the difference between thinking creatively and thinking critically because I think they go hand in hand. Because then you like, when you start thinking of other possibilities or new ideas, then you are (thinking creatively). So maybe you have to think critically sometimes before you can get to the creativity part—possibly.

She went on to mentioned that one could have critical thinking without creative thinking but one could not have creative thinking without critical thinking. Her sentiment is very similar to Gardner’s conception that the creative process begins with a feeling that something is not right; or where Schank might assert that there exists a gap between the current state of affairs and a more desired state. Ms. Griffin expressed this relationship as follows:

I think, to think creatively you have to be able to think critically. I don’t know that to think critically you always necessarily have to think creatively, because to me when you think critically you’re analyzing something that already exists or it may possibly, if you’re reading something and analyzing, for example, a piece of text, then you’re thinking critically about something someone else has already created. Does that make sense or is that convoluted?

Ms. Griffin and Schank appeared to be of the same opinion that questions are the gateway to creative thinking (Schank, 1988). “Teaching people to think,” Schank

concludes, “means teaching people to ask questions, not coercing them into memorizing answers. A question that has a stock answer to it is always the wrong question” (Schank, 1988, p. 35). Schank draws a familiar distinction between adults and children he suggests that adults tend to routinely inhibit their questions, while children he says “have no self-editing mechanism to stop them from asking the questions that occur to them” (Schank, 1988, p. 175).

Ms. Kim suggested that such an approach would have implications in the manner that teachers are trained. Ms. Kim saw the necessity for teachers to possess strong knowledge of the content if they are to guide students through a process of questioning and discovery rather than relying on explicitly providing them with the facts.

Flexibility of thinking and adaptive reasoning. A finding that would have implications across the education spectrum was the participants’ notion of adaptive reasoning as being dependent upon if not synonymous with creativity. Adaptive reasoning is generally considered to be the ability to adapt existing knowledge of concepts to unfamiliar problems. This would include the ability to imagine a path toward a solution that might include any number of different concepts and algorithms. Like synthesis, adaptive reasoning is dependent upon a deep conceptual understanding of content that is also flexible. The National Research Council (2001) considered the deeper the understanding of particular concepts the more likely the right set of algorithms will occur to the student when confronted with an unfamiliar problem. This statement underscores the participants’ conception of creativity comprising of not only the development of creative capacity but also as a tool for deeper conceptual understanding.

Ms. Butler spoke extensively about how the CCSS expects students to achieve the ability to put together various mathematical concepts to solve complex and unfamiliar problems. It was assumed by the participants that the manner in which students learn concepts affect their ability to use such knowledge in the future. Concepts learned through discovery and problem solving may render such concepts more likely to present themselves as useful when a new problem arises. The writers of the Math CCSS express this notion explicitly as the writers warn that students who lack understanding of a topic may rely on procedures too heavily: “Without a *flexible* base from which to work, they may be less likely to consider *analogous* problems, represent problems coherently, justify conclusions, and apply the mathematics” (CCSS, 2010b, p. 8).

The NRC considered adaptive reasoning to hold a particularly prominent position in their conception of the strands of mathematics to be emphasized. According to the NRC, adaptive reasoning refers to “the capacity to think logically about the relationships among concepts and situations” (NRC, 2001, p. 129). The NRC considers such reasoning to be “the glue that holds all of the other strands of mathematics together” (NRC, 2001, p. 129). Below the NRC describes the interdependent relationship between traditional analytical type thinking and the more creative type thinking to describe adaptive reasoning:

Many conceptions of mathematical reasoning have been confined to formal proof and other forms of deductive reasoning. Our notion of adaptive reasoning is much broader, including not only informal explanation and justification (analytical type skills) but also *intuitive* and *inductive reasoning* based on *pattern*, *analogy* and *metaphor* (creative type skills). (NRC, 2001, p. 129)

Ms. Butler expressed the difficulty that her students experienced as they were expected to understand several concepts well enough to be able to know which combinations of concepts would be useful in the solution of a problem.

(The test) measures their thinking. They may have known how to solve a concept or learn a concept but they couldn't put five concepts together and I mean that's what we want them to be able to do. I think it measures an ability to be able to put all the concepts together, to make that relationship, which is what the point of the Common Core is. I mean it's to make a relationship between geometry, algebra- all the different types of math. But you can't just teach that explicit instruction because based on the test it's not just a concept here and a concept there, it's—you look at the assessment piece, the assessment piece is measuring, putting it all together. I think the test measures our advanced learners really well- it measured their ability to think I think that it was a great measurement for them, but not such a good measure of lower and average ability students. They may have understood certain concepts but had difficulty putting four or five concepts together to solve a problem. Not sure that a 6th 7th 8th grade student's brain is cognitively ready. It did measure thinking- it did not measure particular concepts in isolation.

This putting together of ideas to solve unfamiliar problems seems to be at the heart of the adaptive reasoning which the math standards expect, and validates Ms. Butler's struggle to insure that her students learn the concepts in a manner that will be useful for creative problem solving in the future. Ms. Butler's comments along with what the writers of the CCSS appear to expect of students, point to the importance of teaching concepts in a manner that will simultaneously produce both a deep *and* flexible understanding of math concepts. It appears by way of Ms. Butler's comments that such flexibility in applying math concepts is unlikely apart from a deep conceptual understanding of the concepts at hand. Ms. Butler lamented the fact that so many of her

student scored around the 18th–23rd percentile on the Math End of Grade Test. She asserted:

I know that they learned and I know that they can put things together, it didn't show. What made it not show? I mean I think it could be the teaching; it could be the fact that we didn't have time to make a connection. They needed direct instruction and then we didn't have time to make the connection between that and the rigor.

The above statement when taken in context of the whole of her interview, indicates to me that Ms. Butler is describing a view that the individual concepts that were taught did not have sufficient time to gel and become useful on a test that is attempting to not only assess the knowledge of the concepts taught but also assess the level of adaptive reasoning employed (i.e., knowing which concepts to use to solve unfamiliar problems). Partial credit, in other words was not given for the acquisition of domain relevant skills. It is only when those domain relevant concepts and algorithms were combined with the ability to go beyond the given and adapt such knowledge to the requirements of a particular problem was credit given. Ms. Butler's seventh-grade daughter might have best articulated this. When asked by Ms. Butler if any of the questions on the test required a singular concept that was taught in class, Ms. Butler's daughter replied "not one."

It appears that the writers of the CCSS and teachers like Ms. Butler recognize what researchers of creativity have asserted, and that is that some degree of creative thinking has to be integrated with the content knowledge if students are going to meet the challenges of an unpredictable future. Attempts to define and quantify the degree of

creative thinking are not unprecedented. Guilford defined some of the vehicles necessary for departure from an existing content area such as fluency, flexibility and originality (Guilford, 1986). Torrance went as far as to design assessments that quantified the “degree” of creative thinking (Guilford, 1986).

As depicted in Figure 5.8, creative thinking is necessary for the departure from the existing content anywhere along the continuum of analysis. The consideration of a ‘degree of creative thinking’ constitutes the third factor included in route to recreating the working creativity model proposed in Chapter IV (Figure 3.4). The figure suggests that both the depth of analysis and the degree of creative thinking determines the level of creative impact.

Again creative thinking is not synonymous with creativity. Creative thinking or creative relevant skills represent the set of skills that allow avenues of departure from what is known to emerge. These set of skills might encompass such strategies as the synthesis of diverse concepts, the production of a metaphor, or the altering of one’s altered point of view. But the point is that in order for creativity to emerge- in order for something new and meaningful to come into being, then the departure must occur from something that is already known which requires a certain level of domain relevant skill- a certain level of content knowledge and analysis. It is both the degree of creative thinking along with the depth of analysis that affect the level of creative accomplishment. The participants in no way suggested replacing explicit instruction, and analytical ways of thinking with creative thinking but certainly saw creative ways of thinking as integral to the success of the student. Their approach to the integration of creative relevant skills

was measured much like Torrance's assertion that creative thinking abilities "constitute just one part of our expanded and expanding concept of the human mind and its functioning" (Torrance, 1967, p. 59).

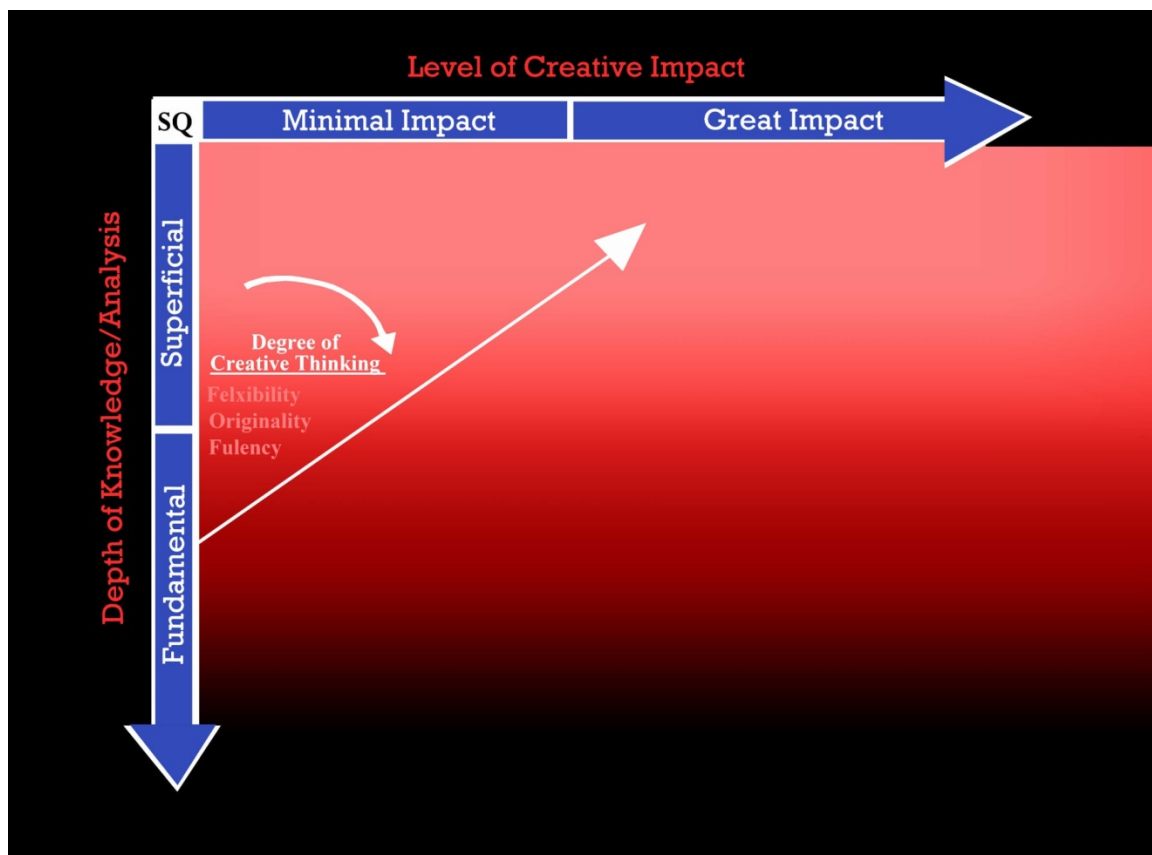


Figure 5.8. Degree of Creative Thinking.

The details provided by the participants' day to day efforts to develop creativity provided a richness and affirmation of the working model of creativity detailed up to this point in the discussion. The participants' completed the relationship between the depth of analysis/content knowledge, the degree of creative thinking and the level of creative impact. Although the relationship is complete, a comprehensive description of creativity

would not be complete without a consideration of the contextual factors that might tend to either promote or restrain creativity. As a result the following section will complete the model by adding the accounts of the participant's conception of the manner in which context affects creativity.

Context

The past few decades have been a dark time in many schools. Emphasis on high-stakes standardized testing, teaching to the test, de-professionalizing teachers, and depending on data rather than teacher expertise has created classrooms that are increasingly devoid of play, rich materials, and time to do projects. Fortunately, there is a technological and creative revolution underway that may change everything. (Martinez & Stager, 2013)

As discussed in the previous section, the current research on creativity along with the perceptions of the participants of the study agree that both domain specific skills and creative specific skills are necessary for creative production but neither sufficient alone. This section explores another broad point of agreement between the participants of the study and the current research. The section details what the participants had to say about contextual factors that either inhibit or promote creativity and the perception of their ability to influence both the individual creator and the context in which he or she operates.

Context is a factor that is virtually inherent in the (generally accepted) definition of creativity. As Sternberg points out, "Always what is viewed as creative will depend on the match between what an individual has to offer and what the context is willing to value" (Sternberg, 2003, p. 115). If "value" is to be an indispensable consideration then, then as alluded to in Chapter II, there must of necessity exist an entity that assumes the

task of appraising value. Researchers have studied the creative process, the creative product, the creative press (environment) and the creative person. It should be of little surprise that teachers who were recognized as exemplary would focused much of their reflection on the latter two factors and expressed confidence in their ability to set the right conditions within the mind of the student as well as the right conditions within the student's immediate environment that would encourage the expression of creativity.

While psychologists argue that the process of creativity "by definition is mysterious and beyond empirical scrutiny . . . the behavioral dispositions of the person creating are not" (Feist, 1999, p. 273). Taking advantage of "behavioral dispositions" interests and individual talents as well as setting the most beneficial environmental conditions emerged among the participant's responses as factors which they considered to be pivotal in their attempts to encourage the expression of creativity.

The participants identified contextual factors that tended to inhibit creativity and described their efforts to mitigate them. This section on "context" will be structured around how the participants described their approach to mitigate what might be considered as the "killers of creativity." The killers of creativity are complex and were described by the participants as operating at both the level of the individual and the level of the environment within which the individual works. Once again the three-way conversation that I sought to mediate between the teacher's perception of creativity, the CCS and the existing literature on creativity proved to be beneficial as I employed Ward's conception of the three contextual factors that tend to restrain creativity to structure the participant's responses on this point. These killers of creativity can be

considered to be *self-regulation* at the conscious level; *functional fixedness* at the unconscious level and *conceptual inertia* at the organization level (Duncker, as cited in Pink, 2009; Koestler, 1964; Ward et al., 1997). The present section will be divided into four parts. Each of the three “killers of creativity” will be addressed separately. I will conclude the section with accounts of the participants’ perception of their ability to overcome the effects of functional fixedness, self-regulation and conceptual inertia.

Functional Fixedness

Some of the most important scientific discoveries consisted of the elimination of psychological road-blocks- in uncovering what had always been there. (Koestler, 1964, p. 236)

What psychologists have characterized as functional fixedness may be the most primary of the killers of creativity. Functional fixedness is the condition that I believe Mr. Bass was describing when he stated that our students need to be “unschooled.” Functional fixedness is characterized as the inability to move beyond the given—a state where the individual is not conscious of alternatives, and unable to imagine other possibilities. Functional fixedness may otherwise be characterized as tunnel vision, narrow thinking and entrenchment (Sternberg, 2003, p. 113). Here ideas are not discarded by the conscious mind; ideas in the case of functional fixedness are never brought to conscious evaluation in the first place. “There is a cost,” Schank suggests “to learning how to do something—namely, you begin to think that the method you learned is the only way to do that thing” (Schank, 1988, pp. xi, xii).

Functional fixedness is the inability to consider alternatives to an established path or the inability to see an object as useful for any purpose other than its prescribed purpose. Functional fixedness often manifests itself in an inability of the individual to improvise. The “degree of creative thinking” that is illustrated in Figure 5.6 as a means of departing from the established route in such a case would be non-existent.

Ms. Griffin saw a potential negative aspect of content knowledge which underscores a question posed in Chapter I; in that how can one engage in a discipline to a depth where a meaningful departure from existing content of the domain is possible while avoiding becoming entrenched or “fixed” by the contents of the existing domain to the point where the individual is unable to entertain how certain aspects of the domain may be transformed. While acknowledging the absolute necessity of domain specific knowledge and the necessity of critically thinking about the work of others within the domain, Ms. Griffin offered this warning:

I think, it could also be stifling, too, if you’re constantly looking at the work of others you may feel pressured to, okay, that’s what the norm is and conform to that, so I think it depends on the individual.

The context in which teachers operate is of course greatly impacted by the concepts and skills that they are directed to teach. One of the most consistent themes that emerged from the participants was their perception of the Common Core State Standards as encouraging creativity. The participants saw the standards as an ally in their struggle against functional fixedness as evidenced by the manner in which they described their support of the standards. The Standards, now in its second year of implementation have

been met with substantial push-back in North Carolina which has left the future of the CCSS in North Carolina is much in doubt. General Assembly voted to do away with the CCSS beginning as early as school year 2015-16.

Nonetheless, each of the participants (except Mr. Michaels who stated to have little contact with the standards) thought that the CCSS represented meaningful move in the right direction for public education and cited its expectation for students to think creatively as a major reason. In fact several of the participants asserted that the new standards aided in the development of creative thinking before a specific question regarding the standards was posed. Ms. Angelou expressed her affection for the CCSS as a weapon against functional fixedness, which she characterized as placing students in a “mold” where teachers modeled one correct approach to a problem.

We’ve all been taught to model and to show (the students) what we want to be the end outcome. And if there was a picture there of a red cardinal the child that may color it a different color or may think out of the box and add something to it—a teacher would come over and say ‘oh that’s not the way mine is!’ We have just hindered their creativity because they were producing a new idea based on what their perspective was and what the picture should look like. And I think that we do that too often in everything.

Ms. Angelou saw the CCSS as in remedy to this sort of functional fixedness as she mentioned (under her breath) “This is why I *love* the common core.”

Ms. Butler was unwavering in her contention that the CCSS calls for creative thinking on the part of the students and cites this as one of the reasons why she states that she would “hate to see the Common Core go.”

I think the new Common Core leads itself to creativity but where we're so used to not doing that, we kinda limited ourselves but I really do think the new curriculum leads itself to create, I mean it really does, because it leaves it wide open, the students are able to, in math, they're able to discover on their own how to solve that problem or how many different ways can you come up with.

Ms. Butler indicated that the first year that she attempted to implement the CCSS, she would have agreed with the critics that the standards constituted a one size fits all industrial age approach to teaching. But after that year she came to understand the standards as the opposite, in that the standards call for students to avoid the "one size fits all" approach to learning and to engage their creative capacities to avoid becoming dependent on the memorization of algorithms and *fixed* on one particular way of viewing a problem.

If you take one look at it you would say ooh they are making everybody learn the same thing. But when you look at the wording of it, and how the students are perceiving—the standards are wide open for them to come up with how they want to solve that problem. So I think it (CCSS) involves them being creative, and they are not used to that. That is the hard part about Common Core they are not used to using their own thinking.

In Ms. Butler's estimation the CCSS expects students to form a relationship between diverse concepts and topics in mathematics such as geometry and algebra. The standards expect students to be able to adapt what they have learned in an algebra unit with what they might be currently learning in a unit on geometry. This transfer of reasoning has been called adaptive reasoning, bisociation, or flexibility in thinking. Each of these terms in some manner constitutes a loosening of functional fixedness and the

resulting ability within the mind of the student to diverge from what has been explicitly given.

Functional fixedness provides a means of describing how people with similar content knowledge and analytical skill can vary in their ability to arrive at creative ideas. Isaacson (2007) provided the example of Max Planck, Henri Poincare, and Hendrik Lorentz as all coming “close to some of the breakthroughs that Einstein made in 1905. But they were a little too confined by dogma based on authority.” “Einstein alone,” Isaacson wrote, “was rebellious enough to throw out conventional thinking that had defined science for centuries” (Isaacson, 2007, p. 550). The participants indicated that their approach to teaching the content could make the difference in the propensity of their students to be fixed on one way of perceiving a situation or one method of approaching a problem. In other words, the participants seemed to indicate that functional fixedness can be attacked at the Mini-C level in that if teachers provide students with opportunities to question assumptions, discover concepts, alter point of view, etc., then such learning would lead to a loosening of functional fixedness. It was in response to this approach that Ms. Butler very candidly reflected, “maybe this is the way that we should have always taught math.”

