NURTURING CREATIVE PROBLEM SOLVING IN SOCIAL SCIENCES IN MIDDLE SCHOOL STUDENTS

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ABSTRACT

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The purpose of this non-experimental research study was three-fold: (1) to investigate the relationships among the attributes of creative problem solving ability (divergent thinking, convergent thinking, motivation, general knowledge and skills, and environment) and their relationships in the humanities (specifically those that took enrichment classes in that area), (2) to explore if there were group differences in Creative Problem Solving (CPS) attributes between students that had a high or low perception of class activities as measured by the My Class Activities (MCA) survey, and (3) to explore whether specific components of learning environment were impacted by certain enrichment classes. The CPSAI (Creative Problem Solving Attributes Inventory) and the MCA (My Class Activities) were administered to 114 students in grades six through eight at a suburban New York middle school on Long Island. The groups were subdivided by the total number of social science courses taken, those that participated in a humanities based enrichment class (rhetoric and debate or Model UN), high and low perceptions of class activities, and achievement in social studies classes as measured by their final grade for the year. Results supported that social science elective classes had a statistically significantly positive effect on student perception of their own CPS attributes, and classroom learning environment was a significant aspect of student perception of their CPS attributes, accounting for 29% of the variance.
This study added to the body of quantitative research regarding creative problem-solving in the social sciences. It supported the validity of the CPSAI and its use in the social sciences and mathematics. Most importantly, it informed teachers of the importance of designing classroom learning environments that supported critical thinking and creative problem-solving while being appropriately challenging.
DEDICATION

This dissertation is dedicated to my parents: Antonio and Maria Gaglione. They left their native Italy after marriage to pursue a better life in America. I am thankful that they were able to achieve success here and that their children were able to pursue wonderful opportunities after attending rival Big East universities (Go HOYAS! Juice ‘CUSE!). The work ethic and attention to detail they demanded of us influenced our successes in our respective fields. It is my hope that this fulfills my mom’s wish of finally having a doctor in the family!

I also dedicate this to the hundreds of children that I have taught throughout my career, especially to the two most important: my nieces Aviana and Valentina. I hope they read this someday, realize they are lifelong learners, and become innovators in whatever domain they are most gifted in.
I would like to acknowledge Dr. Cho, who sparked my interest in creativity research. Without her guidance, encouragement, and tutelage, this dissertation would not be what it is today. I am eternally grateful to have found a mentor who is as attentive, dedicated, and supportive as she has been. I can only hope to have the opportunity to work with her again in the future.

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CHAPTER 1

Introduction

Thomas Friedman, a New York Times columnist and best-selling author, co-wrote a book called That Used to Be Us, which argued that empowering innovation from every worker must become a priority if America is to retain its superior international standing. Arum and Roska (2017) completed a study where they reported that critical thinking and writing skills were no longer progressing during college as compared to previous generations of students. The reported decline in thinking ability was occurring at a time when there were increasing shortages of qualified candidates for jobs in science, technology, engineering, and mathematics (STEM). Sir Ken Robinson (2006), author of some of the most watched TED talks of this century, posited that the industrial model of education that the United States had been using had killed creativity, and that now was the time for a learning revolution. Teaching students to be creative and critical thinkers, however that may be, will allow America to stay competitive to the world. Nurturing the attributes of creative problem solving is key to future American innovation.

In a world of standardized tests, standardized ways of thinking have become the norm. It is time to rethink educational priorities while emphasizing critical thinking and creative problem solving rather than teaching to a test. (Camarata, 2017). Students will be better prepared for a job market in which many of their careers do not yet exist, and for which they will need to be lifelong learners and creative problem solvers (Iftf.org, 2011).

Purpose of the Study

The purpose of this non-experimental research study was three-fold: (1) to investigate the relationships among the attributes of creative problem solving ability...
(divergent thinking, convergent thinking, motivation, general knowledge and skills, and environment) and their relationships in the humanities (specifically those that take Enrichment classes in that area), and (2) to explore if there were group differences in Creative Problem Solving (CPS) attributes between students that had a high or low perception of class activities as measured by the My Class Activities (MCA) survey, and (3) to explore whether any specific components of learning environment were impacted by certain enrichment classes. Results supported the attribute model of creative problem-solving: elective classes had a statistically significant positive effect on student perception of their own CPS attributes, and classroom learning environment was a significant aspect of student perception of their CPS attributes, accounting for 29% of the variance.

**Significance of the Study**

Creativity and brainstorming are encouraged and celebrated in many elementary school classrooms. In middle school, students are taught formulaic expository writing techniques and pre-writing strategies that stem the creativity that is encouraged in the elementary grades. Additionally, traditional teachers tend to have a convergent thinking philosophy; that is, only accepting or steering students toward one particular answer and discouraging divergent responses. Further complicating matters, when completing summative assessments, students are required to complete answers in a multiple choice or long answer response. Therefore, there is little room for creativity in middle school because preparation for the rigors of high school prevail.

This study added to the body of research regarding creative problem solving in the humanities. It also supported the validity of the CPSAI and examined correlations
between the six attributes and student achievement. It aided administrators and teachers in recommending and designing curricula and learning environments that best benefited the students in their schools and classes, as well as informed parents as to the importance of their involvement and contributions to their children’s creative problem solving abilities.

**Research Questions**

This study was guided by the following five research questions:

**RQ1.** Are there significant group differences in the creative problem solving attributes among students with different extent of experiences in social science courses?

**RQ2.** Are there significant group differences in the creative problem solving attributes among students that have taken different combinations of social science courses?

**RQ3.** Are there significant group differences in the creative problem-solving attributes of students with high and low perceptions of class activities?

**RQ4.** What are the best predictors for the total of creative problem solving attributes of all students?

**RQ5.** Are social science classes related to student perception of classroom learning environment?

**Hypotheses**

This study was guided by the following hypotheses:

**Ho1:** There are no significant group differences in creative problem-solving attributes among students with different extent of experiences in social science courses.
**Ha1:** There are significant group differences in creative problem-solving attributes among students with different extent of experiences in social science courses.

**Ho2:** There are no significant group differences in creative problem-solving attributes among students that have taken different combinations of social science courses.

**Ha2:** There are significant group differences in creative problem-solving attributes among students that have taken different combinations of social science courses.

**Ho3:** There are no significant group differences in the creative problem-solving attributes between students of high and low perception of class activities.

**Ha3:** There are significant group differences in the creative problem-solving attributes between students of high and low perception of class activities.

**Ho4:** The number of social science classes (Group) and a student’s perception of their learning environment (MCA) are not statistically significant predictors for creative problem-solving attributes among students in Social Studies, Rhetoric and Debate, and Model UN.

**Ha4:** The number of social science classes (Group) and a student’s perception of their learning environment (MCA) are statistically significant predictors for creative problem-solving attributes among students in Social Studies, Rhetoric and Debate, and Model UN.

**Ho5:** The My Classroom Activities components of interest/enjoyment, challenge, and choice are not related to social science class environments.

**Ha5:** The My Classroom Activities components of interest/enjoyment, challenge, and choice are related to social science class environments.
**Definition of Terms**

The following terms were referenced throughout this study and are defined below to provide a common language and understanding.

**Creative Problem-Solving (CPS):** The conceptual process for solving a problem in a unique way that is valued and appreciated by a gatekeeper. In this study, the model developed by Cho (2003) formed the basis for defining the attributes of creative problem-solving. The Creative Problem Solving Attributes Inventory (CPSAI), developed by Cho and Lin (2011) was used to measure the students’ self-perception of their own creative problem solving abilities.

**Convergent thinking:** A thinking process which honors a single best answer among various possibilities in solving a problem. For this study, it was the sub-score of the items aligned with convergent thinking on the Creative Problem Solving Attributes Inventory (CPSAI).

**Divergent thinking:** A thinking process in which possible solutions to a problem may be unique, flexible, and/or complex. For this study, it was the sub-score of the items aligned with divergent thinking on the CPSAI.

**General knowledge and skills:** Basic knowledge and skills which are applied to general problem-solving in any domain. For this study, it was the sub-score of the items aligned with general knowledge and skills on the CPSAI.

**Domain specific knowledge and skills:** Knowledge and skills that are specific to a certain area, situation, or class of problems. For this study, it was the final grade earned by students in their social studies class.
Motivation: Psychosocial factors which influence one’s willingness to solve a problem. They may be intrinsic or extrinsic and may include curiosity, risk-taking, and persistence. For this study, it was the sub-score of the items aligned with motivation on the CPSAI.

Environment: Refers to the different learning environments experienced by students. In this study, the different learning environments included Honors and Regents level social studies, Rhetoric and Debate class, and Model UN. The social studies classes were more traditional learning environments with mostly teacher centered instruction. Rhetoric and Debate and Model UN classes were based upon Project Based Learning and Problem Based Learning models and were more student centered. The components of learning environment were measured using the My Classroom Activities (MCA) survey. Factors that emerged from this instrument included interest/enjoyment, challenge, and choice.

Interest/enjoyment: In this study, student perception of interest/enjoyment was measured using Gentry and Gable’s (2001) My Classroom Activities (MCA) instrument. It referred to student perceptions of the amount of interest they had in the class itself as well as how much they enjoyed taking the class.

Challenge: Challenge was measured using the MCA instrument. In this study, challenge was the student’s perceived degree of difficulty and use of materials in a classroom learning environment.

Choice: Choice, measured by the MCA, was how much choice students believed that had in the classroom learning environment.
Social Science achievement: This was measured using the students’ final averages in their Social Studies class. The average was inclusive of tests, quizzes, projects, homework, and participation for each student for all four marking periods.

