THE ADAPTIVE LEARNING COMMUNITY ENVIRONMENT:
MODIFYING THE PHYSICAL CLASSROOM TO FOSTER CREATIVITY
IN 4$^{\text{TH}}$ AND 5$^{\text{TH}}$ GRADE GIFTED STUDENTS

by

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Abstract

The purpose of the research study was to explore the role that the physical classroom environment plays in fostering student creativity in the combined fourth and fifth grade USD 475 gifted program. The research focused on answering the primary research question: Does the proposed environmental modification of the physical classroom foster creative behaviors in students? Secondary research questions included: 1) How does function-based classroom design affect both students and the classroom teacher in terms of creative process? 2) How does adaptability of the designed classroom environment affect both students and the classroom teacher in terms of creative process? A review of the literature led to the development of the author's Framework for the Modification of Creative Learning Community Physical Environments.

The study utilized a two-phase, experimental embedded research design that assessed the effects of an environmental modification to the physical classroom. Quantitative data collection methods included an environmental assessment and student survey utilizing a Likert scale. Qualitative data collection methods included participation observation, video observation, expert interviews, and open-ended student survey questions. The study found that the environmental modification of the physical classroom produced precursory creative behaviors in students. The emergent themes from the data analysis included facilitative physical environment, increased environmental acuity, leadership and self-esteem development, and improved teacher classroom management – all attributes found to be conducive to creativity development. These findings suggest further development of similar in-depth studies across a greater diversity of classroom learning environments is needed to establish reliability of the Framework for the Modification of Creative Learning Community Physical Environments.

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Dedication

This is firstly dedicated to educators. I have worked with you across many spectrums and I am impressed and inspired by your natural inclination to go above beyond, to shape the "whole person" rather than just create knowledgeable individuals, and to furthermore do so with limited resources. You are innovators. Secondly, this is in dedication to school children. I hope that each of you live a life in pursuit of realizing your full potential, with all the unknowns and discoveries that come along with that. Finally, to my two daughters and my supportive husband…Girls, you understand some essential life concepts that people four times your age don't even realize. But I'm not going to tell you this until you're in your 30s. As for my husband, you've been through the school of life and think you know nothing much at all – and that's what makes you absolutely *brilliant*.

A toast – to not knowing anything and living a life of discovery!

Chapter 1 - Introduction

Overview

This thesis explores the role that the designed environment plays in the development of creativity in fourth and fifth grade gifted program students. In this chapter, a brief overview of the current state of education and educational objectives leads to a review of literature topics in chapter two that include creativity in terms of process and human development; reference models for the development of creative environments; and additional design considerations and recommendations. The literature informs the development of a synthesized environmental modification model for creative learning environments based on existing theoretical frameworks. The research methodology for observing student creativity development is outlined in chapter three and followed by a presentation of the research findings in chapter four. The thesis concludes with a discussion of the research findings and their implications for future study.

Purpose

The purpose of the study is to explore the role that the physical classroom environment plays in fostering student creativity in the combined fourth and fifth grade USD 475 gifted program.

Research Questions

The research focuses on answering the primary research question: Does the proposed environmental modification of the physical classroom foster creative behaviors in students? Secondary research questions include: 1) How does function-based classroom design affect both students and the classroom teacher in terms of creative process? 2) How does adaptability of the

designed classroom environment affect both students and the classroom teacher in terms of creative process?

Research Design

Participants were chosen based on the representative sample the diverse group of students provided, age group of participants, and the design of the USD 475 gifted program itself. An experimental environmental modification served as the basis for the study, and the study was furthermore designed in two phases: pre-treatment and post-treatment. Over the course of one-and-a-half academic school years, students were observed in their classroom setting and participated in surveys, pre- and post-treatment. The classroom teacher was also interviewed and environmental assessments were performed. The pre- and post-treatment data collected was analyzed to both inform the environmental modification and identify emergent themes.

Significance of the Study

According to Csikszentmihalyi (1997), "Most of us cannot do a great deal about the macro environment…we can, however, gain control over the immediate environment and transform it so that it enhances personal creativity…the important thing, however, is to have a special space tailor-made to one's own needs, where one feels comfortable and in control" (p. 140). Yet, little research is currently available on how the physical environment can influence student creativity. This research is intended to contribute to the field of study in classroom creativity at the primary education level and merit further, larger-scale research across a variety of cultural contexts. Creativity precedes innovation, which is needed to solve modern complex problems, and thus is a critical problem-solving skill. The opportunity to develop creativity should not be a mere option offered during post-secondary studies; instead, it should be a fundamental component of *all* formalized education at first introduction.

Chapter 2 - Literature Review

Introduction

There are external and internal influences that affect creativity in individuals (Vygotsky, . Externally, the educational system is shaped by social values and state and federal mandates. Further embedded within this system are community and familial lives, differing from student to student, and thereby setting the context for the student's school experience. Internally, there are processes from which creativity emerges. Biological, psychological, and psychosocial factors contribute to the development of creativity. A systems approach to understanding creativity acknowledges both the influence of culture and human development on the creative process and provides the basis for developing supportive environments. The following sections provide an overview of existing knowledge regarding these contributing factors, but first, the concept of creativity must be operationalized.

Defining Creativity

Creativity is a natural human process motivated by strong human needs and cultivated through skills development and application (Torrance, 1987). Creativity includes cognitive processes; social and emotional processes; family aspects; education and preparations, both formal and informal; characteristics of the domain and field; social and cultural contextual aspects; and historical forces, events, and trends (Feist, 2010). Creativity, therefore, is a process of both individual and cultural development where creative processes internally transform social and cultural messages. The most basic process of creativity is the effort to communicate, a process of making meaning and sharing a vision that builds and changes the surrounding culture (Starko, 2014).

Mechanisms of the Creative Process

   Problem-finding and Problem-solving. Creativity entails finding a problem or issue worth addressing; making unique connections; and generating ideas for addressing the problem or issue, evaluating the ideas generated, and applying them (Berrett, 2013; Kim, 2011; Starko, 2014). So, if problem-finding and problem-solving drive the creative process, divergent thinking and convergent thinking fuel the process. Divergent thinking involves probing deeply to find alternative, previously unconsidered solutions to a problem. Convergent thinking requires streamlining multiple solutions to arrive at the best testable solution (Berrett, 2013; Sousa, 2014). Creativity requires that the individual alternate back and forth between these two types of thinking, and as such, adaptability and flexibility are necessary skills.

   Motivation and Goals. Intrinsic motivation is a significant and complex aspect of the creative process. Creative individuals persist in their exploration, even without material reward (Gardner, 2008). Motivation furthermore contributes to the processing of new information, which facilitates the creative process. Creative inspiration occurs in a mental state where attention is focused, thought is associated, and large numbers of mental connections are thus activated (Csikszentmihalyi, 1990; Martindale, 1999; Starko, 2014). Preadolescents, for example, can only focus attention intently for about five to ten minutes, sans motivation. Motivation can be used as a vehicle for achieving focus (Starko, 2014). Csikszentmihalyi (1990) describes achieving a state of flow where an individual becomes highly engaged in activity, concentrating very deeply and losing track of time. These flow activities are meaningful and provide some type of feedback that allows the individual to know whether they are approaching their goal (Starko, 2014).

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Motivation is also directly linked to goals. There are two types of goals: performance goals and mastery goals. Performance goals are meant for gaining the approval of others, most closely representing extrinsic motivation. Extrinsic motivation, however, can have a negative effect on creative achievement. Mastery goals are derived from a desire within and most closely represent intrinsic motivation. (Amabile, 1996; Starko, 2014). The relationship between motivation and creativity is also demonstrated by a remaking of oneself – changing the goals and orientation – to traverse unchartered territory (Gardner, 2008). This introduces the concept of *metacognition*, or awareness of one's own thinking process. Metacognition allows individuals to monitor their own progress as they are learning while simultaneously adjusting when problems occur during learning activity (Sousa, 2014).

Novelty and Appropriateness. Novelty introduces an element of surprise into the learning environment, which holds students' attention and is a critical aspect of the creative process. Novelty also incorporates multiple methods of learning about a subject (Sousa, 2014). The ideas derived from the creative process must be both original and appropriate for the situations in which they occur (Martindale, 1999; Starko, 2014). Appropriateness is determined by the cultural context in which the creativity is based (Starko, 2014).

The Education System

According to the President's Council of Advisors on Science and Technology (2010), the future success of our country will depend on "the ideas and skills of its population" (p. 42). With that said, are our schools adequately engaging students to be prepared for life in the 21st century? This section will examine educational performance in the U.S. as well as how the competing interests of standardized education and adopted 21st century learning skills have impacted students' creativity and why this is important. From there, we may begin to recognize the

disparity between our expectations for the future and our present reality in order to develop the framework for a more pragmatic educational experience.

Standardized Education: Analysis and Critique

Historically, school curriculum has been determined by the state, resulting in differences in pedagogical approach and student achievement gaps (Postlewaite, 2003). In an attempt to raise educational standards and close those achievement gaps, several influential programs have risen over the past fifteen years including the No Child Left Behind Act (NCLB) and, more recently, the Common Core Standard (Beghetto, 2010; Cawelti, 2006; Postlewaite, 2003; Rudalevige, 2003; The President's Council of Advisors on Science and Technology, 2011; Kober & Rentner, 2011; McGuinn, 2011). The NCLB, a controversial accountability mandate enacted in 2001, placed increasing pressure on teachers and schools to conform to externally imposed standards (Beghetto, 2010; Cawelti, 2006; Postlewaite, 2003). NCLB was an unprecedented demonstration of federal over state and local school authority emphasizing mandatory testing to assess schools' "adequate yearly progress" (Cawelti, 2006; Postlewaite, 2003; Rudalevige, 2003). Assessment results were directly tied to funding, and technical and costly requirements of the mandate made state implementation challenging (Postlewaite, 2003).

The Common Core standards are the result of the 2009 College and Career Readiness Standards which emphasize "cross-disciplinary literacy expectations that must be met in order for students to be prepared to enter college and workforce training programs ready to succeed" (NGA & CCSSO, 2010, p. 4). Such learning skills are further corroborated by the Partnership for 21st Century Learning (also known as the Partnership for 21st Century Skills), a coalition of education, business, community and government leaders (Partnership for 21st Century Skills, 2008). The framework for these skills is illustrated in Figure 2.1. Released in 2010, Common Core outlines goals for what students should know and be able to do at the end of each grade.

Common Core was designed through collaboration among teachers, school chiefs,

administrators, and other experts to provide a framework for educators (Kober & Rentner, 2011;

McLaughlin & Overturf, 2012). The Common Core standards:

▪ are aligned with college and work expectations;

▪ are clear, understandable, and consistent;

▪ include rigorous content and application of knowledge through high-order skills;

▪ build upon strengths and lessons of current state standards;

▪ are informed by other top-performing countries, so that all students are prepared to succeed in

  our global economy and society; and

▪ are evidence-based (McLaughlin & Overturf, 2012).
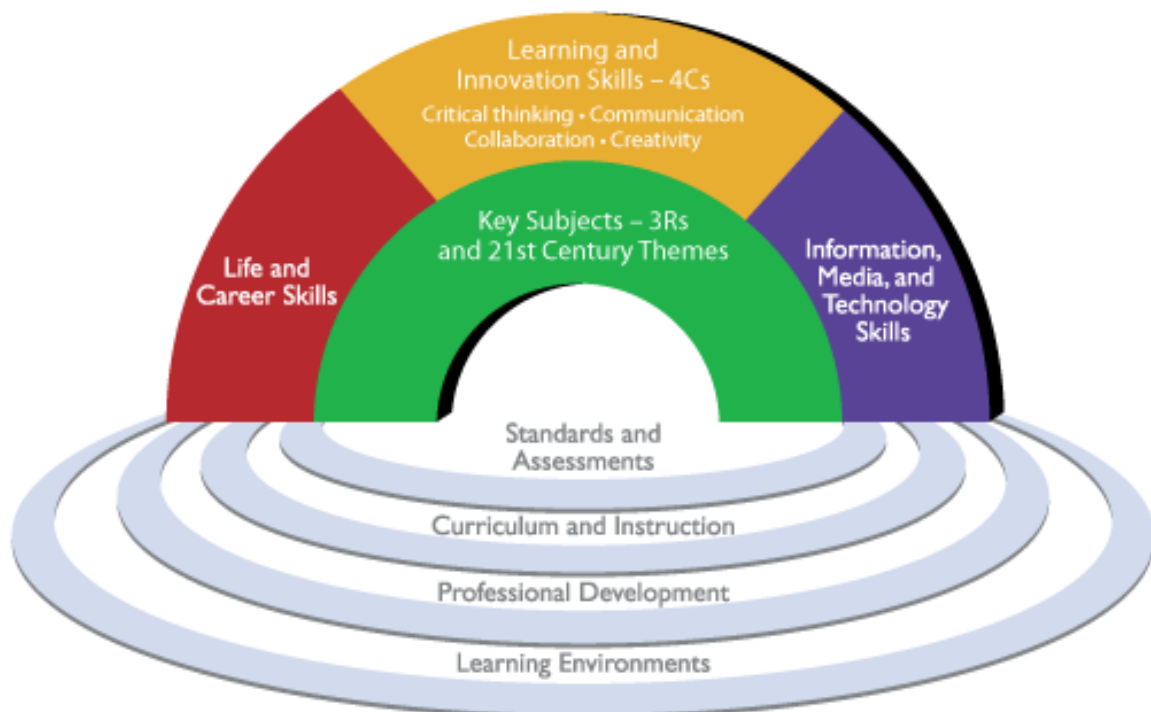
Figure 2.1 P21 Framework for 21st Century Learning. (2007).
Retrieved from http://www.p21.org/about-us/p21-framework

The Common Core standards are much more rigorous than previous curricula, and the substantially revised curriculum materials requiring fundamental changes in instruction are costly. Although the Common Core is designed to improve students' skills and the expected outcomes are clear, it is the responsibility of the teachers to figure out the best instructional methods. Common Core implementation is also by state choice, contributing to inconsistencies in national educational standards and achievement (Kober & Rentner, 2011).

International Testing. In 2012, the Organisation for Economic and Co-operative Development (OECD) conducted the Programme for International Student Assessment (PISA) in reading, mathematics, and science for 15-year-olds. The U.S. is not among any of the top performing OECD nations, having achieved average, mid-range scores in reading and science and below-average scores in mathematics (OECD, 2014). Table 2.1 outlines the 2012 PISA results. If our focus is on how students' educational experience prepares them for life, what makes these scores relevant? Proficiency in mathematics is found to be a strong predictor of positive outcomes for young adults, influencing not only their ability to participate in post-secondary education but future earnings as well (OWP/P Architects et al., 2010). According to educational thought leader and advisor Sir Ken Robinson, companies and organizations are trying to fix a downstream problem originating in schools and universities (2001). Berrett (2013) further asserts that colleges are weathering criticism that they fail to prepare students to be productive citizens and employees. The educational process itself, which is meant to develop our natural abilities, is a fundamental problem (Robinson, 2001). Studies have found that a third of the U.S. student population drops out by high school, and in many low-income schools the graduation rate is less than 50 percent (OWP/P Architects *et al.*, 2010).

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Table 2.1 2012 PISA Test Results. (2014). Retrieved from http://www.k5learning.com/blog/us-students-make-no-progress-international-academic-performance-pisa

	Maths			Sciences			Reading	
1	Shanghai, China	613	1	Shanghai, China	580	1	Shanghai, China	570
2	Singapore	573	2	Hong Kong, China	555	2	Hong Kong, China	545
3	Hong Kong, China	561	3	Singapore	551	3	Singapore	542
4	Taiwan	560	4	Japan	547	4	Japan	538
5	Korea	554	5	Finland	545	5	Korea	536
6	Macau, China	538	6	Estonia	541	6	Finland	524
7	Japan	536	7	Korea	538	7	Taiwan	523
8	Liechtenstein	535	8	Vietnam	528	8	Canada	523
9	Switzerland	531	9	Poland	526	9	Ireland	523
10	Netherlands	523	10	Liechtenstein	525	10	Poland	518
11	Estonia	521	11	Canada	525	11	Liechtenstein	516
12	Finland	519	12	Germany	524	12	Estonia	516
13	Canada	518	13	Taiwan	523	13	Australia	512
14	Poland	518	14	Netherlands	522	14	New Zealand	512
15	Belgium	515	15	Ireland	522	15	Netherlands	511
16	Germany	514	16	Macau, China	521	16	Macau, China	509
17	Vietnam	511	17	Australia	521	17	Switzerland	509
18	Austria	506	18	New Zealand	516	18	Belgium	509
19	Australia	504	19	Switzerland	515	19	Germany	508
20	Ireland	501	20	Slovenia	514	20	Vietnam	508
21	Slovenia	501	21	United Kingdom	514	21	France	505
22	Denmark	500	22	Czech Republic	508	22	Norway	504
23	New Zealand	500	23	Austria	506	23	United Kingdom	499
24	Czech Republic	499	24	Belgium	505	24	United States	498
25	France	495	25	Latvia	502	25	Denmark	496
26	United Kingdom	494	26	France	499	26	Czech Republic	493
27	Iceland	493	27	Denmark	498	27	Austria	490
28	Latvia	491	28	United States	497	28	Italy	490
29	Luxembourg	490	29	Spain	496	29	Latvia	489
30	Norway	489	30	Lithuania	496	30	Luxembourg	488
31	Portugal	487	31	Norway	495	31	Portugal	488
32	Italy	485	32	Italy	494	32	Spain	488
33	Spain	484	33	Hungary	494	33	Hungary	488
34	Russia	482	34	Luxembourg	491	34	Israel	486
35	Slovakia	482	35	Croatia	491	35	Croatia	485
36	United States	481	36	Portugal	489	36	Iceland	483

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The Purpose of PISA. PISA was designed to assess "the aptitude [of students] to undertake tasks found in everyday life" (OECD, 2001, p. 20). PISA differs from other achievement tests in that it does not test curricular-based knowledge; instead, it aims to test students' ability to use knowledge and skills in order to meet real-life challenges (Eivers, 2010; McVey, 2013; Rochex, 2006). PISA encourages the design of curricula primarily emphasizing the development of basic skills. The four PISA measures are how well schools have prepared students for life; choice of key competencies; use of real-life challenges; and curriculum independence. The emphasis of current educational practices on reading, math, and science however infers that the social sciences, foreign languages, art, and music do not provide students with essential life skills (Rochex, 2006).

PISA Critiques. As just one well-known form of standardized testing, PISA is not free from criticism. Sjøberg (2007) comments that "PISA results and advice are often considered as objective and value-free scientific truths, while they are, in fact embedded in the overall political and economic aims and priorities of the OECD" (p. 203). As a development of the OECD, it can be inferred that PISA objectives would include economic growth, cooperation, and development, and PISA results would inform the creation of efficient education systems that offer value for money and produce quality outputs (Eivers, 2010).

Under the assumption that countries with effective education systems become successful economies, PISA would appear to be appealing to policymakers. PISA assessment indicators are often utilized to increase schools' effectiveness (and, therefore, a country's capacity for economic competitiveness) as well as inform "good practices" that influence school policy implementation. As tests like PISA provide the basis for identifying common indicators, school systems and school units can be more easily compared and assessed (Rochex, 2006). Thus,

teachers feel forced to "teach to the test", which only disempowers the role of the teacher in the classroom and narrows the learning experience by encouraging "teacher-proof" curricula, or reading verbatim from instructional scripts rather relying on their expertise and own creativity (Rochex, 2006; Sawyer, 2004). Additionally, PISA studies are cross-sectional, not longitudinal, bringing into question how well students' achievements can really be assessed and attributed to their formal education experience (Eivers, 2010).

There are cultural implications for PISA to consider as well. According to Paulston (1988), comparative evaluation is problematic because it necessitates standardization or homogenization which assumes shared values. The narrow focus of the test further underestimates the impact of the different historical, social, political, cultural and linguistic contexts in which schools and school systems are always embedded (Paulston, 1988). The social, cultural, and economic requirements for a successful life differ from country to country. Policymakers are moving away from the idea that learning leads to independence, self-awareness, and maturity (and that these are worthy goals in themselves) in favor of economization, privatization, and productivity (Eivers, 2010).

The Creativity Crisis

Increased emphasis on standardization has shifted schools' focus toward drill exercises and away from critical, creative thinking. As a result, electives, the arts, enrichment and gifted programs, foreign language, elementary sciences, and elementary recess are being eliminated. The issue is further exacerbated by seemingly endless budget cuts to education. Eliminating these activities is taking away the students' outlets for imagination, scholarship, critical and creative thinking, and problem-solving, lending itself to underachievement in school (Gentry, 2006). Rigorous schooling emphasizes facticity, correctness, linearity, and concreteness, which

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conflict with the development of creativity (Eisner, 2002). The education system reinforces little more than student recollection and recognition (Beghetto, 2010; Sternberg, 2004).

Since the 1990s, international policymakers have enacted policy initiatives to develop students' creative potential. These efforts were viewed as an investment into students', and countries', future. In the U.S., creativity is strongly linked with economic and cultural prosperity (Beghetto, 2010). Yet, education doesn't follow the natural grain of students' abilities. Robinson (2001) argues that students are sent through two filters: *economic*, which categorizes people according to labor markets and is otherwise known as industrialism; and *intellectual*, which categorizes people according to a particular view of intelligence otherwise known as academicism. Both models are out of date and insufficient and must be completely reconstructed (Robinson, 2001). A "creativity mandate" from external policymakers will not, however, address long-standing barriers to fostering creativity in the classroom (Ingersoll, 2003). These mandates often take on a septic focus, or the tendency to look at a problem in isolation from its context which, in turn, causes *more* problems as a form of solution (Robinson, 2001). Externally imposed mandates often fail to consider the context within which classroom teachers work and create more pressure as a result of contradictory demands (Ingersoll, 2003). While standardized testing is widely used to assess students' basic skills and predict their ability to succeed in our 21st global society, there is far less emphasis placed on evaluating students' creative aptitude, an essential component of problem-solving.