Technology as a Contributor to Functional Fixedness

Technology (another term routinely bantered about in public schools) emerged as a substantial barrier to creative thinking in the minds of several participants. Technology emerged as much more of a contributor to functional fixedness than it emerged as increasing the likelihood of creative thinking. The importance that is generally attributed

to the use of technology is evidenced by the term appearing a total of four times in the state of North Carolina's guiding goals and objectives (NCDPI, 2014). As evidenced by Ms. Butler's apologetic tone when criticizing technology, the importance of technology to the future of public education remains practically unquestioned. Nonetheless, Ms. Butler along with Ms. Roberts and Mr. Bass saw technology also as a factor within the context of their school environment that can actually have the effect of inhibiting creative thinking. Although neither teacher denied technology as a tool that can lead to phenomenal innovation and creativity- they saw the manner in which technology is generally used by students to have the opposite effect. Ms. Roberts stated:

I don't think they have the discipline necessary to put it down. I don't think they have the judgment, the foresight, the big perspective to see how it's hurting them in the long-term. I mean I've done a lot of research on this where you're constantly interrupted by the 'beep,' you don't make those deep lasting connections which leads to great connections which leads to new ideas which leads to creativity which leads to innovation, those deep connections.

Over the past year I have tried to embrace technological tools, but what I have learned is that they are not the answers to all of the problems in education—they are just not. My knowledge of how the brain works tells me that constant superficial learning is not what we want.

Alan November (2012) characterizes much of the way in which computers are used in schools as providing children a thousand dollar pencil. "Simply adding technology—the thousand dollar pencil—to the current highly prescribed culture won't help very much" (November, 2012, p. 6). November continues his indictment by stating that the "successful implementation of technology into k-12 education is much more complex than providing students with access to computers and moving content to online

courses. Instead, we have to teach students to use information innovate, solve problems, *create*, and be globally connected” (November, 2012, p. 15).

Mr. Bass commented that it is the responsibility of the teacher to teach students to use technology as a tool rather than being “tooled by the technology—if that makes any sense.” I gather that Mr. Bass was criticizing teachers being driven to utilize technology apart from a meaningful context. When asked what barriers might exist in the development of creativity, Ms. Butler exemplified this unquestioned expectation to embrace technology by stating “you are going to hate my answer.”

Technology emerged in the minds of Mr. Bass, Ms. Roberts, and Ms. Butler as a tool that can just as easily (if not more so) be used to inhibit creative thinking as it could be to encourage it. Technology represented a specific example of how the manner in which teachers use the strategies and tools available to them can either restrain or promote creative thinking.

In the words of Martinez and Stager, authors of *Invent to Learn*, students have become consumers instead of composers with respect to how technology is used (Martinez & Stager, 2013). Instead of viewing technology as a creative tool Ms. Roberts in particular saw it having the effect of dulling ones imagination. Instead of a tool for deep analyzes, technology became a shallow diversion. Instead of using technology as a tool that would free the students to analyze at a deeper level and to create at a higher degree, students in Ms. Robert’s estimation tend to become fixated with technology at the most shallow and routine level.

Ms. Butler was apologetic in her criticism of technology:

I don't know if you are going to like my answer. I don't think that the students that we have today are as creative as they were five or six years ago. We were just talking about this—I posed the question. And I think the reason is . . . please don't shoot me, we were saying technology—they don't have to be creative. I hate to say that- because we want technology but I am not so sure that . . .

Ms. Butler then provided an example where she asked her students how many different ways they knew how to do long-division and described how each student pulled out their phones and wanted to show me on a calculator, “this is how you punch it in.”

Ms. Roberts was the most passionate about technology as a barrier to creativity. Ms. Paul asserted that it is more difficult for students to develop creative thinking now as a result of “all of the technology that we have out there now.” She described a change in school policy over the current school year where a prohibition against students having their cell phones out during the school day was lifted. Ms. Roberts recounted that she noticed a difference in the depth of thinking among her students after the prohibition was lifted.

I think that the cell phones killed it. [*Really?*] I do, I do, I do, I do. The cell phones were a disruption and a distraction and a way to suck up the free time, I hate them, Mr. Scott, I hate them. Instead of conversing and having meaningful conversations, they were checking the last tweets. I really tried to sort of embrace the (change)—(In years past) midway, and toward the second, latter half of the class it seemed like the whole of that class was greater than the sum of its parts, and that has always been the magic of journalism, always, once they jelled, congealed, shared, great things always happen. It didn't happen last year, and I'm like is it me, have I lost my interest, have I lost my ability to sort of facilitate this class, what is going on, and I even talked to them about it . . . but I don't think it was me, I think it was them. I think it was the smart phones . . . Smart phones kill creativity, I hate them, today's students seem to need constant stimulus, which gets in the way of deep thinking. Students do not make deep connections.

Several of the participants seem to whole heartedly agree with Martinez and Stager in their assessment that technology is no automatic anecdote to functional fixedness in education. “Technology in education,” Martinez and Stager say “usually means inventing new gadgets to teach the same old stuff in a thinly disguised version of the same old way” (Martinez & Stager, 2013, p. 19).

Self-Regulation

The mind, wrote Wilfred Trotter, likes a strange idea as little as the body likes a strange protein and resists it with similar energy. . . . The new idea is the most quickly acting antigen known to science. If we watch ourselves honestly we shall often find that we have begun to argue against a new idea even before it has been completely stated. (Koestler, 1964, p. 217)

Even if an individual has been able to analyze a problem to a certain depth, avoid functional fixedness and exercise a degree of creative thinking that would allow a level of departure from what is given, an overactive self-regulation might prevent the idea from ever moving beyond the mind of the would-be creator. A certain level of self-regulation is necessary for creative production but as alluded to in the above quote an overabundance of self-regulation can have a debilitating impact on the expression of creative solutions. The present sections detail several of the participants’ struggle to negotiate the most beneficial level of self-regulation. “Creative work that is to be realistic must be done under some degree of evaluative restraint. Too much restraint, of course is fatal to the birth of new ideas” (Guilford, 1986, p. 16). As Guilford suggests, self-regulation manifests itself in the very productive evaluation and critical assessment of ideas which are indispensable to the “value” or “meaning” criteria of creativity. Lau

(2009) of the University of Hong Kong also asserted the crucial role that critical thinking plays in the creative process. Lau states that

It is sometimes suggested that critical thinking is incompatible with creativity. This is a misconception, as creativity is not just a matter of coming up with new ideas. The new ideas should also be useful. Critical thinking plays a crucial role in evaluating the usefulness of new ideas, selecting the best ones and modifying them if necessary. (Lau, 2009, p. 1)

In fact the writers of the ELA CCSS established the necessity for students to be able to “comprehend as well as critique” as one of its seven capacities of a “college and career ready” student (CCSS, 2011, p. 7). However, an overabundance of self-regulation, a propensity to be too conservative can have a restraining effect on creativity (Csikszentmihalyi, 1996). The participants clearly articulated the propensity of students to “self-regulate” to the point where creative thinking is suppressed. Parnes (1967) asserts that “we know little about what creativity really is. But we do know how to stimulate greater creative behavior in individuals. It is a matter of helping them to release whatever creative potential they possess, like removing a *governor* from an automobile” (Parnes, 1967, p. 41).

The participants of the study saw their role in overcoming an over-active self-regulation as providing a safe space for students to venture beyond the information given. Mr. Bass stressed in his Teacher of the Year portfolio that his objective is to “create an environment where students are challenged, yet feel safe to explore and make mistakes.” He also indicated that students need to be “unschooled.” This comment was clearly an indication of the idea that schools value analytical skill almost exclusively, and such

emphasis on analytical thinking void of creative thinking might result in the tendency of students to over-regulate and learn to become very conservative in the ideas that they choose to express.

Several of the participants saw self-confidence as a possible antidote to an over-active self-regulation. Ms. Kim saw a direct correlation between creativity and confidence.

I think when a child struggles academically, they struggle with self-confidence and they struggle with letting people see them step out. I think creativity and letting your creativity shine is directly correlated with how comfortable you are with yourself. The most creative people are out there by themselves- and they are comfortable with that. I think that in order to withstand the criticism that you might get along the way, I think you have to have some level of comfort with yourself- and to withstand the failures that are going to happen along the way when you step outside and take those risks. Because with creativity there is a risk. I really believe that if there were not a risk then I don't think it would be creative. It would be run of the mill normal.

Mr. Michaels expressed that self-confidence may be the factor that separates eminent creators from the rest of the pack:

So I think it's just, you know, for students to again have a belief in what they're doing, have a vision in what they're doing, and then be able to sell it to other people, be able to have other people understand that, you know, kind of what your direction is that you're going in with it.

A tendency to over-regulate was not confined to the student level. According to several of the participants a tendency to over-regulate ideas existed not only at the student level but also expressed itself at the teacher level. Ms. Paul expressed such fear:

I speak for myself and others; we have a fear of not being able to answer the student or to give them what they need. In our minds we may not be as smart as the student. There is a fear of creativity- there is a fear of letting them express who they are when it should be the total opposite.

Ms. Kim drew a clear relationship between teacher comfort with the curriculum and their ability to develop the creative capacity of their students.

Because when you don't know the curriculum well and you are trying to learn how to teach it, then creativity goes by the wayside. When a kid asks you a question and you don't know the answer to it (helping the student discover the answer) goes out the window.

It appears clear from Ms. Kim's comments that teachers with limited content knowledge or teachers who are new to a content area will tend to regulate their behavior more so than that of a person with a depth of content knowledge in their particular content area. Ms. Kim's comment reinforces the notion that domain relevant skills are necessary for creative ideas to emerge. She indicated that not only would a depth of content knowledge on the part of the teacher suggest many more potential avenues for helping students discover the content, but that depth of understanding on the part of the teacher also would produce a level of comfort with the content where taking instructional risks would be more likely. She expressed the relationship between self-confidence and self-regulation as follows:

I have a degree in Chemistry. I have been teaching it for 15 years. I am not bragging but I know the Chemistry curriculum and that frees me up to be creative with it. I think if you don't know your curriculum well and you're not comfortable with it. Because when you don't know the curriculum well and you're trying to learn the curriculum and learn how to teach it, creativity goes by the wayside. I mean because you, when a kid asks you a question and you can't

answer the question, thinking about how to creatively do something goes out the window immediately. When you're trying to explain a concept and you're struggling in your mind how to even explain it in its bare minimum content, being creative with the explanation goes out the window.

In Ms. Kim's estimation as the teacher's comfort level with the curriculum goes up his or her tendency to over-regulate goes down. Her comments represent the notion that a teacher has to have established a "comfort zone" with the content if he or she is to meaningfully step out of the zone. Each of the participants expressed confidence in their own abilities in general and confidence in their ability to develop creativity within their classrooms specifically. Ms. Griffin expressed her resolve as follows:

I think what, if anything inhibited me it was my own creativity—can't do this because that's not the way we do it over here, other teachers aren't doing that. I took a risk and I would be doing all these crazy things in the classroom and when others were like what, shut your door, you're making the rest of us look bad, because the kids were enjoying it, they were excited, they were learning, so I mean, I wasn't as worried about the administrative mandate piece as I was my own ability to design those lessons.

Schank echoes Ms. Griffin's illustration as he affirms the role that the environment might play in a person's tendency to engage in an unproductive level of self-regulation. He asserts that "the hardest part of being creative is that it is very threatening to those who are not" (Schank, 1988, p. 48). Ms. Griffin went on to state that "it took some convincing of *me*," as she attributed her willingness to step outside of the box and try more creative means of teaching to her years of experience in the classroom as well as her experience with the National Board process and attainment of advanced degrees.

It took convincing of me. I think going through the National Board process helped to alleviate it a little bit of that, I mean as a young teacher, I used to be young, as a new teacher I felt more of that, I felt less confident but the more experience I got, the more confident I became, because I can sit here and I can articulate to (my principal) and tell him why I was doing what I was doing in my classroom while two doors down they're still in the book answering the questions. I could tell him why my kids were a little loud because they're discussing the text or whatever, I was confident in that I knew my philosophy and learning theory well enough to articulate to him and to parents, so that, that's why going back and getting a Master's degree, doing National Boards, all of that elevated my confidence and ability to do that. Oh yes, especially when I did the reading licensure and did the reading—got my Master's in reading, that's—my whole, the whole dynamics of my classroom changed.

The participants of the study seemed to intuitively recognize the impact that a healthy degree of self-regulation can have on the success of an individual, industry, domain or culture. The participants of the study and researchers alike suggested that overactive self-regulation might be creativity's worst enemy. It can be inferred by one of Ms. Angelou's statement that the degree of one's creative capacity is dependent upon one's ability to avoid hyper-self-regulation.

We all have ideas and a different perspective on things. I think some of us are fearful of using those ideas. I know I have children that are like that in the room that don't want to say the way they problem solve. I think we see that in the workforce where we're afraid to stand up and say our perspective, but I think we all can be creative; it's just a difference in degree of our creativity.

The context in which Ms. Angelou mentioned that “everyone could be creative but not to the same extent” implies that the degree of creative thinking expressed may be determined as much by a *willingness* to express creative thinking as by the *ability* to do so.

It is by way of this point that we can add consideration of the “degree of evaluation” to our construction of the creativity model. As Figure 5.9 suggests, a tension exists between the degree of creative thinking attempted by the individual and the degree of self-regulation imposed by the individual. As discussed in Chapter III, Csikszentmihalyi (1996) warned about the detrimental effects of the *domain* that tends to be either too liberal or too conservative in what is accepted as a creative contribution. The participants of the study indicate that this tension can exist at the *individual* level as well. Individuals with the propensity to over-regulate, as Ms. Angelou described in the above quote, may conceive of fantastic ideas that never see the light of day. In this respect creative ideas can be forced back to the confines of the existing content of the domain by the will (or lack thereof) of the individual before the idea ever comes into contact with any part of the field (gatekeepers, peers etc.). Conversely individuals with a propensity to be too liberal in what they accept as creative may conceive of many ideas that may be regarded as unrealistic or unrelated to the problem at hand at the instant that the ideas come into contact with the field. Several of the participants recognized self-regulation as an act of evaluation and critical thinking; an act that is also indispensable to the creative process because as illustrated in Figure 5.9 it acts as a governor that keeps ideas within the realm of what is possible or applicable to the problem at hand.

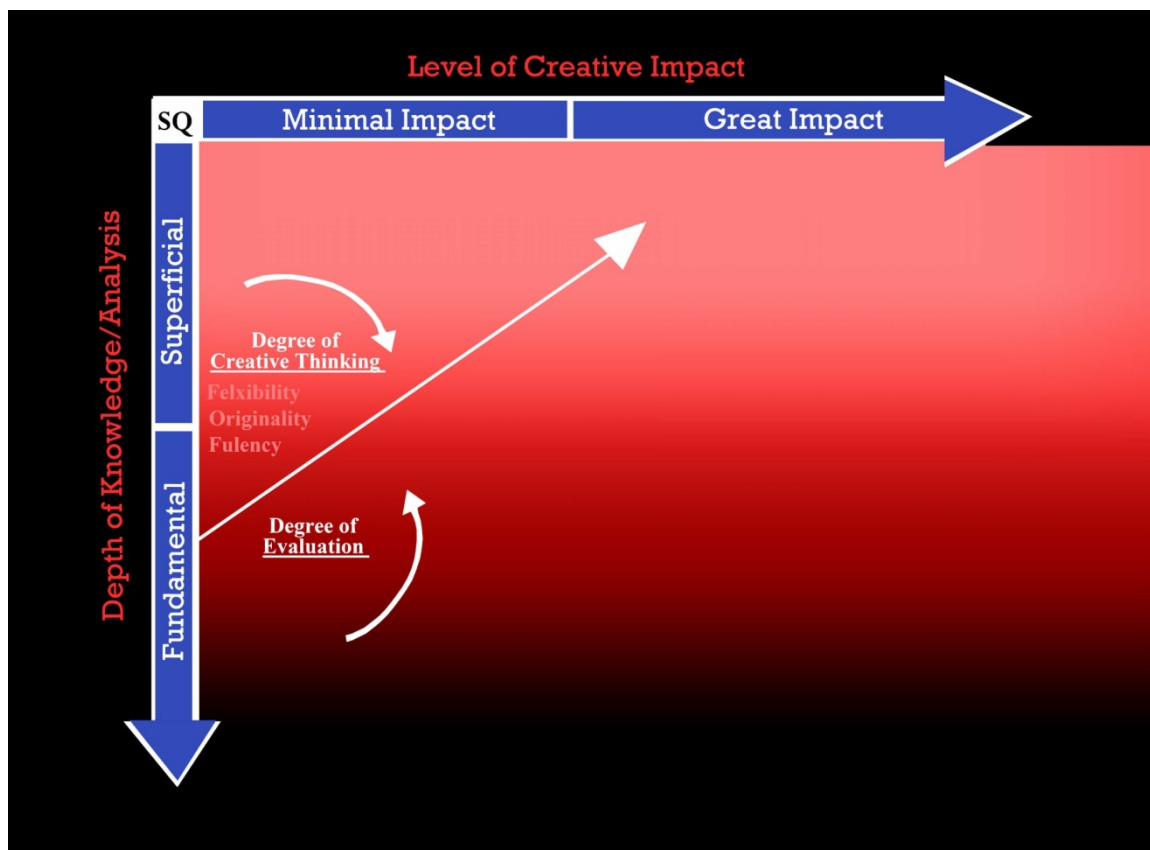


Figure 5.9. Degree of Evaluation.

Conceptual Inertia

We have no record of the countless lesser tragedies, no statistics on the numbers of lives wasted in frustration and despair, of the discoveries which passed unnoticed. The history of science has its Pantheon of celebrated revolutionaries- and its catacombs, where the unsuccessful rebels lie, anonymous and forgotten. (Koestler, 1964, p. 218)

The critical response of a peer group or a set of ‘gatekeepers’ was thought to be a major impediment to the development of creative thinking in the minds of the participants. This factor has been termed conceptual inertia.

Conceptual inertia is the property of conceptual systems that causes them to resist change. Just as physical objects resist changes in state, ideas resist movement from their current state, and change in the direction of their movement. Thus when people develop new ideas, those ideas tend to resemble old ones: new ideas do not move much beyond old ones without a good deal of cognitive effort being applied. (Ward et al., 1997, p. 22)

A clear line of separation does not exist between the concepts of functional fixedness, self-regulation at the individual level and conceptual inertia at the organizational level. There exists an interdependent relationship between these factors as an individual acts upon and reacts to his/her environment. Ms. Kim provided an example of how the conceptual inertia that was in existence in her school resulted in a case of intensified self-regulation among her peers as she described their reaction to the CCSS. She commented that teachers who were suddenly asked to implement the CCSS had been “educated and trained in vastly different ways than the Common Core.” She mentioned that the teachers bought into the fact that the way of teaching that the CCSS expected made sense but, Ms. Kim thought that the teachers were not provided with sufficient training to effectively make the shift. And to compound the problem the state at the same time intensified teacher accountability as measured by standardized tests. Ms. Kim used the term “survival mode” to describe how her peers tended to self-regulate in light of the conceptual inertia that permeated the school environment:

So it goes back to survival mode I’ve got to teach this, so creative thinking is going to go by the wayside. I am going to do it the best way I know how—we are going to do step by step by step. We all have a certain survival mode—when it comes down to it I know I have to teach the curriculum (factual & procedural domain specific content) if nothing else if I get it out there something will take—and that’s sad but that’s the truth in the end when you don’t know—you hope some of it will take—toss it out there and hope for the best strategy.

Ms. Roberts suggests that the successful production of new ideas in any field depends on one's ability to endure the conceptual inertia that they are certain to encounter when expressing such ideas. She warns the students within her Journalism class of conceptual inertia in this manner:

Once you put something in print, you can't control how it's perceived, and if you're going to do this for a living, you've gotta be able to handle negative responses.