Model UN: This class was based on the Model United Nations competition that students participate in every March. Students met every other day throughout the year to discuss international issues and ways to address them. Once the school was assigned a country, students worked with a partner and joined a virtual UN committee that addressed a specific world issue. Students researched and wrote their country’s position on the issue as well as suggested possible resolutions. Students debated the issue in committee at a two day conference and then worked in blocs to write and vote on resolutions. The curriculum was based on a Problem Based Learning model.

Rhetoric and Debate: A five week class that was run every other day for a 10 week quarter in the seventh grade. Each student was taught how to structure a basic argument using points, counterpoints, and refusal of counterpoints. They were encouraged to research various angles of their argument and face off against one another. Students determined through consensus what the day’s topic would be. After the opening argument, students worked on an interdisciplinary project of their choice and at their level; choices included creating a sports franchise, pitching a new product to venture capitalists, creating a budget based on the salary of their chosen career, and passion projects. The curriculum was based on a Project Based Learning model.
CHAPTER 2

Review of the Literature

Creativity is difficult to define. Plucker, Beghetto, and Dow (2004) reviewed 90 works in creativity journals with the word *creativity* in the title. Of these 90 articles, only 34 contained an explicit definition of creativity. Thirty seven articles contained an implicit definition, whereas 19 articles contained no definition of creativity. Plucker et al. created a definition of creativity that was based on what they found both in and outside of the realms of creativity research. The authors defined creativity as “the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context (p.90).”

Kaufman and Beghetto’s (2009) 4C Model of Creativity could help educators understand different levels of creativity. According to the model, the first level of creativity is identified as mini c creativity, which causes changes to our own personal understandings. For example, learning processes taught in school can change a person’s outlook. The second level of creativity is called little c creativity, which is defined as everyday creativity that impacts an individual’s immediate surroundings. An example of little c creativity is when an individual uses an everyday object in a non-standard way, such as that of a paperclip that can hold something other than papers together. The third level of creativity is identified as big C creativity, which innovates an industry or field of study. For example, Steve Jobs’ introduction of the iPhone changed the world’s relationship with their phones and sparked an entire smartphone market.
Outside of the model of creativity, it is also important to view how products can be impacted through a sense of creativity. Kaufman (2009) saw creative products through a process of 4Ps. The first of the 4Ps included the creative product, or the item itself, such as the iPhone; the second was the creative person or the individual creating the item; the third was the creative process, or the steps that the individual or individuals took to create the item. As demonstrated by the case of the iPhone, Apple and their research and development and engineering teams took on this aspect for the creative product. The final process is creative press, or the gatekeepers that decide whether the item is creative within a field. For example, the iPhone became a worldwide obsession as evidenced by consumers paying high prices and waiting in extraordinary lines for upgrades. Plucker et al. (2004) joined other researchers and theorists in defining creativity as a process that involved several attributes or traits, but not without the experience of consequences.

One of the consequences of defining creativity is that it can be difficult to measure. In addition, in the realm of gifted education, standard tests for giftedness do not sufficiently evaluate creativity. There are several tests that measure creativity in terms of person, product, process, or place. These tests are meant to be given to students of certain ages and groups, but have been modified for use by many since the 1950s. One reason they might not be more widely used is the amount of time and specific training needed to administer the tests.

For example, Joy Paul Guilford’s test was used to measure aspects of creativity by giving subjects an ordinary household object and scoring how unique and useful the identified alternate uses might be. These included: fluency, originality, elaboration, and flexibility, demonstrating the difficulty of measuring creativity as it can be subjective in
nature. Additionally, the Torrance Test of Creative Thinking (TTCT), based on J.P. Guilford’s Structure of the Intellect (1956), was created in 1966 and has undergone several iterations through 1998. Overall, the TTCT measures fluency, originality, elaboration, abstractness of titles, and resistance to premature closure. The TTCT tests for creative strengths in the areas of emotional expressiveness, storytelling articulateness, movement or action, expressiveness of titles, synthesis of incomplete figures, synthesis of lines or circles, unusual visualization, internal visualization, extending or breaking boundaries, humor, richness of imagery, colorfulness of imagery, and fantasy. Both tests have been used to measure levels of creative problem-solving ability as well as to identify possible areas of giftedness in students as early as kindergarten. However, these tests have focused mostly on divergent thinking and not necessarily the domain specificity of the creativity. This is where theorists began to think more closely on the aspects that define creativity and creative problem-solving (Cho, 2003; Kim, Cho, & Ahn, 2003; Cho, 2006; Sternberg & Lubart, 1995; Urban, 2003). The work of Treffinger (1996) and Cho (1999) in particular were used as the framework for this study.

**Theoretical Frameworks**

**Cho’s Dynamic System Model of Creative Problem-solving Ability**

The primary framework adopted in this study was the Dynamic System Model of Creative Problem-solving Ability developed by Cho (1999, 2003) as identified in Figure 2.1 below.
Treffinger’s Creative Problem-Solving

The secondary framework that guided this study was Treffinger’s Creative Problem-solving (CPS) version 6.1 (Treffinger, Isaksen, & Dorval, 2010). The CPS model was designed to assist people of all ages in their efforts to solve problems. The CPS model was selected as a complement to Cho’s (1999, 2003) Dynamic System of Creativity because it focused on the procedures an individual undergoes when creatively solving a problem. CPS allows for both creative and critical thinking skills to be utilized in order to understand challenges and opportunities, generate ideas, and develop effective plans for solving problems and managing change, whether it be in an individual or group environment. Treffinger (1996) believed that every individual had the ability to increase their creative problem-solving ability (Treffinger, & Isaksen 2005).
Figure 2.2. *The Creative Problem Solving Framework Version 6.1* (Treffinger, Isaksen, & Dorval, 2010)

**Conceptual Framework**

Figure 2.3. *Relationships between social science classes, learning environment, and creative problem-solving attributes*
Creativity and creative problem-solving are widely regarded as having several components. Cho’s Dynamic System Model of Creative Problem-Solving Ability (1999, 2003) detailed six components:

1. Convergent thinking
2. Divergent thinking
3. General knowledge and skills
4. Domain specific knowledge and skills
5. Motivation

Within this model, the creative problem-solving attributes interact with both the learning environment and the social science curriculum. Researchers found correlation between interest and motivation, which in turn is tied to learning (Deci & Ryan, 2000, 2008; Katz, Assor, Kanat-Maymon, & Bereby-Meyer, 2006; Lietaert, Roorda, Laevers, Verschueren, & De Fraine, 2015; Ryan & Deci, 2000; Tomlinson & Jarvis, 2009). The model acknowledges the overlap between motivation, a component of creative problem-solving, and interest; thereby expanding to include other aspects found within a learning environment, such as challenges, choices, and enjoyment, as described by Gentry and Gable (2001).

Cho’s Dynamic System Model of Creative Problem-Solving Ability (1999, 2003) highlights how social science classes include traditional social studies classes that are taught daily using a variety of teaching methods and social science electives. The electives taught in the target school included Rhetoric and Debate in grade seven and Model United Nations in grade eight. These were partial year programs, designed using
the principles of project and problem-based learning. This framework proposes that these elective classes and the learning environment created through them will have a positive effect on student perceptions of not only their enjoyment of class, but ultimately on their perceptions of their creative problem-solving abilities. In essence, Cho (2003) posited that learning environments built around problem-based learning allowed educators to nurture creative problem-solving in middle school students.

A Brief History of Creative Problem Solving

Creative Problem Solving (CPS) is a research-based framework that has been reviewed, revised, and researched for five decades (Treffinger, 2005). CPS holds that creativity can be taught, and that all people have creative potential that can be expressed in a variety of areas, and that their creativity is manifested according to their interests (Treffinger, 1995). Treffinger purported that a person’s potential for creativity was not a guarantee that they will be creative, but working within the framework of creativity, asserted that anyone could become creative. (Treffinger, 1995).

Isaksen and Treffinger (1985) built upon the body of research in two ways: they more clearly defined what a problem was, and they built upon the existing Osborn-Parnes’ model (1985). Within the Osborn-Parnes’ model, problems were seen as puzzles or as being negative; that is, something wrong that needed fixing or an obstacle that someone experienced. The authors posited that a problem was an opportunity to make change and to be constructive; as they stated that “a problem might be any important, open-ended, or ambiguous situation for which one wants and needs new options and a plan for carrying a solution successfully” (Treffinger, 1995, p. 304).
There are two notable models within the Osborn-Parnes’ (1985) framework: Osborn-Parnes’ Five-Step Model, and Treffinger’s model, which Treffinger and Isaksen built upon in the 1990s. Osborn began his research of CPS in 1953, and when he joined Parnes in the mid-50s they created and put into practice the Five-Step CPS Model (Treffinger, 1995). Treffinger and Isaksen built upon the Five-Step CPS Model by adding a sixth step (mess-finding). The sixth step grouped the previous steps together into three processes with no particular starting point: Understanding the problem, generating ideas, and planning for action (Treffinger, 1995). The most important implication of the change in the model was that it moved towards being a flexible process of approaching and solving problems; a more descriptive approach versus a step-by-step prescriptive program (Treffinger, 1995).

**Attributes models of Creative Problem Solving**

In addition to Treffinger (2005) and Cho (2003), there were several other component models of creativity that posited that creativity was a confluence of factors and could be developed. For example, Urban (1990) highlighted a components model of creativity, which was grounded on six factors. The first three elements were cognitively based and included:

1. Divergent thinking and acting
2. General knowledge and a thinking base
3. A specific knowledge base and area specific skills.

The final three components were psychosocial and included:

1. Focusing and task commitment
2. Motivation
3. Openness and tolerance of ambiguity.

Urban’s model posited that the factors interacted but that no one factor was solely responsible for driving the process or the product of creativity.