Torrance Tests of Creativity

One test that actually proves itself to be effective in assessing the creativity skills that schools are encouraged to develop is the Torrance Test of Creativity (TTCT). Torrance's main focus was to understand and nurture qualities that help people express their creativity. Developed in 1966, the TTCT is the most well-known and widely used test for measuring

creativity (Almeida *et al.*, 2008; Kim, 2011) and was designed to serve as a tool for enhancing creativity (Kim, 2006). As a divergent thinking test, the TTCT scores predict creative achievement better than other measures of creative or divergent thinking (Kim, 2011).

From 1990 to 2008, creative thinking scores for grades K through 6 decreased significantly. This is concerning because a lack of creativity stunts abilities which are supposed to mature over a lifetime. Efforts to encourage creativity should begin before preschool and be carried throughout a student's school career (Kim, 2011). These were some of the findings:

▪ *Decrease in Strengths* scores indicate that children have become less: emotionally expressive, energetic, talkative and verbally expressive, humorous, imaginative, unconventional, lively and passionate, perceptive, apt to connect seemingly irrelevant things, synthesizing, and likely to see things from a different angle (Kim, 2011).

▪ *Decrease in Elaboration* scores indicate that over the last 30 years, people of all ages, kindergartners through adults, have been steadily losing their ability to elaborate upon ideas and detailed and reflected thinking. They are also less motivated to be creative and creative thinking is less encouraged by home, school, and society overall (Kim, 2011).

▪ *Decrease in Abstractedness of Titles* scores beginning in 1998 indicate that children are becoming less capable of the critical thinking processes of synthesis and organization and less capable of capturing the essence of problems (Kim, 2011).

▪ *Decrease in Closure* scores beginning in 1998 indicate that children are tending to grow up more narrow-minded, less intellectually curious, and less open to new experiences (Kim, 2011).

To reverse decline in creative thinking, the U.S. must reclaim opportunities for its students and teachers to think flexibly, critically, and creatively, avoiding standardization (Kim, 2011).

21st Century Skills

Although high-stakes testing is the modus operandi for student assessment, the test scores do not measure skills that are essential to 21st century living. Among these skills are questioning, problem-solving, and innovation, all of which are components of the creative process (Starko, 2014). According to Starko (2014), practices that produce exceptionally high test scores do not support creative thinking, and top scorers on IQ tests are not necessarily the top scorers on creativity tests. Intelligence and creativity are separate abilities which can be modified by the environment and schooling (Kim, 2011; Starko, 2014).

Sternberg (2004) found that students taught content using analytic, practical, and creative thinking skills were more successful across academic disciplines than those taught solely by traditional methods. Additionally, a 2009 high school survey of student engagement for 43,000 students identified that 65 percent of students "like discussions in which there are no clear answers" and 82 percent would welcome chances to be creative in school (Sousa, 2014, p. 4). According to Thomas R. Fisher, professor of architecture and dean of the College of Design at the University of Minnesota-Twin Cities, "humans are naturally playful, creative beings. We're doing something to kids in grade school that drums the creativity out of them" (Berrett, 2013, p. 15). Teachers have the opportunity to improve student achievement by encouraging them to think creatively (Starko, 2014). The teacher's role is to draw out the individual in every child and provide the educational environment that allows children to grow into their unique personality and talents (Robinson, 2001).

The current, dominant ideologies of education defeat their very purpose: to develop people who can cope with and contribute to our rapidly changing society using their creative abilities and talents. Rapid technological advancement is generating many new social issues and cultural

challenges. Technological innovations are driving economic and social changes at breakneck speed and, in order to respond, radical strategies in the way we perceive and develop human resources are necessary. Both government and businesses acknowledge that education and training are the key to the future, and they emphasize the critical need to develop creativity and innovation (Robinson, 2001). Innovative thinkers use the tools of creativity to solve problems, and today's students need tools to tackle the problems that they stand to inherit. The goal in developing students' creative skills is to train them to be able to look at familiar problems or sets of data from a fresh perspective. If students begin developing the capacity to think creatively now, it is much more likely that they will be more adaptable both as employees and citizens in an uncertain future (Berrett, 2013; Csikszentmihalyi, 1997). However, we rarely provide the community setting in schools that was once available for large numbers of children (Noddings, 2005).

Culture becomes a part of each person's nature and the mechanism for individual developmental change is rooted in society and culture. Learning should be dedicated to developing full human growth biologically, psychologically, and socially. Learning should also encourage a sense of belonging, continuity, and civic mindedness (Dewey, 1902; Vygotsky, 1978). Creating an environment in which creativity can be fostered accomplishes these goals.

Human Development and Creativity

If the development of creativity is embedded within individual and cultural processes, then human development is essential to its understanding. Human development is influenced by neuroscience, biological and cognitive development, and psychological and psychosocial development. Each of these factors, in turn, affects teaching methods and environmental

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conditions, thus contributing to the development of classroom culture. The following discusses the current research across the topic areas.

Neuroscience

Having been introduced to some of the complex psychological and psychosocial factors influencing creativity, educators are becoming more involved in the biology of learning and how much environment can affect growth and development of the brain. A topic that has gained much interest is the concept of *plasticity*, or the brain's ability to reorganize itself on the basis of input. This process continues throughout life but is exceptionally rapid in the early years. During these years, there are windows of opportunity for the development and consolidation of neural networks. There are also *critical periods* that coincide with developmental markers. When these taper off, the correlating brain cells may be called upon to be dedicated to other tasks. Luckily, the windows for cognitive and skill development are far more plastic and open to influence. We can learn for the rest of our lives, even though the skill level attained will not be as high outside of these windows (Sousa, 2014; Starko, 2014).

Experiences in grade school contribute to shaping the neural circuitry that will determine *how* and *what* the brain learns in latter school years and beyond. The making of new combinations of associative elements which are achieved through neural complexity and interconnectedness are essential for creative thought (Andreasen, 2005; Martindale, 1999). Creative people generate many more ideas and the ideas generated tend to be looser and more remote in their associations. This demonstrates *cognitive fluency*. It may be that creative brains have more neural connections, which the frontal lobes are responsible for creating (Feist, 2010; Kaufer & Lewis, 1999). Furthermore, the right hemisphere is more active than the left hemisphere when processing novel, diffuse, heuristic, and global information. Creative people

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rely more heavily on the right hemisphere than the left only during creative processing, not in general. The right hippocampus also appears to play an important role during insights into difficult problems (Feist, 2010).

Biological and Cognitive Development

Neurological, biological, and cognitive development are inextricably linked. Movement, for example, actually improves brain performance (Sousa, 2014). Dr. Dieter Breithecker, a sports and physical scientist and Europe's foremost expert on the relationship between ergonomic design in school furniture and the physical development of school children, considers school instruction to be a "sitting trap." Students are trained to unnatural behaviors, such as sitting for extended periods of time, which can cause problems with brain development. Movement stimulates the vestibular system which activates special hormones like neurotrophin. Neurotrophin, in turn, has a tremendous effect on brain activity (OWP/P Architects *et al.*, 2010).

Changes over time may also correspond to developmental changes in creative thinking (Piaget, 1950; Vygotsky, 1994). Piaget (1950) found that, in addition to maturation and heredity, biological development is also a result of adaptation to changes in environment. There are four stages of cognitive development: *sensorimotor* which occurs from birth to two years of age; *preoperational* which occurs from two to seven years of age; *concrete operational* which occurs from seven to eleven years of age; and *formal operational* which occurs from adolescence to adulthood. None of these stages can be "skipped" and through each stage, children demonstrate new intellectual abilities and an increasingly complex understanding of the world (Piaget, 1950; Piaget, 1973). Figure 2.1 outlines the stages of development.

As mentioned before, the majority of learning is done earlier in age rather than later, more specifically, from birth to eleven years of age. These are primarily the elementary school

years, which are dominated by concrete operational thinking. During the preceding

preoperational stage, children learn to use language, and memory and imagination develop.

Intelligence, at this point, is still egocentric, intuitive, and not logical. Learning is primarily

developed through interaction with the surrounding environment. During the concrete

operational stage, intellectual development is illustrated through the use of logical and

systematic manipulation of symbols. With increased awareness of external events, thinking

becomes less egocentric and evolves to take relationships into consideration (Orey, 2001; Piaget,

1950).

Stage	Age Range	Description
Sensorimotor	0-2 years	Coordination of senses with motor response, sensory curiosity about the world. Language used for demands and cataloguing. Object permanence developed
Preoperational	2-7 years	Symbolic thinking, use of proper syntax and grammar to express full concepts. Imagination and intuition are strong, but complex abstract thought still difficult. Conservation developed.
Concrete Operational	7-11 years	Concepts attached to concrete situations. Time, space, and quantity are understood and can be applied, but not as independent concepts
Formal Operations	11+	Theoretical, hypothetical, and counterfactual thinking. Abstract logic and reasoning. Strategy and planning become possible. Concepts learned in one context can be applied to another.

Figure 2.2 Piaget's Model of Cognitive Development. (2016).
Retrieved from http://www.psychologynoteshq.com/piagetstheory/

The educational implication derived from research into biological development is that

the teacher's role is to facilitate learning by providing a variety of developmentally

appropriate experiences. Piaget (1950) determined that children are stimulated by discoveries

they themselves make (Besançon & Lubart, 2007). Additionally, teaching strategies that

coordinate with students' biological development and cognitive abilities encourages less mature students to advance to a more mature understanding with their peers (Orey, 2001), enhancing the social aspect of learning.

Psychological and Psychosocial Development

The brain has a hierarchical response to sensory input. Input of higher priority diminishes the processing data of lower priority. These stimuli may also be referred to in the context of *threats* and *emotions* which have effect on learning, memory, and recall (Sousa, 2014). High levels of arousal prep our brains for crisis and we are unable think flexibly. Even small amounts of anxiety result in less effective problem-solving (Mueller *et al.*, 2012). Before students can engage in cognitive learning, they must feel safe and emotionally secure in their school environments.

An ascending order of human needs outlined by Maslow (1943) is organized into three ascending categories within Maslow's Hierarchy of Needs: basic, physiological, and self-fulfillment needs. In order for an individual to address higher level desires, the most basic of needs must first be met. An individual will then continue to address an ascending order of needs as illustrated in Figure 2.2. Creativity is a psychologically higher need, organized into the self-fulfillment category (Maslow, 1943; Poston, 2009). Starko (2014) concludes that "any act sending the message that students are important, valuable, and full of potential builds a foundation of psychological safety" (p. 245). Maslow's Hierarchy of Needs also illustrates the importance of fulfilling love and belonging needs in order to advance to higher levels of development (Maslow, 1943; Poston, 2009). Teachers can therefore promote emotional safety

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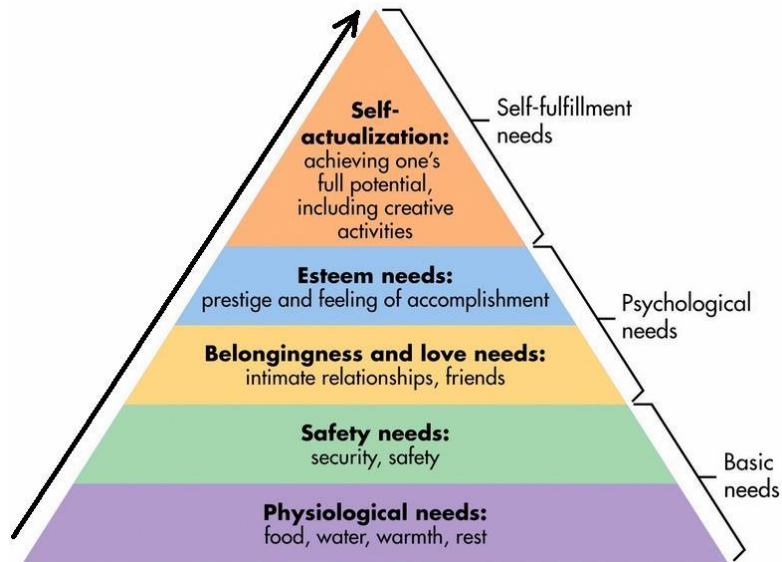
Figure 2.3 Maslow's Hierarchy of Needs. (2015).
Retrieved from http://studiousguy.com/maslows-hierarchy-of-needs/

by establishing a positive classroom climate that encourages appropriate risk-taking (Sousa, 2014). The physical design of the classroom environment can correspond naturally with both biological and psychosocial development, adapting for new learning experiences with peers through developmental stages. The physical classroom itself can encourage exploration and experimentation and fully engage the senses in a healthy way (Besançon & Lubart, 2007).

Ultimately, there is not one single area of the brain and its subsequent functions that is responsible for creative thinking. Brain scans find that several areas of the brain are stimulated when performing creative tasks versus engaging in conventional activity (Sousa, 2014). Brain activity corresponds with or informs cognitive, biological, psychological, and psychosocial development and experiences. In addition to constructing age- and aptitude-appropriate environments, teachers must also create environments that encourage feelings of safety and

belonging in order to foster creativity in students. The physical classroom environment has the potential to mediate and facilitate this process.

Models of Creative Environments

In addition to considering how much and what we are teaching, it should be taken into consideration how much of the progress observed is attributable to facilitating the conditions that free natural process to operate (Torrance, 1987). The most successful approaches to teaching children to think creatively are those that involve cognitive and emotional functioning, provide adequate structure and motivation, and present opportunities for involvement, practice, and interaction with teachers and children (Torrance, 1987). Students must be allowed to participate in developing their learning objectives and finding relevant problems to solve (Dewey, 1902). Students need to be given opportunities to consider genuine problems, make meaning of their learning, and apply content in various contexts that allow for interdisciplinary interaction (Starko, 2014). Motivating and facilitating these conditions makes a difference in creative functioning when combined with deliberate teaching (Torrance, 1987).

The design of the physical environment also affects children's perception, learning, and behavior (Read *et al.*, 1999). High quality physical environments facilitate the creative process by addressing biological, psychological, and psychosocial needs; adapting to meet needs as they change; and allowing students to exercise choice. New research finds that students will gain greater understanding of and derive greater pleasure from learning when they are allowed to transform their learning environment into creative thoughts and products (Sousa, 2014). Just as curriculum may be organized to move students to higher-order thinking, environments may be thoughtfully designed to facilitate the teacher's role in guiding student learning outcomes in the

classroom – and there have been programmatic and organizational efforts to improve the environmental conditions in which learning takes place.

LEED for Schools

The U.S. Green Building Council developed LEED as a guideline for Leadership in Energy and Environmental Design. LEED for Schools, a rating system that recognizes the unique nature of design and construction of K through 12 schools, recognizes that schools are responsible for safeguarding children's health as well as providing space that functions efficiently for a number of daily activities. LEED for Schools demonstrates to communities that a facility is built and/or operated in a way that supports the health and wellbeing of occupants all while saving energy, resources, and money. Based on sustainable building practices and emerging concepts, the LEED for Schools rating system is performance-based and comprehensive in scope, considering such design elements as environmentally preferred materials, finishes, and furnishings as well as indoor air quality, occupant comfort, and innovation in sustainable design and construction. School projects are thereby certified at four progressive levels (Certified, Silver, Gold, and Platinum), all administered by the Green Building Certification Institute (The Center for Green Schools, n.d.).

Organizations

Creative Culture. Meaning is derived through culture, as will be explored in the Theoretical Frameworks section of the next chapter. Cultural communities can be defined as a group of people with diverse characteristics who are linked by social ties, shared perspectives, and engage in joint action. Schools serve as one students' first introductions to organizational culture. They further prepare students to enter into the workforce where they will interact with a diverse set of peers and across disciplines to solve our 21st century problems. In this sense,

workplaces are like communities – places where people live, work, and socialize together (Donnelly, 2014; Puccio & Cabra, 2010; Williams & Yang, 1999). Cultural conditions can either kindle or kill creativity, which is stimulated by the work, ideas, and achievements of other people (Robinson, 2001; Feldman, 1999). Organizations also exist to provide solutions society's needs and problems, and in order to remain viable, they must change and *adapt* to changes (Hitt, 1975; Williams & Yang, 1999). To do so requires "utilization of all resources available, especially the most creative – the human resource" (Williams & Yang, 1999, p. 284). With that said, it is critical to remember that it is not organizations themselves that adapt to change; rather, it is the people within organizations who are required to change. Thus, workers have to be flexible, adaptive, imaginative, and able to tolerate ambiguity. In short, they must be creative (Puccio & Cabra, 2010; Williams & Yang, 1999).

The 2008 report *21st Century Skills, Education & Competitiveness* (Partnership for 21st Century Skills, 2008) highlighted the central role creativity plays in today's organizations identifying solving complex multidisciplinary, open-ended problems; creativity and entrepreneurial thinking; and making innovative use of knowledge, information, and opportunities as desirable, creativity-related skills. A number of additional studies and reports have identified creative thinking and creative problem-solving as fundamental workplace skills. For example, a three-year long national study sought to identify the skills necessary for success in the workplace. A cross-industry data sample of organizations identified adaptability, which included creative thinking and problem-solving, as one of seven critical skills (Carnevale *et al.*, 1990; Puccio & Cabra, 2010). An analysis of 317 firms found that the most innovative firms were those that were most active in using creativity to generate new knowledge. Specifically, it was concluded that "creativity in problem-solving is the main driver of new knowledge creation

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and innovation" (Soo *et al.*, 2002, p. 145). If innovation is the means by which society's problems are solved in workplaces, then the development of creative thinking should be a priority in the school environments that prepare students to enter these workplaces.

  Creative Spaces. As innovation has become a strategic priority, great attention has been given to the physical features within an organization and how workspaces might be designed to inspire creativity (Puccio & Cabra, 2010). General Manager Tom Kelley (2001) of IDEO, a California-based design firm, observed that, "This may sound a bit extreme, but companies that depend on the creativity of their staff give them free reign when it comes to space" (p. 125). Choice plays a significant role in fostering creativity (Starko, 2014), but the creation of creative workspaces is outpacing scholars' ability to document and describe the nature and impact of such spaces (Puccio & Cabra, 2010). There are, however, some findings to support the design development of creative spaces. Lewis and Moultrie (2005) note that the marketplace has become highly dynamic; thus, organizational spaces that are designed well are apt to be more responsive and flexible than those that are not. Using a case-study approach, three U.K.-based innovation laboratories were examined; findings indicated that physical structures were conducive to innovation when malleable space that can be broken down, changed, or reconfigured at a moment's notice in response to an organizational need or marketplace demand (Lewis & Moultrie, 2005). Moultrie et al. (2007) were able to develop a framework for understanding the roles, goals, and various design features of physical spaces that promote organizational creativity. Kristensen (2004) emphasized that physical spaces influence an employee's emotional wellbeing and that a positive association with the surrounding physical space will therefore enhance creative work. Haner (2005) argued that a hybrid space that accommodates both private and group work, as well as convergent and divergent processes, is

optimal for innovation. He further posited that an attractive space can serve as a source of inspiration and motivation, sparking innovation strategies and signaling to employees that creativity is expected (Haner, 2005).

Community by Design. What many organizations are missing is an explicit tie-in and buy-in to a sense of community at work and, as a result, placemaking is becoming more important as the knowledge economy grows (Donnelly, 2014; Gillen, 2006). Just as communities consider the diverse needs of their residents, innovative organizations are beginning to understand the changing and varying needs and expectations of their employees (Donnelly, 2014). This emphasis on place and community is making the contribution of design ever more important (Gillen, 2006). Physical spaces are important for communicating what organizations stand for, facilitating and increasing face-to-face interaction, building trust between coworkers and collaborators, and fostering relationships and generating the context for casual creative interactions (Nicolaou, 2006). Organizations are creating spaces that foster collaboration, innovation, and camaraderie through social interaction, offering workers a variety of options to feel "connected" for the purpose of increasing engagement and producing places where people want to work (Donnelly, 2014). Innovative organizations like Airbnb, Kickstarter, and Soundcloud have designed workspaces that are more human-centered and diverse with the understanding that when people have satisfying experiences at work, they are more likely to be creative and connect in meaningful ways (Herman Miller, n.d.). Figures 2.3 through 2.5 are additional examples of community-centered, customizable workplace design.

One innovative design approach that organizations are employing is to design workplaces that function similarly to the communities in which people live (Donnelly, 2014). Neighborhood planning is a process whereby an organization creates a mix of open and closed, individual and

Figure 2.6 (l) Harry's Customizable Workspace 1 features adjustable desktops.
Business Insider. (2013).

Figure 2.6 (r) Harry's Customizable Workspace 2 is personalized to feel like home.
Business Insider. (2013).