One of the ways that conceptual inertia manifested itself within the environment of the participants was in the general resistance to the value of creativity within the context of the schools in which they worked. This was evidenced by the propensity of their schools to consider creative thinking as taking a back seat to the domain specific skills and content knowledge that are easier to assess, less risky and less difficult to plan. Ms. Griffin stressed that teachers are resistant to incorporating creativity as a result of viewing such teaching as not only increased work but also as high risk within their school system.

At the classroom level, I think sometimes it's the work involved, it's easy to go to the copier and run off worksheets, you know that, it's very easy, okay, and you write up on the board, we're gonna read these pages and we're gonna—and then you let them sit and read and answer the questions, that's easy. That's the parking lot lesson plan, but—well it is, but to prepare an engaging lesson where kids are collaborating, discussing, building, working, researching, and you've got 20 of them, 25 of them, and they're all researching something different and they're all creating something different on your topic, it's a lot of management work, there's a lot of resources you help get together, there's a lot more planning involved.

To compound the problem, Ms. Griffin stated her belief that teachers view developing creativity as a risk in particular in light of the new teacher evaluation tool.

It is a risk. Right now it is your job. It's your job because if the kids fail or they don't fare very well then there's no time to, well, we'll get it better next time.

Ms. Kim exemplified Sternberg's description of the creative person as a risk taker who is willing to "buy low" and sell high; with buying low characterized by the willingness to resist conceptual inertia within an environment and to pursue ideas that are not seen as very valuable when initially proposed.

I really believe there's a huge risk when you step out. And so I think that you have to have some bit of notion to know that I'm gonna stick my neck out, there's a chance for failure, there's a chance for ridicule, but I'm okay with that, because in the end there's a chance for something great.

Ms. Kim also recognized the test as the driver of instruction and as a factor that contributes to a level of conceptual inertia that is persistent in education.

I think a lot of teachers would feel that adding creativity in would be something extra to do and that they don't have time for that. I don't have the time to let students explore, I don't have time to have them do something that's artsy or different. I just need students to write a paper, answer the question or do multiple choice because that is all I have time for and that is what prepares them for the test.

Ms. Kim describes the test as contributing to a sort of conceptual inertia that manifests itself in covering as much information as possible and hoping for the best. Several of the participants found this manifestation of conceptual inertia all too common of a practice within their schools. I think they would agree with Leinwand (2009) who

suggests that this default position of covering content doesn't work anyway. He says "it makes no sense to try to cover so much material during a school year when every professional bone in your body tells you it's not sinking in for many, it's not making sense to many, and it's creating more and more serious long-term mathematics problems" (Leinwand, 2009, p. 17). This default position might be considered by the participants to be the most challenging manifestation of conceptual inertia as evidenced by their efforts to describe this aspect of their work environment.

A particular consideration regarding the business of education that might render its work environment as particularly susceptible to conceptual inertia is the fact that those employed in schools have by and large spent their entire lives there. Ms. Butler approached this idea to explain how individuals who choose a career in education might be more inclined to accept the relative safety represented by this default position than to risk failure (as measured by the test) in the implementation of strategies that they might intuitively know to be in the best interests of their students. She described the phenomenon as follows:

As educators we were the kind of people that wanted to make sure that our homework was done and that everything was in order—they want to do what is expected. And it is expected that they produce quantifiable results—it is stressful when teacher effectiveness is based on test data.

Ms. Butler's hesitancy to criticize technology, mentioned earlier in the chapter also represents a good example of the propensity of teachers to "want to do what is expected." Her apology for criticizing technology left me with the clear impression that technology was not something teachers are supposed to question within schools. Such

conceptual inertia may have been most pronounced in Ms. Angelou's description of collaborative planning at her school. She shared that teachers at her current school were not only expected to cover the same material at the same time but are expected to cover it in the same manner. After describing how some students in her class are fearful of sharing their ideas or strategy for solving a problem, Ms. Angelou immediately related the fear to professional life.

I think we fear—I think we are scared to share our creativity. I think it's the fear of being wrong—I think it is the fear of someone not perceiving it as a good idea. Especially from a new teacher, I can speak from experience. I was scared when I first started, especially if I was with a teacher that had twenty years of experience sharing something new that I wanted to implement in the classroom—because I would question myself. It took a while for me to get over that.

Now there's a big push at my school for teachers to collaborate and plan together and implement the same activities throughout the day. If you are a teacher that wants to allow creativity in your classroom and you are meeting with a team of teachers who are reluctant- worksheet based- direct instruction based- it's hard. We meet and we are expected to conduct the same exact activities—the way that we deliver instruction might be different but the children are doing the exact same thing at the same time of the day—our schedules everything is the same. So when you walk in my room and you walk into the next room you should be doing the same thing.

At this point I sought clarification and mentioned that “it's one thing to say that your school expects you to accomplish this particular objective during a given span of time, but it's a very different thing to say that you've got to accomplish this objective during a given span of time and then dictate exactly how you are to accomplish it. Is that really?”

Ms. Angelou whispered:

Yes, yes. *I do what I'm supposed to*, but when I have that time that's *left*, because we have time for remediation through the day and of course that's done on your own, the remediation probably took about ten or 15 minutes, I plan my own things.

When asked how such an expectation makes her feel as a professional Ms.

Angelou expressed her confidence in her approach.

I think sometimes I question whether or not I am doing the right thing- but I know that I am. I know as a parent that is how I would want my child to learn and be allowed to create. And I see it in the room- I see their learning. I don't think that I am trusted as a teacher. I think we all kind of feel like that. I know my team—when we talk we are not trusted as a teacher to make the right decisions for our class and implement the lessons that we believe will help them. It's not always been like that—when administration changes you usually see the shift.

Ms. Roberts expressed her exasperation in this manner:

I feel a little bit like we're expected to be puppets on a string and in a good faith effort to incorporate this and do this and respond to this, it has been the longest year of teaching for everyone that I have talked to, everyone, it's been horribly long. It's just—and it's been the least fulfilling I've got to say, it's been the least fulfilling, and so I feel like we're on a crossroads but I don't know if it's politics, I don't know if it's state politicians trying to run education like a business which does not work, because there's not a bottom line profit, there's not a bottom line test score that, it's not the way we work, it's not the way education works, that's not the way growth works.

Mr. Bass mentioned:

You talked with all teacher of the year candidates- right? Well that gave you some idea of the climate, and I don't know if it's just this county, especially with this evaluation tool, how are they going to use it—am I going to be fired?—

politically, there is a bit of fear and paranoia that reminds me a little bit of Big Brother.

Nonetheless, in the face of such inertia the participants detailed a level of confidence and conviction in their approach. In this respect the participants situated themselves as in possession of a quality in which Ms. Kim ascribed to the most eminent of creators. She mentioned that people like Albert Einstein, Steve Jobs and Thomas Edison:

Didn't feel constraints, whether through society (conceptual inertia) whether through their minds (self-regulation) whether through fear of failure, I think that they were strong enough in their convictions in wanting to create something new and inventive and beautiful.

Her sentiment is akin to Constance Wolf and Howard Garner's perception of the role of conviction within the creative process. The researchers presented individuals like Picasso and Freud as exhibiting great self-confidence. "Each was convinced from a young age that he knew what he was doing and that it was right. Rarely were they shaken from a course of action simply because of negative feedback" (Csikszentmihalyi, Feldman, & Gardner, 1994, p. 55). The participants used varied terms (conviction, passion, interest) to describe what they considered to be an overriding desire to apply the time and effort that is necessary to overcome conceptual inertia in the process of transitioning original ideas from one's head and into the physical world.

The participants believed that helping students get over this fear to be an integral factor in developing their capacity to create. They suggested strategies for creating an environment that diminishes the fear and self-consciousness that give conceptual inertia

its power. The participants also detailed instances where they personally confronted conceptual inertia within their buildings. Mr. Bass provided an example where he resisted “Big Brother” and was able to overcome the conceptual inertia present within his district and school with a particular class which he described as very troubled and low performing. This was a group of students who Mr. Bass stated had already failed Algebra I once. Mr. Bass explained that he gained permission to do things a little differently. During the 90-minute block of math, Mr. Bass would allow a break of about 10 minutes each day.

We were taking instructional time—so that was a risk there—sometimes we would walk outside—we would toss the ball—so you can see how many questions we got because that was very nontraditional.

It must be noted here that Mr. Bass’s strategy not only represents creative risk taking on the part of Mr. Bass as the teacher but also represents an example of the incubation of ideas and concepts during down time mentioned by Ms. Roberts earlier in the chapter. Mr. Bass continued:

I really thought that the principal felt there was nothing left to loose—he was holding me accountable but I think he felt like ‘well so what, they are not probably going to do well anyway.’

Mr. Bass described both his willingness to take a risk and his confidence in his approach throughout the semester. He disclosed that at the end of that semester only one student failed to pass the Algebra End of Course Test as he continued to explain:

And that was just a tremendous victory and what I tell people is that made the difference between those boys being high school graduates or high school drop outs. (At the time passage of the Algebra I EOC was a graduation requirement in NC). I did receive some resistance, but I was pretty fearless in that I was going to do something different or I was not going to be teaching anymore. So I don't let that fear hold me back even though I did not feel totally supported by my principal. The good thing was that everybody bought in and we started doing more of that at Piedmont High School. Actually the director of secondary education for the district came to me and said I want you to do a staff development on the pacing guide-how you use the pacing guide. (Laugh) I said Jackie that would be great if I actually used the pacing guide so perhaps I am going to get fired but I cannot tell you that . . .

(The director said) Well let's explore that -why do you not use it- I said it's outdated, the sequence is not right. It does not work for everybody. I can support why this isn't working. She eventually asked "well can you conduct staff development on how you don't use the pacing guide?"

Ms. Griffin provided an example of her own as she described a circumstance where she was confronted with resistance from a peer when she employed a creative strategy for teaching a certain piece of literature:

I did have, when I was at a certain location, we were actually reading a novel and the kids, I was actually having them to live the experience of the characters in the book so we kinda role played. I mean we actually lived in that world during the classroom and even at lunch and I had them wearing name badges and doing all, all this kind of stuff and I had a teacher tell me to quit doing all that, it made the rest of them look bad.

Resistance from the field was no more pronounced than in the participants' discussion of standardized tests. The test emerged as the primary driver of conceptual inertia within the participant's classrooms. The End of Grade test itself, in effect took on the role of the gatekeeper of what was acceptable as of value. The participants discussed the test as the factor by which every practice is evaluated. As illustrated by Figure 5.1

each participant with the exception of Mr. Michaels considered themselves to be under immense pressure to produce quantifiable results. Ms. Roberts perception of the school year that she and her peers endured along with Ms. Angelou's frustration sort of affirms Ward's contention mentioned earlier that "new ideas do not move much beyond old ones without a good deal of cognitive effort being applied" (Ward et al., 1997, p. 22). What Ward indicated in theory, several participants affirmed in practice as they detailed the energy expended resisting the conceptual inertia prevalent within their profession.

The types of assessments mandated by the state factored greatly in teachers perception of the ability to develop creative thinking. Ms. Butler and Ms. Angelou in particular sounded almost apologetic when criticizing the idea of "data driven decision making" based on test results. The whole idea that data should "drive instruction" is a mantra that has permeated public school discourse. When asked to identify barriers to developing creative thinking Ms. Angelou for instance immediately responded "oh the test." Her criticism was immediately followed by a sort of apology:

I feel that teachers are bombarded with all of these tests and so are the students. You are trying so hard to make sure they get all of the information on a daily basis that they will need to test that sometimes there is limited time. (A teacher might say) 'Oh I don't have time to allow them to be creative and come up with their own answers and ideas because I need to make sure that they get this information so they will be ready for the test. And testing is good—don't get me wrong when I say that and I know that we need assessment and we need data to drive instruction, but it needs to be balanced.

I know data is important, and I do use it to drive instruction as far as what I know my children need to learn and what they are weak at and what I need to reteach; but I also now it's not just about the data—it's about true learning I don't want them to just learn it for the year, I want them to retain it for the rest of their life. I don't want them to go to 4th grade next year and forget everything that I taught them about division and fractions just because it was all about getting them a

score. I feel the pressure and the kids really feel the pressure oh my goodness—I want to say ‘they are only eight and nine!’

Mr. Bass continued with an opinion that the pressure to produce quantifiable results, can result in teachers going against their better judgment.

I think there is a lot of fear. I also think that they think that they will not get everything covered (Mr. Bass used his fingers to symbolize quotation marks around the word ‘covered’) I’d rather my students discover more and me cover less. I think they feel a lot of pressure to do that so I think there is not a lot of creativity especially with the emphasis on testing, but I think that your students can really thrive with creativity.

Ms. Griffin shared a similar assessment regarding how fear tends to restrain the teacher’s will to teach creatively, but suggests that encouraging creative thinking will actually improve student outcomes if teachers are willing to take the risk.

I mean it’s a catch 22, I mean I know that I’ve got an EOG, I know my kids are gonna have to do that, but that’s down here (at the end of the year). If I’m assessing them in a variety of ways with formative and summative assessments and taking into consideration their different learning styles and all that stuff, then they’re going to be fine come this day. Do we need to do some of that, yes, but they’re gonna be fine because if the tests are assessing the standards, then we’ve got to trust that we’re teaching the standards and that they’re gonna be fine no matter what format that test might be in. If you’re giving them all those different opportunities to learn and you’re assessing them in a variety of ways they should be good. But teachers won’t step out and *trust* that. The majority of teachers will not do that, they will tell you, but I’ve gotta teach, they won’t say that but they’re like we gotta take this test so I can’t teach this unit, or I can’t spend... it is because they know they’re being held accountable for how their students perform on that test.

Mr. Bass continued to express what he saw as the detrimental effects of a school environment that has succumb to conceptual inertia.

I think that principals have tremendous power . . . going back to that modeling, if you do not create that environment, you know, if that principal does not value it, does not create that environment, if that principal does not model that, it's gonna be left to those handful of teachers who are fearless, who are not conformist, who are the individuals who are gonna do it regardless, but I don't think it'd be a widespread buy in.

At this point I asked Mr. Bass if he would quantify the “handful” that he mentioned as fearless.

I don't mind giving you my opinion. I would say 20% that do it on a pretty, you know, a pretty regular basis that they would be considered creative. I think that- I think what's kinda sad is we walk down in the halls of the schools and it's not that they're bad people, it's not they're not good teachers, but how often it looks like it did a long time ago, yeah, it's just—it's like oh my gosh, we know better.

When asked why he believed there to be such a small percentage of the staff that was committed to developing the capacity to create, Mr. Bass responded:

You never know what is going on in another person's mind, but I sense a lot of fear on the part of my colleagues. I think that it is probably justified fear, at least justified in their own minds. I have to work in a place where I am given some freedom—you know as long as I give the a research based reason for what I am doing that I have some freedom to do what I think is best for my students- that's just a must—that's where I draw the line. I cannot work in an environment that does not allow that. I don't think that a lot of my colleagues feel that they think they can do that. They think that they are expected to get certain test scores. I don't think that that works in opposition. I don't mean to brag about it but I have had really good test scores.

The following statement by Ms. Angelou was mentioned earlier in this section but it bears mentioning again as it must be noted that the jovial and light texture of the interview changed as she described her experience with conceptual inertia.

We meet and we're expected to plan the same exact activities, the way we deliver instruction may be different, but the children are doing the same exact things at the same time of the day, our schedules, everything is the same, so when you walk in my room and walk to the next room you should be doing the same things.

At the opposite end of the “pressure continuum” lies Mr. Michaels. Mr. Michaels described an environment in his art class that is free from data driven pressure. When asked to quantify the amount of pressure he believed he was under to produce quantifiable results on a scale from one to ten, Mr. Michaels stated “zero,” as he characterized an environment free from such pressure:

I think anytime you can combine fun with learning you're going to be in good shape. You know, I thought of on the way over here one of the funny things that's I guess if you want to call it a mark of being successful is I have students contacting me throughout the summer wanting to know when am I going to be in here so they can come in and work. Now when you've got kids that want to come learn on their own, you've—yeah, you've done something there.

For the other participants of the project however, the pressure to produce quantifiable results emerged as the ever-present factor that produced fear of taking the time to develop the capacity to create. But as illustrated in Figure 5.1 they were nonetheless determined to teach creatively and to work to develop the capacity to create within their students. As noted earlier in the chapter, Ms. Kim was of the opinion that such conviction is what constitutes the difference between the eminently creative individuals and the general population. The preceding examples from the participants certainly demonstrate such a conviction. It is at this point that the participants of the project expressed a level of conviction which Ms. Kim asserts that teachers should work

to develop within their students. When once again considering the qualities of the eminently creative she said:

There wasn't that fear of what if this happens or what will people think, and I'm sure they had those thoughts, but even more was that drive to, I've got to do this, I have to create this something new or this something beautiful, and it's that innate drive that I have to feed, and I think that when we teach kids that it's okay to step out and try something new and then if you fail, so what, you learned something new and you pick up and you do it again, you learn from it and you move on, that it's okay to fail.

Although there may be any number of ways of analyzing how the participants perception of their ability to develop creativity and their perception of the pressure in which they felt they were under to produce test results, the idea that the participants are on a "mission" (as Figure 5.1 illustrates) to develop the capacity to create in the face of such pressure seems extremely consistent with the context and tenor of their comments and illustrations.

Ms. Kim's statement that she is okay with "sticking her neck out" because in the end there is a "chance of something great," suggests a relationship between the level of risk and the level of reward. Within the context of the discussion so far we can define risk as the degree of departure from an established line of thinking along with the depth within the domain at which the departure takes place. By way of such thinking, it is reasonable to assume as depicted in Figure 5.9 that the deeper the analysis and the more original the departure from the status quo the more risk is assumed by the would-be-creator.

Figure 5.10 represents the idea that the deeper the level of analysis and the higher the degree of creative departure then the more resistance one can expect from the gatekeepers of a particular domain. This possibility adds the consideration that completes the reconstruction of the creativity model proposed in Chapter IV. The length of Line C in Figure 5.10 would represent the amount of resistance that would be imposed by the field. The final piece of the completed model illustrates how when either the length of the y axis (depth of analysis) increases and/or when the degree of angle that extends from the y axis (degree of creative thinking) increases then there would of necessity be an increase in the length of Line C; which represents an increase in resistance from the field.