Additionally, Amabile (2012) had been examining creativity as a componential model since the 1980s. In her theory, creativity was influenced by three psychosocial components: domain-relevant skills, creativity-relevant processes, and task motivation. Another component laid outside of the individual and included the social environment in which an individual was working. According to her theory creativity necessitated a confluence of all combined components. In contrast, Sternberg and Lubart’s (1995) Investment Theory of Creativity believed that a confluence of factors contributed to creativity in schools. According to the authors, creativity was inclusive of six factors:

1. Abilities
2. Knowledge
3. Styles of thinking
4. Personality attributes
5. Motivation

Overall, scholars believed that creativity and creative problem solving required development of several components. There was support for the claim that no single creativity component was solely responsible for creativity (Amabile, 1996; Lin & Cho, 2011; Sternberg & Lubart, 1995; Urban, 2003). The development of these components is important to increase the creative problem-solving abilities of all students.
Attributes of Creativity

Many of the theories and definitions of creativity have focused on the need for divergent thinking, convergent thinking, general knowledge and skills, domain knowledge and skills, motivation, and student environment. This dissertation explored which of these factors had the most impact on creativity, while exploring attributes and how the factors interacted in middle school Humanities students.

Convergent and divergent thinking

Convergent thinking is the ability for students to arrive at one correct answer. Teachers have been reinforcing this way of thinking as a result of standardized testing preparation. Additionally, many students enjoy the feeling of knowing that there is a correct answer. However, teachers will note that many of their higher achieving students will sometimes be able to rationalize two correct answers on a multiple choice type test. Divergent thinking is a crucial component of creativity (Cho, 2011; Runco, 1991). Research has recognized divergent thinking as an important predictor of creativity as well as other positive outcomes, such as that of academic achievement (Kim, 2008; Milgram & Hong, 1993; Runco, 1986; Runco, Millar, Acar, & Cramond, 2010).

Delany and Cheung (2019) conducted a study of Chinese and American adolescents that examined the transactions between adolescents’ after school activities and their divergent thinking. Students participated in four types of activities:

1. Personal academic, such as studying or reading alone
2. Personal nonacademic, such as watching TV alone
3. Social nonacademic, such as team or intramural sports
4. Social academic such as study groups or homework club.
Students were given the TTCT to measure divergent thinking. The results of the study supported that the more adolescents engaged in academic-oriented after school activities, the more they had heightened their levels of divergent thinking. In addition, the authors’ found that divergent thinking was a factor in the adolescents’ selection of academic type activities over time. Transactional analysis of the three waves of creativity tests showed the following results: for adolescents in the United States and China, there were unidirectional paths with initial participation in personal academic activities predicting divergent thinking at Wave 2 but not vice versa. Additionally, in the United States, divergent thinking at Wave 1 predicted personal academic activities at Wave 2. Moreover, in both countries, divergent thinking at Wave 1 predicted personal academic activities at Wave 3. However, the adolescents’ participation in personal academic activities at Wave 2 did not predict their divergent thinking at Wave 3.

**Motivation**

According to Deci and Ryan’s (2000) Self-Determination Theory (SDT), social environments influence autonomous motivation. Autonomous motivation refers to behaving with a full sense of volition and choice (Deci & Ryan, 2008). In turn, autonomous motivation affects cognitive, affective, and behavioral outcomes. Therefore, autonomous motivation may be a factor that influences creativity (Guay, Ratelle, & Chanal, 2008; Ren, Li, & Zheng, 2017). Autonomous motivation at the middle school level may be determined by the students’ learning environment.

Attempts to incite creative problem solving using external rewards have so far been controversial. Some studies have demonstrated that extrinsic monetary rewards do not encourage creativity, while others have indicated that explicit rewards increase
creativity (Amabile et al., 1986; Csikszentmihalyi, 1984). Cristofori, et al (2018) conducted a study that tested the effect of supraliminal and subliminal reward on problem solving performance. Results showed that the higher subliminal reward increased the percentage of problems solved correctly overall. Participants solved more problems using insight versus deliberate analysis when there was a high subliminal reward. This was compared with solving via insight when there was a low subliminal reward. The authors concluded that subliminal rewards activated automatic processes that enhanced creative solutions without increasing selective attention, which could potentially hinder insight.

**General and domain specific knowledge and skills**

General knowledge is thought to be an attribute of Creative Problem Solving (Cho, 2003). However, if students do not have general knowledge, it could possibly be built through domain specific searches for other problems. Kajamaa, Kumpulainen, and Rajala (2018) studied 111 hours of video of 94 9-12 year old’s on a search platform called Fuse Studio, which allowed for student interest and choice in making and designing science, technology, engineering, arts, and mathematics (STEAM) activities. The study found that the Fuse Studio platform enabled students to use their own knowledge and interests to generate ideas, utilize out of school knowledge, and finally, work collaboratively by utilizing one another’s knowledge bases to address challenges. In this scenario, students used their own interests, ideas, and knowledge to address design problems, and then worked together to become more creative in their designs. It appears that collective specific knowledge facilitated a broader knowledge base for all students involved.
Harms, Reiter-Palmon, and Derrick (2018) completed research where they recruited 221 people in a Midwestern university to participate in a study where active engagement in problem construction was manipulated. Students were allowed to search for additional information that might contribute to a more creative solution. Quantity, breadth, and efficiency of information searches were monitored. The results indicated that the length of time spent searching, the quantity of information viewed, and the breadth of information searched did influence the relationship between problem construction engagement and creativity. Furthermore, the more efficiently participants searched for information, the more creative their solutions. This study supported that technology may help build domain specific knowledge in order to address problems and create solutions. Although this study was completed at the university level, it seemed that educators should be modeling and encouraging efficient searches for information. Overall, general knowledge and domain specific knowledge is built over time and through interaction with others and technology.

**Learning environment**

The environment has been suggested as a critical factor for exercising creativity by scholars. Csikszentmihalyi (1996) focused on where creativity happens. The author proposed that creativity existed in the interaction between an individual’s thoughts and social context. Csikszentmihalyi claimed that creativity was delivered, generated, and decided through the interactions among domain, field, and person. In comparison, Cho (2019) determined that for younger children, a creative environment is greatly determined by parents at home, while at the middle school level, creative learning environments were key. For example, researchers supported that teachers played a major role in creating
environments in which children were comfortable expressing their creativity (de Kruif, McWilliam, Ridley, & Wakely, 2000; Jeffrey, 2006; McWilliam & Haukka, 2008). In particular, research implied that children’s creativity, including divergent thinking, was impacted by the learning environment the teacher created. These positive learning environments were created by teachers who were described as fun, that were receptive to new ideas, and had less structured classrooms (de Kruif et al., 2000; Lee & Kemple, 2014).

The Creative Problem-Solving Attributes Inventory (CPSAI) contains questions that address environment; however, they mostly focus on the home environment and the influence of parents on their children’s perception of the CPSA. The researcher decided to replace the CPSAI home environment questions with an instrument that specifically measured components of a classroom learning environment: the My Classroom Activities survey (MCA) (Gentry & Gable, 2001a). Replacing the CPSAI aided in quantifying four instructional components of a learning environment in a middle school (e.g. interest, challenge, choice, and enjoyment) that affected the CPSA.

**Interest**

Teachers often find that student interest and engagement is a natural classroom management tool; however, student interest may even have a cognitive effect. For example, student interest may lead to student engagement in relation to a classroom’s environment that are both conducive to learning especially when combined with other motivational factors such as enjoyment (Gentry & Owen, 2004). Researchers have found some correlation between interest and motivation, which in turn was tied to learning (Deci & Ryan, 2000, 2008; Katz, Assor, Kanat-Maymon, & Bereby-Meyer, 2006;
Lietaert, Roorda, Laevers, Verschueren, & De Fraine, 2015; Ryan & Deci, 2000; Tomlinson & Jarvis, 2009). Renzulli’s Schoolwide Enrichment Model (SEM) (2013) is based on student interest and choice.

**Challenge**

Many scholars have claimed that students need to be challenged in order for learning to occur (Brophy, 2004; Csikszentmihalyi, 1990; Laevers, 1993; Tomlinson & Jarvis, 2009; Vygotsky, 1978). Others have argued that there was a link between challenge and motivation (Brophy, 2004; Laevers, 1993). Challenging curricula are by nature rigorous and complex and allow for depth and differentiation of content, process, product, and audience (Gentry & Owen, 2004). Challenge is another attribute of Renzulli’s (2003) SEM.

**Choice**

The opportunity for student choice in the classroom positively relates to motivation (Frey & Fisher, 2010). Allowing students some control over their own learning may increase intrinsic motivation, engagement, and learning (Deci & Ryan, 2000, 2008; Ryan & Deci, 2000, 2002). Student choice supports student autonomy, which is a facet of Self Determination Theory (Deci & Ryan, 2000).

**Enjoyment**

Student enjoyment has been described as a crucial component of effective learning experiences (Csikszentmihalyi, 1990) and is positively correlated with student interest (Gentry & Gable, 2001b). Passion Projects, or Genius Hour, is an instructional practice that blends student interest and enjoyment; students select a topic of interest and a pathway that guides their inquiry, which allows them to choose how to best showcase
their knowledge. Enjoyable learning experiences can motivate students. All in all, the four factors measured by the My Classroom Activities Survey influenced classroom environment and impacted student motivation and skills. Because of these possible correlations, it was important to keep them in mind when considering the data and the design of learning environments in general.

Harris and de Bruin (2018) completed an international qualitative study on teachers and their perceptions of creativity and how it was incorporated into a classroom. Overall, teachers felt that classrooms that fostered creativity involved “inter-, trans-, and cross-disciplinary learning shaped by teacher collaboration, dialogue, and classroom organization that fostered critical and creative thinking (p. 153).” The American teachers in the study reflected on how teaching for creativity and critical thinking was a mindful process that required slowing down the learning dynamic by utilizing improvisational teaching techniques that not all teachers were comfortable with. The American teachers agreed that rubrics were a strong way to allow creativity while encouraging mastery. Performances, group work, and the justification of answers were alternatives to individual tests or assessments that allowed for collaboration, creativity, and critical thinking.