Images retrieved http://www.inc.com/worlds-coolest-offices-2015.html
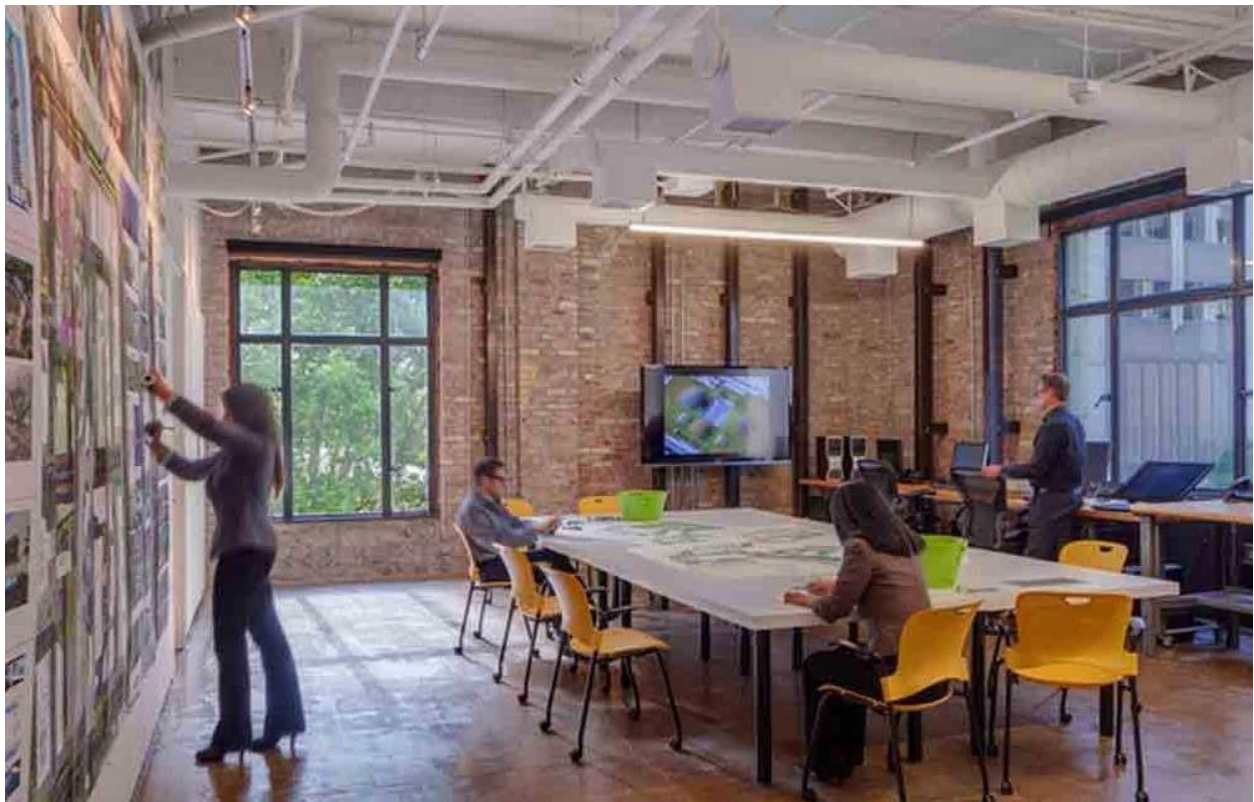
Figure 2.4 SWA Group Offices Culture Wall is a graphic representation of the company's values.
Lagorioa-Chafkin, (2015).

Retrieved from http://www.businessinsider.com/the-most-innovative-workspaces-2013-
7?op=0#swa-group-offices-in-san-francisco-greets-visitors-with-a-culture-wall-which-includes-
photos-of-people-inspiration-and-work-examples-7

group spaces based on employees' needs and work patterns. "Streets" become central spines of activity connecting people to workplace services. The "Town Square" is the workplace focal point. "Piazzas" provide open space for exhibition, gatherings, and chance encounters in a meaningful context. "Neighborhoods" are characterized by open plan, adjustable desk configurations (Gillen, 2006). The workplace becomes a microcosm of the city using principles of urban design as the primary point of design reference and is the result of pent-up demand for more meaningful workplaces (Gillen, 2006; Nicolaou, 2006).

According to Nicolaou (2006), "The paradoxical demand for distinctive places and adaptable settings results in the identification of core functions with high symbolic value which become the fixtures around which functions can adapt and change" (p. 216). Three interchangeable concepts that describe and prescribe this kind of space performance are:

- *Use* which is a planning term borrowed from land use class orders (Nicolaou, 2006).

- *Function* which is an organizational term referring to operational classification (Nicolaou, 2006).

- *Activity* which is a behavioral term informed directly by and derived from physical settings and is, therefore, suitable for informing design (Nicolaou, 2006).

By modeling patterns of use, behavioral patterns, and allowing for a variety of activities within a building that has already been assigned its primary function, there is potential to increase the adaptability and diversity of the workplace therein (Nicolaou, 2006). Once the settings that support people and their needs are identified, organizations can align workplace elements to work cooperatively, improving not only the physical, cognitive, and social experience of the workplace, but also fulfilling the basic need for security, purpose, and

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belonging (Herman Miller, n.d.; Starko, 2014). Thus, the physical environment can play a major role in developing, supporting, and sustaining community in the workplace (Donnelly, 2014).

Four Work Mode Theory. Creativity must develop in the human sphere, particularly in the ways in which humans relate to one another personally, carry out work, and fulfill citizen obligations (Gardner, 2008). In 2008, internationally renowned architecture and design firm Gensler conducted the Workplace Survey in the U.S. and the U.K. to uncover new insights about how and where people work today. Gensler found that, ultimately, the physical office environment can be used as a tool for people to be productive and that quality of space matters far more than quantity of space. Gensler also found that workers tend to spend their workday in four modes of work: Focus, Learn, Collaborate, and Socialize (Pogue, 2009).

- **Focus** is the ability to concentrate and devote uninterrupted effort to a particular task or project that requires thinking, reflecting, analyzing, problem-solving, creating, imagining, reviewing, assessing, and producing work. Granted protected, distraction-free time, workers make considerable progress in productivity (Pogue, 2009). The OECD also finds that encouraging teachers and students to reflect when dealing with subject-specific problems shows promise. Metacognitive reflection also supports students' own thought processes and ability to integrate basic principles into divergent strategies (OECD, 2014).

- **Learning** is necessary of a highly skilled, knowledgeable workforce and is critical to business growth and success in a knowledge economy. It involves problem-solving, memorization, concept exploration and development, discovery, and reflection, as well as the ability to integrate and apply knowledge (Pogue, 2009).

- **Collaboration** involves working with another person or group to achieve a specific business goal. Planning, strategizing, sharing knowledge and information, problem-solving,

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development, innovation, creation, and production are functions of this mode. Collaboration

can result in increased productivity, innovation, and the ability to respond more creatively to

complex organizational challenges (Pogue, 2009).

- **Socialization** involves the infrastructure, or social networks, through which knowledge moves

  in an organization to foster innovation. It is characterized by interactions in the workplace that

  create common bonds and values, collective identity, collegiality, and productive relationships

  otherwise referred to as a "sense of community" (Pogue, 2009).

Given the new definition of work in the 21st century, a fundamental restructuring of the

traditional office is necessary (Pogue, 2009). The same could be said for schools since they

provide the opportunity to practice future workplace behaviors (Sousa, 2014). According to

Victoria Bergsagel, founder and director of Architects of Achievement, "Our schools should look

more like our high-functioning industries do…we need to design a variety of different spaces in

schools, and provide for informal as well as formal learning spaces" (OWP/P Architects *et al.*,

2010, p. 208). The design of the physical environment affects children's perception, learning,

and behavior (McAfee, 1987; Read, Sugawara, & Brandt, 1999). Learning spaces should be

intentional and avoid prescriptive and restrictive behaviors both for teachers and students

(Herman Miller, 2013). Good design solves problems and understanding which characteristics

of the physical environment affect children's behaviors will help designers to create more

developmentally appropriate environments that enrich academic, psychological, and

sociological growth (Herman Miller, 2013; Legender, 1999).

Design Factors

Defining creativity, researching human development as it relates to creativity, and

exploring models of creative environments contributes to the development of a design strategy

for the elementary classroom environment. A breadth of general design considerations is first outlined. This information is then synthesized into classroom-specific design recommendations. The recommendations listed here are ultimately taken under consideration for an experimental elementary classroom design implementation, serving as the basis for the research study.

Structure

The learning environment's physical structure includes the arrangement of space and furniture and the materials used in it, all of which are vital to the space's effectiveness (McAndrew, 1993). Size, shape, and scale of the classroom itself is included. Large classrooms tend to be more flexible and accommodate more users than their smaller counterparts. Smaller classrooms, however, can encourage more class participation and group discussion (Lang, 1996). Size may also be directly related to density (McAndrew, 1993).

Density and Crowding

Density, crowding, and personal space affect physical environment and learning. High density areas typically promote feelings of crowding, although not always. Feelings of crowding are dependent on culture, but most people will react when personal space is violated. Crowding and density also has a direct impact on students emotionally and behaviorally. Feelings of crowding can create aggressive behaviors, lower task performance, poor memory, and anxiousness. During competitive activities, feelings of crowding lead to social and psychological withdrawal (McAndrew, 1993).

Acoustics and Noise

Reverberation, internal noise, and external noise are the three most common sources of classroom noise. Reverberation occurs when sound waves rebound off of flat, hard surfaces, creating extra noise that must be filtered out. Reverberation is a product of room configuration,

surface finishes, material density, and airtightness and can be reduced (although not completely eliminated) or enhanced by changes to room size, internal surface dimensions, and surface materials (Kopec, 2006; Lang, 1996). External noise can be reduced, but again not eliminated, through sound-dampening zones built into walls and ceilings, double- and triple-paned windows, and tall greenery. Internal noise is a result of human actions such as voices and pencils tapping against desks and is much more difficult to mitigate (Lang, 2006).

Thermal Comfort, Humidity, and Ventilation

The predominant issue with temperature is a lack of ventilation, which can depend on the configuration of materials in a building, amount of glazing on windows, size and volume of space, number of occupants and their state of activity, as well as heating and cooling systems (Lang, 2006). Oftentimes, indoor air also contains more harmful pollutants than outdoor air, contributing to poor indoor air quality (IAQ).

The ability to maintain comfortable classroom environmental conditions has been shown to affect the mental efficiency of students, especially in situations that require quick recognition and response (Kopec, 2006). According to the H, improved indoor air quality promotes better concentration, information recall, and overall productivity (Heschong Mahone Group, 1999). Although fluctuations in temperature have a tendency to affect teachers more than students, there is a significant decrease in students' work efficiency and productivity levels when temperatures exceed 80 degrees (Lang, 1996). Air conditioning can reduce incidences of classroom annoyances and improve attitudes, performance, and student behavior (Kopec, 2006).

Ergonomics

Ergonomics, as particularly related to student seating, impacts student learning. Poor ergonomic design of chair can lead to lower back pain, which has become a major concern in industrialized nations (Troussier *et al.*, 1999). Musculoskeletal fatigue and pain can cause students to focus more on easing their discomfort than on the subject they are learning because, as outlined earlier in this chapter, the human brain is configured to address physiological needs before cognitive needs (Kopec, 2006).

Lighting

As a means of enhancing their general wellbeing and to counter symptoms related to light deprivation (e.g. fatigue, irritability, and general unease), students need to be exposed to full-spectrum lighting. Very early studies of fifth- and sixth-grade students who were taught in well-lit classrooms indicated better concentration levels and higher test scores (Luckiesh & Moss, 1940; Horton, 1972). Increases in student attendance, academic achievement, and physical and cognitive growth and development were reported in schools that use full-spectrum lighting (Hathaway, 1994). A summary of the Heschong Mahone Group (1999) daylighting study concluded that the visual environment is very important for learning. Daylighting can produce either positive or negative effects on learning outcomes. For example, an ample and pleasant view out of a window that includes vegetation or human activity and objects in the far distance supports better learning outcomes. Increased daylighting that controls for the negative impacts of glare also has the potential to produce positive effects as illustrated by test scores in Figure 2.6.

Color

Students' attitudes, behaviors, and learning comprehension are influenced by color (Sinofsky & Knirck, 1981). It is shown to affect their attention spans and perceptions of the
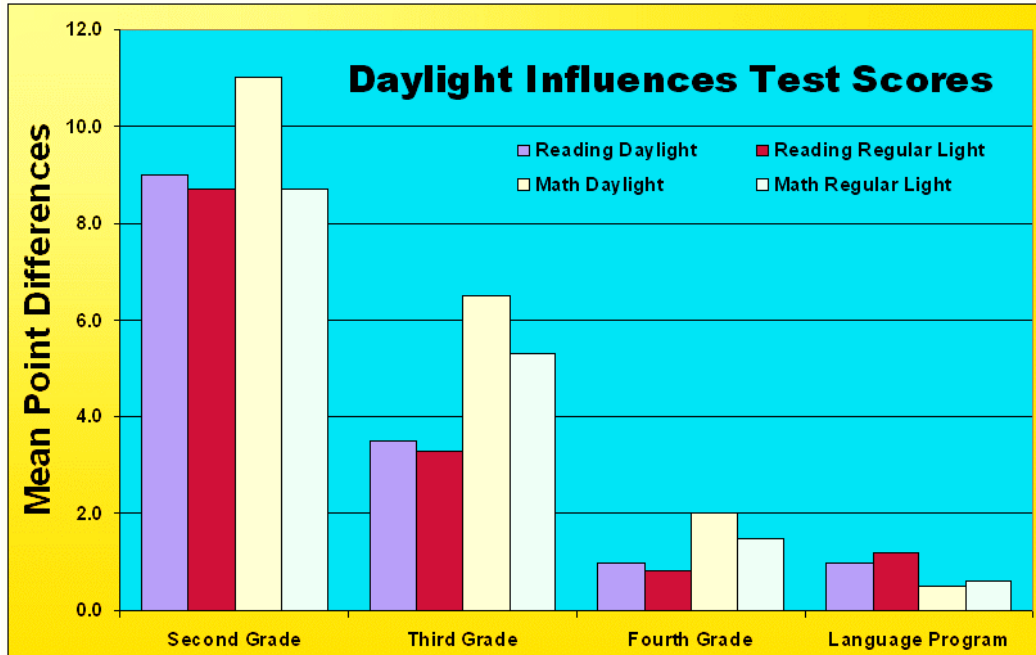
Figure 2.7 Daylight Influences Test Scores. Heschong Mahone Group. (1999).
Retrieved from http://kanat.jsc.vsc.edu/student/oakley/mainpoints.htm

classroom environment as well as teachers' perceptions of time (Kopec, 2006; Sinofsky &

Knirck, 1981). Color adds aesthetic appeal, excitement, and stimulation to the classroom

environment, all of which contribute to reduction of absenteeism and promotion of greater school

affiliation (Kopec, 2006). Color also induces physiological and emotional reactions like

respiratory rate and blood pressure (McAndrew, 1993) in addition to the release of hormones

within the brain and hypothalamus affecting mood, mental clarity, and energy levels

(Engelbrecht, 2003). Transmission of light energy to the brain affects the functioning of the

cerebral cortex, where thought occurs, and the central nervous system, which is responsible for

muscle control, eyesight, breathing, and memory (Birren, 1997). Warm colors are generally

found to stimulate the optic nerve and, when combined bright lighting, increases blood pressure,

heart and respiratory rates, muscle tension, and brain activity (Wohlfarth, 1986). Cool colors and

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dim lighting produce the reverse physiological response (Failey *et al.*, 1979). White and off-white have been shown to decrease human efficiency by an average of 25 percent (Birren, 1997).

Recommendations

Of all the educational settings, elementary school classrooms require the greatest diversity in terms of the physical environment (Kopec, 2006). Classrooms that are both physically and psychologically comfortable promote a sense of wellbeing, keep minds focused, and limit distractions. Classroom design also influences levels of interaction and engagement. As the student population becomes more diverse, creating classrooms that are flexible enough to adapt to this diversity and enhance the learning experience of *all* students, regardless of their backgrounds and educational objectives, is imperative (Herman Miller, 2013). Classrooms should be designed for specific uses and equipped with furnishings and other components that facilitate those uses (Henderson, 1997). The ideal learning environment, provides a variety of tools for learning, facilitates individual learning, and contains design features that are interesting and novel (Maxwell, 2003; Starko, 2014). Furthermore, a creativity-friendly classroom provides an experience that allows students to exercise choice, practice cooperation and independence, and engage in questioning and experimentation. Creativity is fostered through observation, imaging, and body thinking; and creative people use their senses in creating experiences, recalling and imagining feelings or sensations associated with those experiences, and formulating explanations through the senses (Starko, 2014). The following are some specific design recommendations for enhancing creativity:

Spatial Arrangement

Organic spatial arrangements are preferable because they encourage engagement and help both teachers and students to move about freely (Herman Miller, 2013). Horseshoe and circular arrangements can increase student interest, participation, and performance as well as their visibility and attentiveness (Sommer & Olsen, 1990). Linear arrangements, on the other hand, may require teachers and students to squeeze between aisles (Herman Miller, 2013). Flexible spaces that allow for grouping and are not limited to one configuration with teachers at the front are more conducive to creative environments (OWP/P Architects *et al.*, 2010, p. 58).

Seating and Work Surfaces

Students spend an average of nine hours per day sitting (OWP/P Architects *et al.*, 2010). Furnishings should support students comfortably in the two main seated positions: *leaning forward* to write, read, or draw and *leaning back* to listen or watch (Troussier *et al.*, 1999). Seats that tilt forward help alleviate strain on the spine by increasing the trunk-thigh angle (Henderson, 1997). Furnishings should be moveable and scaled for students' popliteal height, measured from the back of the knee to the floor (Burgstahler, 2012; Zandvliet & Straker, 2001). Children in the fifth and sixth grades, for example, can range from four to six feet tall, so just one standard-size seat and desk can't fit this range (OWP/P Architects *et al.*, 2010). School furniture should also allow for natural body positions, such as the trunk and legs at 120 degree angles (Zandvliet & Straker, 2001). Soft seating facilitates one-on-one student and teacher interaction (Herman Miller, 2013). Use of texture and natural materials are also encouraged to incorporate interest and comfort in the learning environment (OWP/P Architects *et al.*, 2010). A mix of shapes,

colors, and hard and soft surfaces creates novel and stimulating learning spaces (Herman Miller, 2013).

Display Surfaces and Demonstration Area

This includes all areas where the teacher may display student work and other static learning tools as well as make use of dynamic teaching tools. Static teaching tools include posters and other wall art whereas dynamic teaching tools include chalk boards, marker boards, smart boards, and other interactive or technological accessories. These areas provide opportunities to integrate light color, and material into the learning landscape to produce visceral teaching moments. Electronic tools utilizing power cords must also be strategically located near power outlets to avoid tripping hazards. Color can influence atmosphere and performance. Painting the teaching wall a deeper or brighter shade than the side walls attracts attention and gives eyes a visual break when focus is shifted to the side. Colors that reduce glare and subsequent eyestrain from electronics should be considered (OWP/P Architects *et al.*, 2010) as well as a coordinating color palette that is not over-stimulating. Controlling artificial and natural lighting through use of indirect lighting fixtures and window treatments also reduces glare.

Storage Areas

These areas house students' personal belongings as well as materials that may not be in immediate use or not used often. As such, these areas must be directly accessible to both students and the teacher accommodating a variety of heights and bending, stooping, and reaching actions. Multi-functional, adjustable, and mobile storage accessories allow for easy reconfiguration as classroom needs change. Storage that is aesthetically pleasing will also avoid

the visual overload that results from clutter; however, whatever is needed must also be easy to locate. Color coordination and labels can help enhance the functionality of storage accessories.

Community Area

This area allows the teacher and students to share and bond, thereby creating a sense of community. It may be used as a gathering spot for show and tell, giving presentations, and reading stories. Children need comfort at school just as they do at home. Subsequent sections of this paper will provide evidence of the importance of psychological safety and belonging in the school environment. Providing a soft, cozy, quiet area with domestic features and natural materials or even textural, soft flooring (which improves acoustic quality) can help make school feel like a home too (OWP/P Architects *et al.*, 2010).

Theoretical Framework

As a model of functional community design, the Four Work Mode Theory serves as the organizing principle for the design of the learning environment. However, this does not sufficiently explain the sociocultural aspect underlying this organizational design principle. This section delves more deeply into the theories that scaffold this design approach, addressing both the educational and creativity aspects that contribute to the development of a synthesized, systems approach to the construction of a meaningful, pragmatic learning environment.

Vygotsky's Sociocultural Learning Theory

The basic premise of Vygotsky's Sociocultural Learning Theory is that higher forms of mental activity, such as creativity, are derived from the adaptive social and cultural contexts within which individuals interact (Berk & Winsler, 1995). Vygotsky (1978) finds learning to be social in nature, "a process by which children grow into the intellectual life of those around them" (p. 88). Children learn to think and behave in ways that reflect their community's culture.

This process occurs in two steps, first at the social level and then at the individual level, and is facilitated by the interpretation and manipulation of meaningful signs and symbols (Berk & Winsler, 1995; Vygotsky, 1978).

Both Vygotsky (1978) and Blumer (1969) cite the importance of symbols in culture. According to Vygotsky (1978), individuals actively modify their environment as part of the problem-solving response, and direct manipulation can transition into complex psychological processes. Through a process of *mediation*, individuals use signs and tools to manipulate the outcome of a situation. Signs serve as internal "behavior regulators" whereas tools facilitate a range of new activities, creating the conditions for higher psychological processes to occur (Vygotsky, 1978). Through education, children "become aware of and develop the capacity to consciously manipulate and control the symbolic systems of their culture" (Berk & Winsler, 1995, p. 114).

Blumer (1969) interprets signs and tools on the basis of the meanings assigned to them. Meanings are seen as social products or creations that are formed in and through the defining activities of people as they interact. Meaning is furthermore affected by situational context which directs action. The two forms of social action are non-symbolic, which is reflexive and describes thoughtless reaction, and symbolic interaction, which is the interpretation of action that informs subsequent responsive behaviors. Symbolic interaction involves joint activity or the dual process of indicating to others what to do and interpretations of definitions. It is by this process that individuals fit their activities to one another and form their own individual conduct. Human activity is the result of a flow of situations requiring actions (Blumer, 1969).