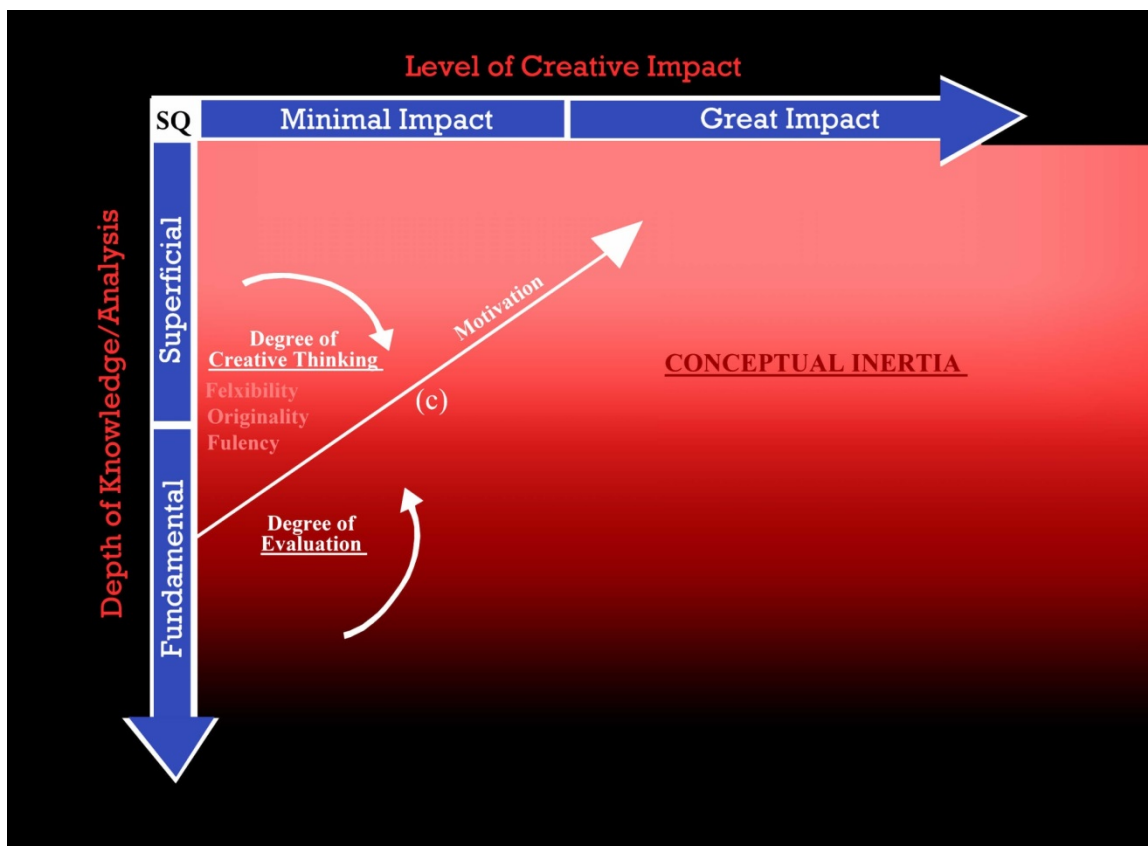


Figure 5.10. Motivation & Conceptual Inertia.

Koestler details the nature of a domain to resist particularly the most novel and meaningful ideas. He quotes Schiller who considered the progress of science to take place “through a few master architects” who are in essence the real innovators who in turn set all of the “industrious labors at work for decades until the new break through becomes crystalized.” Whether the scientist, artist (or education administrator), Koestler asserts that it is at this point that “they hang on for dear life to the prevailing school and style which some genius initiated, and defend it with stubbornness and venom against heretic innovators” (Koestler, 1964, p. 257). Establishments Koestler adds “are either consciously or unconsciously bent on preserving the status quo—partly because unorthodox innovations are a threat to their authority, but also because of the deeper fear that their laboriously erected intellectual edifice might collapse under the impact” (Koestler, 1964, p. 257).

Time as a Contributor to Conceptual Inertia

The test emerged as the factor in school that granted conceptual inertia its restraining power. Test data drives instruction and must drive the instruction to a fixed destination at a fixed point in time if the student and teacher are to be deemed successful. As a result the participant’s discussion of the test and data driven instruction was inextricably linked to the limited resource of time. The feeling that there exists insufficient time to engage creative thinking emerged as probably the most daunting contextual factor that the participants confronted in their pursuit of creativity. The participants indicated how the test forces teachers to prioritize their time, and often results in priority being given to the memorization of rules and algorithms at the expense

of the types of discovery and problem solving as instructional strategies which they might consider to be in the best long-term interest of the student.

Such a context prompted Ms. Griffin to explain teachers' response to such conceptual inertia as "you adopt sometimes a mindset of the environment that you're in." Mr. Bass indicated that even from an early age teachers have trained students to be passive recorders of information. He commented that from an early age we have "schooled" the children too much. Ms. Paul articulated the same sentiment:

I think students are waiting for us to say number one, do this, number two, do this number three, do this, and there is no way to grow or inspire creativity when we give them a check off list from kindergarten up.

As a result it is reasonable that the repeated barrage of "step one-step two" cues from an individual's environment must eventually seep into students' subconscious and can result in functional fixedness where students are "schooled" to the point where either novel ideas are never conceived of or to the point where the ideas that are conceived succumb to an over-active self-regulation where the ideas are discounted by the individual before they are ever vocalized. As detailed by several of the participants this sort of teaching strategy is a self-regulatory reaction on the part of the teacher in response to the conceptual inertia that is largely driven by the specter of the test. This pressure to provide this sort of instruction is how students are in Mr. Bass's words are "schooled" to be passive receptors of information- in search of the right answer, whether, as Ms. Roberts's journalism student suggested, "they learn anything or not."

Our insensitivity to granting students the gift of time to allow big ideas to gel might constitute another reason why Ken Robinson (2001) would say that we have many intelligent students who think they are not. (And why we may have many great teachers who think that they are not). Given the resistance of creative thinking to time constraint and the additional pressure exerted on the teacher by the data driven and accountability culture that persists in public schools, time constraints may have the impact of convincing many of our most effective teachers thinking that they are not; because within such a context teachers have no way of knowing how close their students are to the eureka moment. Ward et al. (1997) quoted Stephen Donaldson to illustrate this phenomenon—“rather like a binary poison—or a magic potion—two inert elements combine to produce something of frightening potency” (Ward et al., 1997, p. 7). To continue with Donaldson’s logic- the materials held in isolation- represent unrealized potential. In the context of public schools teachers like Ms. Butler may find encouragement in the possibility that success might be much closer to the surface than the End of Grade test might indicate.

Ms. Roberts also approached this sort of incubation and gelling that is taking place below the level of consciousness prior to the moment of illumination. She used a character on a popular television series to illustrate her point:

He makes these great diagnoses, they always come when he is in his office and he’s throwing his rubber ball against the wall and he’s just sort of on simmer, he’s down, he’s on sleep mode or whatever it is, he doesn’t have constant stimulus, so his brain, and this is physiological, his brain is able to make those deep connections and so, and then it just comes to him, it’s like Newton underneath the apple tree and he’s like oh my gosh!

Several participants implied that practices that are driven by data and efficiency are incompatible with a context that would allow time for diverse concepts to gel and for creative ideas to emerge. Ms. Butler sums the perception of many of the participants very plainly:

Now I think where there may be a problem is that creativity doesn't come real quick. I think that is the ultimate goal but I don't know that it always comes together (at least not in time for the test).

The following section will detail some of the strategies that teachers employed in an effort to diminish fear and/or encourage the motivation on the part of the students that is necessary to overcome the aforementioned killers of creativity.

Teacher Power over Context

One of the findings that I found to be most encouraging was the determination of the participants' to mitigate the effects of functional fixedness, self-regulation and conceptual inertia. There was sparse mention of socio-economic status, background, and culture as affecting developing the capacity to create. If asked directly, I assume that the participants would all agree that poverty, for example would play a significant role in the development of creativity. I propose that the lack of mention of the factor is not so much of a discounting of the potential impact of such factors, as it is a faith and belief in their abilities as teachers to mitigate that difference. The confidence in their ability to transcend conceptual inertia and the conviction by which the participants expressed in pursuit of creativity was one of the most encouraging findings of the project. The participants' responses exemplified Alan November's contention that "The most

successful way to teach students innovation and creativity is to embrace those elements in our own methods” (November, 2012, p. 9). Each participant indeed emphasized their duty and ability to shape an environment that was conducive to creative thinking.

For example, Ms. Angelou mentioned that she does not assign projects to be completed at home by her third graders because what you often get back are “mom and dad’s creativity.” This statement represents an acknowledgement of the differences in support and access to help that her students receive at home, but the comment also suggested a confidence on the part of Ms. Angelou that she had the ability to mitigate such circumstance once the students walked through the classroom door.

Mr. Bass also affirmed his ability to produce an environment conducive to creative thinking. He commented:

I think the biggest thing is creating that environment. I think the teacher models creativity I think the teacher creates that environment from the very first day that they enter the room. I think one of the things that gets lost in the discussion of creativity is whether the teacher is modeling it themselves- because I think if you don’t take some chances or try to do some things differently then they may not feel very comfortable doing the same- so I have to create that safe environment. I have to do silly and crazy things to model that- and I don’t mind doing that. Creating that environment is so very, very important; I get out of my comfort zone because that comfort zone can actually become a confinement zone.

Ms. Angelou’s enthusiasm was evident as she described her passion for developing an environment that is conducive to creative thinking.

I think it’s wonderful to foster creativity. Because you take those students and they are going to grow up and be in the workforce and the things that can come if they have the freedom to create and not just by themselves but with a team. I mean we do that a lot they are in a group with their menu (of projects from which to choose) *I get chills just thinking about it* (laughter) when they arrive in the

workforce—even if they are working at Wendy’s—I mean you never know what can come of it.

Ms. Roberts also detailed a faith in her abilities as a teacher to shape a context conducive to creativity:

I feel like I have a lot of opportunities. Well, with just the environment. My classroom, I have the freedom to create an inviting atmosphere. I have the—I feel like I have the freedom and autonomy to create meaningful relationships with my students. I feel like he (her principal) trusts me, that I know where the lines are. I feel like I am afforded as a teacher (freedom) to create lesson plans that I feel are suitable, meaningful, worthwhile, effective, so I mean, I feel like I have a—and always, I feel like I can be creative as a teacher.

Mr. Bass expressed his year-long effort of de-schooling his students. He implied that such de-schooling is progressively becoming more difficult to perform but firmly communicated his resolve to continue his efforts to develop the capacity to create.

At elementary level, I am afraid to say that even early on they have been schooled too long. They have been schooled to the point that they want you to tell them the next thing to do and the next thing to do and the next thing to do. I really have to spend the entire year kind of de-schooling them in that thought process because they want the right answer; because you know we have rewarded them for the right answer. It is sort of a sad statement for me to say that the projects have not been as creative as I would like them to be, *but I am not giving up.*

Mr. Bass rated his freedom to develop creative thinking as a five (on a scale from to 10). With this rating it is important to recall that Mr. Bass asserted that he could not work in a place where he was not allowed to be creative. As a result he cited time as the primary restraint as opposed to administrative pressure or the availability of resources.

While I cannot be as creative as I like, time is the biggest constraint. I get around the resource thing—there is so much on the internet. If you search for a creative lesson, I mean you can find it. I think that that can become an excuse—you have so much access to so many great resources if you are not creative yourself, find one. Grab one from someone else—you can add some creativity to your classroom even if it is not your natural tendency to do so.

Ms. Angelou posed the following as a strategy for assisting her students in considering divergent means of solving a problem, but the collective nature of the strategy described also represents an example of her exerting power over her context in that the strategy might also prove beneficial in diminishing the effects of conceptual inertia and the effects of an over-active self-regulation by providing students with experience in defending their thinking and critiquing the thinking of others. This process is consistent with the CCSS mathematics practice that expects students to: Construct viable arguments and critique the reasoning of others or the ELA CCSS expectation that students will be able to “comprehend as well as critique” (CCSS, 2010a, p. 7; CCSS, 2010b, p. 6). Ms. Angelou goes on to discuss how this expectation of the CCSS supports her efforts to produce an environment that is conducive to creative thinking.

I think the CCSS are great for creativity. With common core there is no one way to answer a question—students are allowed to use their own thinking and they are encouraged to do so. And you accept others. That is one thing that I teach in my classroom a student may solve a problem this way and another student may solve the problem another way. *And we look at it together as a group of students and they get to see other perspectives and new ideas.*

The remainder of the present section details two approaches that were described by the participants which they believed would mitigate the effects of the “killers of creativity.” As will be detailed in the following two sub-sections, knowledge of the

student and student led critiques were specific approaches cited by the participants by which they employed to fashion an environment that was conducive to the development of creativity.

The Critique

Ms. Griffin's statement that "you adopt sometimes a mindset of the environment that you're in," points to the restraining influence of the environment in which one operates. The statement can be interpreted as an acknowledgment that an individual's propensity to persevere in pursuit of a novel idea is determined in large measure by the degree of conceptual inertia existing within a given environment and the individual's confidence and drive to create. Several of the participants stated that the ability to overcome conceptual inertia to be the quality that separates eminently creative people from the rest of the pack. All of the participants spoke of strategies that would increase student motivation to pursue creative ideas. Two of the participants extended the conversation by suggesting the strategy of the student *critique* as a measure to increase the resilience of students when attempting to create. The critique emerged as a possible way of mitigating the power that conceptual inertia might exert on the individual as the critique affords students with the opportunity to defend and justify their solutions but maybe more importantly affords students the experience of receiving criticism from a group of peers.

Mr. Michaels, as the teacher was certainly a gatekeeper within the context of his class but he also empowers 20 or so other gatekeepers to offer feedback during his student critiques. Mr. Michaels mentioned in his philosophy of teaching statement that

each of his projects is concluded “by students completing peer critiques and verbally defending their work.” He indicates that he found the strategy to be “very supportive of student growth in not only the artistic field but also in self-evaluation, understanding and being able to provide constructive criticism.” The critique might be considered an intentional strategy for raising questions. This strategy represented an example of teacher power of over context in that it represents not only a strategy for the type of critical thinking that might improve the quality of student work, but also can be seen as a strategy of diminishing the effects of conceptual inertia. The critique may have the effect of helping teachers establish the “safe environment” for risk taking that several of the participants indicated as necessary for the development of creativity; an environment where students can become accustomed to the sort of questions and criticism that any would-be creator is likely to encounter.

Mr. Michaels described his version of the critique:

Usually it’s a double-sided sheet, so they have a rubric on the front and then they have a critique on the back in which they have to answer some questions, and now we’ve got a writing tie-in to our project as well. So they’re talking about, you know, list two elements or principles that you used in your project and how did you use them, how did you feel your craftsmanship was on this project. I mean literally every one of these is different, according to the project they’re working on, so that is one way that they’re evaluated, but then we go out in the hallway, let’s say it’s a 2D piece, we’ll have everybody’s work gets on out in the hallway, and we will actually go out on the hallway and conduct a critique, and usually this is a two part, so the first thing we go through all the projects and a student is able to stand up and talk about their piece, what was the inspiration, point out anything they want to point out on it.

Ms. Angelou mentioned the critique as a means of helping students get used to both providing criticism and accepting criticism as well as an avenue for improvement of

ideas. Though she did not use the term “critique” it was evident that Ms. Angelou wove the idea of the critique into the fabric of her math class. At the conclusion of a lesson or particular problem the students would collaboratively examine each students approach to solving the problem. Ms. Angelou saw her version of the critique as important to building flexibility in thinking, deeper conceptual understanding as well as an increasing level of comfort in attempting varied approaches to solving problems.

The type of thinking skills utilized in the critique would likely be considered as relying much more on the analytical types of thinking that are explicitly prescribed by the CCSS and have been traditionally valued in education. The point here is not that the critique necessarily involves a high degree of creative thinking but that such practice may prove to be a powerful tool in the overall process of creating. If students are able go through such practice to achieve a more helpful degree of self-regulation and are able to become used to receiving such criticism from the gatekeepers within the classroom then maybe they will be more likely to overcome similar criticism in their professional lives and come to see criticism as a possible avenue that would help them to refine and improve their ideas. Mr. Michaels continues his support of the critique as follows:

And it’s really interesting, I mean it touches on a lot of things, and when we first started it’s kind of like you’re treading on ice a little bit, because you don’t want people’s feelings to get hurt, but I’m going to say that the thing that I tell them before we even get started, is- the thing that I’ve found in doing this is number one, nobody since we’ve been doing it says things that aren’t usually hitting the nail right on the head. I mean usually when they say well here’s the problem with this piece, they’re exactly right, that’s what the problem with this piece is. And I tell them that you need to understand the difference between somebody saying something hurtful and constructive criticism. And I said, you know, the things that are being said is other people’s viewpoints are things that you can take into consideration to help you become a stronger artist.

The critique was seen as a means of helping students to overcome resistance from the field; as a means of helping students to step out and take a risk. If students are able to overcome such fear then in Ms. Kim's estimation such an attitude would open the door to at least the possibility of greatness as opposed to the certainty of mediocrity. She firmly attested: "I am okay with risk, because at the end there is a chance for something great."

Knowledge of the Student and Student Autonomy

Einstein's fundamental creed was that freedom was the lifeblood of creativity.
(Walter Isaacson, 2007, p. 550)

The participants of the study moved the discussion of context from their power to control the external conditions that impact creativity to their power in influencing the internal factors that impact creativity. Each participant stressed the recognition of each student's individuality as a means of combating conceptual inertia. Their comments suggested a recognition that only those who are able to withstand the scrutiny of the gatekeepers of a given domain can hope to make a creative contribution. As a result the participants strongly related their appreciation and knowledge of each student's unique talents and interests with the motivation and attention necessary to resist conceptual inertia in pursuit of "great ideas."

A primary concern for all participants was the role of autonomy in the development of creative thinking. The participants cited autonomy as the factor with the greatest potential of establishing relevance, by way of tapping into the individual intelligences, passions and interests of the student. The participants indicated that autonomy produces the motivation to apply the levels of cognitive attention necessary for

high quality creative work. This line of thinking is consistent with both Amabile and Collins's (1999) and Csikszentmihalyi's (1996) confluence models that establish motivation as an indispensable factor in creative production. Csikszentmihalyi (1996) also included "attention" as another indispensable factor. The participants suggest motivation is the factor that compels the individual to apply such attention. And they consistently cited student autonomy as integral to the expression of such motivation.

When asked to define creativity our art teacher, Mr. Michaels immediately asserted the importance of student autonomy.

I think the biggest thing that comes to mind when you say creativity is allowing students the ability to make choices on their own. One of the things I'm a firm believer of here in the classroom is student-based learning, and that, we generally introduce the general topic, but allow students a lot of avenues to take that topic and kind of go the route with it that they want to go with it.

Mr. Michaels continued and related student autonomy with motivation as well as the attention necessary to pursue a creative solution to an assignment in his visual arts class.

The interesting of that, is you start with a general topic area, let's say you have a class of 24 students, and when you get finished you literally have 24 completely separate pieces of artwork on what a student has based their opinion on,—it's just a different way to go across from learning. It kind of gets you out of that old school, if you will, the, you know, just textbook, that kind of thing, and the students are doing really a lot of the- like I said decision makings and learning themselves and having to research themselves and find things themselves and then incorporate things together in order to create this original piece of artwork.

Ms. Kim detailed her appreciation of student individuality within the context of her Chemistry classes and expressed that providing students with a level of autonomy to be the primary strategy that she employs to develop creative capacity.

On a surface level, I have a very prescriptive curriculum it's a very deep chemistry curriculum that requires an extensive amount of math—where do I fit something like (creativity) in? I try to fit a level of creativity in by giving students choices on how they can express their knowledge.

As detailed in the previous section, several of the participants asserted that the pressure that is accompanied by high stakes tests was considered by several participants as detrimental to creative thinking. Daniel Pink (2009) warned against the carrot and stick approach to motivation. He considered such an approach to be effective when there exists a routine and standard objective, but becomes counter-productive where the problem is complex and unfamiliar. Mr. Michaels described intrinsic motivation as a much more effective approach in such cases:

It's nothing for me to have four or five kids want to stay after school until four or five o'clock at night because they want to work on the wheel more, or they want to, you know, do some more with their projects, and you know, I think when you've got folks that are 14, 15, 16 years old and all the stuff that's going on in this world and you've got them that interested in what you're doing that they want to come back on their time and do it, then you know . . .

Ms. Roberts strongly associated student autonomy with creative thinking. Similar to the atmosphere that Mr. Michael suggested exists in his art classes; Ms. Roberts affirmed that her great thinkers emerged within in her journalism class where her students were generally extended more freedom than in her regular English classes.

My great thinkers usually show up in journalism because of the unstructured nature of the class, the freedom of expression, the freedom to think, the freedom of opportunity to utter great ideas, and when I was thinking about the great thinkers, they all showed themselves in journalism . . . I don't think I would have realized that they were great thinkers unless the environment was unstructured and free.

In order to help direct student autonomy as a means of generating creativity, several of the participants asserted that knowing the student constituted an indispensable factor. Ms. Roberts synthesized relationships, relevance and rigor as she described how she works to influence her students' willingness and capacity to create. She suggested that the teacher must develop a relationship with a student in order to know what would be relevant to that student and once the content is made relevant to them then the rigor will follow.