Teaching techniques became an important component of research as evidenced by Pham and Cho (2018) who worked to determine what instructional methods were best suited for creativity in mathematics. Although one cannot directly teach creativity, one can teach for creativity (Kaufmann & Sternberg, 2007). Development of all six of the attributes was important as they were dynamic in their interaction (Cho 2003, 2007): differentiation, choice, recognition of students’ efforts, providing students with an
environment where it was safe to take academic risks, and providing students with ill
defined, real life problems were methods that could be utilized to encourage creative
problem solving attributes.

**Creative Problem-Solving in the Social Sciences**

There were very few studies that involved creative problem-solving attributes
outside of STEM areas. Kulinski (2018) completed a case study of one of her sixth grade
visual arts students. The author focused on how creative problem solving, when promoted
through scaffolding, related to students' art making. In the treatment, various creative
problem-solving strategies were introduced that included prompts, collaborative materials
exploration, and an elegant problem.

Similarly, Sewell, Fuller, and Funnell (2002) completed case studies on their
second and sixth grade (equivalent) social studies classes in New Zealand. They found
that students were instructed in the six steps of creative problem solving:

1. Recognized a problem existed
2. Asked clarifying questions
3. Articulated a problem statement
4. Brainstormed ideas
5. Thought logically through the ideas to decide on workable solutions
6. Acted on solutions and reflected on the implementation

Additionally, the authors found that students began to participate more, while taking on
additional responsibilities, fostering leadership skills, asking questions, and working
cooperatively to decide on social actions.
CHAPTER 3
Methods and Procedures

Research Design

This study was a non-experimental study in which the relationship between the attributes of creative problem-solving ability such as divergent thinking, convergent thinking, motivation, general knowledge and skills, domain specific knowledge, and learning environment was analyzed. In addition, this study examined correlations between students’ class combinations in the social sciences and their effects on student perception of their creative problem-solving abilities as well as their perception of classroom learning environments.

Setting

Nassau County is located in New York State and includes 56 public school districts. The middle school in this study had an enrollment of 492 students in a district of 2,099. Of the school’s enrollment, 76% students were White, 17% were Hispanic, 4% were Asian or Pacific Islander, 1% were Black, and 1% were Multiracial. Additionally, 22% of the students were economically disadvantaged, 14% were students with disabilities, and 3% were English language learners (NYSED, 2017). Nassau County is a suburb located in New York City.

Participants

The target population for this study was students in grades six through eight. The accessible population was 180 grade six students, 160 grade seven students and 157 grade eight students, who were sampled by a convenience sampling method. Subgroups included grade seven and eight students that participated in Model UN as an elective;
grade eight students that participated in Rhetoric and Debate and had two years of social studies instruction; grade seven students that participated in Rhetoric and Debate and had a year of social studies; grade seven or eight students of social studies only; and a small number of grade six students accelerated in mathematics that were eligible to take Rhetoric and Debate as an elective but remained in a grade six social studies class.

Research that followed a convenience sampling method may be limited as the researcher could not say with confidence that the individuals were representative of the greater population (Creswell, 2015). The sample size of 114 students met the minimum sample size of 30 for a group in a causal-comparative study according to Fraenkel (2015). Some of the sub groups included fewer than 30 subjects. Table 3.1 represents the demographic information of the target school and Table 3.2 shows the social science class distribution of participants.

Table 3.1

*Student Demographic information of the target school*

<table>
<thead>
<tr>
<th>Demographics</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Population</td>
<td>492</td>
<td>100</td>
</tr>
<tr>
<td>White</td>
<td>376</td>
<td>76</td>
</tr>
<tr>
<td>Hispanic</td>
<td>85</td>
<td>17</td>
</tr>
<tr>
<td>Black</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Asian</td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>
Table 3.2

*Social science class distribution of participants*

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Participants</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>Model UN</td>
<td>38</td>
<td>33</td>
</tr>
<tr>
<td>Rhetoric with two years of SS</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Rhetoric and one year of SS</td>
<td>43</td>
<td>37</td>
</tr>
<tr>
<td>Social Studies ONLY (no electives)</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Grade 6 accelerated with Rhetoric</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Multiracial</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

**Instruments**

The primary instrument which was administered by the researcher included Lin and Cho’s (2011) Creative Problem-Solving Attributes Inventory (CPSAI). The validity and reliability of the instrument is described below. Additionally, this study utilized students’ social studies class average, given by their respective teachers and based on assessments, homework, classwork, and projects. To further analyze whether the students perceived the enrichment programs as being creative, they also completed the My Class Activities Survey (MCA) from Gentry and Gable (2001).

**Creative Problem-solving Attributes Inventory (CPSAI)**

The Creative Problem-solving Attributes Inventory (CPSAI) is a self-report questionnaire developed by Lin and Cho (2011) and was adopted from two theoretical frameworks. The two frameworks were Cho’s Dynamic System of Creative Problem
Solving (2003) and Treffinger’s Creative Problem-Solving (CPS) version 6.1 (2006). The CPSAI was used to identify student perceptions of the attributes they were accessing when they approached a creative problem-solving task. Students rated each of the items on a five-point Likert scale. Items on the CPSAI could be further divided into five subscales. These included:

1. Convergent thinking
2. Divergent thinking
3. Motivation
4. General knowledge and skills
5. Environment.

CPSAI questions described creative problem solving behaviors and attributes that could be exhibited during the creative problem-solving process.

Lin and Cho (2011) had a panel of experts in Educational Psychology assess the relevance and content validity of the CPSAI. Additionally, they had two classroom teachers review the clarity and readability of the test items for fifth and sixth graders. Lin and Cho (2011) validated the CPSAI by utilizing 409 Taiwanese students. The researchers reported these students were in the fifth and sixth grade and consisted of 14.4% gifted and 85.6% non-gifted students. Lin and Cho examined the relationship between each subscale of the CPSAI as compared to other established instruments such as the Test of Divergent Thinking (TDT), the Critical Thinking Test Level 1 (CTT-I), Test of Divergent Feelings (TDF), and the Inventory of Parental Influences (IPI). The Pearson correlation coefficients revealed an association between the CPSAI and the TDT ($r=0.15$, $p=0.01$), Critical Thinking Test (CTT-I) ($r=0.19$, $p=0.01$), TDF ($r=0.40$, $p=0.01$),
The researchers further reported a medium to large effect size in the associations. Lin and Cho (2011) reported the Cronbach’s Alpha based on the attributes of the CPSAI. They found general knowledge and skills had a Cronbach’s Alpha level of 0.65, which was fair. However, all other attributes had Cronbach’s Alpha levels between .80 and .94, which were considered very strong.

**My Class Activities Survey (MCA)**

Gentry and Gable (2001a) developed My Class Activities (MCA), an instrument designed to assess the frequency with which students perceived four motivational components (interest, challenge, choice, and enjoyment) in their classes. Gentry and Gable defined the four dimensions measured by the MCA as follows:

1. **Interest**: reflected positive feelings/preference for certain topics, subject areas, or activities.
2. **Challenge**: engaged the student and requires extra effort.
3. **Choice**: gave the student the right or power to select educational options and direct his or her own learning.
4. **Enjoyment**: provided the student with pleasure and satisfaction.

Students responded to 31 items using a five-point frequency response scale. Scores were calculated by averaging students’ responses to items on each scale.

Gentry, Maxfield, and Gable (1998) assessed the content and construct validity of MCA. Content judges provided evidence of validity for the four factors. Exploratory factor analysis supported the hypothesized four-factor model. MCA was normed using a national sample of 3,744 elementary and middle school students, both comprised of 51% males (Gentry & Gable, 2001b; Gentry, Rizza, & Gable, 2001). Cronbach’s Alpha internal consistency estimates ranged from .68 to .92, which ranged from fair to very
strong (Gentry, et al., 2001; Gentry & Gable, 2001b). Confirmatory factor analyses were used to further investigate the validity of the scores for the normative sample, yielding goodness of fit statistics for elementary and middle school students of .95 and .88, respectively. RMSEA values ranged from .04 to .09 (Gentry & Gable, 2001a). Validity tests were also completed on the MCA in the Arabic language (Sudan) and in Korean (South Korea) (Pereira, Bakhiet, Gentry, Balhman, & Hakami, 2017).

**Social Studies achievement**

Social Studies achievement was assessed using student final averages after four marking periods (40 weeks of instruction). The averages were computed by teachers using a weighted system that included tests, quizzes, projects, homework, and class participation on a 100 point scale (55 was the lowest average allowed by school policy). Averages were given by the four certified social studies teachers in grades seven and eight. Scores were standardized using a z score on SPSS. Enrichment classes such as Rhetoric and Debate and Model UN were run as electives and had a pass/fail grading system. It should be noted that the third marking period was longer than usual due to the COVID-19 remote learning situation, but grades were assigned; marking period four was shorter and based on distance learning criteria set by the department.

**Procedures**

St. John’s University Institutional Review Board approved the study and consent was given by the district Superintendent and the building Principal to perform the study in the middle school. Consent was gained from parents via a Google form, and a letter of student assent was included in the survey given to the students. Students were not able to continue with the survey if they did not give their assent. Both of these letters affirmed
students could refuse at any time and there were no consequences for backing out of the study. The researcher cooperated with both the school and teachers in administering the instrument online as the COVID-19 pandemic closed all school buildings at the time of data collection. Both the CPSAI and MCA were administered and data were collected using Survey Monkey. Students were given unlimited time to complete the surveys, but the time to take the survey averaged 12 minutes according to Survey Monkey.

**Analysis**

For each research question, the following statistical analyses were conducted:

**RQ1.** There were no significant group differences in creative problem solving attributes among students with different extent of experiences in social science courses (ANOVA).

