THE EFFECTS OF CONTRACT ACTIVITY PACKAGES ON BOREDOM IN A

SIXTH-GRADE ACCELERATED MATH CLASS

by

JoAnna Lee Bartlett

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

There is currently a lack of research aimed at determining the boredom level experienced by sixth grade students participating in an accelerated math class, as well as suitable strategies aimed at helping students avoid it. This quantitative quasi-experimental static-group comparison study investigated boredom levels with the implementation of Contract Activity Packages (CAPs), a strategy specifically related to combatting boredom for gifted and talented students, into a sixth-grade accelerated math class. Data were collected from 138 sixth-grade students participating in an accelerated math class via the boredom scale of the Achievement Emotions Questionnaire – Mathematics (AEQ-M) and analyzed using a two-way analysis of variance and a one-way analysis of variance. Results showed that there were no statistically significant differences in the boredom levels of sixth-grade students participating in an accelerated math class who received and did not receive CAPs, regardless of gender or giftedness. These results imply that the use of CAPs might not be a suitable strategy to use in order to prevent the presence of boredom in the classroom setting, or that the CAPs were not effectively designed. Thus, more research in this particular field of education is recommended.

Keywords: boredom, accelerated math, engagement, contract activity packages, gifted and talented, gender differences

Dedication

To the love of my life…my strength when I am weak…my security blanket…my provider…my stabilizer…my constant reminder of how wonderful life is even through the darkest moments…to my all-time favorite person, my husband. Without you, life simply does not make sense. Without you, there are no messes to clean up. Without you, there are no shoes to constantly pick up. Without you, there are no date nights before grocery shopping. Without you, there are no simple joys in life. Without you, there are no gardenias to smell when the windows are open. Without you, there are no silly jokes upon which to roll my eyes. Without you, there are no midnight conversations. Without you, there are no early morning trips to Waffle House. Needless to say, I would not be where I am today without your strength, guidance, patience, love, acceptance, and encouragement. Thank you for being you…but most importantly, thank you for loving me…there is no one I would rather tackle this journey we call life with other than you.

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To the two people that taught me the importance of working hard. To the two people that taught me nothing is free in life and if you want something, then you have to work for it. To the two people that never allowed me to feel entitled. To the two people that taught me perseverance, determination, and commitment. To the two people that taught me the importance of failure and getting back up when you have been knocked down. To the two people that taught me to set my goals high and then to let noting stand in my way as I work to attain each one of them. Thank you, mom and dad, for always being the best role models. I am so thankful you set high expectations for me when I was a little girl, and I am even more thankful when you raked me over the coals each time I did not live up to your expectations. Words will never be able to express how thankful and appreciative I am for both of you.

We call her #1 for so many different reasons, such as because she was born first…because she was always the favorite…because she was always better at everything…because she was more creative, and certainly more entertaining. But, I have always called her #1 for a different reason. To me, she is #1 because she always puts others needs ahead of her own. To me, she is #1 because she is the most selfless person I know. To me, she is #1 because she is always the loudest person cheering in my corner. To my sister…thank you for always having my back and for always being there for me. Thank you for not allowing me to quit even when I really wanted to. Thank you for always being able to make me laugh when I needed it the most. Thank you for loving me unconditionally…even though I beat you once with a remote control.

To my coworkers and friends…thank you for taking the time to call or text or stop me in the hallway to ask how things were going. You will never know how much this meant to me.

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CHAPTER ONE: INTRODUCTION

Overview

Chapter One begins with a background of the implementation of an accelerated math curriculum at the middle school level and then moves into a discussion of the importance of teaching mathematics. A problem statement and a purpose statement are also included, both of which will help navigate the study as they pertain to boredom in the classroom setting. The significance of the study elaborates on the idea that the current literature has not adequately covered the presence of boredom in the classroom setting, which is the focus of the study. Chapter One concludes with the research questions for this quantitative study and the definitions that will be used throughout.