It starts with that relationship to the student, for example, back to John Smith (student in class), the more I knew about him, his interests, the way he—his cluster, the more I could make the lesson relevant. He's the kind of kid, if he doesn't care about it he's not gonna exert one ounce of energy, and once I could make it relevant then I can build on rigor. Create relationships, it really starts with relationships. The more that I know about the student the more I can do to make my content relevant to him/her. The more relevant the subject matter is the more rigorous I can make the content—because they are now motivated.

Here, Ms. Roberts identified all three of the three factors that make up Csikszentmihalyi confluence model and suggested a relationship between the three. As represented in Figure 2.2, Csikszentmihalyi's model illustrated the "creative flow" to be a result of a confluence of attention, motivation and context (Csikszentmihalyi, 1996). Ms. Roberts' reflections on her practice suggests a strong correlation between the *motivation* that is established by tailoring projects (*context*) to specific learning styles and interests

of students and the *attention* necessary for high quality creative work. As a result, Ms. Roberts placed a premium on getting to know her students; their individual perspectives and unique set of intelligences. She used this knowledge of her students to tailor projects and instruction (context) that were likely to motivate them to exert the attention necessary to produce high quality creative work.

Ms. Kim suggested a connection between student-teacher relationship and the development of creative thinking as well. She mentioned, “In terms of building relationships with my students, depending on where I am in the semester, I am limited in my knowledge of their interests.” As a result of such limited knowledge of her students (at least initially) Ms. Kim makes a practice of allowing her students the opportunity to come to her and present alternative ways of demonstrating their knowledge of a particular concept. Ms. Kim also suggested, as did Ms. Roberts, that the motivation that is produced when students are granted a level of autonomy results in the students applying more attention and learning more about the topic than they may have otherwise.

I think that it is reasonable to conclude from the perceptions of the participants of the study that they considered students’ desire to express their own individuality and to create something that represents their particular interests, abilities and personality to be something that the human spirit desires. Ms. Paul, in particular used the word passion repeatedly in reference to the importance that she placed on students discovering what drives them. The participants all alluded to the overall enjoyment of bringing something new into existence that is energized by such passion. Nickerson (1999) mentioned that

he finds it “easy to believe that we have an innate drive to create” (Nickerson, 1999, p. 400). Nickerson continues:

We that we get satisfaction from the act of creating whether what we are creating fits the stereotype of a creative product—a poem, a painting, a scientific hypothesis—or something more private and less tangible—an inventive approach to a problem of personal significance, a novel way of looking at a familiar situation, the perception of humor where it is not easily found. (Nickerson, 1999, p. 400)

Ms. Paul echoed Nickerson’s perspective by making a reference to the individual as a special and unique creation. She quoted a verse from the book of Psalms where King David affirms each human as a unique wonder of creation (Psalms 139:14).

I think at the core of who we are and where creativity comes from, we’ve gotta understand how we’re ‘wonderfully and fearfully made,’ different, how one, who are we, what are our interests and passions, two, what are our multiple intelligences, how are we smart. Everybody can talk all day long about reading and math but outside of that how are you smart, are you nature smart, are you word smart, are a logophile and we talked about that, what are your learning styles. We’ve got just innateness and we talked about that, what are your learning styles.

Mr. Bass suggested a similar relationship between knowing the student and creative thinking. Like Ms. Paul, Mr. Bass discussed the strategy in terms of finding each student’s passion as he described a particular culminating project where he capitalized on his student’s passion.

This really challenges them. They don’t know how to react, so I tell them you are going to have to define your passion, take your passion and tie it to geometry. They ask “Mr. Bass, what do you mean?” They have never been given an assignment like that. (Mr. Bass would respond to the student with . . .) I don’t know this is your passion you have to come up with something. I know that it is

uncomfortable for you. I think creativity is also about making connections in a different way. I have got some phenomenal projects from students.

Mr. Bass recounted one particular student's project:

The student had been taking dance for a number of years and made a strong connection between dance and geometry. She talked about lines of symmetry, she talked about angles, she talked about acute angles-obtuse- how her body was moving and the importance of physical fitness and exercise. Her product was an actual dance routine that she recorded on a CD for me.

Mr. Bass reported that he would ask his students "What is your passion? What would you do if you did not have to be at school today?" While Mr. Bass used the term Passion and Ms. Roberts used the concept of "personal relevance," Ms. Paul used the concept of a personal profile to underscore the unique factors that motivate individuals as she continued to assert the importance of students finding their passion.

I do these little surveys and then I'm gonna make a little business card and every student will make a business card and when they go into their ninth-grade classroom they're gonna say this is who I am as a learner, right now, this is who I am. I'm a visual learner and a kinesthetic learner. I need to move and I need to see it. they're gonna have their little business card and they're gonna come into their classrooms here at ninth grade and they're gonna say this is my business card, this is who I am, my learning style, I'm a visual learner, I'm gonna have to see it, or I'm all three, I'm auditory, I've gotta hear it, see it, and do it before I'm gonna take it to long-term memory, this is how I'm smart and then I tagged in my interests, my passion, because you've gotta have passion for what you're doing. From that, this is who I am right now, and this is how you're gonna reach me.

Mr. Michaels related student autonomy with motivation and implied a correlation between motivation and both creative thinking and technical skill attainment. Similar to Ms. Roberts's contention, Mr. Michaels simply sees motivation as an indispensable factor

in his students applying the effort and attention necessary for development high quality creative work.

I think that—for me it's extremely easy because it's literally on students' plates. You know, I just simply am introducing the general topics and letting the kids run with it in the direction that they want to go with it and then kind of more or less just go around and just serve as a supervisory role and making suggestions here or there on how they can make a stronger composition or how they can improve some things, but really the creativity lies in the hands of the students, and I've really found as I've made the evolution through teaching and moved more into that we have stronger compositions because of it, because the students then had a bigger interest in what they're doing because it has more of a personal connection to them, the craftsmanship improves in their work because again, it's something that they want to be proud of because it's—they're the ones that are more involved in this and they're coming up with all the ideas for it. So it's, you know, just all around has helped us create artwork that's just stronger pieces because of the student involvement, the student decision making, and the student creativity.

Mr. Michaels affirmed:

I think the most important thing is student-based learning. You've got to allow students to be the ones to make decisions. You've got to allow students to have a say in what it is that they're working on, and through doing that I think that you're going to—you're going to have a better product from the students and you're going to see a lot better interest and involvement from the students. And I think some teachers have understood that and some teachers it still hasn't caught on yet.

Ms. Kim defined creativity in terms of infusing a part of “yourself” into the product or idea. The following comments from Ms. Kim and Ms. Butler constituted a good example of how several of the participants saw the strategy of granting students a level of autonomy as an important factor in diminishing the effects of conceptual inertia. Ms. Butler asserted that in order to be creative individuals have to take existing information and “put your personality with it.” Ms. Kim defined creativity as follows:

I think creativity is the ability to put your own spin on something and to make it uniquely yours and different and to make what it fit what it needs to fit for you at that time.

Ms. Kim's idea of making something "uniquely yours" and Ms. Butler's idea of creative work being infused with one's personality implies a conception of creativity at a very personal level, whereas the rejection of "your" idea may be construed as a rejection of "you." The merging of the idea with the individual on a personal level might explain why it is so difficult to overcome conceptual inertia. Further, based on such comments it is reasonable to suggest that bad experiences with conceptual inertia within a classroom can have a much more persistent and destructive effect if not managed effectively in that it may lead to an over-active tendency to self-regulate.

We all have, in Gardner's words, "a unique blend of intelligences" (Gardner, 1999, p. 45). The participants held this unique blend of abilities to be essential in the production of creative work. The participants of the study and Gardner seem to be in total agreement on this point. As Gardner asserts: "We can choose to ignore this uniqueness, strive to minimize it, or revel in it . . . I suggest that the big challenge facing the deployment of human resources is how best to take advantage of the uniqueness conferred on us as a species exhibiting several intelligences" (Gardner, 1999, p. 45). The participants would have agreed with Marginson who proposed that "All else being equal, the more complete is the element of self-determination, the larger is the scope for creative work" (Marginson, 2008, p. 270).

It was apparent from the existing literature and from the perceptions of the participants of the study that creative ideas can perish at the level of the individual (self-

regulation) or at the level of the organization, domain or culture (conceptual inertia). These killers of creativity might constitute the reason why Ward et al. (1997) would assert that “all new ideas do not move much beyond old ones without a good deal of cognitive effort being applied” (Ward et al., 1997, p. 23). The present study assumes that the more fundamental the analysis and the higher the degree of creative thinking then the greater the degree of resistance the idea is likely to encounter from the field. So similar to Pythagoras’s conception of the right triangle, the extent of resistance is in direct relation to the depth of analysis along with the degree of creative thinking imposed. It was clearly assumed by the participants of the study that they could influence the capacity of a student to persevere through the field of conceptual inertia as represented in Figure 5.10 as line (c).

The length of Line C in Figure 5.10 can be seen as illustrative of the words of Ms. Butler, in that “Creativity does not come real quick.” And in particular creativity that is to have a great impact will meet a resistance that is proportional to the level of the domain at which the creator attempts to depart and the degree of departure the creator attempts to make. As Gilfillan (as cited in Rhodes, 1987) suggests such resistance can be measured in the time that it takes for a creative idea to gain acceptance. Or as Ms. Butler suggests, the gelling and accepting of ideas at the individual level also takes time. To illustrate this point Ms. Butler again mentioned her seventh-grade daughter’s reaction to a particular problem that she realized she answered incorrectly on the End of Grade Test.

‘I took this test today and I did not figure it out until after I took the test.’ With creative thinking (Ms. Butler continues) it takes them a little bit longer. We had home school three weeks before the test- she said I would not have made this

score if it wasn't for the help at home—It is because I was able to take what she learned and help her extend it.

Ideas encounter resistance at both the individual and the organizational level. In light of Ms. Butler's comments it is reasonable to assume that the time and effort necessary for the “gelling” of concepts may be proportional to the depth of analysis and the degree of creative departure that is required for the solution at the individual level just as the same factors affect the time and effort necessary for acceptance at the domain level. As a result it would seem that the approach to instruction that would prove to be the most meaningful to the students and would produce the type of deep conceptual understanding that is both flexible and fluid, is also the approach that consumes the most time and effort. Hence, I don't think that the frustration that Ms. Butler expressed concerning the test was as much a reaction to the rigor of the test, as it was a reaction to the test's inability to account for all of the concepts taught and “ways of thinking” developed throughout the year that were not given sufficient time to gel. It is a frustration that test simply cannot account for her student's own personal “cognitive clocks” and how they cannot all be set to go off between the hours of 9 a.m. and 11 a.m. on May 27th (or whatever the test day might be).

Ms. Butler attempted to reconcile disappointing test results with what she felt she was able to accomplish with her students during the year. She could see the pieces falling into place in a manner that the test could not.

So, I don't know. I did, after the test was over I felt really good about, I mean their scores were not good, I mean I understand that, but I felt really good that when they left the classroom and I could ask them a question and they could tell

me the answer or they have a foundation so I know that they're ready for Math I (1st level of High School math), so I'm okay with that even though they might not have (scored well) but I know they have built something—I could see from the beginning of the year to the end of the year that they have built something.

Summary

One of the major reasons for conducting the present research was the assumption that there exists little consensus regarding the meaning of creativity among educators. It was assumed that if teachers are to develop this capacity then there should exist a common understanding of what is meant by the term or at least a common appreciation of the diversity of meanings that exist. As detailed in Chapter II it is clear that education is not alone in its failure to achieve a common understanding of creativity. Psychologists, scientists, inventors, and artist have attempted to define creativity and describe how it might be developed. As represented in the literature review researchers have only served to underscore the complexity of the concept by the lack of consensus.

The complexity of the concept along with the lack of conversations regarding the meaning of creativity was evidenced by participant comments such as “do you know what I mean?” Does that make sense? “Is that someplace in the research?” At one point in the interview Ms. Roberts stated plainly “I can't find the words.” At which point I mentioned that what she was attempting to describe (and intuitively knew) was very prevalent in the literature on creativity. At which she replied “Good! Somebody knows, it's out there somewhere.” Ms. Roberts's statement most explicitly suggested to me that the strategy of mediating a conversation between the participant responses the existing ideas of creativity found in the literature was absolutely necessary to adequately deal with

the very complex ideas with which the participants attempted to express during the course of the interviews.

In fact one of the participants, Ms. Griffin, explicitly affirmed the complexity of the topic and how the concept is certain to be defined differently by different people.

I don't think that you, I don't think you could take a definition of creativity and say show me creativity and you could ask everyone in the room to do that and you're gonna have as many different models as there are people, so I don't think you can put a finite definition on this is what creativity or this is what creativity looks like because it's gonna look differently.

Such comments underscored the complexity of the topic and substantiated the assumption that it can in no way be taken for granted that any one in a school understands what any of their co-workers necessarily mean when they use the term creativity. Such comments also supported the assumptions concerning the methodology employed in the study. I assumed that Teacher of the Year candidates might prove to be most reflective and would present a depth of understanding that might not exist in a random sample of teachers. I think it was clear as evidenced by the teacher's body language- pauses to contemplate and the responses they provided that this might have been an accurate assumption. The participants took great care in considering their experiences as classroom teachers and were able to provide rich descriptions of occurrences within their schools in an effort to answer the questions posed. I also assumed that selecting a pool of teachers that represent diverse content areas would represent the best means of capturing the varied meanings of creativity that might exist among teachers in public education. Several of the teacher's comments affirmed this notion. The most poignant of which was

Ms. Kim who questioned “why in the world” would I want to speak with a chemistry teacher about creativity.

The participants of the study identified varying factors that might contribute to the development of creativity and approached it by way of different vantage points. As I asserted at the onset of the study, even if a consistent definition of creativity will forever elude teachers, scientists, artists, and psychologists alike, conversation regarding the development of creativity will cause teachers to think about “thinking” differently or more deeply than they might have otherwise and such discussions by those who are actually tasked with the duty of developing creativity would undoubtedly add to our collective understanding of the concept. The participants were insightful and reflective as they struggled to “find the words.” No one verified this assumption more than Ms. Kim as she continued to reflect upon my initial request to include her in my study.

I really enjoyed this; I was thinking I’m a chemistry teacher, why in the world would he want to talk to me about creativity. In my mind to begin with I couldn’t even put the two together until it’s like; I mean really, it was like what in the world.

One of the most striking findings was the extent to which creativity morphed so easily into other terms (i.e., problem solving, adaptive reasoning, relevance, critical thinking, passion, self-confidence, great thinking, autonomy). Even though the participants may have used different terminology in describing the concept certain themes emerged that were very consistent among the participants. The themes can be summed up as the participants’ attempts to develop within their students “ways of thinking” that yield understanding of content that would be both *deep* and *flexible*. They

spoke of their approaches to instruction which they thought would develop such thinking as well as their strategies to affect the environment of the student to enhance the development of such thinking. Further, the participants were clear in their view that they had a duty to develop creativity and saw the CCSS as an ally in this effort. Chapter VI will discuss the implications of these findings. Chapter VI will move the discussion from an analysis of *what* the participants said to the implications of “*what if*” their perception are or could be indicative of teachers in general.

CHAPTER VI

IMPLICATIONS OF THE PARTICIPANTS' CONCEPTION OF CREATIVITY

Introduction

The core of our work is to contribute to the creativity of our students. (June Atkinson, NC State Superintendent, Keynote Address 2014 CTE Conference)

The question that the present research hoped to answer was what do exemplary teachers consider creativity to mean. I hoped that by adding the voices of exemplary teachers from a wide range of subjects taught would add to the overall understanding of creativity and how it might be developed. I hoped to achieve a greater depth of understanding of creativity by analyzing the participant's conception of the idea in light of the existing research on the topic and in light of the newly adopted Common Core State Standards. An understanding of the meaning that these exemplary teachers poured into the concept of creativity was achieved by way of (1) their descriptions of the interdependence of creative and domain specific skills that render concepts both deep and flexible; (2) their approach to instruction and the classroom environment that they believed encouraged this way of thinking; and (3) their insistence that they have a duty to develop such thinking. The present chapter will be structured around these themes as the discussion transitions from an analysis of what the participants said in Chapter V to a conceptualization of the implications that such conception of creativity would have on the business of education.

If the purpose of Chapter V was to detail what the participant said then the purpose of Chapter VI is to theorize the question of what if the participants' conceptions of creativity were representative (or could be representative) of the general population of teachers? The present chapter will ask four questions that are based on the findings that emerged from the participant responses. First, what if teachers believed as the participants believed that they are expected to develop creativity. Second, what might instructional practice look like if creativity was viewed as integral to each subject taught? Third, what if teachers believed it to be within their power to influence student attitudes and school/classroom environment in a manner that would promote the development of creativity? And finally, what if educational leaders were to arrive at the same conclusions as the participants concerning the value that they attribute to creativity?

Implication I: What If Teachers Believed That They Were Expected to Develop the Capacity to Create?

The first implication that I will address in the chapter is: What if teachers in general believed that they are expected to develop the capacity to create as the participants of the study indicated their belief to be? This section will detail the participants' assessment of the CCSS as an ally in their effort to develop creativity. This section will also address the necessity to diminish the idea of creativity as the sole responsibility of the arts and will discuss how such a conceptualization of the importance of creative might impact education beyond the walls of the classroom.

Common Core State Standards

I love the Common Core! – Ms. Angelou

One of the most surprising findings of the project was the virtual consensus among the participants that the Common Core State Standards not only allowed for creativity but expected it. As detailed in Chapter III, the CCSS did not mention creative thinking as a goal and only made passing reference to the concept. As a result I proposed three scenarios in Chapter III by which I conjectured that the writers might have considered creativity. I suggested in the first scenario that the writers may have considered creative “ways of thinking” as a capacity that could be added on at some future point to the domain relevant knowledge and well developed analytical “ways of thinking” that the CCSS are to develop. The second scenario that I proposed would be indicative of a belief that creativity has more to do with personality traits that may be the possession of a few individuals who would naturally employ creative ways of thinking. In this second scenario the Standards would be relegated to establishing the foundational content knowledge that would be of use to these naturally creative individuals. I stated that these first two scenarios tend to place the development of creative ways thinking outside of the scope of the CCSS but the third scenario that I posed in chapter III does not. And it is this third scenario that the participants gravitated toward by way of their descriptions of creativity and the relationship that they perceived creativity had with the Standards. As the third scenario suggests, the participants saw the CCSS as affording teachers the opportunity (if not directing them) to develop creative ways of thinking as

they work to develop the more analytical ways of thinking that are clearly outlined in the standards.

One of the most important considerations that the participants indicated regarding the implementation of CCSS was that while “learning” the concepts contained within a particular domain is important, how students learn what they learn greatly impacts their success. It is proposed in this scenario that the habits (ways of thinking) that students develop as they learn, would constitute an indispensable factor in how they handle new problems and whether or not they will attain the capacity to generate new and meaningful ideas of their own as adults (Willoughby, 1968). This third scenario is based on the assumption that creative ways of thinking are implied within the standards and that teachers are provided the pedagogical latitude to emphasize creative ways of thinking.

The participants of the study certainly read the development of creative thinking into the CCSS. The teachers filled in the blank space left in the CCSS with creative thinking situated as essential to the ability to solve unfamiliar problems in mathematics and to create “create a high volume and extensive range of print and non-print texts” as the ELA CSSS expects (CCSS, 2010a, p. 4). This line of thinking constitutes a realization that something important happens between the analysis of a problem and the evaluation of a solution that is not easily measured, quantified, or adequately described. Ms. Butler demonstrated this through descriptions of her attempts to implement the math standards and by way of her understanding of the pivotal goal of developing adaptive reasoning skills. As detailed in chapter V, adaptive reasoning is considered by one of the major writers of the standards as the glue that holds the math strands together. The NRC

(2001) went on to describe adaptive reasoning in terms that are very similar to how the creative process is conceived of within the present study—as an integration of both domain relevant skills and creative relevant skills. Attempts to negotiate these two competing factors were the ground for much reflection on the part of the participants.