**RQ2.** Are there significant group differences in creative problem solving attributes among students that have taken different combinations of social science courses?

**RQ3.** There were no significant group differences in the creative problem solving attributes between students of high and low perception of class activities (independent samples t-test).

**RQ4.** The number of social science classes (group) and a student’s perception of their learning environment (MCA) were not statistically significant predictors for creative problem solving attributes among students in Social Studies, Rhetoric and Debate, and Model UN (multiple regression analysis).
**RQ5.** Are social science classes related to student perception of the components of classroom learning environment (interest/enjoyment, challenge, and choice)? (One-way ANOVA).

**Limitations**

Possible internal threats to the study included maturation, selection, and diffusion of treatments. Students, especially in middle school, mature at different rates and this may have affected their perceptions of creative problem solving. Self-selection of Honors or Regents level Social Studies classes was also a possible limitation. Those students that chose exposure to material over higher numerical grades may be classified as low performing. Diffusion of treatments was a possibility because the subjects had known the researcher as a teacher at least once in their middle school career.

Possible external threats to the study included multiple group interference and interaction of the setting. Multiple group interference meant that students with a certain combination of classes may not be generalizable to the greater population. In addition, there were two social studies teachers with different teaching styles; these different teaching styles may have affected the effects and perceptions of the group on their creative attributes or their perception of class enjoyment. Threats to statistical validity included random conclusion validity, where variation between the groups may have inflated variances and impacted the rejection of a null hypothesis.
CHAPTER 4

Results

Findings

Before any data analysis was conducted, the variables were matched for all subjects for the combination of social science classes and in-class average (Social Studies achievement score) and all identifying information was removed to ensure the anonymity of the subjects. The original data files were then purged to ensure no one could determine the identity of the subjects, including the researcher. The data was then imported into IBM’s Statistics Package for Social Sciences 26.0 (SPSS) and screened to ensure the accuracy of the dataset. The screening process included removing the respondents who omitted questions on the CPSAI or the MCA. This removed 31 students from the original dataset. In order to check for outliers, the data was also screened to ensure that all data points fell within 2.5 standard deviations of the mean; there were no significant outliers. After the data cleaning process, the total number of valid cases was 114.

An exploratory factor analysis was conducted to determine the number of factors indicated by the 38 items in the CPSAI. Each variable was correlated with at least one other at a moderate level (≥0.3). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett’s Test of Sphericity revealed an adequate to very good sample with $KMO = .780$ and Bartlett’s $p<.05$. Additionally, Cronbach’s Alpha for all 38 items of the CPSAI was computed to be $.91$, which indicated excellent internal consistency. Four factors emerged: convergent thinking, divergent thinking, general knowledge, and motivation. For this reason, survey items addressing environment were removed from the instrument and measured instead using the MCA survey. Based on the factor analysis
conducted, four variables were defined as the sum of the items which loaded on the corresponding factor: convergent thinking, general knowledge, divergent thinking, and motivation. Domain specific knowledge was not included as an organic factor in the survey.

Based on these confirmations, a varimax maximum likelihood factor analysis was conducted in SPSS with four fixed factors, all included in the final loading on the basis of a factor index of greater than .4 as suggested by Pituch and Stevens (2016). Table 4.1 demonstrates the eigenvalues, while Table 4.2 shows the entire rotated factor matrix, with coefficients less than 0.4 suppressed to clarify the findings.

Table 4.1

*Total Variance of the Four Factors*

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>Divergent</td>
<td>2.099</td>
<td>5.523</td>
</tr>
<tr>
<td>Motivation</td>
<td>1.858</td>
<td>4.889</td>
</tr>
</tbody>
</table>

*Note: Extraction Method: Principal Component Analysis*
### Table 4.2

**Rotated Factor Loading of the CPSAI on the Four Factors**

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. When I read problems, the problems make sense to me.</td>
<td>.497</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I try to understand what caused the problem.</td>
<td>.456</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I search for the most important information to understand the problem.</td>
<td>.609</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. I search for solutions which fit the problem.</td>
<td>.687</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. I check for errors as I am solving a problem.</td>
<td>.582</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. I judge whether or not the plans for problem solving will be successful.</td>
<td>.532</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. I like to solve problems in my own way.</td>
<td>.666</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. I test out new ideas to solve common problems.</td>
<td>.567</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. I continue working until I am satisfied with my ideas for solving problems.</td>
<td>.672</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I come up with many ideas to decide whether my plan is right.</td>
<td>.656</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. I find the purpose for solving the problem.</td>
<td>.406</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. If I cannot solve a problem, I spend as much time as it takes to find a solution.</td>
<td>.487</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. I work hard and finally solve difficult problems by myself.</td>
<td>.787</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>My friends ask me to help them when they face difficult problems.</td>
<td>.794</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>I solve problems faster than my friends.</td>
<td>.637</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>The questions in homework or on tests are easy for me.</td>
<td>.581</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I notice myself understanding the problem differently than my friends.</td>
<td>.628</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>When things are messy, I try to figure out what the problem is.</td>
<td>.548</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I get many different ideas by thinking from different viewpoints.</td>
<td>.438</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>My ideas are different from most of my friends’ ideas.</td>
<td>.471</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I think of more than one idea when I solve a problem.</td>
<td>.633</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I have several different procedures to solve a problem.</td>
<td>.519</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I have several plans available for solving a problem.</td>
<td>.568</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I search many possible resources to support my plans.</td>
<td>.417</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>I review my work and correct the errors.</td>
<td>.457</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>I reduce the number of possible solutions to fit the problem.</td>
<td>.635</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>I choose the best idea among several ideas I thought.</td>
<td>.475</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>I have strong interests in figuring out problems.</td>
<td>.412</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Extraction Method: Principal Component Analysis  
Rotation Method: Varimax with Kaiser Normalization  
Rotation Converged in 15 iterations
Several new variables were computed. The average of all items in the CPSAI was created and called CPSA. A second variable, the MCA score, was also computed. MCA was calculated using Gentry and Gable’s (2001) My Classroom Activities instrument, which measured students’ perception of their learning environment. The survey considered four aspects of a student’s learning environment: interest, challenge, choice, and enjoyment. The MCA variable was also binned to compare high and low perceptions of classroom environments for RQ2. The Group variable was based on the number of social science courses taken by each student over time (see Table 4.3). Group 1 students took Model UN, Rhetoric and Debate, and at least one year of social studies. Group 2 students took Rhetoric and Debate, and two years of social studies classes. Group 3 took Rhetoric and Debate, and one year of social studies, Group 4 took only social studies and no elective classes, and Group 5 were accelerated students in grade 6 that were able to take Rhetoric and Debate. Finally, a variable was created that separated the students taking Model UN from all other students.

Table 4.3

*Groups Defined*

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Social Science Classes Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>38</td>
<td>Model UN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rhetoric &amp; Debate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grade 7 and/or 8 social studies</td>
</tr>
<tr>
<td>Group 2</td>
<td>10</td>
<td>Rhetoric &amp; Debate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grade 7 and 8 social studies</td>
</tr>
<tr>
<td>Group 3</td>
<td>43</td>
<td>Rhetoric &amp; Debate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grade 7 social studies</td>
</tr>
<tr>
<td>Group 4</td>
<td>10</td>
<td>Only grade 7 and/or grade 8 social studies</td>
</tr>
</tbody>
</table>
**Research Question 1:** Are there significant group differences in creative problem-solving attributes among students with different extent of experiences in social science courses?

**Ho₁:** There are no significant group differences in creative problem-solving attributes among students with different extent of experiences in social science courses.

**Ha₁:** There are significant group differences in creative problem-solving attributes among students with different extent of experiences in social science courses.

An exploratory analysis of variance (ANOVA) was conducted on the total CPSAI score based on the social science experience groups to determine if the differences in the total CPSAI score differed significantly for each group. In order to validate the conclusions of the one-way ANOVA analysis, three assumption tests were conducted. First, each of the observations within the dataset were independent. Second, the dependent variable (CPSA) followed a normal distribution for each group (i.e., each level of the independent variable). Finally, Levene’s test of homogeneity in the variance demonstrated no violations (p>.05). Therefore, the data set passed the primary assumption tests for the one-way ANOVA.

The number of social science courses taken had a significant effect on the total CPSAI score at the p<.05 level \([F(4, 109) = 3.65, p = .01]\) \(\eta^2=.12\). Therefore, the null hypothesis was rejected. Post hoc comparisons using Tukey’s HSD test indicated that the mean score for Group 1 \((M=3.74, SD=.44)\) was significantly higher than Group 4 \((M=3.2, SD=.45)\), as well as a significant difference between Group 2 \((M=3.8, SD=.41)\) and Group 4 \((M=3.2, SD=.45)\). Group 1 included the students that had taken two social science electives and two years of social studies. Group 2 included students with one elective and
two years of social studies. Group 4 students had not taken any social science elective classes. Table 4.3 highlights the different groups of students and their level of social science experience from grades six through eight. No other significant differences were found between any groups. Taken together, these results suggested that taking elective classes in the social sciences such as Rhetoric and Debate and Model UN had a significant effect on students’ perception of their creative problem solving abilities. Even one elective social science class had the effect of increasing perception of creative problem solving attributes of middle school students.

**Research Question 2: Are there significant group differences in creative problem-solving attributes among students that have taken different combinations of social science courses?**

**H₀²:** There are no significant group differences in creative problem-solving attributes among students that have taken different combinations of social science courses.

**Hₐ²:** There are significant group differences in creative problem-solving attributes among students that have taken different combinations of social science courses.