Background

Georgia, as well as several other states, recently implemented the Common Core State Standards (CCSS), which directly affect the educational system at large. The CCSS was implemented with a goal in mind to gain consensus across several states for a set of common 21st century standards, particularly in language arts and mathematics. Standards that were rigorous and relevant in nature were included in the CCSS, which sought to meet the needs of a range of learners with diverse academic needs. Challenging, relevant, and academically rich in nature, CCSS was specifically developed to meet the vast array of needs of all learners while participating in different types of learning environments (VanTassel-Baska, 2012). One specific content area, mathematics, has received special attention over the years because students performing at higher levels in math and science show larger rates of increase in economic productivity as compared to similar countries with lower-performing students (Hanushek, Peterson, & Woessmann, 2011). One of the essential components of CCSS is the inclusion and

development of an accelerated middle school math curriculum focusing on "making sense of problems" and constructing "viable arguments" (VanTassel-Baska, 2012, p. 222). With emphasis and pressure stemming from No Child Left Behind (NCLB), many suggest, particularly in the field of mathematics, meeting the needs of high level learners is just as important as meeting the needs of low level learners; therefore, a middle school accelerated math curriculum is critical for the gifted, talented, and advanced learner in the field of mathematics (Hanushek et al., 2011). Others suggest mathematics is a critical part of academic preparation of the middle school child while building confidence and igniting interest in the beauty of mathematics (Morrison, 2011). Hanushek et al. (2011) support the notion that mathematical skills better predict future earnings and economic outcomes, thus implying that more emphasis needs to be placed on the field of mathematics because "math appears to be the subject in which accomplishment in secondary school is particularly significant for both an individual's and a country's economic well-being" (p. 12).

According to the CCSS, for a middle school accelerated math curriculum, the learner will be able to possess a concrete mathematical understanding stemming from "a result of taking the time to connect the hand to the mind and the abstract and theoretical to the practical and meaningful" (Morrison, 2011, p. 34). With this notion in mind, a middle school accelerated math curriculum may not be intended for every student, a conclusion many educators support (Hanushek et al., 2011). In actuality, there are only a small number of students fully capable of undertaking and successfully completing such an advanced and challenging curriculum. Research suggests that most schools have "less than 10 percent . . . on an accelerated track" (Morrison, 2011, p. 30). Research also suggests that students capable of successfully completing such a vigorous curriculum are among the top 10 percent in a class and should be expected to

remain in the top 10 percent throughout their academic careers (Colangelo et al., 2010). When the time comes to recommend placement into a classroom currently using a middle school accelerated math curriculum, careful consideration and thought must be applied during the decision making process due to the demanding and challenging nature of an advanced curriculum (Morrison, 2011). Supporters of acceleration, particularly in the field of mathematics, believe that challenging gifted, talented, and advanced learners has the potential to decrease the level of boredom typically experienced in a regular education mathematics classroom (Daschmann, Goetz, & Stupnisky, 2014). The "inconspicuous, 'silent' emotion" (Preckel, Götz, & Frenzel, 2010, p. 454) of boredom has received extensive research, an emotion that is often associated with gifted, talented, and advanced students in the classroom setting, and has been proven to negatively impact student's motivation, activation of cognitive resources, achievement outcomes, and self-regulation, all negative impacts on the educational system. In any educational system, for both students and teachers alike the setting in which learning takes place is of critical importance. "Because of their subjective importance, educational settings are infused with intense emotional experiences that direct interactions, affect learning performance, and influence personal growth in both students and teachers" (Pekrun, Frenzel, Goetz, & Perry, 2007, p. 13). More research is needed to detect the presence of boredom while offering suitable deterring strategies for middle school accelerated math students because the presence of boredom has a profound impact on students' performance, learning, and motivation on the educational system at large (Lichtenfeld, Pekrun, Stupnisky, Reiss, & Murayama, 2012).