This tension between domain relevant skills and creative relevant skills was articulated by the 113th Congress in House Bill 347, which acknowledged that creativity (along with critical thinking, communication, and collaboration) skills had to be “fused with core academic subjects” if “students in the United States are to be prepared to succeed in citizenship and work places of the present and future.” The Congress insisted that students need to be able to demonstrate these 21st century skills “alongside content knowledge” in order to be ready for “postsecondary education and careers” (21st Century Readiness Act of 2011, section 2).

Ms. Butler’s comment upon reflecting on the interdependence of creative thinking and domain relevant skills that she believed to be prescribed by the CCSS that “maybe this is how we should have been teaching all along,” has immense implications regarding the direction of public education, especially in light of the recent push back against the CCSS. The recent plight of the CCSS actually proved to be a good example of how depth of analysis, degree of creative departure from what has gone before and the amount of resistance that is incurred are related (i.e., the more fundamental the level and degree of departure from a domain the more resistance that a new idea like the CCSS is likely to encounter).

The depth of departure from the former way of instruction was exhibited by Ms. Butler's ongoing struggle to develop the right mix between domain relevant skills and creativity relevant skills. Ms. Butler mentioned that her seventh-grade daughter drew a distinction between the math test (CCSS) and her science and social studies tests (subjects not included in the CCSS). She said that her child was upset because the science and social studies test did not require her to "figure anything out."

It was like taking a sentence out of a textbook making it into a question and giving you the choices that went with it.

It was also borne out by the distinction that Ms. Kim drew between the math CCSS and the revision of her science standards, to which she attributed the shift in the CCSS to be at a much more fundamental level than that of science curriculum which she characterized as a superficial re-organization.

You know with chemistry and biology- the sciences there was a switch here and a switch there- basically a routine reorganization of the science curriculum. So it was not a change in the content- it was not a change in the thinking. With math and English it was a whole switch in the thinking and it became a skill set rather than a content set. So you went from being very content driven to very skill driven but that was a whole mind-set change.

Creativity: Not Just for the Arts Anymore

If as the participants suggest creativity is viewed as integral to the life of each discipline and beneficial to the conceptual understanding of the content currently contained within each discipline then creativity must be wrestled away from the arts as its sole provider. It must cease to be viewed as only the responsibility of the arts

department. As mentioned in the previous section, the participants did not see creativity as something that should be added on to the students' skill set at some other point in their lives or by a set of experiences or classes that are generally viewed as "enhancement," "elective," or otherwise outside of the "core" content. They by and large opted for a much more expansive view of creativity. Mr. Bass offered the following description:

I think that while music, drama and art are certainly creative outlets for students that cannot be the sole way that we look at creativity. I think just like problem solving, creativity has to be a common thread that runs through all aspects of the educational system.

Ms. Kim also made a point to extend the idea that creativity should not be viewed as limited to the arts and expressed that viewing the development of creativity as the exclusive responsibility of the arts represents a very superficial view of creativity.

I don't think that creativity necessarily means that I can paint well or I can sing well or I can draw well. I think you can be creative in many different realms. I think teachers have to first understand creative thought. I think they have to understand that it is not just art projects and poster projects and painting and those types of things. Because I think there is this surface understanding that that is creativity. Not to say that those things are not creative but those are not the only things that are creative- and again that's my personal view on creativity.

Ms. Butler continued the line of thought by asserting:

And I think we forget that it's creativity, I mean we skip over that. A lot of people say, how creative are you and I hear people say I'm not very creative, I can't do this bulletin board, or I can't—but it, I mean through this I can see that it's probably what fosters everything. I mean what gets everything going.

It may be startling to some to hear a math teacher assert that creativity is “probably what fosters everything and what gets everything going.” But should it be? When one considers the possibility as discussed in Chapter V that creativity and adaptive reasoning are virtually synonymous then it is all of a sudden completely reasonable that a math teacher might view creativity in this light. What if conversations between math teachers and art teachers reveal that the adaptive reasoning that holds the math content together and the creativity that has always been associated with the arts are essentially the same thing—or that they are dependent upon essentially the same processes? What if the art teacher and the math teacher find that they have been working toward the same goal all along—only using different terminology to describe their efforts and different medium of expression?

It has been a generally accepted practice to encourage art classes to integrate reading and mathematics so that the arts would have some measure *usefulness* to the data driven culture that permeates public education. If the participants of the study are correct about the nature of the shift that has taken place between the CCSS and the former Standard Course of Study for North Carolina, then it appears that the manner in which mathematics is expected to be taught has moved in the direction of the arts rather than the other way around. Ms. Angelou expressed the fundamental shift in this respect:

I think about that all of the time because in math I used to say you have to solve that problem this way (as she tapped on the table mimicking a sequence of steps) and we don't do that anymore and probably should have never done it.

Creativity beyond the Classroom

Perhaps nothing would do more to improve the mental health of the teaching profession and to improve the satisfaction of teachers with their jobs than to raise the level of their creative functioning. (Torrance, 1969, p. 23)

Another implication of teachers viewing creativity as something that they have a responsibility to develop is that such thinking may not be easily confined to the classroom. If teachers, as several of the participants suggested, are to develop the capacity of their students to create then they should model such behavior. If creative thinking begins with questioning assumptions and teachers are to model this type of behavior then it is reasonable to assume such creative thinking will not be confined to the classroom. In Robert Schank's assessment, "the quickest way to take a creative attitude is to ask a question and particularly a question that everybody seems to know the answer to" (Schank, 1988, p. 40). Such an attitude as expressed by Schank may motivate teachers to fervently question the role of education and can emerge as a motivation for a change that would be more responsive to the rapidly changing knowledge based age in which we find ourselves. Examples include Mr. Bass' account of an instance when he openly questioned the utilization of the current pacing guide within his district. Other examples include Ms. Roberts and Ms. Butler's questioning of the role that technology plays within their respective schools.

As mentioned in Chapter V, Mr. Bass stated he could not work in a place that did not allow him to express his creativity in teaching. Ms. Angelou shared the same resolve. I discovered during her second interview that she transferred to another school within the

district. She cited the restrictive nature and what passes as collaboration and fidelity in her former school as the motivating factor for her deciding to spread her wings and seek an environment more conducive to her way of teaching.

As Ms. Griffin alluded to, the questions of *what if* and *why not* open the door for creative thinking. It stands to reason that the most reflective teachers might constitute the ones who are most likely to ask such questions of their profession. One wonders if such a propensity to chart a different course along with the knowledge base to make such departure meaningful constitutes the reason why such teachers are selected by their peers as Teachers of the Year. I asked Ms. Griffin this question during our follow up interview. She indicated that the recipients' willingness to express their creativity as teachers could certainly have been one of the reasons they were chosen as Teacher of Year. But she thought that their propensity to create was based on other factors that their peers may have recognized when selecting them as recipients. She indicated that Teacher of the Year Recipients would likely have advanced degrees, national board certification and other credentials that would yield not only an increased level of content knowledge but also a measure of confidence in their abilities; a measure of confidence that would provide them with more of a willingness to take a risk than others; risks which might too easily fall prey to self-regulation in the minds of some of their less confident peers. If creativity spreads beyond the confines of our exemplary classrooms then such a movement would greatly diminish the Industrial Age Model of education that I contend continues to thrive; and in the words of the National Research Council, "clearly has not changed a great deal in a century" (NRC, 2001, p. 50).

The description of the physical design of the buildings in which the participants worked was intentional. The designs offered an analogy between the architects' attempt (or lack thereof) to break from the Industrial Age model in his/her building design and public schools' struggle (or lack thereof) to accomplish the same in their Industrial Age instructional design. The older schools were visually indistinguishable from the surrounding textile factories and according to the National Research Council much of the instruction occurring within public schools continues to resemble an Industrial Age, efficiency model exemplified by the increasingly vacant textile factories (NRC, 2001). For instance the NRC compared the instructional practices of several countries and described the typical math lesson in the United States as:

Beginning by checking homework or engaging in a warm-up activity. The teacher then presents a few sample problems and demonstrates how to solve them. This part of the lesson is often conducted in a recitation fashion, with the teacher asking fill-in-the-blank questions as the procedures are shown. Seatwork is assigned, and students complete exercises like those they have been shown. The teacher often ends the lesson by checking some of the seatwork problems and assigning similar problems for homework. (NRC, 2001, p. 50)

The council concluded that such a lesson could have just as easily been observed in the year 1900. The business of education as assessed by the NRC stands in stark contrast to the adaptability that is taken hold in much of the business world. A good example would be one CEO's account of how his North Carolina based textile plant was able to emerge from the confines of an Industrial Age way of thinking and survive the unprecedented level of outsourcing that spelled the end of so many textile companies in

North Carolina during the 1990s. Alan Gant, CEO of Glen Raven, made the following comment in a documentary (Newton, 2013):

A lot of textile companies blame their failure on the fact that China or India has shipped very cheap goods in here. We spend a lot of time and energy thinking we have been damaged by the rest of the world as opposed to using that money and that energy re-inventing ourselves. (15:37–16:00)

We (Glen Raven) have the ability to change fairly dramatically fairly quickly and in fact if we don't reinvent this company every 3 to 5 years then we are loafing. And we—that's just part of our culture; it is part of our being. (16:30–16:44)

The whole of the participants' comments express a notion that the ability to adapt is dependent on knowledge of the existing state of an industry or domain, an ongoing willingness to question the current assumptions within the domain and the ability to imagine how the domain might be extended or changed in some way in order to meet the demands of a rapidly changing landscape. The participants of the study certainly ascribed it to be their duty to help students develop this capacity. One of the major implications of an increased appreciation of the role of creativity is that such capacity would not be confined to the classroom but would provide the motivation for education to re-invent itself.

It was ironic that on the same evening that as I was analyzing Ms. Roberts's responses to this particular question, I was also previewing some video clips that our team of central office directors intended to present to the district's principals at a beginning of the year presentation. The metaphor that the team chose to exemplify how a professional learning community should work was that of a "pit crew" in the midst of a NASCAR race. In effect, they could have chosen no better example of the Industrial Age

efficiency model that continues to permeate education and what several of the participants of the study began to criticize. The metaphor of the pit crew stands in stark contrast to the importance that the participants consistently detailed regarding appreciating the individuality and multiple intelligences of their students. The pit crew receives an item that shows up with the exact same raw material and the crew has a clear and standard goal to achieve. Such a standard process can be based on precision and can be effectively driven by data-benchmarks- pacing guides, a stop watch or whatever. But as the participants insisted, teachers are not working with a standard individual (contradiction in terms) nor are they working with a standard and easily assessed outcome. As a result the efficiency model driven by data might often prove counterproductive. As Ms. Roberts emphatically asserted:

Trying to run education like a business does not work, because there's not a bottom line profit, there's not a bottom line test score that, it's not the way we work, it's not the way education works, that's not the way growth works.

Another illustration of the persistence of this model of education is that the students have apparently figured out that it is more about the data than it is about their progress. Ms. Roberts presented me with a copy of her school's newspaper generated by her journalism class last year. It contained an article written by a graduating senior in her Journalism class that was particularly relevant to the present study.

I learned at an early age that the only way that I could fail would be to honestly stop coming to school. I can sit in class and not even pay attention enough to know what the teacher's voice sounds like and still make a B at the end of the six weeks.

(As he walked across the field at graduation he contemplated) What does it matter anymore? I don't care who is number one in our class or who had to get a pardon to walk on graduation because he failed Foods II and didn't get his last math credit. We will all have something in common; we are about to get our diplomas that let the entire world know that we can BS our way through any task thrown our way. That is simply the joke that has become the public school system and no one can blame the kids that come through it. (Everyone trying to beat the system) It seems that administrators and teachers think it's more important to have a 90 percent graduation rate than for us to learn anything (School Newspaper, 2014).

The “pass the student along system” that the student mentioned was illustrative of the sort of misplaced motivation that Daniel Pink speaks of where one's creative energy is spent devising schemes of obtaining the bottom line data point rather than engaging the students in meaningful experiences that authentically build both domain relevant skills and creative relevant skills (Pink, 2009). The student's perception of the Industrial Age- bottom line data driven school environment painted a picture of Schank's warning that a *system* does not require thinking (creative or domain relevant). Ms. Roberts went on to state:

I don't know how much you all up there at central office are aware of how the students are playing the system. He had figured out that the data is more important. I do think that data has a place. I need to have quizzes. I need to give tests. I need to give formative assessments; that has a place but the bottom line for me is the student growth academically, emotionally- that is what I am after.

Discussion regarding creativity can potentially have the impact of dismantling the “system” that the student quoted above has figured out. The participants strongly indicated that a school environment characterized by the value of both teacher and student autonomy would more likely meet the needs of the 21st Century student as well as the 21st Century economy. The participants were consistent in their resistance to what I

have characterized here as the mediocrity minded and efficiently ineffective Industrial Age model of education. And, at least in Ms. Angelou's case resisted a model where, even professional collaboration is standardized, mandated, monitored, and "driven" by data.

Implication II: How Would the Participants' Conception of Creativity Affect the Practice of Teaching?

It's a form of pedagogy that is a tool in my belt. It can't be another thing on your plate, it has to be a fork to get some of the food off your plate (laugh) —Ms. Kim

A major consideration of the findings is of course how the participants' conception of creativity actually affects their instruction. As a result the second implication that I will address will be how the participants' conceptions of creativity might affect instructional practice. The participant's description of the methods that they employed to develop creativity both contributed to my understanding of what they meant by the term and shed light on how such practices might impact instruction at large if such a conception of creativity becomes widespread within public schools.

The participants believed that content knowledge can become much more "relevant" to the student and more "relevant" to their future if the *manner* in which they learn the contents of the domain affords them the skill to question and possibly extend, alter or change the direction of the domain later in life. This section will be organized around the instructional practices that the participants of the study thought could be employed to help develop the capacity to create. The approaches detailed by the participants include, problem finding, the integration of domain relevant and creative

relevant skills, an emphasis on creative thinking and adaptive reasoning along with the provision of time that it takes for such thinking to emerge.

Problem Finding

The participants' perception of creativity will affect instruction by situating *problem finding* as an essential component of schooling. The ability to question a current state and identify problems or opportunities for improvement was expressed by several of the participants. The act questioning was not only cited as a weapon against conceptual inertia and an unhealthy level of self-regulation but in the context of *problem finding* was cited as opening the door for creative thinking and thereby constituting the very beginning of the creative process in the minds of at least two of the participants. Whereas self-regulation and conceptual inertia destroy ideas of which we are consciously aware, the act of questioning can be conceived as breaking down the functional fixedness of which we are not consciously aware; and thereby allow for the conception of ideas, problems and opportunities that might have gone unrealized if a certain question had not been posed.

Tony Wagner, author of *Creating Innovators* points out this crucial skill as he is quoted by Alan November as stating that "The essential skill of the 21st century is knowing how to ask the most interesting questions" (November, 2012, p. 5). Questioning establishes the progression of thought from "what is" to "what if." With the former constituting an analysis of the current body of knowledge and the latter representing the beginnings of a possible extension or departure from what is currently accepted. A school environment that is as concerned with the questions that the students ask as it is

concerned with the answers that they provide would have broad implications on the manner in which instruction is delivered and understanding assessed.

Ms. Griffin suggested a clear relationship between critical thinking and creativity. She saw the individual's ability and willingness to question to be the beginning of the creative process. She suggested that one could exhibit critical thinking without exhibiting creative thinking but one could not exhibit creative thinking without first engaging in a measure of critical thinking. This contention of course is synonymous with Schank's assertion that questions constitute the beginning of thinking and that the quickest way to take a creative attitude is to question everything (Schank, 1988).

Problem finding as the beginning of the creative process was exemplified by Mr. Michael's identification of the potential of the large open common space of the school where he worked. He at some point questioned the aesthetics of the area which led to his proposal that his students (along with a visiting artist) create of a large scale mobile for the area in question. The problem was an outgrowth of initial criticism of "why the open space" which transitioned to the question "why not enhance the aesthetics of the space with a large scale mobile."

Ms. Griffin mentioned the progression of what is to what if as she detailed what she perceived to be the relationship between critical thinking and creative thinking:

Well, I'm analyzing something deeply, I'm looking at the different parameters, the different perspectives, the what if, I'm looking at knowledge that already exists about that topic, I'm questioning, thinking of alternatives, other possibilities, which is a lot of what you do when you think creatively.

Simon suggested that “much of the creativity that is exhibited in our world is exhibited in relation to new problems that weren’t solved earlier because they weren’t posed earlier” (Simon, 1967, p. 49). Simon’s suggestion is similar to Ms. Paul’s contention that the way teachers encourage creativity in all students is to “instead of saying what’s the answer, what’s the answer, what’s the answer, (ask) what could be the possibilities?”

In his book *Accessible Mathematics* Leinwand stresses that we should “Make ‘why’; ‘How do you know;’ and ‘can you explain,’ classroom mantras” (Leinwand, 2009, p. 69). While Leinwand’s focus was on mathematics, Ms. Griffin discussed how such questioning might encourage creative thinking a social studies classroom.

I think our Social Studies classrooms, a lot of times it’s learning of facts and history and those kinds of things, but you can bring in primary sources for students to analyze and to think critically about why, why history fell the way it did or why it occurred the way it did, I don’t think it’s just about memorizing those facts and taking them at face value but looking at all the dynamics that may have occurred and the what if, you know, what if a particular historical figure didn’t act the way they did, what might have happened, so I don’t think it has to necessarily be tangible product, I still think, I go back to their thinking, I think it’s about thinking, the process.

Ms. Griffin provided a similar example of how questioning can lead to the creation of original work in English classes as she underscores the necessity of certain domain relevant skills to form a basis for the expression of meaningful questions. The example seemed to form the basis for Ms. Griffin’s support of the CCSS as detailed below.

I am a Common Core supporter, not all the other hullabaloo that's going on around it but the actual standards; I support the Common Core standards, the literacy. They think it's a federal takeover and all this other mess. No, they are very rigorous standards and I do think they are standards that allow the students to dig into, again, literacy, a piece of text and think critically about its composition, why the author maybe chose to craft a piece of text that way, why did they use certain language and word choice as opposed to pick out the simile in the paragraph, where did the writer use a hyperbole as opposed to asking why does that exaggeration advance the author's purpose or something, so yeah, it is, there is a lot more critical thinking, which the—to me, the creative part, if you're looking just at the standards, the creativity part comes in how they're able to express their ideas, whether it's through a piece of writing, through an audio-visual that they create or some other multimedia in their analysis and stuff, so yes, I do think it moves us much more toward creative thinking than our past standards.

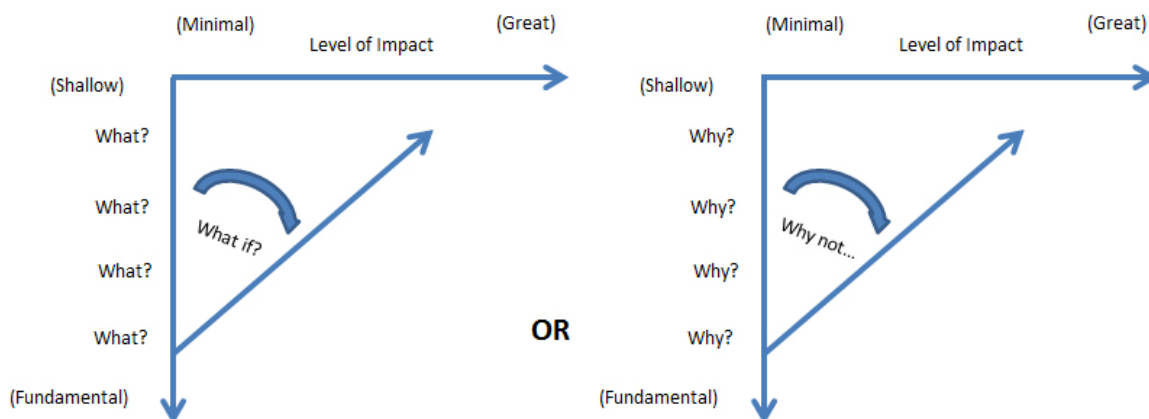


Figure 6.1. Creativity and Critical Thinking.