Table 4.3 above shows the different groups of students and their level of social science experience from grades six through eight. An independent samples t-test was conducted to compare levels of CPSA for students that took Model UN (n=38) with students that had not taken Model UN (n=76) as a social science course. In order for the conclusions from the independent samples t test to be trusted, three assumption tests were conducted. First, each of the observations within the dataset were independent; second, the dependent variable (CPSA) followed a normal distribution for each group (i.e., each level of the independent variable); finally, Levene’s test of homogeneity in the variance
demonstrated no violations (p>.05). Therefore, the data set passed the primary assumption tests for the independent samples $t$-test.

The null hypothesis was rejected, $t(112)=2.20$, $p=.03$ with a medium effect size of Cohen’s $d=.44$. There was a significant difference in CPSA for students that had taken Model UN ($M=3.74, SD=.44$) compared to those that had not ($M=3.54, SD=.46$). The results suggested that the Model UN class had an effect on student perception of creative problem-solving attributes. Specifically, the students that participated in Model UN felt they had stronger creative problem solving attributes. Implementing classes such as Model UN can be considered one way to nurture creative problem solving attributes.

**Research Question 3: Are there significant group differences in the creative problem-solving attributes among students of high and low perception of class activities?**

$H_{03}$: There are no significant group differences in the creative problem-solving attributes between students of high and low perception of class activities.

$H_{a3}$: There are significant group differences in the creative problem-solving attributes between students of high and low perception of class activities.

An independent samples $t$-test was conducted to compare the creative problem-solving attributes average (CPSA) of students with high and low perception of their class activities as measured by the My Class Activities Survey (MCA). There were no coding errors or outliers found in the dataset. MCA data was binned and the top 33% and bottom 33% were compared to the CPSA. This removed 39 cases.

In order to assess the validity of the independent samples $t$-test, three assumption tests were conducted. There were independent observations for each participant in the dataset, the dependent variable followed a normal distribution for each group, and
Levene’s test demonstrated that there was no violation for the assumption of homogeneity of variance (p>.05). Therefore, the data set passed all of the assumption tests in order to conduct the independent samples t-test.

Again, the null hypothesis was rejected, \( t(73) = -6.93, p=.001 \) with an effect size of Cohen’s \( d=1.60 \), which was classified as very large. There was a significant difference in CPSA scores for the group with high MCA (\( M= 3.33, SD=.39 \)) as compared to those with low MCA (\( M= 3.90, SD=.32 \)). This provided evidence that classroom environment had an effect on creative problem solving attributes. This finding can suggest that students that reflect more positively on their learning environments also see themselves as having stronger creative problem solving attributes.

**Research Question 4: What are the best predictors for the total of creative problem-solving attributes of all students?**

**Ho\textsubscript{4}:** The number of social science classes (Group) and a student’s perception of their learning environment (MCA) are not statistically significant predictors for creative problem-solving attributes among students in Social Studies, Rhetoric and Debate, and Model UN.

**Ha\textsubscript{4}:** The number of social science classes (Group) and a student’s perception of their learning environment (MCA) are statistically significant predictors for creative problem-solving attributes among students in Social Studies, Rhetoric and Debate, and Model UN.
Table 4.4

Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average CPSA</td>
<td>114</td>
<td>3.61</td>
<td>.46</td>
</tr>
<tr>
<td>Average MCA</td>
<td>114</td>
<td>3.82</td>
<td>.49</td>
</tr>
<tr>
<td>Group</td>
<td>114</td>
<td>2.58</td>
<td>1.35</td>
</tr>
</tbody>
</table>

A multiple linear regression analysis was carried out to investigate whether the number of social science classes (group) and a student’s perception of their learning environment (MCA) could significantly predict participants’ creative problem solving attributes (CPSA). In order to assess the validity of the multiple regression analysis, six assumption tests were conducted. Scatterplots showed that the relationship between the IV and the DV was linear. An analysis of collinearity statistics determined that this assumption was met as evidenced of a VIF score of 1.1 and a tolerance score of .904. The Durbin-Watson statistic showed that this assumption had been met, as the obtained value was 1.99. The plot of standardized residuals versus standardized predicted values showed no obvious funneling, suggesting that the assumption of homoscedasticity was met. The P-P plot for the model demonstrated that the values of the residuals were normally distributed. Finally, Cook’s Distance values were all under 1, suggesting that no individual cases were having an undue influence on the model.

The null hypothesis was rejected based on the results. The model was a significant predictor of CPSA, $F(2, 111)= 22.46, p= .001$ and explained approximately 29% of the total variance of CPSA. Additional examination of the significance of the unstandardized betas indicated that the best predictor of CPSA and the only factor that contributed significantly to the model was student learning environment ($B=.46, p < .001$). The
number of social science classes (group) was not found to be a statistically significant predictor of CPSA ($B = -.04, p = .17$). A student’s CPSA score was influenced by the characteristics of their learning environment and the final predictive model was:

$$\text{CPSA score} = 1.97 + (0.456 \times \text{Learning environment}) + (-0.040 \times \text{Number of social science classes})$$

Research Question 5: How are the My Classroom Activities components of interest/enjoyment, challenge, and choice related to social science class environments?

**Ho$_{5}$**: The My Classroom Activities components of interest/enjoyment, challenge, and choice are not related to social science class environments.

**Ha$_{5}$**: The My Classroom Activities components of interest/enjoyment, challenge, and choice are related to social science class environments.

An exploratory factor analysis was conducted to determine the number of factors indicated by the 31-items in the My Classroom Activities survey. Each variable was correlated with at least one other at a medium level ($\geq 0.3$). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett’s Test of Sphericity revealed a very good sample with $KMO = .893$ and Bartlett’s $p < .05$. Additionally, Cronbach’s Alpha for all 31-items was computed to be .93, which indicated excellent internal consistency. Three factors emerged: interest/enjoyment, challenge, and choice.

Based on these confirmations, a varimax maximum likelihood factor analysis was conducted with three fixed factors. For an item to be included in the final loading, it had to have a factor index of greater than .4 as suggested by Pituch and Stevens (2016). Table 4.5 demonstrates the eigenvalues and variances whereas Table 4.6 provides a listing of the rotated factor matrix, with coefficients less than 0.4 suppressed to clarify the findings.
In addition to Cronbach’s Alpha, composite reliability analysis was also performed on each of the factors and are included as an additional measure of internal reliability.

**Interest/Enjoyment**

The first factor, interest/enjoyment, made up 41.47% of the variance. Sixteen of the MCA had a factor loading more than .6 on this factor and none loaded on any other factor at the .4 level. Table 4.6 shows the specific items that loaded onto this component: 6, 7, 4, 28, 1, 2, 29, 25, 26, 3, 30, 31, 8, 16, 5, and 27. Cronbach’s Alpha for the 16-items identified was computed to be .97, indicating excellent internal consistency of these items. The mean and the standard deviation for interest/enjoyment were \( M = 66.72 \) and \( SD = 11.38 \). The construct or composite reliability of this factor was calculated to be .97. While values up to .9 are generally considered excellent internal reliability (Netemeyer, 2003), the literature demonstrated that there was discussion of whether values over .9 were considered redundant (Hair, 2017).

**Challenge**

The second factor, challenge (\( M = 26.28, SD = 4.10 \)), composed 9.2% of the variance. Eight items loaded to this factor at the .5 level or above: 9, 17, 11, 10, 12, 13, 14, and 15. Cronbach’s Alpha for these eight items was .69, indicating an acceptable internal consistency for this item. Composite reliability was calculated to be .77, which was also considered acceptable (Netemeyer, 2003).

**Choice**

The third factor of choice made up 7.2% of the variance (\( M = 25.63, SD = 3.92 \)). Seven items loaded cleanly onto this factor at a level of .5 or above: 18, 20, 24, 22, 21, 23, and 19. Cronbach’s Alpha for choice was calculated to be .72, also indicating an
acceptable internal consistency for this component. Here, the composite reliability was .81, considered to be strong.

A One way ANOVA was conducted on the mean of each of the three MCA components: interest/enjoyment, challenge, and choice against the group of students that had taken Model UN and those that had not taken Model UN. This was completed to determine if the differences in the three component scores differed significantly. There were independent observations for each participant in the data set. The groups were larger than 25; Model UN (N=35) and those who did not take Model UN (N=71), so the normality assumption was not needed. Levene’s test of homogeneity demonstrated a violation of the assumption for equal variances of the components of interest/enjoyment and challenge (p<.05). However, the Shapiro-Wilk test for normality resulted in p>.05 for the components of challenge and choice while the result for interest/enjoyment was p<.05. It was assumed that there was homogeneity of variances in the component of Choice (p=.92).

The null hypothesis was rejected for the components of challenge and choice but retained for the interest/enjoyment component. While not a statistically significant result, the Means Plots for all three components had a similar slope. Students that took Model UN scored higher in the components of challenge t(111)=3.17, p=.002 and choice t(109)=2.79, p=.006. Based on the results, students signified a much stronger belief in significantly more choice and were more challenged in the Model UN class than they were in other social science classes.
### Table 4.5

**Total Variance in the Three Factors of MCA**

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>Interest/Enjoyment</td>
<td>12.886</td>
<td>41.567</td>
</tr>
<tr>
<td>Challenge</td>
<td>2.861</td>
<td>9.230</td>
</tr>
<tr>
<td>Choice</td>
<td>2.221</td>
<td>7.164</td>
</tr>
</tbody>
</table>

*Note: Extraction Method: Principal Component Analysis*

### Table 4.6

**Rotated Factor Loading of the MCA on the Three Factors**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What I do in class fits my interests.</td>
<td>.845</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I have an opportunity to work on things in my class that interest me.</td>
<td>.845</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. What I do in my class gives me interesting and new ideas.</td>
<td>.810</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I study interesting topics in my class.</td>
<td>.858</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. The teacher involves me in interesting learning activities.</td>
<td>.710</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. What I learn in my class is interesting to me.</td>
<td>.884</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. What I do in my class is interesting.</td>
<td>.862</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. My class has helped me explore my interests.</td>
<td>.801</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. What we do in class fits my abilities.</td>
<td>.733</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. I look forward to my class.</td>
<td>.839</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
27. The teacher makes learning fun. .......... 680
28. I like what I do in my class. .......... 849
29. I like working in my class. .......... 841
30. The activities I do in my class are enjoyable. .......... 805
31. I like the projects I work on in my class. .......... 805

9. The activities I do in my class are challenging. .......... 844
10. I have to think to solve problems in my class. .......... 639
11. I use challenging materials and books in my class. .......... 657

12. I challenge myself by trying new things. .......... 782
13. My work can make a difference. .......... 623
14. I find the work in this class demanding. .......... 449
15. I am challenged to do my best in class. .......... 417

17. This class is difficult. .......... 755
18. I can choose to work in a group. .......... 865
19. I can choose to work alone. .......... 384

20. When we work together, I can choose my partner. .......... 818
21. I can choose my own projects. .......... 843
22. When there are many jobs, I can choose the one that suits me. .......... 435

23. I can choose materials to work with in the class. .......... 637

24. I can choose and audience for my product. .......... 527

Note: Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 18 iterations.
CHAPTER 5

Discussion

The quantitative analysis of the data obtained from the students in this study revealed substantial findings on ways to nurture creative problem solving in social science students in middle school. The following are major findings of this study:

1. Factor analysis of the entire sample revealed that a 4-factor model of creative problem solving was supported, consisting of convergent thinking, divergent thinking, general knowledge and skills, and motivation.