By sociocultural theory, education then is the "transaction and transmission" of cultural knowledge between individuals within a shared environment. This also forms the concept for

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zone of proximal development (ZPD), which can be described as the "gap" between what one already knows and the potential of what one can learn through group interaction (Berk & Winsler, 1995; Chang-Wells & Wells, 1993; Vygotsky, 1978). Development is an ongoing occurrence of natural and social processes that lead to transformative experiences. These experiences are emulated in the classroom through the development of activity centers, or "thematically structured areas of the classroom that permit children to work in various ways to accomplish individual and group academic goals" (Berk & Winsler, 1995, p. 117). By offering a diversity of experiences, activity centers encourage students to make meaningful contributions that allow them to understand others. Within these activity centers, opportunities for individual student activities, reciprocal teaching, cooperative learning, and play are presented. Reciprocal teaching occurs when the teacher scaffolds students' involvement in a discussion in ways that lead to full participation and higher order thinking. Cooperative learning, on the other hand, occurs between students. These modes of classroom learning most closely represent the Collaborate work mode and are usually preceded by the Learn and Focus work modes. After students learn a new concept, they may need time to reflect or focus on the material through individual activity. This practice of learn-and-process then primes for a collaborative demonstration of understanding. Lastly, the richly equipped classroom environment will also accommodate play, which gives students the opportunity to further practice collaborative and imaginative behaviors (Berk & Winsler, 1995; Vygotsky, 1966; Vygotsky, 1990). This mode of classroom interaction most closely represents the Socialize work mode.

Csikszentmihalyi's Systems Theory of Creativity

Csikszentmihalyi (1997) considers creativity in terms of the individual, domain, and field. The *individual* brings novelty into the symbolic domain. The domain consists of a culture

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containing symbolic rules (Csikszentmihalyi, 1997). Domains exist in context of broader fields that organize their activity (Feldman, 1999). A field of experts recognize and validate innovation. Although creative work is performed by individuals, individuals also work with other individuals and groups within an organized body of knowledge (Csikszentmihalyi, 1997; Feldman, 1999). Together, the individual, domain, and field contribute to a systems theory of creativity.

The Individual. The work of Gardner (2008) closely overlaps the work of Csikszentmihalyi (1997), offering additional insight into the individual process of creativity. Creative thinking is a process that involves preparation, incubation, illumination, and verification. First, acquisition of knowledge building toward expertise facilitates the development of strategies for manipulating content, finding problems, and looking at content from new perspectives. Secondly, connections to other experiences are made given adequate time or *incubation*. From there a new idea may be formulated, lending itself to *illumination* (Gardner, 2008). For the purposes of this study, the individual is considered to be the student, within whom creativity is fostered.

The Domain. Domains contain the artefacts and symbols that provide orientation to the activity therein. They are relevant to creative process as they determine clarity of structure, centrality within the culture, and accessibility (Csikszentmihalyi, 1997). For the purposes of this study, the classroom represents the symbolic domain to be manipulated, offering opportunities for mediation and informing acceptable (as well as new) classroom interactions.

The Field. Creative products or solutions must be verified through testing and they must be accepted by knowledgeable consumers in the case of creativity with a big *"C"*. These knowledgeable consumers are typically found within the social field which passes relevant

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judgment on the merit of the individual's creative product (Csikszentmihalyi, 1997; Gardner, 2008; Sousa, 2014; Starko, 2014). For the purposes of this study, the classroom teacher is the expert and validating entity representing the field. Although students do not necessarily produce work that merits creativity with a big *"C"*, the work may most certainly be novel to them and potentially influences other individuals or students in the classroom domain.

Synthesis

Creativity is a part of the learning process and learning is embedded within the larger sociocultural context. Therefore, one theoretical model does not provide a sufficient basis for the research to be conducted. The author's synthesis of Sociocultural Learning Theory and Systems Theory of Creativity led to the development of the Framework for the Modification of Creative Learning Community Physical Environments as depicted in Figure 2.7. As an adaptation of Systems Theory of Creativity, the individual, field, and domain are represented as the student(s), teacher, and classroom. The individual student, who is responsible for the creative product, interacts with the expert teacher in the field, who serves as the validating entity. The classroom domain further influences and is influenced by the student(s) and teacher through its shared symbols, which includes such learning environment tools as furnishings, technology, activities, et cetera.

Interactions amongst these three entities produces behaviors and activities that create the conditions in which creativity is able to thrive. Between student and classroom, the ability to manipulate symbols exercises choice. Between classroom and teacher, the ability to manipulate those symbols enables management. Between student and teacher, collaboration is cultivated. All of these interactions are further affected by internal influences such as motivation, goals, novelty, and appropriateness. They may also be optimized by adaptability, which, for this study, is
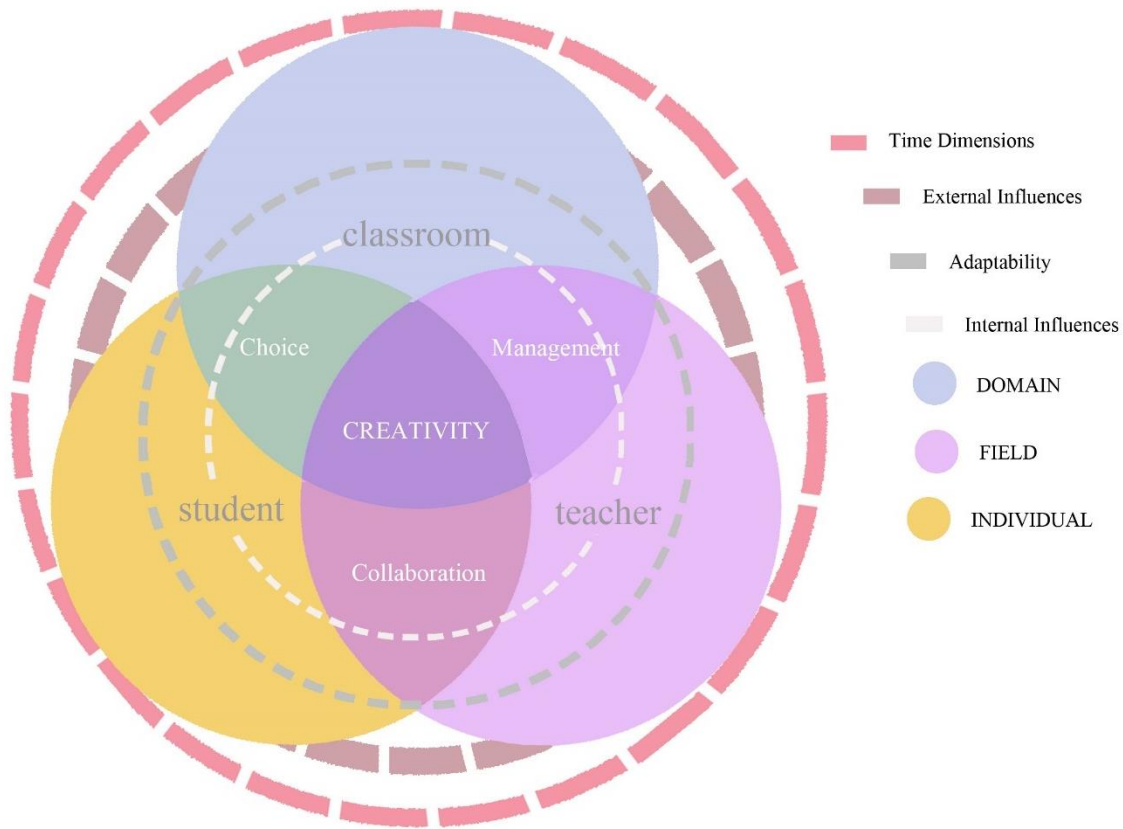
Figure 2.8 Author's Framework for the Modification of
Creative Learning Community Physical Environments

specifically enhanced through intentional design of the physical environment. The Four Work

Mode Theory serves as the organizing principle for the design implementation. Student, teacher,

and classroom adaptation is affected by external influences such as personal relationships,

community, and government. All of these aspects are further influenced by historical, current,

and future events.

Conclusion

The appropriate arrangement of the objects, buildings, and various human artifacts that compose our environments is part of their utility. They are important to our overall well-being as well as our aesthetic sense. Schools, however, have become "thing-poor" places with emphasis on performance rather than personal connection. The domain of objects, however, corresponds to the moral domain of human interaction (Noddings, 2005). Shifting the culture of the classroom is a matter of habits and habitats – the habits of mind and the physical environment in which people operate (OWP/P Architects *et al.*, 2010). The capacity of the physical environment to adapt to the physical, psychological, and social needs of students while facilitating teacher instruction and classroom manageability is paramount to a heightened learning experience. Thus, modification of the classroom environment must be intentional, utilizing a framework that is rooted in sociocultural learning theory.

Chapter 3 - Methods

Research Questions

The purpose of the study was to explore the role that the physical classroom environment plays in fostering student creativity in the fourth and fifth grade USD 475 gifted program The research focuses on answering the primary research question: Does intentional design of the classroom environment foster creative behaviors in students? Secondary research questions included: 1) How does function-based classroom design affect both students and the classroom teacher in terms of creative process? 2) How does adaptability of the designed classroom environment affect both students and the classroom teacher in terms of creative process?

Hypotheses

The major hypothesis for this research is that the proposed modification of the classroom environment will produce precursory creative behaviors. While some inferences are made about just what constitutes these precursory behaviors, it is proposed that they will be more readily identifiable through the data collection process. Secondary hypotheses are that both function-based and adaptable classroom design will improve teacher management in terms of organization and time-to-task. Time-to-task refers to the amount of time it takes to transition out of one activity and into the next. It is further hypothesized that student comfort will increase.

Research Design

The research study is phenomenological in nature and utilizes a two-phase embedded design approach where quantitative data supports a primarily qualitative, experimental study (Creswell & Plano Clark, 2007). The two-phase study includes pre-treatment and post-treatment phases where the treatment is an environmental modification to the physical classroom. The pre-

treatment phase includes participant observation, a quantitative physical environment

assessment, a student survey that is both quantitative and qualitative in nature, and an interview

with the classroom teacher which inform the treatment itself. This phase also includes classroom

video observation. The post-treatment phase repeats the environmental assessment, video

observation, student survey, and teacher interview.

Participant Selection

USD 475-Junction City, Kansas was chosen for the research study due to location

convenience, structure of the gifted program, and diversity of the sample population. USD 475

implements a full-day curriculum where students are bussed to a host school and have use of a

classroom designated specifically for their program. Students are separated by grade level and

subject emphasis where the combined second and third grade class meets on Wednesdays and the

combined fourth and fifth grade classes meet on either Tuesday for Math and Science

Enrichment or on Thursday for Language Arts Enrichment. The fourth and fifth grade Thursday

Language Arts Enrichment group, which ranged between eight and ten participants throughout

the study, was chosen based on the potential for future study and assessment of creative arts

and/or writing assignments. Nearby USD 383-Manhattan, Kansas was also considered for the

research study; however, the program meets several days per week in 45 minute increments

where the gifted facilitator travels to participating schools and utilizes auxiliary space available

in the host school. Additionally, due to limited time and resources, the researcher's city of

residence at the time (Junction City, Kansas) was most conducive to completing the study.

USD 475-Junction City is also racially diverse allowing for greater representation of

creativity across culture. The Junction City population is 54.5 percent white, 22.3 percent

African American, 13 percent Hispanic or Latino, 3.9 percent Asian, and at least 7.3 percent bi-

or multi-racial (U.S. Census Bureau, 2015a). This more closely represents national population demographics which indicate a 62.1 percent white, 12.5 percent African American, 17.4 percent Hispanic or Latino, 5.4 percent Asian, and at least 2.5 percent bi- or multi-racial population (U.S. Census Bureau, 2015b).

The gifted facilitator, interchangeably referred to as the classroom teacher, holds a bachelor's in Special Education and Elementary Education and master's in Curriculum, Instruction, and Assessment from Walden University. The facilitator also possesses an Endorsement in Gifted Education. Of her 25 years teaching experience, five years have been dedicated to gifted education, 19 years toward special education, and one year was spent in a fourth grade classroom. Under her special education designation, the classroom teacher has experience teaching children with behavioral and learning disorders. According to the teacher, she has been able to use all of her previous experiences to support her expertise in extending the learning of reading and math gifted elementary students (York, personal communication, 2016).

Consent and Confidentiality

Administrative consent was first needed to engage in the research study. The gifted facilitator and the hosting school's principal were required to read, understand, and sign a consent form that granted the researcher permission to alter the physical classroom and collect and use data from the study. This form was generated by the researcher (see Appendix A: Form 3.1). Parental consent was then needed to allow the students to participate in the study which included recorded observation and administration of surveys. Parents were required to read, understand, and sign a consent form that granted the researcher permission to collect and use the data acquired. The consent forms provided were derived from the International Review Board template provided by Kansas State University (see Appendix A: Form 3.2).

The participating students were assigned random identification letters for the surveys and video observations. These identification letters were stored on a secure personal laptop kept in the researcher's personal office. Research documentation will continue to be maintained in the same location for three years following the conclusion of the study in the spring of 2016. Those parents or school faculty involved who wish to obtain data related have been informed that they can contact the researcher directly to do so.

Debriefing

The debriefing of the research will be presented in the final month of the 2015-2016 academic school year through the gifted program parent newsletter. The purpose of the research and research findings will be disseminated to parents. The researcher's contact information will also be made available to parents should any questions or concerns related to the research arise.

Research Timeline

The following Table 3.1 outlines the timeline for completion of all research activities.

Table 3.1 Author's Research Timeline

Research Environment

Pre-Treatment

Participant Observation. In order to determine classroom patterns of use for the purpose of determining design treatment, participant observation of classroom activities is necessary. Furthermore, participation in these activities gives insight into other considerations such as school regulations and schoolwide activities affecting classroom management. Observations regarding specific use (e.g. circulation and daily activities) were recorded according to the daily schedule and further categorized into the four broader uses: Learn, Focus, Collaborate, and Socialize. The day's activities included the following as further outlined in Appendix B: Table 3.1:

Brain Warm-Ups. Students take note of the daily brain teaser and participate in fun, critical thinking exercises as a class.

Language Arts Class Unit/Individual Research. Students engage in in-depth learning of a concept that becomes the focus of the next several weeks. Following the language arts class unit, students engage in research for a topic of choice which requires a written report and visual presentation materials. At the conclusion of the research, students present to their gifted classmates as well as their home-school classmates.

Critical Thinking Skills. Students work through three stations of individually-focused, critical thinking activity for a limited time. These stations include one word problems station and two spatial-figural activity stations. During this period, the classroom lights are shut off and task lamps provide soft lighting. Background orchestra music is also played.

Lunch. Students have recess either in or outside followed by lunch either in the classroom or in the school's lunchroom.

Computer Lab/Research. Students continue to research their individual topics of choice utilizing Internet resources or the school library.

Celebration of Knowledge/Brain Teasers. Students wrap up the day with teacher-led notation in their personal notebooks and discuss the brain teaser presented at the beginning of the day as a class.

Environmental Assessment. Following participant observation, an environmental assessment of the physical classroom was performed by the researcher to serve as a design treatment "checklist". The environmental assessment for this research study is adapted from Gary T. Moore's Child Physical Environments Rating Scale (CPERS): *Part C: Indoor Activity Spaces.* The adaptation includes additional measures to rate the classroom environment's facilitation of the Learn, Focus, Collaborate, and Socialize modes of function (see Appendix A: Form 3.3). CPERS may be used by center directors, early childhood educators, policy makers, and regulators. It is the first tool of its kind intended to assess the quality of the physical environment of childcare, preschool, kindergarten and other early childhood education settings. Based on Piagetian ecological theory of child development and the environment, CPERS is comprised of 143 items which are organized into 13 subscales (Moore *et al.*, 2003). These subscales focus on "general planning principles, the overall quality of the childcare center as a whole, modules including home bases and resource-rich activity spaces, and play yards and other outdoor areas" (p. 2). CPERS has been evaluated for validity and reliability extensively. Very high inter-rater, test-retest reliabilities, and expert opinion on the validity of test items and the scale as a whole were finally determined (Moore, *et al.*, 2003). Although it was not done for this research, the adapted assessment tool could be used as a formal rating scale under the execution

of a trained rater other than the researcher. Figures 3.1 through 3.5 are pre-treatment images of the classroom.

Expert Interview. A teacher interview was audio-recorded following the environmental assessment to gain insight to the teacher's perception of creativity and the classroom environment. This included questions about how creativity is evidenced in the classroom and how classroom organization affects student creativity. The interview was then transcribed by the researcher and saved to a password-protected laptop. Pre-treatment interview questions are listed in Appendix A: Form 3.4.

Student Surveys. Student surveys were administered at the time of initial video recording; however, the surveys can also be administered beforehand. The surveys combine both quantitative and qualitative methodology (see Appendix A: Form 3.6). The quantitative component utilized a Likert scale to assess student perspectives on classroom function and furnishings. The qualitative component asked open-ended questions to determine student perspectives on creativity and environments that facilitate creativity.

Video Observation. Students were recorded for two full, consecutive class periods which allowed for five hours of data per video recording device per day. The researcher set up video equipment at two access points in the classroom before the start of class and retrieved all recording devices at the conclusion of class. During the first video recording session, the teacher took the opportunity to address the presence of the recording devices in the classroom, communicate expectations in this regard, and inform the students of how many times they would be recorded throughout the study. Recordings were then uploaded to the researcher's password-protected laptop and briefly scanned before full viewing and recording of observations.

Figure 3.5 Classroom entrance features student's coat hanging space. The teacher's area is immediately adjacent.

Figure 3.4 (middle left) Display area features classroom graphic and storage bookcases below that house student materials and resources.

Figure 3.3 (middle right) Collaboration area features student research tracking tool and more storage.

Figure 3.2 (lower left) Demonstration area features teacher's classroom learning tools.

Figure 3.1 (lower right) Student sign-in area features a desk and graphics.

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Treatment

Insights from participant observation, student surveys, expert interview, and video recordings informed the purchase of adaptable furnishings, such as desk chairs and desks; and acoustic dampening materials such as area rugs, pillows, and acoustic panels. A full listing of classroom additions can be found in Appendix B: Table 3.2. Spatial organization was also modified in the classroom to create areas for the combined activities of Socializing and Collaborating as well as Focusing and Learning. The following design considerations were addressed:

Density and Crowding. Desks and tables used for student seating were replaced with new desks. Desks were regrouped from quads into triads and rearranged to better facilitate circulation and provide easy viewing of the teacher's demonstration area. The regrouping of students from quads to triads was also meant to improve behavioral issues associated with crowding.

Acoustics and Noise. Soft furnishings and textural finishes in the form of armchairs, area rugs, knit pouf seating, and pillows were added to the classroom for sound dampening effect. The teacher's metal desk was replaced with a wooden desk to reduce reverberation as well. Acoustic panels were fixed to the entrance door wall.

Ergonomics. One-size-fits-all student furnishings were replaced with adjustable desks and chairs, chosen on the basis of suggested chair and table heights for grades 4 and 5 provided by Smith System Furniture (see Appendix D: Table 3.3). Desks feature push-button adjustable legs and have a larger work surface and storage space beneath. Chairs feature pneumatic levers, are able to swivel, and are flexible enough to allow for backward movement.

Lighting. New task lamps were added to the classroom and new window treatments were hung so as not to obscure the view to the outside. Windows also feature adjustable shades for additional lighting control.

Color. A triadic scheme of purple, green, and red-orange was the dominant color palette with a touch of blue added (this was a nod to the pre-treatment classroom color palette). Storage shelf units were updated to a warmer, neutral grey tone and file cabinets to a warm grey and purple combination.

In addition to designing a specific area for Collaborate and Socialize modes of work, several smaller nodes of space with soft furnishings were created for Focus work. The adaptable desks and chairs composed the space for the Learn work mode which also has the ability to double for Focus work. The larger desks and a student tote tray tower increased classroom organization and a new laptop stand (which replaced a student desk) for the teacher's technology operations increased classroom organization. The teacher's desk with coordinating hutch and a new writing desk also created additional storage and organization. Wall graphics were also organized into groupings. Figures 3.6 through 3.11 are post-treatment images of the classroom.

Post-Treatment

Environmental Assessment. Immediately following the environmental modification, a follow-up environmental assessment was conducted by the researcher. The assessment was again used as a "checklist" to ensure that significant changes to address the four work modes were being implemented.

Video Observation. Students were recorded the class period immediately following the design treatment. Recording devices were set up in the classroom from same the two access points that were utilized for the pre-treatment recording. Students were recorded again utilizing

Figure 3.9 Classroom entrance with personal tote tray organizer

Figure 3.9 (middle left) Teacher's area with storage for confidential files.

Figure 3.9 (middle right) Teacher and student sign-in areas, where extra community supplies are kept.

Figure 3.9 (bottom) Student resource area houses reference materials.

Figure 3.11 Collaborate and socialize area features multiple open seating options.

Figure 3.11 Learn and focus area features student work area and the teacher's demonstration space.

the same two access points four weeks later. At the conclusion of each class period, video cameras were retrieved and recordings uploaded to the researcher's password-protected laptop. Recordings were scanned before full viewing and recording of observations.

Expert Interview. A teacher interview was audio-recorded five to six weeks following the second follow-up video recording to allow time for the novelty of the design treatment to subside. Questions about how the environmental modification affected classroom organization

and student behavior were asked. The interview was then transcribed by the researcher and saved to a password-protected laptop. Post-treatment interview questions are listed in Appendix 3.5.

Student Surveys. Student surveys were administered in the same time frame the expert interview was conducted. The quantitative component of the survey remained unchanged utilizing a Likert scale to assess student perspectives on classroom function and furnishings. The qualitative component asked open-ended questions to detail student likes and/or dislikes regarding classroom furnishings and arrangement (see Appendix 3.7).

Recording and Coding Data

Data recording and coding varied among the expert interview, student survey, and video recording observations. The quantitative data acquired from the student surveys were separated according to pre- and post-treatment. Question results were then cross compared by statistical analysis of the sample mean (x) and the sample standard deviation (s). Due to the scale of the study and small sample population, rigorous data comparison was beyond the scope of this study.