This unique human capacity to consider “what if” affords humanity the possibility of returning by way of a path different from the one traveled. As a result, Figure 5.10 can conceivably be generalized with the analytical questions of “what is” known progressing along the continuum of shallow to fundamental analysis and “what if” indicative of the degree of departure from what is presently known or accepted as illustrated in Figure 6.1. This simplified version of the working creativity model illustrates that the individual in

possession of a creative attitude would constantly look for opportunities of departure at any number of points on the “what is” continuum as he or she descends from a superficial consideration of a concept to a more fundamental one. Ms. Griffin and Ms. Roberts saw the encouragement of questioning on the part of students to have broad implications with regard to the depth to which content is assimilated as well as implications regarding the ways of thinking developed that would render such content as fluid, flexible and thereby adaptable.

Ms. Roberts made several references to Krathwohl and Anderson’s (2010) revision of Bloom’s Taxonomy as she illustrated the progression from remembering at the base of the taxonomy to *creating* at the peak. The revision of the taxonomy seems to at least in part constitute a progression of the individual from “what is” to “what if.” The “what is” constituting an increasing demonstration of a depth of understanding of a given concept as an individual moves from memorizing facts to thinking about the facts. But it is the final level of the taxonomy that illustrates a break from what is known or currently accepted. The “what if” and “why not” questions constitute the catalyst that renders a departure from the available information as at least conceivable. As discussed in Chapter V, the actual vehicle for the creative departure might manifest itself as an analogy, a metaphor, or a novel synthesis.

Domain Relevant Skills and Creative Relevant Skills

Another way in which the participants described creativity that would impact instructional practice would be the interdependent relationship that they considered to exist between domain relevant skills and creative relevant skills. The deliberate attempt

to develop both domain relevant skills and creative relevant skills would have substantial implications within school. The participants suggested that it is the push and pull between domain relevant skills and creative relevant skills that provide the tension from which creative solutions emerge. As Ms. Roberts described with her engine metaphor in Chapter V, the participants felt relatively comfortable describing the domain relevant skill of analysis. The factors that the participants had more of a difficult time describing, however were the factors that would allow an individual to *re-create* the engine; that is to render the new engine useful for satisfying a different need or new challenge. It is the factor or set of skills that allows one to depart from the contents of the existing domain that the participants and researchers alike struggled to define.

As a result, one of the most important implications of the project is that discussions regarding the nature of creativity might shed light on the ambiguous space that exists between the domain relevant skills that are involved with the analysis of a problem and the domain relevant skills that are involved with the evaluation of a solution. This space is what Einstein considered to be more important than knowledge. It is the space that Mr. Bass characterized as the “fun part.” It is what Ms. Angelou characterized as “play.” It is the space that we have defined here as the “creative relevant skills.”

The participants saw creative thinking as integral to the process of problem solving as they tended to define problem solving heuristically, where a clear readily available route to a solution does not exist. After all a problem that comes equipped with a presently known (to the student) algorithm for solving the problem cannot really be considered a problem. If the participants of the study are right in their assessment that

both analytical type thinking and creative type thinking are necessary to solve these types of problems, then it is imperative that we draw creative thinking out of the shadows and into the light of educational discourse.

The arrival of creative thinking as an indispensable factor in the education of young people can be found most prominently in the NRC's emphasis on adaptive reasoning. As mentioned in Chapter V, the adaptive reasoning, which the NRC describes as the glue that holds all of the other strands of mathematics together, is explained by the NRC as closely aligned with the manner in which the creative process is described in the study (NRC, 2001). The NRC's conception of adaptive reasoning extends beyond the analytical and deductive reasoning that is illustrated by the "depth of understanding arrow" in Figure 5.10 and calls for "intuitive and inductive reasoning based on pattern, analogy and metaphor" that have been conceived in the study as representative of ways of creative thinking (as illustrated by the "creative thinking arch in figure 5.10). At the heart of what the 21st Century demands is the ability to adapt to a changing landscape. Such adaptation necessitates continuous negotiation between analysis and imagination; reflection and refinement; reverence and challenge—between "what is" and "what if."

Evident in several of the participants' comments was a struggle to negotiate the tension between the stability and certainty of the established domain and the type of creative thinking that would be necessary to extend or alter the domain. The intentional integration of the two ways of thinking is in Ms. Butler's words "maybe how we should have been teaching all along." Feldman details the challenge as he asserts that "both the internal urge to change reality and the external nature of constructed reality need to find

their way into consciousness, to be represented and thought about” (Csikszentmihalyi et al., 1994, p. 37). The idea that analytical and creative ways of thinking are not as much in opposition to each other as they are different sides of the same coin would have tremendous implications on instructional practice. The two sets of skills were seen by the participants as working in tandem as exhibited by the propensity of the mind to *imagine* variations which may be consciously *evaluated* and modified by the other tendency of the mind to seek stability and certainty. As represented in Figure 5.10: This push and pull is most explicitly played out in the tension between the degree of creative thinking attempted by the individual and the degree of evaluation imposed by the individual. It is this tension that leads to adaptations that are crucial to our survival- and the quality of such.

It is clear that the participants of the study would tend to agree with Herbert Simon (1967) that there exists “a particular kind of intelligence that allows a person to do things that other professionals who are skilled in the art (domain) can’t do or are unlikely to do” (p. 48). The hope of this project is that exemplary teachers are able to assist with the search for clarity in the identification of this sort of intelligence. It may very well be the difficult to define and illusive nature of creativity that has relegated the concept to the periphery of educational discourse. Ward et al. (1997) cited this to be the reason that psychologists have neglected to study creativity until the recent past. It is the intent of this study to suggest that it is education’s turn to shed light on this illusive construct via the day to day interactions that teachers have with their students.

Embrace the Design Process; Apply Adaptive Reasoning

To derive pleasure from the art of discovery, as from the other arts, the consumer- in this case the student- must be made to re-live, to some extent the creative process. (Koestler, 1964, p. 265)

As mentioned in Chapter III, the design process is a conception of the overall process of creating broken down into specific steps. Any number of versions of the design process exists within the literature. A synthesis of the participants' perceptions of the creative process detailed in Chapter V produced a series of steps which proved to be as comprehensive as any of the conceptions of the design process that could be drawn from the literature.

As one considers the design process illustrated in Figure 3.3 it is important to point out the distinction that exists between the skills that make up creative thinking and the overall process of creating, because such a distinction underscores the fact that the overall process creating dependent upon the tension that exists between both creative relevant type thinking and the domain specific skills. These two sets of skills work together to fulfill the two generally agreed upon requirements of creativity- novelty and value. The participants indeed detailed a creative process that covered the entire progression illustrated in Figure 3.3, from the identification of a problem to the marketing of a solution.

Mr. Michaels presented the following example of how the design process can have far reaching implications for bringing teachers together across content areas as he detailed the plans for the large scale mobile mentioned earlier in the chapter.

A large scale project that I've been working on for two years now that has just taken baby steps is we are trying to get a—an artisan residency here to have an artist from Washington DC come down and create a large-scale mobile in our open area that you saw I think when you came in the front of the school and the interesting thing in this is that it is a collaboration between the art department and the math department because the engineering and the physics that's involved in creating the balance, so it's something that, like I said, we've—it's more necessarily not me selling it to people, it's a funding issue on trying to get the money together to be able to pull this off, but I mean that's a prime example of two completely separate departments trying to come together and work on a collaborative project that I think just has huge ramifications, it's going to involve probably three to four hundred students, and the students are involved from the very design of the project to actually creating the panels and painting and it's something I'm really excited about that hopefully we're able to pull off.

Mr. Michaels went one step further with the design process. He mentioned the very end of the process—where design can be converted into capital—as he detailed his practice of posting student work online where their works can be offered for sale. Such a comprehensive view of creativity would engage the teachers of business, entrepreneurship and marketing courses.

I mean this thing, it has really just ballooned, to be honest with you, I've got kids that have taken what we're doing in pottery class, started making stuff on their own, set up their own Etsy account, and are actually selling their own work on Etsy. Well, I've got kids that are doing stuff on Pinterest, we have stuff, I've actually been contacted and I said it's kind of a gray area, but I put all my students' work on Facebook. I'm proud of it, they're proud of it, I always tell them, it's a good chance for them to get a nice warm fuzzy from somebody who doesn't even know who they are to comment and say man, that thing's awesome, that's a cool piece. And I've actually had multiple kids sell their work off of that. I have been contacted by people just, you know, from wherever said I love this piece, can I buy it, would the student sell it. So I mean now you're opening up a whole—and this is one thing that I've talked to our art education in the county, we've talked a lot in art class about making art and the elements of principles, but now you're getting into the area of saying okay, I'm a professional artist, how do I *market* myself? How do I price my artwork? What kind of things do I need to consider in coming up with the fee for mine, my time involved, the—my materials cost. Now you're opening up a whole new door of questions that if

you're a professional artist these are all things you've got to take into consideration.

The neatest thing that I found too with kids is you have some that aren't sure of whether they're a good artist or not, until they sell that first piece. And once somebody wants their work, and is willing to pay money for it, it's almost like I've arrived. You know, I really can do stuff that other people want and are willing to pay money for.

Ms. Griffin emphasized this process of creating as she warned that people tend to focus on the product when discussing creativity rather than the process.

It's not necessarily about the end product, it could be, but as much as it is about the process, the creative process that they go through. I think a lot of people think creative, they think okay, let's see what product they created and how is that unique compared to others, which I think creativity can be that, but I think it's more about the thinking and the process that they go through maybe to create a product or arrive at an answer that may be a different way or a different perspective. It is a hard question.

Ms. Griffin's contention that creativity "is more about the thinking" is indicative of one of the most important findings within the study. Ms. Griffin suggested here an idea that was prevalent in much of the participants' conception of creativity which might have the most impact on teacher day to day approach to instruction. The idea that the creative process was not only "about the thinking" but indicative of thinking at the highest level was a pivotal finding. As mentioned in chapter V the participants' perception, along with much of the research on creativity tended to view the creative process as very similar to how the CCSS views the type of high level thinking that the NRC termed adaptive reasoning. The participants' responses suggested there to exist a strong relationship between the creative process and adaptive reasoning. It is with this conception of

creativity and adaptive reasoning that the strategy of mediating a conversation between the existing literature, the CCSS and the participants of the study most vividly coalesced around a central idea which may have gone unnoticed if any one of the three voices were not engaged. The extensive descriptions found within the literature regarding the relationship between domain relevant skills and creative relevant skills along with the actual experience of the participants struggle to navigate the relationship, and the National Research Council (influential in the writing of the standards) assessment that adaptive reasoning is in large measure dependent upon such a relationship were each integral to the conception of creativity proposed in this study. The knowledge that art teachers and math teachers are essentially working toward the same set of skills would break down content barriers and forge relationships between content areas that would deepen and enhance each other.

Time to Gel

But creativity takes time. —Ms. Butler

As Ms. Butler mentioned repeatedly, the type of thinking described in the previous section “takes time.” If the participants’ conception of creativity were to permeate education discourse then one of the major issues that the existing efficiency model of education would have to confront would be the issue of time. Several of the ideas that the participants expressed would have implications regarding how the instructional day is scheduled as well as how learning is paced and assessed. Like Ms. Butler, several of the participants insisted that creative ideas take time; ideas need time to

incubate and time is required for diverse concepts to synthesize. The participants were firm in their assessment that it simply takes time for creative ideas to emerge given the complexity entailed with engaging in a process of acquiring a depth of understanding that is fluid and flexible enough to be adapted to meet the challenges of unfamiliar problems. The back and forth that must take place between domain relevant skills and creative relevant skills is time consuming and does not fit well within the confines of a pacing guide. “Successful countries tend to select few critical topics for each grade and then devote enough time to developing each topic for students to master it” (NRC, 2001, p. 37). By this statement the NRC firmly acknowledges the necessity of affording students the time for mastery. And it is reasonable to assume, given their regard for adaptive reasoning that by “master” they mean the achievement of a deep understanding of a concept along with the flexibility to adapt the concept to meet the requirements of unfamiliar future problems.

The participants saw time, along with the risk of not “covering” the entire curriculum as a major impediment to the development of creativity. It became clear that Ms. Butler in particular saw the development of both domain relevant skills and the development of creative relevant skills as requiring time to accomplish. The participants were consistent in their assessment that teaching domain relevant skills in a way that will allow students the ability to question, imagine alternate possibilities, adapt concepts and merge diverse ideas represents an endeavor that is time consuming and not easily paced, benchmarked, or completely controlled.

Ms. Butler is convinced that the CCSS expect students to be able to draw upon any number of math concepts in order to solve problems. Such gelling as Ms. Butler describes it, takes time and does not necessarily proceed along a straight and predictable line. As mentioned in Chapter V, even though hours of preparation and incubation may be necessary for a creative idea to emerge, very little progress toward the goal can be effectively measured until the (unpredictable) moment of illumination occurs. Ms. Butler understood from her experience what psychologists like Herbert Simon have suggested from their studies and that is creative gelling takes time, but often manifests itself suddenly. Simon (1967) says:

There has been a great deal of attention to the stages of incubation and sudden illumination following incubation, largely because of the drama of the sudden flash of insight, particularly when it follows a period where the person is not conscious the fact that he has not been working on the problem. (p. 52)

Ms. Butler expressed the moment of illumination as follows:

Like a lot of mine did not make it (the connection) until the end and they were all like gasp I get it now!

Ms. Roberts asserted the importance of allowing ideas to incubate as important to deep and creative thinking as she detailed the prevalence of factors that interrupt such processing.

Constant stimulus doesn't allow our brain to make those deep connections, so I talked to them, especially my honors students, you can't hurry a great essay, you can't write them the night before, you can't write an excellent essay with a phenomenal piece the night before, you have to allow your brain to sort of go into sleep mode, my best lesson plans I always came across when I was running or in

the shower, when you sort of disassociate and let your mind sort of simmer, I don't know if I'm using—I can't find the words to precisely explain it.

Ms. Roberts's interview took a surprising turn as she considered the idea of incubation and suggested "day dreaming" as important to deep and creative thinking Ms. Roberts explains a novel strategy that she intends to employ next school year that takes the incubation of ideas into account.

When I start school next year and I say I don't want to see the cell phone. If you finish the test early I don't want to see the cell phone, I want you to daydream. Researchers using brain scanning technology found that the default network, the relatively new buzzword for the daydreaming state was significantly more active in a superior intelligence group. I mean do we need to just shut down?

Koestler (1964) mentioned how departure from the established path results in an initially tentative link between two frames of reference but suggests that the link is insufficient to "overcome resistances and effect their fusion. It will have to be strengthened by repetition" (Koestler, 1964, p. 220). Certainly a level of confidence and perseverance is required to overcome the resistance of the field (conceptual inertia) but Koestler did not use the word perseverance- he used the word repetition which suggest cognitive operations that might be occurring somewhat below the level of awareness—and at least initially only representing vague or incomplete synthesis of ideas. It appears that Koestler is referring to overcoming what has been described in Chapter V as functional fixedness—where repetition and gelling is required for the new link to be consciously considered within the mind of the individual. Where one would assume that

such repetition and gelling would require time; which was so expressly stated by Ms.

Butler:

We give them that time to discover, but let's say that they discover the concept near the end of class—you still need time to want to make sure that you sum it all up for them—let them know what they discovered- bring it full circle.

If it takes time for a scientist, artist or mathematician to discover a concept that is new to an entire domain or an inventor to make a discovery that is new to an industry then it is reasonable to assume that it will take time for students to discover concepts that are new to them. One of the implications of teachers engaging in discussion regarding creative thinking is how they can most effectively use instructional time to accelerate the discovery process. To find as Ms. Butler described, the right balance between the explicitly providing students with the algorithm at one end of the continuum and leaving the students alone to discover it for themselves at the other end.

Another instructional implication that might arise from the ideas of the participants is that the development of the capacity to create may actually save instructional time in the long-term. Ms. Butler, for instance suggested that if a teacher is able to develop student capacity to synthesize diverse concepts and to develop their ability to adapt concepts learned to new problems, then such skills will progressively save instructional time as the year proceeds and as the young people become *students of mathematics* rather than simply students in a math class.

People say that there is a lot to teach with the common core- And there is, I mean there is. It's outrageous. But if they ever make that relationship in that common core . . . By the time that we got to the second to the last concept this year, they

already knew it because they had made a relationship between that concept and what we learned at the beginning of the year. So when we got to geometry they had no trouble whatsoever because they could already solve equations they had already built to that rigor where they could relate it to anything.

Ms. Butler illustrated this point as she mentioned her students' reaction to the science teacher across the hall from her, who was attempting to teach their students to convert measurements from one unit to another near the end of the year. He was teaching them one way but as Ms. Butler detailed the students approached the science teacher with questions:

Why can't we solve it like an equation? Why can't we use equivalent fractions? They were making a relationship but that takes time.

Ms. Butler's description of her students' journey last year points to another implication regarding allowing time for concepts to gel. I drew from her comments an understanding that it is not just a matter of providing teachers with the instructional time to "draw creative capacity out" of students, it is not just a matter of allowing time for ideas to incubate in the short-term or allowing time for diverse concepts to "gel" in the long-term; it is also a matter of teachers and students gaining a level of tolerance for the *time* in between. Ms. Butler's experience is described by Herbert Simon who affirms the importance of the would-be creator to achieve an

ability and willingness to stick with a problem for a very long time, to preoccupy oneself with it over months and over years, there has to go a deep tolerance for ambiguity-an ability to live with a situation, even if the situation does not immediately lead to clarity, doesn't immediately lead to a solution to a problem. (Simon, 1967, p. 51)

Ms. Butler contended that the moment of illumination for her students took place close to the end of the semester. Her attempts to grant her students a deeper more useful understanding of seventh-grade mathematics bore little fruit over the first half of the school year. And any assessment that tests attempts to assess adaptive reasoning (appropriately applying and synthesizing the math concepts learned) rather than simply assessing each concept in isolation would generate very poor results until the moment of illumination; a moment that might prove to be different for each child.

Ms. Butler seems to have found the resolve to tolerate the uncertainty that is accompanied with waiting for the moment of illumination. Teachers like Ms. Butler are out on the proverbial ledge. They have no real control over when the concepts gel in the minds of their students (how could they?). Further, the explicit teaching of the concepts in isolation might yield a certain memorization of algorithms that would be easily measured by periodic benchmark tests; but such instruction would often prove to be void of meaning and would result in the accumulation of abilities that the NRC states can be completed much more effectively by an inexpensive machine (NRC, 1989).

Ms. Butler affirmed her growing tolerance for the uncertainty the methods of instruction that she employs to develop adaptive reasoning and creative thinking as she concluded her description with the following comment that points back to the illustration that she recounted early in her interview concerning a professor of hers that asked her class to draw a flower.

I think that it takes time to learn how to teach them so they will make that connection. If they make that connection- then it goes back to creativity- they can go wild with it. The first year was really tough, because I was having a hard time

making the connections. As a teacher you have to be ready for whatever you think that they might be creative about—prepared for all the different ways that they could possibly come up with. That’s was so difficult about the Common Core- you have to be ready for the purple flower.

Implication III: How Would the Participants’ Conception of Creativity Affect the Educational Environment?