2. The Creative Problem Solving Attributes Inventory (CPSAI) had shown itself to be a valid instrument in the area of social sciences.

3. Elective classes in the social sciences such as Model United Nations (MUN) had a positive effect on students’ perception of creative problem solving attributes.

4. Classroom environment was a significant factor in student perception of these creative problem solving attributes.

5. Factor analysis of the entire sample revealed a 3-factor model of classroom learning environment as measured by My Classroom Activities was supported, consisting of interest/enjoyment, challenge, and choice.

6. Students that reflected more positively on their learning environments also saw themselves as having stronger creative problem solving attributes.

7. Student learning environment accounted for 29% of the variance in student perceptions of their creative problem solving attributes.

8. Students that had taken Model UN as an elective saw themselves as being more challenged and having more choice in their learning environment.

Relationship to Prior Research

The current study added to the body of knowledge regarding attributes models of creativity and CPS (Amabile, 2012; Cho, 2003; Sternberg & Lubart, 1995; Treffinger, 2005; Urban, 1990). The factor loading of the CPSAI in this study supported Lin and Cho’s (2011) distinct components of divergent thinking, convergent thinking, motivation, and general knowledge. In addition, the results illustrated that no single component of
creativity was responsible for creativity or creative problem solving (Amabile, 1996; Cho, 201; Sternberg & Lubart, 1995; Urban, 2003). The average of all components were used in the study as they demonstrated a significant relationship with student perception of their learning environment. Therefore, components of CPS demonstrated some correlations.

The Cho and Lin (2011) Creative Problem-Solving Attributes Inventory was validated by a panel of experts and was found to have internal validity, as the Cronbach’s Alpha levels for all attributes was between .80-.94, which was considered strong. In this study, the Cronbach’s Alpha for the all components was .91, which was also considered very strong. After factor analysis was performed, the Cronbach’s Alpha of each factor ranged from .68-.83, which was considered fair to strong. In addition to Cronbach’s Alpha, composite reliability was also calculated in order to further support validity. Construct validities ranged from .67-.82, which were considered acceptable to strong (Netemeyer, 2003). As a result, the CPSAI may very well be used successfully in the social sciences as well as in the subject of mathematics because the instrument demonstrated strong internal validity when used with the current study’s sample of middle school social science students.

The strongest findings in the study were related to learning environment. Student learning environment accounted for 29% of the variance in student perceptions of their creative problem solving attributes. The students that had a stronger positive view of their learning environments also had higher means of the CPS attributes. Furthermore, the students that had taken Model UN perceived their classroom challenge and choice to be higher than students that took other social science classes. These results explained why
the Model UN group had statistically significant differences in their perception of CPS attributes and supported that learning environment was a significant factor in nurturing creative problem-solving attributes.

**Limitations of the Study**

Possible internal threats to this study included maturation, selection, and diffusion of treatments. Students, especially in middle school, mature at different rates and this may have affected self-perception, as the cases ranged in age from 11 to 14 years of age. Therefore, this must remain a consideration. Self-selection of honor or Regents level Social Studies classes was also a possible limitation. In addition, data were collected during the COVID19 remote teaching period, so the number of student subjects may have been impacted by families’ regular communication with the school. Diffusion of treatments was also a possibility because the subjects had known the researcher as a teacher at least once in their middle school career.

Possible external threats to the study included multiple group interference and interaction of the setting. Multiple group interference meant that students with a certain combination of social science classes may not be generalizable to the greater population. In addition, there were four social studies teachers with different teaching styles; these could have affected the effects and perceptions of the group on their creative attributes or their perception of class enjoyment. Finally, the COVID-19 pandemic prevented the researcher from obtaining more data as school buildings were closed, causing consent and survey gathering to be completed remotely. Threats to statistical validity included random conclusion validity, where variation between the groups may have inflated
variances and impacted the rejection of a null hypothesis. This was especially true with the smaller groups that were accelerated students or classified students with IEPs.

**Recommendations for Future Research**

It is recommended that future researchers find a reliable achievement instrument with which to compare the CPSAI scores. The grade point averages used in this study did not pass assumption tests for homogeneity of variances. As the grades were calculated during a pandemic, it was easy to see that this might not be ideal data. As a result, completing a similar study at the lower high school level where there are standardized social science exams (such as Regents exams in New York State) might be prudent.

Another recommendation for future research would be to compare scores from a traditionally taught class, such as Advanced Placement (AP) US History, with a problem-based learning type class such as Model UN. Alternatively, recreating a study similar to Parker, Mosborg, Bransford, Vye, Wilkerson, and Abbott’s (2011) study where they examined how the breadth of the AP US History curriculum could be covered in the depth of a PBL style class. Comparing CPSAI scores for the same type of social science class, such as AP US History, taught in a traditional way and taught using a PBL style would be an additional analysis that would support this study.

**Recommendations for Future Practice**

The theoretical frameworks chosen for this study embraced that every student’s creative problem-solving ability could be nurtured (Treffinger & Isaksen, 2005). This study clearly supported that the student learning environment was critical when designing programs that nurtured creative problem solving attributes. The regression model showed that learning environment accounted for 29% of student perception of their CPS ability.
The teacher created learning environment is a large portion of how students nurture their creative problem-solving attributes. Creating a learning environment in which students are interested and enjoy what they learn, are appropriately challenged, and have choices encourages student development in the creative problem solving attributes.

Curriculum that espouses divergent thinking in conjunction with convergent thinking is another recommendation for future practice. Both divergent and convergent thinking explicitly teaches creative problem-solving methods that foster general knowledge and skills, while motivating students to be creative problem-solvers. This can assist students in becoming America’s future innovators. In a time where districts and teachers are innovating their curricula and as remote and hybrid instruction are becoming more common than ever, the findings of this study can inform curriculum and instruction methods for the social sciences particularly at the middle school level. Districts and teachers that incorporate challenge, choice, interest, and enjoyment into their classrooms (virtual or otherwise) might find that their students that are more engaged and, as a result, might experience fewer incidences of behavior issues. In addition, the ability to nurture creative problem solving attributes will contribute to students that grow into adults that can think critically and create solutions or innovations that might improve society. In a post-COVID-19 society, the world needs citizens that can spur innovation and be creative problem solvers.

In this study, students that had taken Model UN (MUN) were statistically significantly higher in their perception of their creative problem solving attributes than students who had taken only social studies or other social science electives. In addition, Model UN students saw that they had more challenges and choice in learning than
students who did not take Model UN. Classes such as Model United Nations (MUN) have been in existence for as long as the United Nations (1947) at the university level. Over time, it has been shown that the skills and scenarios used in MUN can be taught and developed in students as young as eight years old (Villanueva, 2020). In addition, a carefully crafted MUN class incorporates all of the skills and strategies endorsed by P21, while also following the structure of Problem Based Learning’s (PBL) gold standard as set by the Buck Institute for Education.

A recommendation is that schools create MUN electives within the school day or run MUN co-curricularly in an existing social studies class, rather than making it an extracurricular club activity. This will offer the skills and benefits of a MUN class to a greater number of students in the population. Students of all learning levels can participate in MUN, and prestigious high schools, colleges, and universities, such as Regis High School in New York City, Yale, and Georgetown can look for MUN on student transcripts to differentiate from other candidates. The research, public speaking, and negotiation skills learned in the MUN environment are invaluable real world skills desired by academic institutions and employers.

In comments made by students that had taken the survey, several indicated that MUN was challenging:

When I say the class is challenging, it's a good level of challenge. Hard enough where you need to actually think and pay attention and work, but not so challenging that you feel like the task is impossible to do.

Students also felt that it was difficult but they still enjoyed it:
It was my favorite class that I took the whole year because I was able to focus and learn about things and ideas that were very interesting to me. The class could be hard but because I was able to work on educational things that I enjoyed it was always a great time.

Additionally, students felt that they could use the research, speaking, and problem solving skills in real life:

Taking MUN has opened my eyes up in so many ways and I gained new information and skills that I will retain for the rest of my life. I have learned about some of the truths of the world, and how there are serious problems that need to be addressed. Even though many strategies have not worked out already, new steps are being taken for the future. We all wish for a world without conflict and suffering, but there are so many factors that need to be taken to reach that goal, making it seem impossible. In the long run, this class has inspired me to acknowledge my voice and to speak my mind, in appropriate manners of course, to make a difference during the next steps in our future.