One theory underpinning the issue of the presence of boredom in a sixth-grade accelerated math class is the control-value theory of achievement emotions, which offers an integrative framework for analyzing the antecedents and effects of the various emotions

experienced in achievement and academic contexts for educational systems at large. With only

the presence of theories and prior research addressing single emotions, such as test anxiety, or

single functions of emotions, such as the impact of emotions on cognitive processes, more

integrative approaches are largely lacking (Pekrun, 2006). Since the control-value theory of

achievement emotions "integrates assumptions from expectancy-value approaches" (Pekrun,

2006, p. 316) to various emotions, researching the presence of boredom is relevant to the current

study and will guide the included research questions. Pekrun (2006) defines boredom as an

achievement emotion associated with the control-value theory; Preckel et al. (2010) define

boredom as an affective state comprised of unpleasant feelings, lack of stimulation, and low

physiological arousal. The relevance of using the control-value theory in the current study is

also supported by the significance of emotions experienced in educational settings, which has

been recognized by researchers in different fields for many years (Daschmann et al., 2014;

Kanevsky & Keighley, 2003; Lichtenfeld et al., 2012; Pekrun et al., 2007; Pekrun & Stephens,

2009; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011; Preckel et al., 2010). Achievement

emotions linked to activity-related emotions, such as boredom experienced during classroom

instruction, have traditionally been neglected by research on achievement emotions. Thus,

according to Pekrun et al. (2007), the scope of existing research should be broadened to include

this important aspect of emotions as well, thus making the control-value theory of achievement

emotions relevant to the current study.

The research questions in the current study focus on the use of Contract Activity

Packages (CAPs) with respect to boredom levels in the educational setting. The use of CAPs in

the educational setting "allow students to demonstrate mastery and to verify what has been

learned" (Russo, 2009, p. 3), which is relevant to the control-value theory of achievement

emotions. The control-value theory incorporates activity-related emotions pertaining to the achievement activities themselves, such as boredom, which is posited to be influenced by mastery goals (Pekrun & Stephens, 2009). Implementing CAPs in this study will allow participants the opportunity to master a concept while completing an achievement activity. Upon completion, levels of boredom will be recorded. CAPs will serve as an achievement activity aimed at altering the level of boredom experienced in the classroom setting, thus connecting the control-value theory of achievement emotions to the guidance of the included research questions.

Problem Statement

It is not known whether implementing CAPs into a sixth-grade accelerated math class will alter boredom levels of participants. While there may be extensive research supporting boredom, there is a lack of research aimed at determining the boredom level experienced by sixth-grade students participating in an accelerated math class, as well as suitable strategies aimed at helping these students avoid the "inconspicuous, 'silent' emotion" (Preckel et al., 2010, p. 454) of boredom. A study on the achievement emotion of boredom is important because this particular emotion is typically linked to advanced students placed in a regular education setting; however, studies suggest that more research is needed to determine if boredom is also experienced when advanced students are placed in an advanced learning environment (Preckel et al., 2010; Siegle, Wilson, & Little, 2013; Steenbergen-Hu & Moon, 2011; Vaughn, Feldhusen, & Asher, 1991; Young, Worrell, & Gabelko, 2011), such as an accelerated math class. Since math is a critical needs area, analyzing the "inconspicuous, 'silent' emotion" (Preckel et al., 2010, p. 454) of boredom in this content area is important so educators will be better equipped to meet the needs of their students. Therefore, the problem is that the existence of boredom in the educational setting may be hindering educators' ability to meet the needs of students and in turn,

the ability for students to be successful in this academic setting. This may be remedied with the implementation of CAPs in order to alter or eliminate the presence of the achievement emotion of boredom.