As demonstrated in the first two implications it became clear from the participants that the manner in which one is taught the contents of a domain can impact both the depth of understanding as well as the ability to adapt such content to meet emerging needs. The present section details the participants’ contention that contextual influences can either inhibit or encourage the type of thinking that they detailed in the previous section. The participant’s responses were general concerned with setting the conditions that would motivate students to express creativity. This inclusion of motivational considerations by the participants completes Csikszentmihalyi’s 3-part conception of the factors that produce the flow state (high quality creative engagement). The participants established an interrelated sequence of Csikszentmihalyi’s 3-part confluence model as illustrated in Figure 2.2 (Csikszentmihalyi, 1996). They believed that it was within their power to facilitate a *context* within their classroom that would *motivate* their students to expend the time and *attention* necessary for high quality creative work.

Schank (1988) commented that the “greatest cause of death of incipient ideas is the rejection of those ideas by their creator” (Schank, 1988, p. 51). Ms. Kim also mentioned that the ability to create is dependent on one’s ability to withstand criticism. Ms. Kim mentioned that teenagers are in particular susceptible to a fear of stepping out and being perceived as different. While at the same time Toepfer (1987) suggest that it

was in those early teenage years for creative thinking begins to most prominently emerge. If both Ms. Kim and Toepfer are correct in their assessment, then the propensity of young teens to over self-regulate at the same time that they become most cognitively able to think creatively would have broad implications with respect to how students are instructed late middle grades and early high school years.

Relationships, Relevance, and Autonomy

The participants articulated examples of conceptual inertia, functional fixedness and self-regulation but as Wagner points out “it’s a lot easier to name the things that stifle innovation like rigid bureaucratic structures, isolation, and high stress work environment. But identifying how best to develop capacities of young people to innovate is far more difficult” (Wagner, 2012, p. 23). The participants suggested several strategies for creating a creative context.

One of the most consistent notions explained by the participants that would have lasting implications about how instruction is delivered is the provision of student autonomy. Several of the participants thought that providing students with choice in demonstrating mastery of content would motivate the student to apply more attention and time to a given project than he or she may have otherwise. This conception on the part of the participants suggests a rationale as to why students who are highly motivated might expend uncommonly long hours on a project that is meaningful to them. Mr. Michaels' description of his students' propensity to return to his class after school and during the summer to work on projects constitutes a good example of the implications of a context that is driven by student interests and diverse intelligences as well as an example of how

teachers can influence student will. The implications of engaging student interests in this manner would constitute an extension of thinking and learning beyond the confines of a sixty minute class period.

The participants stressed over and over again the uniqueness of each individual- and their feeling that every individual is unique and has a unique perspective to be offered. Ms. Paul described a strategy that she intends to employ in her new role as a career development coordinator in which she intends to emphasize this quality of the individual. Ms. Paul intends to have students create “business cards” that describe who they are- their preferred learning style and their interests. One of the reasons for this strategy was to help students determine a career path that might be in line with their interests and abilities, but she also suggested that such cards would be helpful when given to teachers to help them better match instruction and design projects with each student’s particular interests and learning styles in mind. Sternberg tends to agree with this line of thinking as he asserts the importance of environmental fit, “teachers,” he said “prepare their children for choosing environments that are conducive to their creative success.” He went on to suggest that we should “encourage students to examine environments to help them select and match environments with their skills”

The participants were consistent and clear in their emphasis on the individuality of the student. Nothing within the participants comments regarding what they hoped to accomplish with their students lent itself to the precision of a pit crew. A metaphor that would be more consistent with how I believe the participants of the study would view their work with students is that of a jazz session, where the tension between the musicians

are much more fluid and unpredictable, where success is based on the flexible interrelation of the participants as well as the interrelationship of both technical skill and creative expression. Grammy Award winning Jazz musician Winton Marsalis described such “adaptive reasoning” in terms of “swing time”:

When you are in time you know when to be quiet, when to assert yourself, how to master the moment with an appropriate or unusually inventive response. Being in time requires you to make the subtlest kinds of adjustments and concessions to keep everyone in the groove. (Marsalis, 2008, p. 17)

Implication IV: How Would the Participants’ Conception of Creativity Affect Educational Leadership?

Although it may often appear otherwise, the business of education has not been completely mechanized and is still directed by living organisms. The present section will detail how the conceptions stated by the participants of the study might affect those “living organisms” that assume leadership positions in the business of education.

Numerous comments made by the participants during the course of the interviews would have tremendous implications on the role of the school leader. The passion and concern that I noted in the participants’ voices as they described their interactions within their school environment communicated an extremely compelling case for the need of a new type of educational leader. As might be demonstrated by the prior statement, the analysis contained within the present section may be particularly influenced by my current role as a district leader and my previous experience as a school-level leader.

Based on the accounts of the participants and the descriptions of creativity found within the literature, I assume that the self-actualizing qualities that are inherent in the act

of creating would be as applicable to the adults in the workplace as it was determined to be applicable to the students within the classroom. As a school leader, I immediately related the participants' conceptions of creativity to the manner in which teachers are often led in the current system of education. This was underscored by the participants' propensity to effortlessly transition between their accounts of creativity at the teacher/student level and their accounts of creativity at the teacher/administer level; same implications different contexts. I saw the participants' efforts to mitigate the effects of *contextual killers of creativity* within their classroom, and their efforts to help students engage in *critical thinking* at the classroom level to be synonymous with how the creative school leader might engage his/staff of teachers.

Context and School Leadership

Much like the creative teacher in the classroom, a major function of the creative leader would be to set the proper context where critical thinking is encouraged, and where creative initiatives that are thought to be rooted in the best interest of the student are given a chance to succeed even if the data does not immediately indicate success. Mr. Bass was adamant in his stance that he could not work in an environment where he was not allowed to express his creativity. Ms. Angelou sited the restrictive nature of her school environment as the motivating factor for her decision to leave. Such resolve by the participants make it reasonable to assume that the same sort of contextual factors that motivate students to exert extra time and attention to a task are the factors that motivate teachers to do the same. And conversely it is also reasonable to assume that the killers of creativity are every bit as lethal at the teacher/administrator level as they are at the

student/teacher level. For example, the following statement by Mr. Michaels was made in reference to his work with his students, but imagine if the same could be said about a principals' work with his/her teachers or a superintendent's work with his/her principals.

They are creating something where they're making all the decisions. They're choosing the subject matter, they're choosing what colors go where, and because of that they really feel this strong personal tie in to this piece and want to see it finished.

The exertion of a high degree of energy and a large amount of time as a result of wanting to “see it finished” is consistent with how the participants tended to see their work. As illustrated in Figure 5.1, the participants saw themselves on a mission to develop creative capacity in the face of intense contextual resistance.

Ms. Roberts characterized the direction that she and her peers receive from leadership as a sort of endless conveyer belt of prescriptions to be faithfully employed. Ms. Roberts' line of thought here has great implications for the educational leader because her comments we made in response to the question “what can be done to increase creativity in schools.” Ms. Roberts immediately placed the overall direction that she and her peers receive from school leaders as a major obstacle to the development of creativity in schools. She described her feelings as follows:

It wouldn't take much . . . what is distressing to us is—I'm going to be candid, what is distressing to us by and large and I've talked to a lot of people about this and it's all the same, it is all the same, we are frustrated with the obligation to respond to so many initiatives from the state and at central office and I don't, I really don't mean any disrespect. I feel a little bit like we're expected to be puppets on a string and in a good faith effort to incorporate this and do this and respond to this, it has been the longest year of teaching for everyone that I have

talked to, everyone, it's been horribly long, it's just—and it's been the least fulfilling I got to say

The frustration that was poignantly expressed in Ms. Roberts's voice relayed a sense of being trapped in a crushing Industrial Age system where allegiance to the system takes precedence over allegiance to the student whom the system is supposed to serve. Such responses on the part of the participants suggest that our leaders have settled into the phase in the life of a domain where the creative work has long been complete and systems of thought have become crystalized; a phase where Koestler asserts that the managers within such contexts “hang on for dear life to the prevailing school and style which some genius initiated, and defend it with stubbornness and venom against heretic innovators” (Koestler, 1964, p. 257). Ms. Roberts's comment that it “wouldn't take much”—when considered within the context of the overriding attitude among the participants that they are on a mission (as illustrated in Figure 5.1), communicates to me that our exemplary teachers are calling for leadership that works to unleash their talents rather than continue to manage a system that inhibits them.

The participants articulated a sentiment that was prevalent throughout the interviews in that the autonomy yields personal investment; and it is the personal investment that propels individuals to expend the time and effort necessary for high quality creative work. I can think of no reason why the adults within the school building would respond differently to such an approach. Such a notion would have tremendous implications for the school leader who is intent upon maximizing human potential within his/her organization. The participants' message to school administrators might be best

summed up by Richard Florida's assessment that "Every single human being is creative. The great challenge of our age is to tap and harness all of that creativity" (Florida, 2006, p. 22).

Critical Thinking and School Leadership

If the ideas expressed by the participants at the teacher/student can be attributed to the teacher/school leader level then the ability on the part of the leader to analyze the business of education and a willingness to question existing and persistent assumptions along the way would constitute the beginning of creative leadership. The leader that asks enough "why" questions will eventually begin to gain an increasing amount of "why not" (try this approach) from him/herself and from his/her staff. It would be therefore incumbent upon the would-be creative leader to negotiate the tension inherent in all creative contributions between the appreciation of what has gone before and the criticism of the same; along with a resolve to endure the conceptual inertia that he or she is certain to encounter when promoting a solution that breaks from the prevailing thought pattern. Similar to Leiwands conception of the active and engaged classroom, the active and engaged professional learning environment would be characterized by an environment that values *questions* as much as answers, *inquiries* as much as explanations and *conjectures* as much as justifications (Leiwand, 2009). Such leadership would promote an approach to solving complex district and school level problems that would resemble the NRC's conception of the type of adaptive reasoning necessary solving complex problems in mathematics; an approach that would be characterized not only by the analytical skills of "explanation and justification" but also by the creative relevant skills of "*intuitive* and

inductive reasoning based on pattern, analogy and metaphor” (NRC, 2001, p. 129).

Under this sort of leadership staff meetings would resemble the sort integration of both analytical and creative ways of thinking which the participants saw to be indispensable to the creative process. Creative leadership would engender an approach to teaching that would produce a sense cohesiveness at a very fundamental level as opposed to the standardization at the most superficial levels; a cohesiveness where educators might view their subject matter as but a means “drawing out” individual talents and abilities the lie within each person and providing the resulting ideas with a form that can be communicated and evaluated.

Such leaders viewed themselves as the artist who as Koestler describes: “does not climb the façade of ideas (but) is more like a pot holder in search of underground rivers” (Koestler, 1964, p. 325). Such a leadership outlook implies (as illustrated in Figure 5.10) a willingness to question at the deepest level, employ a degree of creative thinking and thereby arrive at a solution that would greatly impact the direction of public education.

“I do as I am supposed to.” “You are going to hate my answer.” “I don’t mean to be disrespectful.” These comments from the participants along with the emotion that was evident to me in the tone of their voices communicated the existence of a crushing level of conceptual inertia within public school that is faithfully managed by school leaders. However these comments by the participants also communicated to me that we have arrived at a time in the history of public education where our most exemplary teachers are ready for leaders willing to challenge a system that is no longer responsive to the needs of

a 21st Century economy and probably never has been responsive to the needs of the student.

Conclusion

The purpose of this study was to achieve an understanding of what a group of exemplary public school teachers conceived of creativity to mean. It is the hope of this project that we will be able to obtain a greater understanding of creativity by including the voices of the teachers in the conversation, since they represent the group tasked with developing the capacity. The strategy for dealing with the ambiguity and complexity of the concept was to analyze the teachers' perceptions in light of existing research and within the context of the standards that they are directed to teach. It is my contention that the implications of teachers working out the meaning of creativity will have immense implications on the business of education and would eventually impact our culture's overall understanding of the capacity to create.

Once one begins to consider creativity as the process of conceiving of novel ideas and bringing those ideas out of one's head and into the physical world; or when one considers the content of all domains as a historical record of someone's creative leap; someone's willingness and ability to depart in some way from the current status of the domain, then one might understand why Ms. Butler would state that "Maybe creativity is all of it." Creativity is after all "the engine that drives human progress." According to Ward et al. (1997), "when applied effectively, creative thinking can better the human condition through miraculous advances in science, medicine and technology; enrich our lives through works of art, music, and literature . . ." (pp. 4–5).

Ken Robinson (2001) and Martinez and Stager (2013) among many others assert that we are engulfed in a creative revolution. The NRC insisted that the individual “whose mathematical skills are limited to computation has little to offer today’s society that is not better done by an inexpensive machine” (NRC, 1989, p. 45). With the collective knowledge of mankind at the fingertips of the masses of the population and with the immense analytical power of computers, what could be missing for great leaps of innovation? The participants were consistent in their belief that the individual must, in addition to the domain relevant skills mentioned, be willing to question the contents of an existing domain and be able to imagine how a domain or concept might be constructed differently when different needs or opportunities arise.

Maybe the most remarkable finding from the study was that the exemplary teachers who participated seemed to intuitively know many of the conclusions that researchers drew from their studies. Their perceptions of creativity flowed out as a result of their day to day experiences with their students. Through their practice the participants were able to describe their methods of negotiating the tension between domain relevant skills and creative relevant skills. They were able to discuss the ambiguous space that exists between *what is* (content) and the leap to *what if*. And they all affirmed their power to set the type of context within their classrooms that would facilitate such a transition. As the participants described these complex ideas, I got the impression that their thoughts on creativity often began to gel during the course of the interview. No one better exemplified this phenomenon than Ms. Kim.

The first thing that I thought when you contacted me was what in the world am I going to know about creativity, I am a science teacher, because I am thinking that surface-level creativity—Artsy at first. I don't think that creativity is emphasized enough in public schools and the reason one is that there is not a clear understanding of creativity, and maybe it's not that there is not a clear understanding—maybe it is that there are different understandings of what creativity is. Because I think that a surface understanding of creativity is for lack of a better term “artsy,” allowing children to create something that is beautiful, musical, a painting, a sketch—those types of things. When in reality I think it goes much deeper than that.

Again, it is clear from the participants and from the current research on creativity that the question of “what is” has to precede the question of “what if.” But the participants and the research also seemed to indicate that the manner in which one learns “what is” can have a great impact on his or ability to consider the “what if.” Ms. Griffin suggested the dilemma of how one might be able to achieve a level of understanding of a given domain without becoming so bound by the domain that they are unable to see alternate possibilities or new opportunities. I think that the answer can be found in several of Ms. Griffin comments concerning role of encouraging questioning and critical thinking as the content is taught by the teacher and considered by the student. As Koestler mentioned, “it is not what we know about a particular domain, it is how we think about the contents of a particular domain—it's not in the discovering facts, but in discovering new ways of thinking about them” (Koestler, 1964, p. 234). If Koestler along with the participants of the study are correct, then how we come to know what we know may be as important to the development of creative capacity as the content itself. Were we told—or did we discover? Was the knowledge poured in or was it *drawn out*?

Creativity maintained its status throughout the interviews as something that cannot be easily managed, quantified or contained. Two of the participants verbally demonstrated their working through their conception of creativity by asking questions of themselves during their interview. Ms. Butler was one of them:

Some students that have come up with some neat things. I think they are out there. Is it made? Or is it something that they have and teachers or parents make it better? Are they born with it—I don't know. I think everybody has got it is just a matter of how it's been fostered over the years.

Ms. Griffin was the other as she questioned:

Do you have to be a creative teacher to grow creative kids? (She went on to answer her question). Well, I mean I think to some extent you have to model and to some extent you have to model for students, but not everyone always feels like they can be creative or are creative, it's like not everyone thinks they can, they're a writer but they can't write but yet they write. So, I don't know. That's some deep stuff.

The questions that Ms. Butler and Ms. Griffin posed to themselves underscored a major challenge of conducting the project. Numerous avenues of more in-depth inquiry presented themselves repeatedly throughout the project. Such exploration would in themselves have significant implications on the business of education. In particular much more attention could have been attributed to the strategies that teachers believed would increase the capacity to create. In the end I resolved that it was important to maintain a focus on how teachers describe creativity, and use the teachers' descriptions of the strategies that teacher use to promote creativity as but one of several ways the participants employed in an attempt to ascertain what they considered creativity to mean

rather than focusing on the strategies themselves. As a result, questions such as: Do student critiques increase creative capacity, or what impact do the production of metaphors and analogies have on the capacity to create, were not pursued in the study. This was because there is an inherent challenge built into such questions posed- a challenge that was fundamental to the rationale of the present study, and that is how would the dependent variable of *creativity* be defined? In order to begin to diminish the cynicism that seems virtually assumed in the findings from any study of creativity, there must exist a greater understanding of what is meant by the term creativity before we can identify ideas of how it can be developed with any sort of clarity and credibility. This challenge of course underscores the overarching rationale for the study which is to increase our understanding of creativity by adding teacher perception to the discourse.

I chose to describe the ideas generated within the study in terms of various sets of “tension” that I came to understand as inherent in the creative process. I used descriptions of the participants’ power to create an environment that effectively negotiates the tension between the would-be creator and his/her environment along with descriptions of the participants’ struggle to negotiate the tension between domain relevant skills and creative relevant skills as the primary themes to ascertain the meaning that the participants poured into the idea of creativity.

The grappling with these tensions were characterized by Thomas Feldman, as the inherently human desire for both change and stability (Csikszentmihalyi et al., 1994). The participants clearly saw the expression of this natural tension—under the right circumstances can result in the most creative of ideas. Their perceptions can be

characterized as an intentional break with the Industrial Age model of exclusive focus on domain relevant skills and a school culture constructed to maintain the focus on such. The overarching contextual implication of teachers believing it to be within their power to influence student attitude and their environment is that such thinking would bring on a break with the Industrial Age model of education. Ms. Roberts stated that running education like a business does not work. If she is correct one would assume that attempting to run education like businesses were run half a century ago would work even less.

A certain irony emerged as the participants provided accounts of their schools being run with an Industrial Age approach while situated in the shadows of crumbling textile plants that exemplified the demise of the model. The participants of the study suggested that it is within their grasps as teachers to develop the context within their classroom that would mitigate the effects of the conceptual inertia which tends to fix the system of education in an Industrial Age paradigm that no longer meets the needs of the economy; and probably never has met the needs of the human spirit. The intense desire to embrace creativity and move beyond the Industrial Age model of education and to create a school environment that is more relevant to student needs as well as the needs of our time was addressed notably by Ms. Roberts:

Our perception is largely based on test scores and quantifiable growth, boy, it just doesn't take into account certain things that aren't quantifiable that are most fulfilling to us.

Once again the intent of the research project was to add to the overall understanding of creativity by including the perceptions of those individuals who are called upon to develop it. The participants certainly added credibility to what was detailed as the importance of the research project. As detailed in Chapter I the importance of creativity is based on the ideas that creativity constitutes a fundamental way in which the brain is designed to operate, constitutes the type of thinking that is increasingly in demand within the 21st Century and that the process of creating provides a great deal of satisfaction to the individual.

The strategy imposed for increasing the level of understanding of creativity was to mediate a conversation between the writers of the Common Core Standards, the existing research on creativity, and the perceptions of the exemplary teachers who participated in the study. The three-way discussion greatly increased my understanding of creativity and the role that school can play in its development. The assumption that there existed little conversation about creativity within schools left me with the concern at the onset of the study that I might not obtain a great deal of insight from teachers. I hoped to mitigate this potential problem by including teachers in the study who were most likely to be reflective of their practice and thereby most likely to have considered the role of creativity at some point in their careers. Upon conclusion of the interviews I came away with a deep appreciation for the participant's tendency and capacity to reflect on their practice. The breadth of the ideas detailed in the literature was in large measure matched by the varying ideas expressed by the participants of the study. The ideas that researchers discussed in theory the participants of the study discussed in practice.

I think that it was clear from the participants of the study that creativity manifests itself in solutions to our most perplexing problems. But apart from any external benefits creativity was deemed by the participants to be core to who we are as a species. These reflective practitioners must lead the way toward an understanding of creativity as common to all contents areas. I think that the participants would agree with this concluding assessment: Creativity is indeed the uniquely human attribute that is most common to our core.

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