Additionally, another student reported:

Model UN was an enjoyable and informative experience for me. I learnt (sic) how to solve a problem by looking at it from numerous perspectives, collaborate with my peers, and hopefully broaden my mind. It helped me to solve problems, communicate my solutions and ideas, as well as work on both concise and compelling writing. I have recommend Model UN to everyone with the opportunity to take it, as the class was not only fun and engaging, but also incorporated real life skills that help both academically and in the real world.
Ideally, these results could be generalized and scaled to include PBL not only in the social sciences, but across disciplines in order to reinforce cross curricular and systems thinking, while nurturing creative problem-solving attributes for more students.

**Conclusion**

Finding and refining a research topic from my overall passion for education and learning environments was a challenge. Along the way, I learned quite a bit about project and problem-based learning, 21st century skills, and creative problem-solving. A confluence of professional events and academic conversations allowed me to realize that the Dynamic System Model of Creative Problem-Solving would bring together my desire to teach children critical and creative thinking skills in an authentic way in order to nurture the next generation of American innovators. I am grateful to have found useful results that might impact the design of social science programs at the middle school level. I will forever strive to create and someday supervise student centered learning spaces that incorporate interest, enjoyment, challenge, choice, and explicit instruction in creative problem-solving methods. It is my hope that my students will carry these attributes with them into their future learning.

“We cannot solve our problems with the same thinking that we used when we created them.”

Albert Einstein
REFERENCES


https://doi.org/10.1177/0002764293037001016


Laerd Statistics (n.d.)


https://jerome.stjohns.edu/login??url=https://search-proquest-com.jerome.stjohns.edu/docview/2164086138?accountid=14068


http://dx.doi.org/10.1007/BF02213375


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APPENDIX A: CPSAI

Appendix A: Creative Problem Solving Attributes Inventory

<table>
<thead>
<tr>
<th>Class:</th>
<th>Name:</th>
<th>Boy /Girl</th>
</tr>
</thead>
</table>

This survey focuses on the development of creative problem solving ability. You can help me learn more about what you do, when you try to solve a problem. There is no right or wrong answer. After you read each sentence, put an X in the column which best describes your behavior. There is no time limit for finishing this survey, but try to finish it as soon as possible. Remember: no one will know your answers, not even your teachers or parents.

<table>
<thead>
<tr>
<th></th>
<th>Hardly Ever</th>
<th>Seldom</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I ask many related questions when I try to understand problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I can understand problem from different directions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I notice myself understanding a problem different from my friends.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. When things are messy, I try to figure out what the problem is.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I think over many different situations that could happen with the problem.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I get many different ideas by thinking from different standpoints.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. My ideas are different from most of my friends’ ideas.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8. I think of more than one idea when I solve problems.</td>
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<tr>
<td>9. I have several different procedures to solve a problem.</td>
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<tr>
<td>Number</td>
<td>Statement</td>
<td>Hardly Ever</td>
<td>Seldom</td>
<td>Sometimes</td>
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<tr>
<td>10</td>
<td>I have several plans available for solving a problem.</td>
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<tr>
<td>11</td>
<td>I come up with many ideas to decide whether my plan is right.</td>
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</tr>
<tr>
<td>12</td>
<td>I search many possible resources to support my plans.</td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>When I read problems, the problems make sense to me.</td>
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<tr>
<td>14</td>
<td>I try to understand what cause the problem.</td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>I search for the most important information to understand the problems.</td>
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<tr>
<td>16</td>
<td>I find out the purpose for solving this problem.</td>
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<tr>
<td>17</td>
<td>I find out the main task of the problem.</td>
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<tr>
<td>18</td>
<td>I search for solutions which fit the problem situations.</td>
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<tr>
<td>19</td>
<td>I check errors while I am solving problems.</td>
<td></td>
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<tr>
<td>20</td>
<td>I review my work and correct the errors.</td>
<td></td>
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</tr>
<tr>
<td>21</td>
<td>I judge whether or not the plans for problem solving will be successful.</td>
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</tr>
<tr>
<td>22</td>
<td>I reduce the number of possible solutions to fit the problems.</td>
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</tr>
<tr>
<td>23</td>
<td>I choose the best idea among several ideas I thought.</td>
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</tr>
<tr>
<td>24</td>
<td>I have a specific plan for solving problems.</td>
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</tr>
<tr>
<td>25</td>
<td>I have strong interests in finding out problems.</td>
<td></td>
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</tr>
<tr>
<td>26</td>
<td>If I don’t understand something, I try to find out the answers myself.</td>
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</tr>
</tbody>
</table>

133
<table>
<thead>
<tr>
<th></th>
<th>Hardly Ever</th>
<th>Seldom</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>27. If I have a problem, I am eager to find out how I can solve that problem.</td>
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<tr>
<td>28. I feel comfortable when I try out new ideas.</td>
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<tr>
<td>29. I like to solve problems in my own way.</td>
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<tr>
<td>30. I test out new ideas to solve common problems.</td>
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<tr>
<td>31. I continue working until I am satisfied with my ideas for solving problems.</td>
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<tr>
<td>32. If I cannot solve a problem, I spend as much time as it takes to find the solutions.</td>
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<tr>
<td>33. I work hard and finally solve difficult problems by myself.</td>
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<tr>
<td>34. My parents wait until I come up with many ideas when I am facing with a problem.</td>
<td></td>
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<tr>
<td>35. My parents are happy when I come up with new ideas to solve problems.</td>
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<tr>
<td>36. My parents encourage me to think of different ways of solving problems.</td>
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<tr>
<td>37. My parents encourage me to check and correct the errors by myself.</td>
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<tr>
<td>38. My parents ask many questions to help me think better.</td>
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<tr>
<td>39. My parents are happy when they see me working hard until I solve a problem.</td>
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<tr>
<td>40. My parents are happy when I ask many questions to understand the problem better.</td>
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<tr>
<td></td>
<td>Hardly Ever</td>
<td>Seldom</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
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<tr>
<td>41.</td>
<td>My parents are happy when I dare to try out different ways of solving problems</td>
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<tr>
<td>42.</td>
<td>My parents take me to libraries, museums, and bookstores.</td>
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</tr>
<tr>
<td>43.</td>
<td>My parents encourage me to read many books.</td>
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<td></td>
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<tr>
<td>44.</td>
<td>My parents ask me to practice until I do well.</td>
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<tr>
<td>45.</td>
<td>My friends ask me to help them when they face difficult problems.</td>
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<tr>
<td>46.</td>
<td>I solve problems faster than my friends.</td>
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<tr>
<td>47.</td>
<td>The questions in homework or tests are easy for me.</td>
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<tr>
<td>48.</td>
<td>I know the answers when my teacher asks questions</td>
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<tr>
<td>49.</td>
<td>My grades are better than my friends.</td>
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</tr>
</tbody>
</table>
APPENDIX B: My Class Activities

Student Survey About...

My Class Activities

Marcia Gentry Ph.D. and Robert K. Gable Ed.D.

We would like to know how you feel about your class activities. Read each sentence and indicate how often this happens for you in your class by coloring in the doughnut. There are no right or wrong answers. Your answers will be kept secret. Remember to color in a doughnut for each sentence.

<table>
<thead>
<tr>
<th>Subject/Class</th>
<th>Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name/ID</td>
<td>(Optional)</td>
</tr>
</tbody>
</table>

In the example below, the person indicated that his/her class is often enjoyable.

Example: My class is enjoyable

<table>
<thead>
<tr>
<th>Grade</th>
<th>I am a . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Female</td>
<td>☐ Male</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student ID</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐</td>
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<td>☐ ☐ ☐ ☐</td>
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</table>

<table>
<thead>
<tr>
<th>Never</th>
<th>Seldom</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>☐</td>
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<td>☐</td>
</tr>
</tbody>
</table>

1. What I do in my class fits my interests.

2. I have an opportunity to work on things in my class that interest me.

3. What I do in my class gives me interesting and new ideas.

4. I study interesting topics in my class.

5. The teacher involves me in interesting learning activities.

6. What I learn in my class is interesting to me.

7. What I do in my class is interesting.

8. My class has helped me explore my interests.

9. The activities I do in my class are challenging.

10. I have to think to solve problems in my class.

Please continue on the back

66
<p>| | | | | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>11. I use challenging materials and books in my class.</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>12. I challenge myself by trying new things.</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
</tr>
<tr>
<td>13. My work can make a difference.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14. I find the work in this class demanding.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>15. I am challenged to do my best in class.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>16. What we do in class fits my abilities.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>17. This class is difficult.</td>
<td>○</td>
<td>○</td>
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<tr>
<td>18. I can choose to work in a group.</td>
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<tr>
<td>19. I can choose to work alone.</td>
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</tr>
<tr>
<td>20. When we work together, I can choose my partners.</td>
<td>○</td>
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</tr>
<tr>
<td>21. I can choose my own projects.</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>22. When there are many jobs, I can choose the ones that suit me.</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
</tr>
<tr>
<td>23. I can choose materials to work with in the class.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>24. I can choose an audience for my product.</td>
<td>○</td>
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</tr>
<tr>
<td>25. I look forward to my class.</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>26. I have fun in my class.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>27. The teacher makes learning fun.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>28. I like what I do in my class.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>29. I like working in my class.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>30. The activities I do in my class are enjoyable.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>31. I like the projects I work on in my class.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
</tbody>
</table>
Vita

Name

Michele Gaglione

Date Graduated

June, 1993

Baccalaureate Degree

Bachelor of Science in Foreign Service, Georgetown University, Washington, DC
Major: Comparative Studies of Europe and the United States

Date Graduated

May, 1997

Other Degrees and Certificates

Master of Science, Queens College CUNY, Flushing, NY
Major: Elementary and Early Childhood Education

Date Graduated

May, 2003

Professional Diploma in Educational Administration SBL and SDL

Date Graduated

August, 2017