Purpose Statement

The purpose of this quasi-experimental static-group comparison study is to test the control-value theory relating the level of boredom experienced by 138 students participating in a sixth-grade accelerated math class in Northwest Georgia. The quasi-experimental static-group comparison study will implement the instructional strategy of CAPs in order to determine if a difference in boredom levels exists between participants who do and do not receive the CAPs. CAPs are used to "individualize instruction based on students' learning styles" (Russo, 2009, p. 2). Russo (2009) defines CAPs as an effective type of individualized instruction allowing gifted and talented students to self-pace while discovering new, pertinent, and current academic concepts. This particular learning and teaching strategy is shown to motivate students, as well as aid in educational success, by helping students feel empowered during the learning process. CAPs also allow students to establish learning goals, provide choice, enable hands-on options for showing mastery, and experience personalized instruction (Russo, 2009).

The independent variable will be generally defined as the instructional strategy of CAPs. The dependent variable, level of boredom, will be measured using the scores obtained from the boredom scale of the Achievement Emotions Questionnaire – Mathematics (AEQ-M).

Significance of the Study

The current literature has not adequately addressed the level of boredom experienced by sixth-grade students participating in an accelerated math class. Although current literature addresses successful strategies aimed at combatting levels of boredom by differentiating

curriculum (Johnson, 2008), a lack of evidence still exists. This lack of evidence pertains to whether or not levels of boredom can be linked to the implementation of various successful strategies with gifted and talented students participating in a class that has been designed to meet their unique and diverse academic needs. A study on the achievement emotion of boredom is important because this particular emotion is typically linked to advanced students placed in a regular education setting. Studies suggest more research is needed to determine if boredom is also experienced when advanced students are placed in an advanced learning environment (Preckel et al., 2010; Siegle et al., 2013; Steenbergen-Hu & Moon, 2011; Vaughn et al., 1991; Young et al., 2011). Since math is a critical needs area, analyzing the level of boredom in this content area is important so educators will be better equipped to meet the needs of their students. Educators also need to be informed on successful strategies that can be implemented to combat or alter boredom levels for gifted and talented students.

Research Questions

The following research questions will guide data collection in this study:

RQ1: Is there a statistically significant difference in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

RQ2: Is there a statistically significant difference in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

RQ3: Is there a statistically significant difference in the boredom levels of gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and gifted sixth-grade students who do not receive Contract Activity Packages?

Definitions

Before discussing the current quantitative study in-depth, it is important to provide an overview of frequent terms that will be used throughout the various chapters.

1. *Accelerated learning* - Accelerated learning is defined as an intensive educational method of study employing techniques that allow educational material to be learned in a relatively short time (Rogers & Kimpston, 1992).

2. *Boredom* - Boredom is as an affective state composed of unpleasant feelings, coupled with a lack of stimulation and low physiological arousal (Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010).

3. *Choice* - Choice is defined as the focus on explicit opportunities to act on one's preferences (Kanevsky & Keighley, 2003).

4. *Contract Activity Packages (CAPs)* - CAPs are a strategy specifically related to combatting boredom, specifically for gifted and talented students. CAPs are used to help students individualize their instruction based on their various and unique learning styles (Russo, 2009).

5. *Control-value theory* - In the control-value theory, research implies that variations of both control and value are necessary for achievement emotions to be stimulated. The level of control is dependent upon the value one places on the various emotions they find pertinent to various situations (Pekrun et al., 2007).

6. *Engagement* - Engagement is commonly defined in three ways: behavioral engagement, emotional engagement, and cognitive engagement (Fredricks, Blumenfeld, & Paris, 2004).

7. *Behavioral engagement* - Behavioral engagement is following the rules, adhering to classroom norms, involvement in learning and academic tasks, persistence, concentration, attention, asking questions, and contributing to class discussions (Fredricks et al., 2004).

8. *Emotional engagement* - Emotional engagement is affective reactions in the classroom, including interest, boredom, happiness, sadness, and anxiety. Cognitive engagement is investment in learning and self-regulation (Fredricks et al., 2004).

9. *Gifted learners* - Gifted learners are defined as those individuals who demonstrate outstanding levels of aptitude, typically defined as an exceptional ability to reason and learn, or competence, typically delineated by documented performance or achievement in top 10% in one or more domains (Renzulli, 2012).