Recording and coding data from the qualitative portion of the surveys, the expert interviews, and the video recordings was a challenge to conceptualize considering the ambiguous nature of creativity. Identifying precursory creative behaviors required an approach that was partially based in grounded theory. Grounded theory, as a research method, looks for emergent themes in the data collected (Leedy & Ormond, 2010). After viewing the pre-treatment video recordings and identifying ways in which the environment inhibited classroom learning and functioning, changes in the use of the environment post-treatment and resultant behaviors (both in students and the teacher) were recorded. This data was then cross-referenced with the pre- and post-treatment expert interviews in addition to the post-treatment student survey responses. Open coding, an approach suggested by Corbin and Strauss (2008), was used to divide the data into

segments and identify commonalities contributing to theme development. The data associated

with the emergent themes was highlighted in Microsoft Word and selected quotes were

transcribed by the researcher. Any identifying participant information was removed during the

coding process.

Data Analysis

The experimental research design of this study, which tests a hypothesis, is deductive in

nature. However, based on the prevalence of qualitative data collected during the research study

and the emergent framework utilized to group and correlate the data to identify patterns, an

inductive approach to data analysis was simultaneously executed.

Chapter 4 - Findings

Participant Observation

The purpose of participant observation in the classroom was to identify patterns of classroom use to be categorized into the Focus, Learn, Collaborate, and Socialize work functions. These categorizations, when coupled with the environmental assessment, informed the environmental modification. Observations concluded that an ordinary day's activities could be generally categorized as follows:

Brain Warm-Ups. Students were simultaneously engaged in Collaboration and Socialization modes during this period. Students gather around the teacher for interactive problem-solving activities also sharing personal experiences and stories.

Language Arts Class Unit/Individual Research. Activities vary during this period. This period usually includes a Learning module that features structured discussion. For example, the Chess Unit teaches students the rules and strategies of chess over the course of several weeks. Students have spent equal time in either Collaboration or Focus modes following the learning activity.

Critical Thinking Skills. Students remain in Focus mode during this activity period. It should also be noted that the teacher turns the classroom lights off, providing soft task lighting via lamps situated throughout the room. Soft orchestra music is also played in the background.

Lunch. At one point in time, students would eat lunch in the classroom and were clearly observable in a Socialization mode. However, the students later moved to the school lunchroom allowing the classroom teacher to tend to administrative duties.

Computer Lab/Research. Students originally migrated to the adjacent classroom to make use of the available computers. However, the district acquired a technology grant that supplied

all students with personal 2-in-1 tablets, and students were able to engage in research activities from the classroom and occasionally visit the school library to find additional sources. Students are primarily in Focus mode during this activity although they would occasionally Collaborate with one another as well.

Celebration of Knowledge/Brain Teasers. Students engage in a fun critical thinking activity together as they summarize the day's activities and expectations for the following class period in their personal notebooks. Students are primarily in Collaboration mode as they wrap up the day's activities.

Once per month, the students dedicate the time usually spent on the Language Arts Class Unit/Individual Research to Social Skills. During this period with the district psychologist, students discuss potentially sensitive subjects. Due to the nature of the discussion, the researcher is not permitted to be present. However, the classroom furniture was often rearranged to remove barriers and permit more intimate seating arrangements. Students were in engaged in Learning, Collaboration, and Socialization modes during this activity period (York, 2016).

Environmental Assessment

Pre-Treatment vs. Post-Treatment

Although the assessment includes scoring measures, the scores calculated were not included in this study. Instead, the pre-environmental assessment served as a design "checklist" to determine environmental modifications that could be implemented in the classroom. The post-treatment assessment ensured that these design improvement opportunities had indeed been addressed. The assessment was divided into five subscales: Open-Plan, Learning Mode, Focus Mode, Collaboration Mode, and Socialize Mode Spaces. Opportunities for improvement were identified throughout all five subscales:

- **Subscale 12: Open-Plan Space.** Improvements to community storage and display space were implemented in order to improve organization and space efficiency.

- **Subscale 13: Learn Mode.** Improvements to auditory, visual, and kinesthetic environmental qualities were implemented. This included decluttering demonstration space and the provision of adjustable furniture that accommodated student movement ergonomically. The adjustable, adaptable furniture was noted as an improvement under each of the remaining subscales as well.

- **Subscale 14: Focus Mode.** Improvements to the teacher's work area were implemented. This included providing additional desk storage, creating space for an additional individual (perhaps for meetings with students or parents), creating more privacy, and utilizing more wall space.

- **Subscale 15: Collaboration Mode.** The only improvements noted were the adjustable, adaptable furniture additions. However, it should be noted that although the existing round table and area rug at the front of the room were meant to serve as areas for collaboration, the area rug did not accommodate all students and the round table was rarely used at all. Post-treatment, new area rugs provided sufficient space for students and the round table was a first choice among students for collaborative activities.

- **Subscale 16: Socialization Mode.** The changes noted under Subscale 15 were also noted under Subscale 16. Collaboration areas double as space for socializing creating overall community space. A variety of natural textures and a cohesive color palette was also implemented.

As a final note, classrooms are very limited on space as well as the resources required to improve the efficiency of the space. Subspaces in the classroom often function as multipurpose spaces. As evidenced through the environmental assessment, for example, collaboration space

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has the potential to double as socialization space. The behaviors associated with some of these functions often crossover as well.

Student Survey

Pre-Treatment

A total of ten students participated in the pre-treatment survey. Table 4.1 below illustrates the students' responses. Quantitative results for part one of the survey produced the following mean *(x)* score for each question: Q1*(x)* = 2.7, Q2*(x)* = 2.0, and Q3*(x)* = 3.1. The following standard deviation *(s)* was produced for each question: Q1*(s)* = 0.82, Q2*(x)* = 0.94, and Q3*(x)* = 0.57.

Table 4.1 Pre-Treatment Survey Results, Part 1

	1 (Low)	2	3	4 (High)
Comfort (C) and Ease of Use (E) Ratings				
Q1. Desk (C)	1	2	6	1
Q2. Chair (C)	4	2	4	-
Q3. Room (E)	-	1	7	2

For part two of the survey, most students offered multiple responses to the question posed. Qualitative results of part two of the survey included the following categorical responses:

Q4. What do you think it means to be creative?

▪ *Using imagination/having ideas – 7*

▪ *Producing a product – 3*

Additional single survey responses included thinking logically, making use of the surroundings, having fun, trying new things, and developing expertise.

Q5. When do you feel most creative?

▪ *When using technology – 3*

▪ *When there is ample space – 2*

▪ *When producing a product – 2*

Additional single survey responses included when physically comfortable, alone, in the gifted class, in a space that is vivid or has natural light, and when feeling encouraged.

Q6. Describe the kind of place you feel most creative in?

▪ *A comfortable space – 4*   ▪ *A vivid space – 2*

▪ *My bedroom – 3*   ▪ *A spacious place – 2*

▪ *A fun space – 2*   ▪ *An organized space - 2*

Additional single survey responses included where there is ambient noise or natural light.

Q7. What do you like most about your gifted classroom?

▪ *Spaciousness – 4*   ▪ *Learning Activities –2*

▪ *Organization – 3*   ▪ *Colorfulness – 2*

Additional single survey responses included special tasks assigned to students; scheduling; that the space is encouraging, inspiring, or comfortable; "fitting in" with everyone else; and smaller class size.

Q8. What would you improve about your gifted classroom?

- *Organization – 4*

- *Change colors – 2*

- *Nothing – 2*

Additional single survey responses included providing more learning materials and soft seating as well as a class pet.

Post-Treatment

A total of eight students participated in the post-treatment survey. Table 4.2 below illustrates the students' responses. Quantitative results for part one of the survey produced the following mean *(x)* score for each question: Q1*(x)* = 4, Q2*(x)* = 4, and Q3*(x)* = 3.75. The following standard deviation *(s)* was produced for each question: Q1*(s)* = 0, Q2*(x)* = 0, and Q3*(x)* = 0.46.

Table 4.2 Post-Treatment Survey Results, Part 1

Comfort (C) and Ease of Use (E) Ratings

	1 (Low)	2	3	4 (High)
Q1. Desk (C)	-	-	-	8
Q2. Chair (C)	-	-	-	8
Q3. Room (E)	-	-	2	6

For part two of the survey, most students offered multiple responses to the question posed. However, the overwhelming majority of responses indicated some kind of improvement. Qualitative results of part two of the survey included the following categorical responses:

Q4. Do you like your new desk more or less than your old desk? Why or why not?

- *Adjustabl*e – 6
- *More Workspace* – 5
- *Spacious, Able to Move Around* – 4

- *Comfortable* – 4
- *Coordinating Personal Storage Option* – 1

Q5. Do you like your new desk chair more or less than your old desk chair? Why or why

    not?

- *Adjustable* – 6
- *Able to Move Around/Swivel* – 6
- *Comfortable* – 4

- *Color* – 1
- *Easier to Work/Focus on Teacher* – 4

For both questions regarding the desk and desk chair, all students indicated that they

liked their new furnishings more.

Q6. Is it easier to move around in your classroom after the redesign? Why or why not?

- *Organized* – 3
- *Improved Circulation* – 3

- *Same as Before* – 1
- *Easy Before but Improved* – 1

Of the eight student respondents, seven students thought it was easier to move around and

one student felt that moving around was already easy before the intervention.

Q7. Do you like working in you newly designed classroom more or less than before the

    changes? Why or why not?

- *Adjustability* – 3
- *More Comfortable* – 3
- *Seems More Fun* – 2

- *More Colorful* – 2
- *More Organized* – 2
- *More Seating Options* – 2

Each of the eight students indicated that they liked working in the newly designed classroom more. As for reasons why, additional single survey responses included improved acoustics, increased spaciousness, the addition of area rugs, and a sense of encouragement exuded by the classroom environment.

Pre-Treatment/Post-Treatment Comparison

Mean score and standard deviation by question shows that pre-treatment scores are considerably lower than post-treatment scores for Q1 and Q2. While each of the post-treatment scores were recorded at the highest possible value and subsequently exhibiting no score deviation, the pre-treatment standard deviation for these questions was high indicating a fuller range of scoring values from the mean. The mean pre-treatment and post-treatment scoring for Q3, however, was more similar. Q3 standard deviation scores for both pre- and post-treatment were also similar and much lower than those calculated for pre-treatment Q1 and Q2 indicating a lower range of scores from the mean. Table 4.3 illustrates the data.

Table 4.3 Pre-/Post-Treatment Comparison of Mean Scores and Standard Deviation, Part 1

	Pre-Treatment		Post-Treatment	
	Mean (x)	Std. Dev. (s)	Mean (x)	Std. Dev. (s)
Q1.	2.7	0.82	4	0
Q2.	2	0.94	4	0
Q3.	3.1	0.57	3.75	0.46

Expert Interview

Pre-Treatment

The purpose of the pre-treatment interview was to understand how the teacher facilitated student creativity in the classroom and how the environment was perceived to influence creative processes. The teacher indicated that both physical and psychological factors inhibit creativity in the classroom environment. Physical factors included furnishings, surfaces, and lighting. The teacher shared that students ranged from second to fifth grade so "height level of things…inhibits them" (York, 2015a). The teacher further indicated that textures are important and that students are sensitive to lighting. Managing students' behavior was also identified as a challenge in the classroom.

Opportunities to improve the physical design of the classroom were identified through the interview. According to the teacher, she'd "never really even been given [the option to design the classroom] and financially it's always been difficult…to really invest in that", further noting that she didn't even have a rug for her room and "that would be nice; [she] didn't do that" (York, 2015a). The teacher's statements indicated a need to accommodate the changing physical needs of a diverse student population as well as an environment that encouraged productive behaviors. The principles of universal design take such needs (and more) under consideration by promoting:

- **equitable use**, where the design is useful and marketable to people with diverse abilities;

- **flexibility in use**, where the design accommodates a wide range of individual preferences and abilities;

- **simple and intuitive use**, where the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level;

- **perceptible information**, where the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities;

- **tolerance for error**, where the design minimizes hazards and the adverse consequences of accidental or unintended actions;

- **low physical effort**, where the design can be used efficiently and comfortably and with a minimum of fatigue; and

- **size and space for approach and use**, where appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility (The Center for Universal Design, 1997).

The recommended space plan would not only provide areas for Focus, Learn, Collaborate, and Socialize activities, but also minimize discomfort and the potential for hazards. The classroom modification would also present both the teacher and students with opportunities to customize their space to suit their needs. Recommended modifications to the classroom environment included individually adjustable furniture, such as desks and desk chairs, to accommodate a range of student heights; controlled lighting as provided through task lamps and window dressings; and the introduction of multiple surface textures through soft seating, pillows, and area rugs.

Post-Treatment

Several themes were identified in the post-treatment teacher interview and coded accordingly. Themes often overlapped as well. These themes included facilitative physical environment, environmental acuity, leadership development, self-esteem, and teacher classroom management.

Facilitative Physical Environment included indication of increased comfort and the ability to express choice. Increased comfort was identified through the ability to adapt the environment to suit one's needs and facilitating students' ability to move. Choice demonstrated the provision and use of multiple workspace and seating options. During Social Skills, the teacher noted that desks could be easily moved into a circle. The teacher observed that each student desk grouping had desks at different heights, indicating that the students were expressing choice. Students were also observed to be twisting back and forth in their desk chairs and seeking soft chairs, and "they like having those options" (York, 2015b).

Environmental Acuity included both students' and the teacher's positive perception of the environment as demonstrated by their increased awareness of environmental attributes. According to the teacher, "the kids come in [the classroom] and they see that the color scheme goes together." She continued that the color scheme, the organization, and the comfort level were "very, very nice" and that the room itself had become a "very inviting, creative aspect for [the students]." The teacher also described the classroom as "fun" and "inviting" and shared that other teachers commented on how "beautiful" the room was (York, 2015b).

Leadership Development included students exhibiting independence as well as cooperative or collaborative behaviors and developing responsibility. Independence was demonstrated by students exercising choice and taking initiative. This concept also closely aligns with developing responsibility. The teacher observed students commenting that they felt organized in the classroom and have enjoyed having a personal supply space. Further commenting on the addition of the personal tote tray tower, the teacher said that "[the design modification] has helped [the students] to feel more organized with their things…they've even mentioned and brainstormed together that they would like to do that in their regular classroom."

This observation further serves to evidence brainstorming, a collaborative behavior. Both the students and teacher also cooperated with one another to adjust their desks after settling in to the classroom (York, 2015b).

Self-Esteem included students developing a sense of purpose and community, which also includes belonging and ownership, and trust. Several were made by the teacher indicating students' positive feelings or associations with the classroom and activities as well as student comments expressing feelings of possession or control over processes or things. The teacher observed that the students "feel good" about knowing where everything is in the classroom and coming to class because it's a "fun place to be." She continued that "the students know that everything has a specific purpose. And they like that. When they come [into the classroom], they know there's a purpose in what they're learning, in what we're doing, in we're talking about, in what we're reading, and they feel good about that." The teacher shared a notable example of one student with bone and knee problems having the option to sit on a pouf during a classroom group activity. The option allowed the student to be a part of the group without any special accommodations which, in turn, made that student "feel good" and not "awkward", according to the teacher. Students also felt comfortable asking each other for help when adjusting their desks and chairs, demonstrating a sense of trust (York, 2015b).

Teacher Classroom Management which included developing new insights and improved organization and behavior management. New insights were demonstrated by a change in the teacher's perception. The teacher shared that she hadn't realized that she was "forcing" students into desks and chairs that did not fit them that she learned a lot about creativity. The classroom modification helped her recognize the need to encourage children by allowing them choices. She went on to express that she now sees teaching and learning from a different

perspective. Furthermore, classroom behavior management improved since, according to the teacher, the students were more cooperative with one another. The teacher indicated that overall classroom management has improved now that she has space for her supplies and several functional areas of the classroom for students to use.

Video Observation

Pre-Treatment

The purpose of the pre-treatment video observation was to identify ways in which the classroom environment inhibited creative process. These identifications also informed the environmental modification. There were recurrent issues in regard to organization, furniture arrangement, and furnishings.

Organization. Students did not have personal storage space since the classroom is utilized for three different classes. Instead, students' notebooks, activity folders, and research-related materials were stored in separate "community" bins for each of the three classes. This increased time-to-task as students had to retrieve their materials before transitioning to new activities. During the two video recording days, time spent transitioning between activities for the day totaled 8 minutes, 45 seconds and at least 5 minutes, respectively.

Furniture arrangement. Several instances of the furniture arrangement inhibiting student circulation and classroom activity were observed. For example, on the first recording day, the teacher and students moved a round student table to accommodate the Language Arts Unit activity taking place on the area rug at the front of the classroom. The newly positioned table, in turn, inhibited circulation at the back of the room and was placed back into its original position at the conclusion of the Language Arts Unit activity. The table continued to inhibit students' circulation and also served as a means for students to "swing" themselves between the

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table and nearby desks. This posed a behavioral challenge in the sense that the teacher views this activity as unsafe.

Furnishings. Furnishings also appeared to inhibit students' learning. The area rug at the front of the class was not large enough to accommodate all of the students and students often repositioned themselves (as opposed to minute fidgeting) while sitting on the rug. Three students in particular repositioned themselves 6, 7, and 17 times, respectively. This may have indicated discomfort which can further lead to disengagement. Every student repositioned themselves at least once. Chairs and desks appeared to be too small for some students. One student was observed hunching over her desk while working and had little space underneath her desk for her legs. Students also often sat sideways or backwards in their chairs in order to view the teacher. Students were often asked to remove personal items like water bottles from their desktops to create more space, and the round table furthermore lacks storage for students' supplies entirely.

Post-Treatment

Several positive themes were identified in the post-treatment video observations and coded accordingly. These themes included facilitative physical environment, environmental acuity, leadership development, self-esteem, and teacher classroom management. It was not uncommon for some of these themes to overlap during observation, especially between leadership development and self-esteem.

Facilitative Physical Environment observations included indication of increased comfort, the ability to express choice, and experimentation, which occurs when new classroom spatial arrangements and activities are undertaken. The following were observed:

▪ *Increased comfort:* At least one student commented on how comfortable the armchair was. There was also significant reduction in students repositioning themselves on the area rug

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during the Language Arts Unit. Three students observed repositioning themselves during pre-treatment reduced this behavior from 17 to 4 times, 6 to 2 times, and 7 to 1 times, respectively.

▪ *Ability to express choice:* A round table located at the front of the classroom was previously unused. When given the option to choose their seating during the Language Arts Unit, the round table became the first choice amongst the students. Student adjustment of chairs and desks, their multiple seated positions within the chair (e.g. leaning back, kneeling), and retreating to multiple classroom areas for Individual Research also evidenced choice. Furthermore, several students chose to work with their laptops *on* their laps as opposed to on their table tops; this did not occur previously.

▪ *Experimentation:* This was probably the most notable post-treatment observation. At the onset of a Language Arts Unit on the second recording day, the teacher commented that she wanted to "try something new." Students were instructed to arrange their chairs in a semi-circle at the front of the classroom, a configuration that the classroom seemingly did not allow before. The teacher then engaged the students in a participatory discussion. Students were offered the opportunity to role play. Too many students volunteered requiring the teacher to create new roles. Student engagement and participation was high; a student who is normally reserved and quiet began "acting out" her responses without prompting. Students were anxious to offer their thoughts and off of each other's ideas. The teacher praised several critical thinking "connections" made by various students.

    Environmental Acuity qualities observed included positive response to the environment, sensory activation, and flow activity. Sensory activation was demonstrated through intentional touch interaction with the environment as well as unintentional actions like humming. Flow

activity is demonstrated when individuals are intensely engaged in or focused on activities and lose sense of time. The following were observed:

- *Positive response:* Students' descriptive comments about the classroom and particular furnishings on the first day included words like *cool* and *awesome*. Several students commented that they "loved" the room and there was laughter, smiling. The students were excited by the classroom pet fish. On the final recording day, a student commented that she was "impressed again" by the classroom environment.

- *Sensory activation:* During Critical Thinking activity, two students began to hum and move rhythmically to the background orchestra music, respectively. This was a new phenomenon not observed during the researcher's participant observation the prior year nor during the current year. Another student, who would normally reposition herself multiple times on the area rug, instead diverted her attention to patting, rubbing, rolling, and rotating the pouf seat. Yet another student who was normally observed repositioning himself under the same conditions engaged in rolling the pouf between his legs or lying atop it.

- *Flow activity:* At the end of the teacher's "experimental" Language Arts activity (see Facilitative Physical Environment section on Experimentation), a student commented that she couldn't believe it was lunchtime already. Students also appeared to be engaged during both Critical Thinking and Individual Research. However, there was one student demonstrating off-task behaviors (adjusting and re-adjusting his chair height) during Critical Thinking and influencing some other students to respond with like behavior.

  Leadership Development qualities observed included independence and developing responsibility, cooperative or collaborative behaviors, and community policing, which occurs

when students call out one another's undesirable behaviors in a supportive manner or help each other to stay on task. The following were observed:

- *Cooperation/Collaboration:* Students helped one another adjust desks. For those students arriving late on the first day in the new classroom, fellow classmates were excited to offer instructional assistance on desk adjustment.

- *Independence/Developing responsibility:* In addition to students adjusting their desks and chairs at the beginning of the day by the final recording without prompting, students also knew to retrieve their supply trays and take out their notebooks to be checked by the teacher. Students also knew to put away their trays at the end of the day.

- *Community policing:* After exploring their new classroom, the teacher prompted students to settle into their normal classroom activities. All but one student began retrieving their supply trays; subsequently, one of her classmates prompted her to join the group in retrieving trays. In two other instances, students rotated among desk groupings which prompted readjusting of some desks. When a classmate would notice that their peer's original desk setting was being adjusted, that classmate would make the "adjuster" aware that that they were changing another student's settings.

  Self-Esteem qualities observed included a sense of community, the development of trust, and class participation. Participation parallels feelings of trust or "safety" in the classroom environment which also, presumably, leads to the ability to exhibit critical thinking skills more freely. The following were observed:

- *Sense of community:* Students rotated use of a limited number of pouf seats amongst one another, two students often sitting on one pouf together. Conversely, students would often "claim" their desk at the beginning of the day, expressing this ownership aloud.

- *Development of trust:* Students helped each other to adjust desks and the teacher and student worked together to adjust desks (which breaks down hierarchical patterns of interaction). Thoughts and ideas were shared during the teacher's "experimental" Language Arts Unit. Sharing thoughts and ideas in a group setting also indicates feelings of "safety" within the classroom environment.

- *Class participation:* In addition to the teacher's "experimental" Language Arts Unit activity, the whole class contributed ideas for naming the new classroom pet fish and voted. Other than these specific examples, participation seemed to remain the same as pre-treatment.

Teacher Classroom Management observations included improved organization, behavior management, and time management. Time management closely parallels improved organization and was measured via time-to-task. The following were observed:

- *Improved organization/efficiency:* Since students were able to retrieve their own supply trays, the teacher no longer had to set out students' activity folders at the beginning of the day or prompt them to retrieve additional supplies as they transitioned to new activities.

- *Behavior management:* In order to remind students that the new classroom is a "privilege", the teacher kept one of the old classroom chairs for students who "cannot handle" or respect the new furnishings. Students' gasped, "Noooo!" to this aspect. Furthermore, no students were observed "swinging" between desks.

- *Time management:* It was noted that, during pre-treatment recordings, total transition time between activities for the day ranged between 5 minutes and 8 minutes, 45 seconds. Total transition time did not exceed 3 minutes, 15 seconds post-treatment.

There were also some new challenges observed as a result of the environmental modification. The ability to adjust chairs and desks created participation issues and distractions.

When students would engage in didactic activities with another, the staggered desk heights made this difficult (on the other hand, the new desks are larger which allowed students the option to sit catty-corner from one another at one desk). Some students engaged in inappropriate adjusting of their chairs, adjusting them up and down repeatedly, or spinning 360-degrees; others "jiggled" their chair levers, creating a disruptive noise. The pouf seats also caused some commotion with students, causing the teacher to ban their use at times.

Summary of Findings

The purpose of the research study was to explore the role that the designed classroom environment plays in fostering student creativity in the combined fourth and fifth grade USD 475 gifted program. An experimental environmental modification to the physical classroom primarily utilizing qualitative data collection methods in the forms of participant observation, student surveys, expert interviews, and video recordings was executed. The data collected both informed the environmental modification and contributed to assessment of the outcomes. The student surveys and an environmental assessment also provided quantitative data that both informed the environmental modification and contributed to further assessment of the outcomes.

The research sought to answer the primary research question: Does intentional design of the classroom environment foster creative behaviors in students? Secondary research questions included: 1) How does function-based classroom design affect both students and the classroom teacher in terms of creative process? 2) How does adaptability of the designed classroom environment affect both students and the classroom teacher in terms of creative process? The primary hypothesis was that the proposed modification of the classroom environment will produce precursory creative behaviors. Secondary hypotheses were that both function-based and

adaptable classroom design would improve teacher management in terms of student behavior, organization, and time-to-task. It was further hypothesized that student comfort would increase.

Pre-treatment measures indicated opportunities to improve the physical classroom environment in terms of organization and storage, comfort level, seating options and arrangement, and color scheme. These issues were addressed by creating classroom subareas that facilitated Learn, Focus, Collaborate, and Socialize modes of work, with the Focus-Learn areas and Collaborate-Socialize areas serving dual function. Students were observed fully utilizing the classroom post-treatment whereas this did not occur before. Post-treatment student surveys indicated an improvement across measures of comfort which evaluated student chairs and desks as well as overall classroom organization and circulation. The improvement to classroom organization, however, was not as significant. The post-treatment measures also corroborated emergent themes that included facilitative physical environment, environmental acuity, leadership and self-esteem development, and improved teacher classroom management. This was especially evident between the expert interview and video recordings.

Within each of the emergent themes, specific behaviors were identified. The overall findings indicate that precursory creative behaviors were exhibited by students, the outcomes of which will be discussed in the following section. Function-based, adaptable classroom design was also specifically indicated to improve management of student behavior, classroom organization, and student time-to-task. Student comfort was also increased.

Chapter 5 - Discussion and Conclusion

The research was initiated in response to the perceived disengagement of schoolchildren beginning as early as elementary school, with the lessening of creativity resulting from the push for standardization as a contributing factor. The literature shows the critical role creativity plays in the development of life skills which, arguably, schools are meant to nurture. There are many disputed and uncontrollable facets of the field of education that further decrease opportunities for student creativity development. However, the contribution of the physical learning environment itself to the development of creativity is often overlooked but rich in transformative potential.

Although designing for creativity is a challenge to frame, due much in part to its ambiguous nature, the ability to be creative is embedded within a larger sociocultural context. As referenced in the author's Framework for the Modification of Creative Learning Community Physical Environments, time dimensions and both external and internal influences impact the creative classroom culture. External influences include but are not limited to governments, communities, and personal relationships; internal influences include but are not limited to motivation and goals. In order to create a more ideal environment for fostering creativity, there must be an element of adaptability introduced as a mediator between these external and internal forces. The classroom served as the adaptive element and, in the case of this research, the classroom culture added an additional layer of context.

Analysis of Findings

Although creativity could not be directly observed through this study, the research found that the environmental modification produced precursory creative conditions for and behaviors in the students:

Facilitative Physical Environment

As indicated by Maslow (1943), physical needs must be satisfied first before ascending to a creative state. Increasing comfort by introducing choice and adaptability in the classroom environment was one of the goals of this study, and both the students and teacher cited an improvement in these conditions. The ability to adapt the environment and express choice also seemed to promote an unintended behavior – experimentation. As a result of more optimal environmental conditions, it seemed that there was a willingness to "try new things" in the classroom or, perhaps, it was just that the environment enabled everyone to perform actions that were once inhibited.

Environmental Acuity

Both the students and teacher clearly indicated a more positive perception of the classroom environment in the post-treatment survey and interview, respectively. This was further corroborated by the video recordings. What is less obvious is the increased awareness of the surrounding environment and its attributes and how that enhances the senses. There has been speculation as to whether or not instrumental music, for example, enhances individuals' ability to focus and the consensus has been that it is inconclusive. However, it seems that when the senses are dulled, individuals do not notice their surroundings so much as when the senses have been engaged. Did the enhancement of color (visual) and textural (tactile) quality in the classroom lead to an overall increase in environmental acuity? If not a measurable increase, at least a difference was observed. Prior to the environmental modification, the students had never been observed dancing in the classroom nor humming along to the orchestra music playing softly in the background as they engaged in individual, focused activity. According to the literature, such demonstrations of joy are a result of positive affect, which further seems to facilitate creative

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thinking (Amabile et al., 2005; Frederickson, 2001; Isen, 2000), and which the modified

classroom environment seemed to enhance.

Teacher Classroom Management, Leadership Development, and Self-Esteem

These three concepts emerged as interdependent classroom qualities. Leadership is a

much-desired organizational skill. Transformational leaders are able to assist their followers in

developing their fullest potential by motivating them to do more than what is expected or to

transcend their own self-interests (Burns, 1978). Students demonstrated this quality through their

desire to help one another problem-solve as they adjusted their desks for the first time.

Furthermore, Puccio et al. (2007) argues that the fields of leadership and creativity have become

inextricably linked by a shared concept of change. Creative product leads to change and

leadership acts as a catalyst for change (Puccio et al., 2007). The students' impromptu

brainstorming sessions to improve their home school classrooms is an example of

transformational leadership and creativity as a catalyst for change. Children need meaningful

interactions and collaborations (Piaget, 1981; Vygotsky, 1990) and these interactions

furthermore allow for utilization of creativity, the development of creative application, and the

testing of ideas among peers.

Learning is enhanced by a sense of self-esteem. Self-esteem is demonstrated as trust

develops and students feel that they are in a safe, secure environment. Children need supportive

symbolic ecology in order to feel safe (Csikszentmihalyi, 1997). Under these conditions, students

feel encouraged to participate in classroom activities. The classroom becomes a place that

nurtures a sense of belonging which, in turn, fosters pride and ownership and exhibits itself in an

increased sense of responsibility. Encouraging students to develop ownership, territoriality, and

school pride has the added benefit of preventing negative behaviors like bullying (Killeen et al.,

2003), thus improving teachers' behavioral management. Students are able to develop a sense of community, which in turn fosters their own development.

The Bigger Picture

As referred to in the literature review, community planning is a design approach that is based on the functions of the people in society and placemaking, thus linking community planning to community development. In the effort to produce desirable behaviors in the elementary classroom, a *behavior setting* was essentially created. Behavior settings are small-scale social systems that are composed of people and physical objects arranged in such a manner as to carry out routine actions within a specified time and place. Schools and workplaces are examples of behavior settings, containing physical properties, social components, and the environmental setting (Kopec, 2006). Furthermore, some behaviors are considered to be appropriate in certain environments but not in others; and according to behavior-setting theory, places can evoke particular patterns of behavior (Kopec, 2006). Meaningful symbols therein make it easier for people to know who they are and, therefore, know what they should do; and harmonious, meaningful environments in space and time foster creativity (Csikszentmihalyi, 1997). It may then be inferred that when the classroom is modified to stimulate precursory creative behaviors, creativity will naturally occur.

Community development focuses on building the capacity of a community's citizens in order to achieve a better quality of life (Green & Haines, 2012), to enhance *community vitality*. Community vitality addresses the environmental, economic, and social aspects of a community's capacity (Mattson, 1996; Scott, 2009). If we apply the principles of community design to the classroom, several aspects correlate – the physical classroom itself, creative product, and student-student and student-teacher dynamics. One of the most well-known community

development approaches to educational design is the Reggio Emilia approach. Developed during post-war reconstruction under the guiding influence of Loris Malaguzzi, Reggio Emilia sought to create an educational environment in which collaboration amongst parents, teachers, and the general community would be paramount. Children are believed to have rights and be active constructors of knowledge. Teachers act as facilitators and co-researchers in the child's learning process. Learning is also believed to be a social activity encompassing multiple forms of "knowing", all of which were comprised of meaningful connections (Berk & Winsler, 1995; Hewett, 2001).

Fostering creativity also develops *civic intelligence*, or the "capacity of [a community] to consciously adapt to its environment and shape a future that is healthy, equitable, and sustainable" (Schuler, 2010, p. 295). Civic intelligence builds community awareness, encourages decision-making, and facilitates the collective development of solutions to societal challenges through a creative, active, non-deterministic, and human-centered approach. Because it is a collaborative learning experience, it is transformative in nature (Schuler, 2010; Dale & Newman, 2006). In this regard, one of the most surprising outcomes of the study was the transformative effect the modified classroom environment had on the teacher. The classroom teacher, seasoned in her experience and master of her classroom environment, witnessed the positive, natural behaviors that emerged as a result of the intervention. Although the design process pushed boundaries and necessitated a new way of thinking, the teacher was able to experience – and appreciate – the potential of change and redefinition, thus allowing her students to develop their creative capacities.

Study Limitations

Evidencing creativity is different from facilitating creativity. The premise of the environmental modification was to create an environment that would facilitate student creativity. This study did not specifically test creativity as a result of environmental design. Instead, the study observed indirect conditions that were indicated by the literature to influence the conditions under which people are more likely to reach higher mental processes.

The study did not address individual contextual factors such as student aptitude, home life, learning and behavioral disorders, etc. It is possible that these "unknowns" may be predetermined with the development of a questionnaire that the classroom teacher would be required to fill out for each student. However, such factors in the classroom population will still be out of the researcher's control. Furthermore, the sample group for the research study was very small, preventing any generalizations about the group to be made from data analysis.

The study also did not address the USD 475 gifted program curriculum nor delivery methods. While the designed classroom environment has the potential to inform new and acceptable behaviors, the teacher and the curriculum explicitly define classroom expectations. To most accurately assess the potential outcomes of an environmental modification, it is necessary for the classroom teacher to be willing to allow students' natural reactions and behaviors to emerge, within reason. Additionally, while creative teaching is not the same as teaching to think creatively (Starko, 2014), novel approaches to teaching curriculum increase the opportunity for the environment to be fully utilized.

The inability to conduct creativity study with a control test group limited the validity of the study results. Primarily qualitative data from one group of students was analyzed to identify emergent themes; however, the TTCT-Figural has been shown to be a highly reliable and valid

instrument for measuring creativity and, if implemented, would have increased the researcher's ability to determine correlation. Furthermore, the TTCT-Figural has been found to be fair in terms of gender, race, community status, language background, socioeconomic status, and culture (Cramond, 1993; Kim, 2011). However, had testing been implemented, the design of the USD 475 gifted program would have made it difficult to measure long-term results. A longitudinal study would require prolonged presence in the classroom itself; however, students meet only one day per week and students may not attend consistently since their home school priorities override those of the extracurricular gifted program.

Implications for Future Research

Research study investigating the correlation between the designed environment and creativity are limited. Further research into the sociocultural contexts affecting creativity is needed in order to better understand the role the physical environment can play in its development. In this regard, additional studies are also needed to better define creativity in its various contexts for the purpose of definitively observing its emergence in the research environment.

The research study, exploratory in nature, shows promise for reproducing the study with a larger group, across a variety of grade-levels and curricular and cultural contexts. The determination of consistency amongst the emergent themes would lead not only to a greater understanding of creative processing, but also better inform a universal design model for creativity development in educational settings. While standardization has been shown to antagonize creativity development, a universal model could produce a set of design guidelines that could be adapted to environmental context.

Education has an economic function, but this does not mean that the functions of education are wholly economic (Robinson, 2001). As a means for increasing students' problem-

solving capacity and 21st century life skills, longitudinal studies assessing students' creative development at each educational level (primary, secondary, and post-secondary) through entrance into the workforce are needed to ascertain how the educational environment can be modified to better transition students. This data could provide insight into what contexts better translate to "meaningful" experiences that keep students engaged for the entirety of their educational training.

Final Remarks

The author's Framework for the Modification of Creative Learning Community Physical Environments, based on the synthesis of Csikszentmihalyi's (1997) Systems Theory of Creativity Theory and Vygotsky's (1978) Sociocultural Learning Theory, may provide the design guidelines for learning environments that are better equipped to produce creative behaviors. The Model merits further testing across a variety of educational context to determine its reliability. With creativity currently declining in schoolchildren, guided efforts are needed to create a more pragmatic educational experience. Although it may not be possible to control educational policy and other macro factors, creating a physical environment that is more conducive to creativity development may be within reach. Individuals are inherently influenced by their environments; and environmental cues inform behaviors, both positive and negative. Perhaps, if learning environments are designed to facilitate creative behaviors in students, the environment will eventually lead the curriculum and its delivery, producing a student citizenry that will be able to creatively address the problems they encounter and improve the quality of life in the communities of which they are a part.

Bibliography

Almeida, L.S., Prieto, L.P., Ferrado, M., Oliveira, E., and Ferrandiz, C. (2008). Torrance Test of Creative Thinking: The question of its construct validity. *Thinking Skills and Creativity, 3,* 53-58.

Andreasen, N.C. (2005). *The creative brain: The science of genius.* London: Plume Books.

Amabile, T. (1996). *Creativity in context.* Boulder, CO: Westview Press.

Amabile, T., Barsade, S., Mueller, J., & Staw, B. (2005). Affect and creativity at work. *Administrative Science Quarterly, 50*(3), 367-403.

Bargh, J.A., Lombardi, W., and Higgins, E.T. (1988). Automaticity in Person Situation effects on person perception: It's just a matter of time. *Journal of Personality and Social Psychology, 55,* 599-605.

Beghetto, R.A. (2010). Creativity in the classroom. In Kaufman, J. & Sternberg, R. (Eds.), *The Cambridge Handbook of Creativity,* (pp. 447-461). New York: Cambridge University Press.

Berk, L.E., & Winsler, A. (1995). *Scaffolding children's learning: Vygotsky and early childhood education.* Washington, DC: National Association for the Education of Young Children.

Berrett, D. (2013). Creativity: A cure for the common curriculum. *The Chronicle of Higher Education.* Washington, D.C.

Besançon, M., & Lubart, T. (2007). Differences in the development of creative competencies in children schooled in diverse learning environments. *Learning and Individual Differences, 18*(4), 381-389.

Birren, F. (1997). *The power of color.* Secaucus, NJ: carol Publishing group.

Blumer, H. (1969). *Symbolic interactionism: Perspective and method.* Berkeley: University of California Press

Burgstahler, S. (2012). *Universal design in education: Principles and applications* [Brochure]. University of Washington. Retrieved from http://www.washington.edu/doit/Brochures/Programs/ud.html

Burns, J.M. (1978). *Leadership.* New York: Harper & Row.

Carnevale, A.P., Garner, L.J., and Meltzer, A. (1990). *Workplace basics: The essential skills employers want.* San Francisco: Jossey-Bass.

Cawelti, G. (2006). The side effects of NCLB. *Educational Leadership, 64*(3), 64-68. Retrieved from http://www.csun.edu/~krowlands/Content/SED610/NCLB/Side%20effects%20of %20ncl b.pdf

Chang-Wells, G.L.M., & Wells, G. (1993). Dynamics of discourse: Literacy and the construction of knowledge. In *Contexts for learning* (Eds.), E.A. Forman, N. Minick, & C.A. Stone, 58-90. New York: Oxford University Press.

Corbin, J., & Strauss, A.C. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd Ed.). Thousand Oaks, CA: Sage.

Cramond, B. (1993). The Torrance Tests of Creative Thinking: From design through establishment of predictive validity. In R.F. Subotnik & K.D. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (p. 229-254). Norwood, NJ: Ablex.

Creswell, J.W. & Plano Clark, V.L. (2007). *Designing and conducting mixed methods research.* Thousand Oaks, CA: Sage Publications.

Csikszentmihalyi, M. (1990). *Flow.* New York: HarperPerennial.

Csikszentmihalyi, M. (1997). *Creativity: The psychology of discovery and invention.* New York: HarperPerennial.

Dale, A. & Newman, L. (2006). Sustainable community development, networks and resilience. *Environments Journal, 34*(2), p. 15-27.

Dewey, J. (1902). *The child and curriculum.* Chicago: University of Chicago Press.

Donnelly, T.P. (2014). Community design for the workplace. *Work Design Magazine.* Retrieved from http://workdesign.com/2014/06/community-design-workplace/

Eisner, E.W. (2002). *The arts and the creation of mind.* New Haven, CT: Yale University Press.

Eivers, E. (2010). PISA: Issues in implementation and interpretation. *The Irish Journal of Education, 38,* 94-118.

Engelbrecht, K. (2003). *Impact of color on learning.* (W305). Chicago, IL: NeoCon.

Failey, A., Bursor, D.E., and Musemeche, R.A. (1979). The impact of color and lighting in schools. *Council of Educational Facility Planners Journal,* 16-18.

Feist, G.J. (2010). The function of personality in creativity: The nature and nurture of the creative personality. In Kaufman, J. & Sternberg, R. (Eds.), *The Cambridge Handbook of Creativity,* (pp. 113-130). New York: Cambridge University Press.

Feldman, D.H. (1999). The development of creativity. In Sternberg, R.J. (Eds.), *Handbook of Creativity,* (pp. 169-186). New York, NY: Cambridge University Press.

Frederickson, B. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*(3), 218-226.

Gardner, H. (2008). *5 Minds for the future.* Boston: Harvard Business Press.

Gentry, M. (2006). No Child Left Behind: Neglecting excellence. *Roper Review, 29,* 24-27.

Gillen, N.M. (2006). The future workplace, opportunities, realities, and myths: A practical approach to creating meaningful environments. In J. Worthington (Eds.), *Reinventing the workplace* (2nd Ed., pp. 61-78). Oxford: Architectural Press.

Green, G.P., & Haines, A. (2012). *Asset building & community development* [3rd Ed.]. Los Angeles: Sage Publications.

Haner, U.E. (2005). Spaces for creativity and innovation in two established organizations. *Creativity and Innovation Management, 14*(3), 288-298.

Hathaway, W.E. (1994). Non-visual effects of classroom lighting on children. *Educational Facility Planner, 32*(3), 12-16.

Henderson, S.R. (1997). "New buildings create new people": The Pavilion schools of Weimar Frankfurt as a model of pedagogical reform. *Design Issues, 13*(1), 27-29.

Herman Miller. (2013). "Rethinking the classroom: Spaces designed for active and engaged learning and teaching". Herman Miller Solution Essays. Retrieved from http://www.hermanmiller.com/research/solution-essays/rethinking-the-classroom.html

Herman Miller. (n.d.). "All together now". Herman Miller Solutions Essays. Retrieved from http://www.hermanmiller.com/research/solution-essays/all-together-now.html

Heschong Mahone Group. (1999). Daylighting in schools- PG&E 1999. Retrieved from Heschong Mahone Group website: http://www.h-m- g.com/projects/daylighting/summaries%20on%20daylighting.htm#Daylighting in Schools – PG&E 1999

Hewett, V.M. (2001). Examining the Reggio Emilia approach to early childhood education. Early Childhood Education, 29(2), 95-100.

Hitt, M.A. (1975). The creative organization: Tomorrow's survivor. *The Journal of Creative Behavior, 9,* 283-290.

Horton, C.D. (1972). Humanization of the learning environment. Arlington, VA. (ERIC Document Reproduction Service No. ED066929).

Ingersoll, R.M. (2003). *Who controls teachers' work? Power and accountability in America's schools.* Cambridge, MA: Harvard University Press.

Isen, A.M. (2000). Positive affect and decision making. In M. Lewis & J.M. Haviland-Jones (Eds.), *Handbook of Emotions* (2nd ed., pp. 417-435). New York: Guilford.

Kaufer, D.I., & Lewis, D.A. (1999). Frontal lobe anatomy and cortical connectivity. In B.L. Miller & J.L. Cummings (Eds.), *The human frontal lobes: Functions and Disorders* (pp. 27-44). New York: Guilford.

Kelley, T. (2001). *The art of innovation.* New York: Doubleday.

Killeen, J.F., Evans, G.W., and Danko, S. (2003). The role of permanent student artwork in students' sense of ownership in an elementary school. *Environment and Behavior, 35*(2), 250-263.

Kim, K.H. (2006). Can we trust creativity tests? A review of the Torrance Tests of Creative Thinking (TTCT). *Creativity Research Journal, 18*(1), 3-14.

Kim, K.H. (2011). The creativity crisis: The decrease in creative thinking scores on the Torrance Tests of Creative Thinking. *Creativity Research Journal, 23*(4), 285-295.

Kober, N., & Rentner, D.S. (2011). Common Core state standards: Progress and challenges in school districts' implementation. *Center on Education Policy.* Retrieved from http://www.cep-dc.org/cfcontent_file.cfm?Attachment=KoberRentner_CommonCoreDistrict_Report_091411.pdf

Kopec, D. (2006). *Environmental psychology for design.* New York: Fairchild Publications, Inc.

Kristensen, T. (2004). The physical context of creativity. *Creativity and Innovation Management, 13*(2), 89-96.

Lang, D. (1996). *Essential criteria for an ideal learning environment.* Seattle, WA: New Horizons Learning.

Leedy, P.D., & Ormond, J.E. (2010). *Practical research: Planning and design* (9th Ed.). Upper Saddle River, NJ: Pearson.

Legender, A. (1999). Interindividual relationships in groups on young children and susceptibility to an environmental constraint. *Environment and Behavior, 31*(4), 463-496.

Lewis, M., & Moultrie, J. (2005). The organizational innovation laboratory. *Creativity and Innovation Management, 14*(1), 73-83.

Luckiesh, M., and Moss, F.K. (1940). Effects of classroom lighting upon the educational progress and visual welfare of school children. *Illuminating Engineering, 35,* 915-938.

Martindale, C. (1999). Biological bases of creativity. In Sternberg, R.J. (Eds.), *Handbook of Creativity,* (pp. 137-152). New York, NY: Cambridge University Press.

Maslow, A.H. (1943). *Hierarchy of needs: A theory of human motivation.* Mansfield, CT: Martino.

Mattson, G. (1996). The role of community viability analysis in revealing the elements contributing to sense of place: A case study of Olsburg, Kansas. *Small Town, 26*(4), 14-23.

Maxwell, L.E. (2003). Home and school density effects on elementary school children: The role of spatial density. *Environment and Behavior, 35*(4), 566-578.

McAfee, J.K. (1987). Classroom density and the aggressive behavior of handicapped children: *Education and Treatment of Children, 10*(2).

McAndrew, F.T. (1993). *Environmental Psychology.* Pacific Grove, CA: Brooks/Cole Publishing Company.

McGuinn, P. (2011). Stimulating reform: Race to the Top, competitive grants and the Obama Education Act. *Educational Policy 2012.* Retrieved from http://epx.sagepub.com/content/26/1/136

McLaughlin, M., & Overturf, B.J. (2012). The Common Core: Insights into the K-5 standards. *The Reading Teacher, 66*(2), 253-164.

McVey, M. (2013). PISA under examination: Changing knowledge, changing tests, and changing schools. *International Review of Education, 59,* 141-144.

Moore, G.T., Sugiyama, T., & O'Donnell, L. (2003). The children's physical environments rating scale (CPERS5). Retrieved from http://sydney.edu.au/architecture/documents/ebs/AECA_2003_paper.pdf

Moultrie, J., Nilsson, M., Dissel, M., Haner, U.E., Janssen, S., & Van Der Lugt, L. (2007). Innovation spaces: Towards a framework for understanding the role of the physical environment in innovation. *Creativity and Innovation Management, 16,* 53-65.

Mueller, J. S., Melwani, S., & Goncalo, J.A. (2012). The bias against creativity: Why people desire but reject creative ideas. *Psychological Science, 23*(1), 13-17National Governors Association Center for Best Practices & Council of State School Officers. (2010). *Common Core state standards for English language arts and literacy in history/social studies, science, and technical subjects.* Washington, DC: Authors. Retrieved from http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf

National Governors Association Center for Best Practices & Council of State School Officers.

(2010). *Common Core state standards for English language arts and literacy in*

history/social studies, science, and technical subjects. Washington, DC: Authors. Retrieved

    from http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf

Nicolaou, L. (2006). Emerging building forms and accommodation solutions: New building
    typologies or distinctive place-making. In J. Worthington (Eds.), *Reinventing the workplace*
    (2nd Ed., pp. 205-219). Oxford: Architectural Press.

Noddings, N. (2005). *The challenge to care in schools.* New York: Teachers College Press.
    Organization for Economic Cooperation and Development. (2001). *Knowledge and skills for*
    life: First results from PISA 2000. Paris: Author.

OECD. (2001). *Knowledge and skills for life: First results from PISA 2000.* Paris: Author.

OECD. (2014). *PISA 2012 results: What 15-year-olds know and what they can do with what they*
    know. Retrieved from http://www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf

Orey, M. (Ed.). (2001). *Emerging perspectives on learning, teaching, and technology.*
    Department of Educational Psychology and Instructional Technology, University of
    Georgia. Retrieved from http://projects.coe.uga.edu/epltt/index.php?title=Main_PageS

OWP/P Architects Inc., VSF, & Bruce Mau Design. (2010). *The third teacher: 79 ways you*
    can use design to transform teaching & learning. New York: Abrams.

Partnership for 21st Century Skills. (2008). *21st century skills, education & competitiveness: A*
    resource and policy guide. Tuscon, AZ: Partnership for 21st Century Skills.

Paulston, R.G. (1988). Comparative and international education: Paradigms, theories and
    debates. In *Education: The complete encyclopedia 1.1.* New York: Elsevier.

Piaget, J. (1950). *The psychology of intelligence.* New York: Harcourt Brace.

Piaget, J. (1973). *The child and reality.* New York: Grossman Publishers.

Piaget, J. (1981). Creativity. In J.M. Gallagher & d.K. Reid (Eds.), *The learning theory of Piaget*
    and Inhelder (pp. 221-229). Monterey, CA: Brooks-Cole.

Pogue, J. (2009). Working around the water cooler. *Employee Benefit News.* Retrieved
    from http://ebn.benefitnews.com/news/working-around-water-cooler-2663471-1.html

Postlewaite, C. C. (2003). Federalizing education: States struggle with decreased autonomy
    and increased costs as they try to implement no child left behind. *State Government News,*
    46(4), 12-13.

Poston, B. (2009). An exercise in personal exploration: Maslow's hierarchy of needs. *The*
    Surgical Technologist, 4(8)*.* 347-353

Puccio, G.J., Murdock, M.C., & Mance, M. (2007). *Creative leadership: Skills that drive change.* Thousand Oaks, CA: Sage Publications.

Puccio, G.J., & Cabra, J.F. (2010). Organizational creativity: A systems approach. In Kaufman, J. & Sternberg, R. (Eds.), *The Cambridge Handbook of Creativity,* (pp. 145-173). New York: Cambridge University Press.

Read, M.A., Sugawara, A.I., and Brandt, J.A. (1999). Impact of space and color in the physical environment on preschool children's cooperative behavior. *Environment and Behavior, 31*(3), 413-428.

Robinson, K. (2001). *Out of our minds: Learning to be creative.* West Sussex, UK: Capstone Publishing Limited.

Rochex, J.Y. (2006). Social, methodological, and theoretical issues regarding assessment: Lessons from a secondary analysis of PISA 2000 literacy tests. *Review of Research in Education, 30,* 163-212.

Rudalevige, A. (2003). The politics of No Child Left Behind. *Education Next,* 23-54.

Sawyer, R.K. (2004). Creative teaching: Collaborative discussion as disciplined improvisation. *Educational Researcher, 33,* 12-30.

Schuler, D. (2010). Community networks and the evolution of civic intelligence. *AI & Society, 25*(3), p. 291-307.

Scott, K. (2009). Community vitality: Measuring what matters. *The Vanier Institute of the Family*, p. 1-4.

Sinofsky, E.R., and Knirck, F.G. (1981). Choose the right color for your learning style. *Instructional Innovator, 26*(3), 17-19.

Sjøberg, S. (2007). PISA and "real life challenges": Mission impossible? In S. Hopman, G. Brinek, & M. Retzl (Eds.), *PISA according to PISA: Does PISA keep what it promises?* (pp. 241-263). Wien: LIT.

Sommer, R., and Olsen, H. (1990). The soft classroom. *Environment and Behavior, 12,* 3-16.

Soo, C., Devinney, T., Midgley, D., and Deering, A. (2002). Knowledge management: Philosophy, processes, and pitfalls. *California Management Review, 44,* 129-150.

Sousa, D. A. (2014). *How the brain learns* (4th Ed.). Thousand Oaks, CA: Corwin.

Starko, A. J. (2014). *Creativity in the classroom* (5th Ed.). New York: Taylor & Francis.

Sternberg, R.J. (2004). Four alternative futures for education in the United States: It's our choice. *School Psychology review, 33,* 67-77.

The Center for Green Schools. (n.d.). LEED gives common language for green school buildings. Retrieved from http://centerforgreenschools.org/leed-for-schools.aspx

The Center for Universal Design. (1997). The principles of universal design. Retrieved from https://www.ncsu.edu/ncsu/design/cud/pubs_p/docs/poster.pdf

The President's Council of Advisors on Science and Technology. (2010). Prepare and inspire: K-12 science, technology, engineering, and math (STEM) education for America's future. *The Education Digest, 76*(4), 42-46.

Torrance, E.P. (1965). *Rewarding creative behavior.* Englewood Cliffs, NJ: Prentice Hall.

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

Torrance, E.P. (1987). Teaching for creativity. In Isaksen, S.G. (Eds.), *Frontiers of Creativity Research: Beyond the Basics* (p. 189-215). Buffalo, NY: Bearly Limited.

Troussier, B., Tesniere, C., Fauconnier, J., Grison, J., Juvin, R., and Phelip, X. (1999). Comparative study of two different kinds of school furniture among children. *Ergonomic, 42*(3), 516-526.

U.S. Census Bureau. (2015a). QuickFacts: Junction City, Kansas. Retrieved from http://www.census.gov/quickfacts/table/PST045215/2035750

U.S. Census Bureau. (2015b). QuickFacts: United States. Retrieved from http://www.census.gov/quickfacts/table/PST045215/00,2035750

Vygotsky, L. S. (1966). Play and its role in the mental development of the child. *Soviet Psychology, 12*(6): 62-76.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge: Harvard University Press.

Vygotsky, L.S. (1990). Imagination and creativity in childhood. *Soviet Psychology, 28,* 84-96 (F. Smolucha, trans.)

Vygotsky, L.S. (1994). Thought and Language. Cambridge, Mass.: M.I.T. Press, 1994.

Williams, W.M., & Yang, L.T. Organizational creativity. (1999). In Sternberg, R.J. (Eds.), *Handbook of Creativity,* (pp. 373-391). New York, NY: Cambridge University Press.

Wohlfarth, H. (1986). *Color and light effects on students achievement, behavior and physiology.* Edmonton, Alberta: Planning Services Branch, Alberta Education.

York, K. (2015a). Personal communication with author.

York, K. (2015b). Personal communication with author.

York, K. (2016). Personal communication with author.

Zandvliet, D.B., and Straker, L.M. (2001). Physical and psychosocial aspects of the learning environment in information technology-rich classrooms. *Ergonomics, 44*(9), 838-857.

Appendix A - Supplemental Forms

Form 3.1: Administrative Participatory Consent

ADMINISTRATIVE PARTICIPATORY CONSENT

My name is Kolia Souza and I am a graduate student at Kansas State University with the Department of Architecture, Planning, and Design. As a requirement for my graduate program, I have developed a thesis proposal. This proposal explores how the design of the physical environment may help foster creativity in the 4th and 5th grade gifted classroom. I would like to utilize the USD 475 Gifted Program 4th and 5th grade classroom (located at Lincoln Elementary) to test this hypothesis.

In order to do so, I am requesting your permission to survey and digitally record the students in the classroom in order to inform a classroom redesign. Upon your approval, parents will receive informed participation consent forms. With parental approval, students will receive a pre-design questionnaire asking for their opinions on their classroom environment and creativity. The students and teacher will then be digitally recorded in the classroom for two full sessions. Survey data and recordings will be used to develop a classroom redesign which will be presented for your approval and modified as necessary to accommodate any school regulations or needs. Upon design implementation, the students will be recorded for two more full classroom sessions and receive a post-design questionnaire asking them for their opinions about the new classroom design.

If you consent to participation in the activities listed above, please sign and date below. I appreciate the opportunity to provide an enhanced classroom environment for the students in your school! If you have any further questions or concerns, you may contact me via email, ksouza@ksu.edu, or cell (785) 717-5924. Thank you.

_____   _____
Researcher (Print)   Date

_____
Researcher (Signature)

_____   _____
Gifted Facilitator (Print)   Date

_____
Gifted Facilitator (Signature)

_____   _____
Principal (Print)   Date

_____
Principal (Signature)

Form 3.2: Parental Consent

Hello Parents!

My name is Kolia Souza and I am a graduate student with the Department of Architecture, Planning, and Design at Kansas State University. Last year, I volunteered in Mrs. York's gifted classroom. The Gifted Program is near and dear to me; I participated as a child and my oldest daughter currently does as well. As a part of my thesis work, I am studying how classroom design can activate and facilitate the creative process for students- and I would like to implement a new and improved design in your child's gifted classroom to test this theory.

In order to do so, I need your permission for your child to participate in the study. The study asks that students fill out pre- and post-design **questionnaires** about classroom function and creativity. The pre-design questionnaire will be sent home with your child after he/she has attended a few of his/her gifted class sessions. Please feel free to go through the survey with your child. I also need your permission to formally observe your child in the classroom via **video recording**. I will be reviewing these recordings in order to develop a new classroom design and observe how the design affects classroom functions. In order to protect your child's identity, the recordings may only be viewed by me as the researcher, Mrs. York as the classroom teacher, and university professors who are associated with the study and have completed training for human subject research conducted by the governing body, the International Review Board (IRB). Please initial your participation preferences below and you and your child may fill in the information at the bottom of the page together. Participation is completely voluntary. On the backside of this form is additional project information that is required to be provided to you by the IRB; it is only for your information and it is not necessary for you to fill anything out.

All data collected will be protected during the study and destroyed at the conclusion of my thesis defense. Any data referenced in the report will be coded to preserve anonymity as well. I will provide an update at the conclusion of the study for parents too. If you have any further questions or concerns, you can certainly contact me via cell at **(785) 717-5924** or by email at **ksouza@ksu.edu**. I appreciate your time and consideration and I'm looking forward to improving your child's classroom!

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.
I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

☐   I give permission for my child to fill out the questionnaires.
☐   I give permission for my child to be video recorded in the classroom.
OR
☐   I do not want my child to participate in the study.

Participant Name (Child):   Participant Signature (Child):

_____   _____

Participant Approval – Print (Parent):   Participant Approval – Signature (Parent):

_____   _____

Contact Info (phone/email):

_____   Date: _____

Signature (project staff):

_____   Date: _____

Form 3.2: Parental Consent

KANSAS STATE UNIVERSITY
INFORMED CONSENT

PROJECT TITLE:	The Adaptive Learning Community Environment: Applying Four Work Mode Theory to Foster Creativity in the 4th and 5th Grade Gifted Classroom

APPROVAL DATE OF PROJECT: _____   **EXPIRATION DATE OF PROJECT:** _____

PRINCIPAL INVESTIGATOR: CO-INVESTIGATOR(S):   R. Todd Gabbard; Kolia Souza

CONTACT AND PHONE FOR ANY PROBLEMS/QUESTIONS: rtodd@ksu.edu   (785) 532-5953

IRB CHAIR CONTACT/PHONE INFORMATION: Rick Scheidt   (785) 532-3224

SPONSOR OF PROJECT: NA

PURPOSE OF THE RESEARCH: This is a master's research project exploring how physical classroom design may facilitate the creative process.

PROCEDURES OR METHODS TO BE USED: Students will be asked to complete pre- and post-design questionnaires. Teacher will be interviewed. Pre- and post-physical environmental assessments will be conducted as well. Pre- and post-design video recordings of students will be reviewed to evaluate functions within the classroom. Participation is unpaid.

ALTERNATIVE PROCEDURES OR TREATMENTS, IF ANY, THAT MIGHT BE ADVANTAGEOUS TO SUBJECT:

NA

LENGTH OF STUDY: August 2015 through October 2015

RISKS ANTICIPATED: There are no known risks

BENEFITS ANTICIPATED: Improved classroom function

EXTENT OF CONFIDENTIALITY: Video recordings will be used; the data will be stored on a password protected, encrypted personal computer. All data will be coded and destroyed upon conclusion of the study to further protect confidentiality.

IS COMPENSATION OR MEDICAL TREATMENT AVAILABLE IF INJURY OCCURS: No

PARENTAL APPROVAL FOR MINORS: See other side.

Form 3.3: CPERS Part C Adaptation

PART C ADAPTATION: CHILDREN'S INDOOR CLASSROOM SPACES

The subscales in adapted Part C of the Child Play Environment Rating Scale (CPERS) apply to the spaces where children spend most of their time learning in a formal school setting. This tool has been developed to assess the 4th and 5th grade combined gifted classroom environment. This adaptation of the CPERS tool evaluates open-plan space in terms of community storage, display space, and environmental quality. The following modes of activity take place in the classroom and are evaluated separately as well: learning, focus, collaboration, and socialization.

SPACE BEING EVALUATED: _____

EVALUATION PERFORMED BY: _____

DATE: _____ / _____ / _____

Subscale 12. Open-Plan Space

Open-plan space is flexibly planned learning environment space that can accommodate children individually, in small groups, or in larger groups utilizing few or no dividers.

This is in contrast to a closed-plan space where each classroom activity is in a separate enclosed room, and to modified open-plan space which consists of a mixture of semi-open areas interconnected with smaller, partially enclosed spaces.

	NOT MET			FULLY MET		NA
COMMUNITY STORAGE						
12.1 The space has options for students to store personal belongings (i.e. coats, backpacks, cold lunches, etc.).	0	1	2	3	4	
12.2 The space has options for students to store personal classroom supplies (i.e. notebooks, pencils, etc.).	0	1	2	3	4	
12.3 The space has multiple accessible options (i.e. bookcases of varying heights, countertop storage drawers, etc.) for storing classroom tools (i.e. art supplies, books, etc.).	0	1	2	3	4	
12.4 Storage may be adapted (i.e. moved, easily rearranged, etc.) to meet changing needs.	0	1	2	3	4	
12.5 Storage spaces appear organized and uncluttered.	0	1	2	3	4	
12.6 There is ample space for storage; storage does not impede on space needed for classroom activities.	0	1	2	3	4	
DISPLAY SPACE						
12.7 The space features areas to display and rotate student work.	0	1	2	3	4	
12.8 Feature space is in a location that can be easily viewed by students.	0	1	2	3	4	
12.9 There is wall space for informational graphics (i.e. posters, bulletin boards, etc.).	0	1	2	3	4	
12.10 Display space has visual flow and is organized and uncluttered in appearance.	0	1	2	3	4	
ENVIRONMENTAL QUALITY						
12.11 The space has sufficient artificial lighting to avoid dark or low visual areas.	0	1	2	3	4	
12.12 The space has plenty of natural daylight.	0	1	2	3	4	
12.13 The windows have treatments to control daylighting.	0	1	2	3	4	
12.14 The space has operable windows for air circulation.	0	1	2	3	4	
12.15 The space has vents for heating and cooling.						
12.16 The space has visual connection to outdoor space.	0	1	2	3	4	
12.17 The space has visual connection to landscaped area and/or natural greenery.	0	1	2	3	4	

Subscale 12 Sum

Number of Items Answered

Subscale 12 Score

$$\boxed{} \div \boxed{} = \boxed{}$$

100

SUBSCALES 13-16. ADAPTIVE FUNCTIONS WITHIN THE OPEN-PLAN SPACE

The open-plan space must be assessed for adaptability to classroom functions. The modes of classroom function are Learning, Focus, Collaboration, and Socialization.

Learning Mode allows students to acquire knowledge and new skills. It facilitates activities that promote problem-solving, memorization, concept exploration and development, discovery, and reflection as well as opportunity to integrate and apply knowledge. This arrangement of space may be used for teacher-focused activity that requires listening or viewing demonstration aids such as marker boards, smart boards, projectors, and videos; as well as hands-on activity utilizing classroom supplies and technological tools like smart boards, laptops, and tablets.

Focus Mode allows students to concentrate and devote uninterrupted effort to a particular task or project that requires thinking, reflecting, analyzing, problem-solving, creating, imagining, reviewing, assessing, and producing work. Granted protected, distraction-free time, students make considerable progress in productivity. This arrangement of space may promote privacy amongst students (such as in a test-taking situation) or, at least, limit distractions. Teachers may also utilize this time to get work done or speak with students privately.

Collaboration Mode allows students to work with one another in two-person teams or larger groups to achieve a specific goal. Planning, strategizing, sharing knowledge and information, problem-solving, development, innovation, creation, and production are functions of this mode. Collaboration can result in increased productivity, innovation, and the ability to respond more creatively to complex learning challenges.

Socialization Mode facilitates classroom interactions that create common bonds and values, collective identity, collegiality, productive relationships, and a sense of community. This arrangement of space may be used for sharing stories and experiences, in-class recess, and eating snacks and lunch.

SUBSCALE 13. LEARNING MODE

	NOT MET				FULLY MET	NA
13.1 The space can be easily modified to accommodate learning needs (i.e. changing configuration of desks).	0	1	2	3	4	
13.2 The space utilizes multiple learning tools (i.e. smart boards, marker boards, tablets, etc.) to reach learning objectives.	0	1	2	3	4	
13.3 There is sufficient space for the teacher to demonstrate learning objectives.	0	1	2	3	4	
13.4 Students have sufficient space to utilize learning tools.	0	1	2	3	4	
13.5 The space accommodates multiple modes of instruction (auditory, visual, and kinesthetic) to serve a diverse population of learning styles.	0	1	2	3	4	
13.6 Technological components are arranged near outlets to avoid tripping hazards from power cords.	0	1	2	3	4	
AUDITORY						
13.7 The space is acoustically sound, making use of various sound dampening materials to improve auditory quality.	0	1	2	3	4	
VISUAL						
13.8 Students can easily and comfortably view teacher learning demonstrations.	0	1	2	3	4	
13.9 Demonstration space is uncluttered to avoid distraction.	0	1	2	3	4	
KINESTHETIC						
13.10 There is sufficient space for students to participate in activities requiring mobility.	0	1	2	3	4	
13.11 Furniture accommodates student movement ergonomically (i.e. rocking, leaning back, writing, etc.).	0	1	2	3	4	
13.12 Furniture is adjustable to provide maximum comfort during activities for a diverse population.	0	1	2	3	4	

Subscale 13 Sum

Number of Items Answered

Subscale 13 Score

÷

=

102

SUBSCALE 14. FOCUS MODE

	NOT MET			FULLY MET		NA
14.1 The space can be easily modified to facilitate the need to focus (i.e. changing configuration of desks).	0	1	2	3	4	
14.2 Students have sufficient means to attain privacy (i.e. built-in adjustable desk shield or desk space to create barriers with upright folders).	0	1	2	3	4	
14.3 Students have sufficient workspace to utilize learning tools and materials.	0	1	2	3	4	
14.4 Furniture accommodates student movement ergonomically (i.e. rocking, leaning back, writing, etc.).	0	1	2	3	4	
TEACHER'S WORK AREA						
14.5 Space has ample desk storage.	0	1	2	3	4	
14.6 Space utilizes wall space for additional storage, if needed.	0	1	2	3	4	
14.7 Space has storage for personal belongings (i.e. purse, coat, etc.).	0	1	2	3	4	
14.8 Desk area accommodates up to two individuals if needed (i.e. a student, parent, or classroom aide).	0	1	2	3	4	
14.9 Desk area accommodates laptop and other office supplies.	0	1	2	3	4	
14.10 Space provides some sense of separation or privacy for confidential discussion.	0	1	2	3	4	

Subscale 14 Sum   **Number of Items Answered**   **Subscale 14 Score**

$$\boxed{} \div \boxed{} = \boxed{}$$

103

SUBSCALE 15. COLLABORATIVE MODE

	NOT MET			FULLY MET		NA
15.1 The space can be easily modified to accommodate various types of group interaction.	0	1	2	3	4	
15.2 The arrangement of space encourages non-hierarchical interaction.	0	1	2	3	4	
15.3 Auditory and visual information can be shared easily.	0	1	2	3	4	
15.4 There is sufficient space to use learning tools and materials simultaneously.	0	1	2	3	4	
15.5 Work surfaces can be adjusted to accommodate various types of group activities.	0	1	2	3	4	
15.6 Seating accommodates student movement ergonomically (i.e. rocking, leaning back, leaning in, etc.).	0	1	2	3	4	
15.7 There is sufficient space for students to stand over work surfaces.	0	1	2	3	4	
15.8 There is sufficient space for students to participate in activities requiring mobility.	0	1	2	3	4	

Subscale 15 Sum   **Number of Items Answered**   **Subscale 15 Score**

$$\div \qquad = $$

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SUBSCALE 16. SOCIALIZING MODE

	NOT MET			FULLY MET		NA
16.1 The space can be easily modified to accommodate various types of group interaction.	0	1	2	3	4	
16.2 The arrangement of space encourages non-hierarchical interaction.	0	1	2	3	4	
16.3 Auditory and visual information can be shared easily.	0	1	2	3	4	
RECESS						
16.4 There is sufficient space to accommodate various types of play activity (i.e. floor space, work surface space, etc.).	0	1	2	3	4	
16.5 There is sufficient space to accommodate movement.	0	1	2	3	4	
LUNCH/SNACK TIME						
16.6 An area for cleaning materials is provided.	0	1	2	3	4	
16.7 Surfaces are durable and easy to clean.	0	1	2	3	4	
16.8 An area for food disposal is provided.	0	1	2	3	4	
16.9 An area for recycling is provided.	0	1	2	3	4	
COMMUNITY AREA						
16.10 A cozy area is provided or can be created for comfortable lounging and/or intimate conversation.	0	1	2	3	4	
16.11 A variety of natural textures are present throughout the space to increase comfort.	0	1	2	3	4	
16.12 A cohesive color palette is used to invigorate the space.	0	1	2	3	4	

Subscale 16 Sum   Number of Items Answered   Subscale 16 Score

$$\boxed{} \div \boxed{} = \boxed{}$$

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SUMMARY SCORE AND INTERPRETATIONS

When the assessment for all open-plan and adaptive functions in the open-plan spaces have been completed, calculate the score for each of the above two subscales. For the "Number of Items Answered", be sure to count all of the items in the above two subscales that were not marked as "NA/not applicable".

Open-Plan Space Total

Subscale 12 Sum   Number of Items Answered   Subscale 12 Score

[ ]   ÷   [ ]   =   [ ]

Adaptive Functions Within Open-Plan Space Total

Subscale 13-16 Sum   Number of Items Answered   Subscale 13-16 Score

[ ]   ÷   [ ]   =   [ ]

$$\text{Summary Score} = \frac{\text{Sum of subscale scores}}{2} = \boxed{}$$

Interpretation

There is no absolute for what constitutes a *"good"* learning environment. The scores are relative and diagnostic, and very useful to identify areas of needed improvement. However, as all items and the scores for each subscale and the scale as a whole range from 0 to 4, the final score may be given a descriptive label as follows: $0.00 - 1.00$ = poor, $1.01 - 2.00$ = fair, $2.01 - 3.00$ = good, and $3.01 - 4.00$ = excellent.

Form 3.4: Pre-Treatment Teacher Interview Questions

CREATIVITY IN THE GIFTED CLASSROOM
TEACHER SURVEY

1) How do you define or evidence creativity in the classroom?

2) What classroom tools do you use to promote or facilitate the creative process with your students?

3) What about your classroom organization inhibits the creative process?

4) What additions to the classroom would allow you to enhance student creativity?

Form 3.5: Post-Treatment Teacher Interview Questions

POST-OCCUPANCY TEACHER SURVEY

1) How has the classroom redesign affected your daily classroom management?

2) What effects of the classroom redesign have you observed with the students, including working behaviors?

3) What is the most successful aspect of the classroom redesign?

4) If there were anything you could add or change concerning the classroom redesign, what would it be?

Form 3.6: Pre-Treatment Student Survey

PRE-DESIGN: EVALUATING YOUR GIFTED CLASSROOM

Question #1: How comfortable is your desk while working? Circle the best answer.

1- Really uncomfortable. I don't have enough space on top of my desk for my things or no additional storage space. There's not enough space underneath my desk to move around or spread out, and I can't adjust my desk. It makes working at my desk very difficult.

2- Uncomfortable. I just barely have enough space on top of my desk for my things and I may or may not have additional storage space. There's just enough space underneath my desk to move around a little but not to spread out. I can manage working at my desk.

3- Comfortable. I have enough space on top of my desk for my things and additional storage space. There's enough space underneath my desk to move around and I can spread out a little. I feel comfortable doing my work.

4- Super comfortable! I can adjust my desk height easily for different activities or for comfort. I have more than enough space on top of my desk for my things and more than enough space underneath for my legs. I feel very comfortable and I can work better.

Question #2: How comfortable is your chair while working? Circle the best answer.

1- Really uncomfortable. The chair is not the right height for me to sit comfortably at my desk. It's too hard and it usually hurts to sit in it for too long. I can't move around in it. It makes concentrating on my work very difficult.

2- Uncomfortable. The chair height is okay but the chair itself isn't comfortable and I can't move around in it much. It doesn't really hurt to sit in it for long periods of time or only a little sometimes. I'm able to concentrate enough to get my work done.

3- Comfortable. I can't adjust my chair but because it is the right height I feel like I can sit and work comfortably in it, maybe even move around a little. It doesn't hurt to sit for long periods of time in the chair. I can concentrate well on my work.

4- Super comfortable! I can adjust the chair when I want to sit differently. The chair is flexible and can move with my movement. It feels good to sit in and helps me to concentrate and work better.

Question #3: How easy is it to work in your classroom? Circle the best answer.

1- Very difficult. The classroom is very crowded and unorganized. It's difficult to find things and move around without bumping into things or squeezing past people. I often have to sit differently or move from my desk so I can see the board or not be in the way.

2- Difficult. The classroom has some organization so I can find the things I use often. A few areas are crowded and I have to be careful getting around people or things. Sometimes it's better to sit differently or move from my desk so I can see the board or not be in the way.

3- Easy. The classroom has little clutter and is organized. The things I use often aren't in the easiest place to get to but I can manage. I can move around the classroom without bumping into things or squeezing past anyone. I have to readjust myself to see the board clearly from my desk but I'm not in the way.

4- Very easy! The classroom is uncluttered and organized so that I know where everything is. The things I use often are in an easy-to-reach location that isn't crowded. I can move around the classroom without bumping into things or squeezing past anyone. I can see the board clearly from my desk without having to move and I'm not in the way.

4) What do you think it means to be creative?

_____

_____

_____

_____

5) When do you feel you are most creative?

_____

_____

_____

_____

6) Describe the kind of place you feel most creative in.

_____

_____

_____

_____

7) What do you like about your gifted classroom?

_____

_____

_____

_____

8) What would you improve about your gifted classroom?

_____

_____

_____

_____

_____

Form 3.7: Post-Treatment Student Survey

POST-DESIGN: EVALUATING YOUR GIFTED CLASSROOM

Question #1: How comfortable is your desk while working? Circle the best answer.

1- **Really uncomfortable.** I don't have enough space on top of my desk for my things or no additional storage space. There's not enough space underneath my desk to move around or spread out, and I can't adjust my desk. It makes working at my desk very difficult.

2- **Uncomfortable.** I just barely have enough space on top of my desk for my things and I may or may not have additional storage space. There's just enough space underneath my desk to move around a little but not to spread out. I can manage working at my desk.

3- **Comfortable.** I have enough space on top of my desk for my things and additional storage space. There's enough space underneath my desk to move around and I can spread out a little. I feel comfortable doing my work.

4- **Super comfortable!** I can adjust my desk height easily for different activities or for comfort. I have more than enough space on top of my desk for my things and more than enough space underneath for my legs. I feel very comfortable and I can work better.

Question #2: How comfortable is your chair while working? Circle the best answer.

1- **Really uncomfortable.** The chair is not the right height for me to sit comfortably at my desk. It's too hard and it usually hurts to sit in it for too long. I can't move around in it. It makes concentrating on my work very difficult.

2- **Uncomfortable.** The chair height is okay but the chair itself isn't comfortable and I can't move around in it much. It doesn't really hurt to sit in it for long periods of time or only a little sometimes. I'm able to concentrate enough to get my work done.

3- **Comfortable.** I can't adjust my chair but because it is the right height I feel like I can sit and work comfortably in it, maybe even move around a little. It doesn't hurt to sit for long periods of time in the chair. I can concentrate well on my work.

4- **Super comfortable!** I can adjust the chair when I want to sit differently. The chair is flexible and can move with my movement. It feels good to sit in and helps me to concentrate and work better.

Question #3: How easy is it to work in your classroom? Circle the best answer.

1- **Very difficult.** The classroom is very crowded and unorganized. It's difficult to find things and move around without bumping into things or squeezing past people. I often have to sit differently or move from my desk so I can see the board or not be in the way.

2- **Difficult.** The classroom has some organization so I can find the things I use often. A few areas are crowded and I have to be careful getting around people or things. Sometimes it's better to sit differently or move from my desk so I can see the board or not be in the way.

3- **Easy.** The classroom has little clutter and is organized. The things I use often aren't in the easiest place to get to but I can manage. I can move around the classroom without bumping into things or squeezing past anyone. I have to readjust myself to see the board clearly from my desk but I'm not in the way.

4- **Very easy!** The classroom is uncluttered and organized so that I know where everything is. The things I use often are in an easy-to-reach location that isn't crowded. I can move around the classroom without bumping into things or squeezing past anyone. I can see the board clearly from my desk without having to move and I'm not in the way.

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1) Do you like your new desk more or less than your old desk? Why or why not?

_____

_____

_____

_____

_____

2) Do you like your new desk chair more than your old desk chair? Why or why not?

_____

_____

_____

_____

_____

3) Is it easier to move around in your classroom after the redesign? Why or why not?

_____

_____

_____

_____

4) Do you like working in your newly designed classroom more or less than before the changes? Why or why not?

_____

_____

_____

_____

_____

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Appendix B - Classroom Schedule

Table 3.1: Kristi York's Schedule for Junction City Gifted 3-5 Grades. (2014).

Mondays	Tuesdays/Wednesdays		Thursday	Fridays
LI Homeschool	**Tues LINCOLN** Time-Location **Gifted Math Emphasis**	**Wed LINCOLN** Activity **Gifted 3rd Grade**	**TH Lincoln** Time-Activity **Language Arts Emphasis**	**LI** Homeschool 8:00-9:00 Elem GI MTG At LI/SV/FE
Testing, Planning, IEP writing, MTSS, Staffings	9:15 MEET students at LI Entrance Then Rm 114	9:15 MEET students at LI Entrance Then Rm 114	9:15 MEET students at LI Entrance Then Rm 114	Testing, Planning, IEP writing, MTSS, Staffings
Testing, Planning, IEP writing, MTSS, Staffings	9:15 – 9:45 **Brain Warm-Ups**	Opening **Brain Warm-Ups**	9:15 – 10:00 **Brain Warm-Ups**	Testing, Planning, IEP writing, MTSS, Staffings
	9:45 SNACK	9:45 SNACK	9:45 SNACK	
10:00-12:30 Math Acceleration Follow-up at SH	9:45 – 10:45 **Math Class Unit/ Individual Research**	9:45 – 10:45 **3rd Grade Class Unit/ Individual Research**	9:45 – 10:45 **Language Arts Class Unit/ Individual Research**	**10:00-12:30 Math Acceleration Follow-up at SH**
SH-Math	10:45 – 11:30 **Critical Thinking Skills**	10:45 – 11:30 **Critical Thinking Skills**	10:45 – 11:30 **Critical Thinking Skills**	**WE-Math**
SH-Math	11:30 – 11:45 **Recess**	11:30 – 11:45 **Recess**	11:30 – 11:45 **Recess**	**WE-Math**
Lunch	11:45 – 12:15 **LUNCH** Eat in the classroom /Clean up	11:45 – 12:15 **LUNCH** Eat in the classroom /Clean up	11:45 – 12:15 **LUNCH** Eat in the classroom /Clean up	Lunch
Testing, Planning, IEP writing, MTSS, Staffings	12:15 – 1:30 **Computer Lab Rm 113-B Type to Learn /Research/or Class Unit**	12:15 – 1:30 **Computer Lab Rm 113-B Type to Learn /Research/or Class Unit**	12:15 – 1:30 **Computer Lab Rm 113-B Type to Learn /Research/or Class Unit**	Testing, Planning, IEP writing, MTSS, Staffings
Testing, Planning, IEP writing, MTSS, Staffings	1:30 – 1:55 **Celebration of Knowledge/ Brain Teasers/ Geography**/CleanUp	1:30 – 1:55 **Celebration of Knowledge/ Brain Teasers/ Geography**/CleanUp	1:30 – 1:55 **Celebration of Knowledge/ Brain Teasers/ Geography**/CleanUp	Testing, Planning, IEP writing, MTSS, Staffings
	2:00 LOAD BUS	2:00 LOAD BUS	2:00 LOAD BUS	
Testing, Planning, IEP writing, MTSS, Staffings	2:00 – 3:15 **Testing, Planning, IEP writing, Staffings**	2:00 – 3:15 **Testing, Planning, IEP writing, Staffings**	2:00 – 3:15 **Testing, Planning, IEP writing, Staffings**	Testing, Planning, IEP writing, MTSS, Staffings

Appendix C - List of Classroom Design Contributions

Table 3.2: Classroom Design Expense Report

USD 475 ELEMENTARY GIFTED PROGRAM DONATION EXPENSE REPORT

LOCATION: Lincoln Elementary   Junction City, KS 66441
DONATED BY: Kolla Souza   **ADDRESS:** 300 Lincoln School Drive

Receipt Number	Date	Category	Item Description	How Item is Used	Base Cost	Tax Rate	Qty	Total Cost
1a	02/27/2015	Supply	Protective coat spray paint	Protective finish coat for metal rolling bookcases	■	■	6	■
4a	02/23/2015	Supply	Spray paint	Refinishing metal rolling bookcases	■	■	1	■
4a	02/23/2015	Supply	Spray paint	Refinishing metal rolling bookcases	■	■	1	■
4c	02/27/2015	Supply	Spray paint	Refinishing metal rolling bookcases	■	■	4	■
4d	02/27/2015	Supply	Spray paint	Refinishing metal rolling bookcases	■	■	5	■
4g	09/24/2015	Supply	Shelf Liner	Protective lining for shelves on metal rolling bookcases	■	■	2	■
						Subtotal		
1b	02/27/2015	Finish	Acoustic panels, 6-pk	Attached to walls to improve acoustic quality of classroom	■	■	4	■
4b	02/26/2015	Finish	Cork tiles, 4-pk	Attached to wall for teacher's personal use	■	■	9	■
2c	02/27/2015	Finish	Rug pads ONLY	Used to provide slip-resistance to area rugs	■	■	2	■
						Subtotal		
2d	04/02/2015	Décor	Area rugs	Used for floor seated activities at front of classroom	■	■	2	■
2e	09/12/2015	Décor	Paper sorter ONLY	Used to organize construction papers in 2-door tower	■	■	1	■
3a	09/27/2015	Décor	Stationary- office organizer ONLY	Used to organize teacher documents	■	■	1	■
3b	10/01/2015	Décor	Decorative pillow	Paired with armchair	■	■	1	■
3b	10/01/2015	Décor	Stationary- office organizer	Used to organize teacher documents	■	■	1	■
4e	03/08/2015	Décor	Lamp ONLY	Used for student task lighting	■	■	1	■

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Table 3.2: Classroom Design Expense Report

Receipt Number	Date	Category	Item Description	How Item is Used			Qty
4g	09/24/2015	Décor	1-gallon bowl	Houses classroom pet fish	▮	▮	1
4g	09/24/2015	Décor	Floral sign	Decoration for fish bowl			1
4g	09/24/2015	Décor	Neon Lavender	Decoration for fish bowl			1
4i	10/02/2015	Décor	Accent rug	Used for floor seating in reading nook area			1
4i	10/02/2015	Décor	Backrest pillow (1)	Used in reading nook area			1
							Subtotal
2a	02/23/2015	Furniture	Desk w/hutch	Teacher use	▮	▮	1
4b	02/26/2015	Furniture	Desk chair	Teacher use			1
4f	03/10/2015	Furniture	Armchair	Used for reading nook			1
4h	09/24/2015	Furniture	Round knit pouf	Seating for collaboration table			3
4i	10/02/2015	Furniture	Lounge seat	Seating for collaboration table			1
5a	02/27/2015	Furniture	Adjustable chair	Student use			10
5a	02/27/2015	Furniture	Adjustable desk	Student use			10
5a	02/27/2015	Furniture	Tote tray mid-tower	Student supply organization			1
5b	07/22/2015	Furniture	Adjustable chair	Student use			2
5b	07/22/2015	Furniture	Adjustable desk	Student use			2
							Subtotal
							Discount
5b							Subtotal
4g	09/24/2015	Other	Male Betta	Classroom pet fish	▮	▮	1
4g	09/24/2015	Other	Bettasafe	Fish water stabilizer			1
4g	09/24/2015	Other	Beta Pro 1-liter	pH-balanced water for fish bowl			2
4g	09/24/2015	Other	Betamin	Fish food			1
							Subtotal

Receipt Number	Date	Category	Item Description	How Item is Used	Years Owned	Qty
-	09/15/2015	Personal Donation	2-drawer console/desk	Additional teacher work surface and storage	8	1
-	09/15/2015	Personal Donation	Louis XVI armchair (estate item)	Guest seating	5	1
						Subtotal
						Grand Total

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Appendix D - Suggested Chair and Table Heights

Table 3.3: Smith System Suggested Chair and Table Heights
Retrieved from http://smithsystem.com/wp-content/uploads/2012/04/SS_Heights.pdf

Suggested Chair and Table Heights

Chair Height	10"	12"	14"	16"	18"
Table Height	~19"	~22"	~24"	~27"	~29"

	10"	12"	14"	16"	18"
3-4 year olds	50% OF CLASS ↔	50% OF CLASS			
Kindergarten		50% OF CLASS ↔	50% OF CLASS		
Grade 1			100% OF CLASS		
Grade 2			25% OF CLASS ↔	75% OF CLASS	
Grade 3 - 4				100% OF CLASS	
Grade 5				50% OF CLASS ↔	50% OF CLASS
Grade 6 - 12					100% OF CLASS

For more information, please call customer service: 1-800-328-1061

SMITH SYSTEM