10. *Subject-area acceleration* - This type of gifted delivery model allows gifted learners the opportunity to accelerate through a grade level specific curriculum during one academic school year (Rogers & Kimpston, 1992).

CHAPTER TWO: LITERATURE REVIEW

Overview

Subject-area acceleration, or an accelerated class, is one type of instructional extension implemented at the middle school level in order to help meet the needs of gifted and talented learners. With an emphasis on creating classroom environments conducive to helping gifted and talented students in their academic classes, an accelerated math class is one type of delivery model for gifted services supported by the researcher's local school system. Since increased levels of boredom have been associated with irregularities with the placement of gifted and talented students into classes that do not meet their advanced academic needs (Preckel, Götz, & Frenzel, 2010), more research is needed to determine the effectiveness of Contract Activity Packages (CAPs), an instructional strategy for treating boredom, on boredom levels. In this particular chapter, a theoretical framework and its associated theories will be explored, the history of acceleration and gifted education are delineated, the importance of providing choice as an instructional strategy is discussed, the history of the achievement emotion of boredom is outlined, and an explanation of CAPs is provided.

Theoretical Framework

Creswell (1994) describes a theoretical framework as an organizing model for the researcher. The theoretical framework for this study is driven by the control-value theory of achievement emotions, which revolves around the emphasis students place on their ability to control certain emotions and the value they place on each associated emotion. The ability to control and place value on various achievement emotions depends on whether students associate the aforementioned emotions as being activity-related or outcome-related. The subjective value

and importance associated with this value controls a student's ability to discern which achievement emotion should be initiated.

Control-Value Theory

In the control-value theory of achievement emotions, research implies that variations of both control and value are necessary for achievement emotions to be stimulated (Pekrun, Frenzel, Goetz, & Perry, 2007). "Achievement emotions are defined as emotions that are directly linked to achievement activities or achievement outcomes" (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011, p. 37). Achievement emotions are directly linked to achievement activities or achievement outcomes, depending on the circumstances of each particular situation. In terms of achievement emotions, achievement is the quality of activities or their specific outcomes as evaluated by a specific standard of excellence. Achievement emotions delineate students' academic achievement and learning; these emotions are labeled as achievement emotions because they often relate to behaviors and outcomes typically judged according to standards of quality, both by students and associated professionals (Pekrun et al., 2007).

Achievement emotions, or emotions pertaining to achievement-related activities, are decomposed into two categories: activity-related and outcome-related. Outcome-related achievement emotions, such as joy and pride, are experienced when academic goals are met or exceeded. Frustration and shame, more examples of outcome-related achievement emotions, are ignited after efforts fall short or simply fail expectations. Activity-related achievement emotions, such as enjoyment and boredom, are initiated in one of two ways: from the positive aspect of enjoyment or the negative aspect of boredom. However, both are experienced during classroom instruction where learning can ignite anger, frustration, or anxiety brought on due to various task-related demands. "Activity emotions have traditionally been neglected by research on

achievement emotions" (Pekrun et al., 2007, p. 15) because they are continuously overshadowed by outcome-related achievement emotions, such as anxiety. Differentiation in the classroom setting, as it pertains to activity versus outcome-related achievement emotions, revolves around the object focus of achievement emotions. Grouped according to valence and degree of activation implied, achievement emotions encompass a range of emotions typically experienced at various grade levels (Pekrun et al., 2007).

Research supports the notion that humans experience a vast array of achievement emotions when they feel in control of, or out of control of, various achievement activities and outcomes. Research shows that the level of control humans place on the achievement emotions they experience depends on the subjective value and importance associated with them. While certain experiences initiate particular achievement emotions for one person, they might not be initiated for the next person. "The term 'subjective value' denotes the perceived valences of actions and outcomes" (Pekrun, 2006, p. 317). Therefore, the control-value theory suggests control and value appraisals are significant determinants of activity-related and outcome-related achievement emotions. The control-value theory also implies appraisals of both control and value are necessary components for an achievement emotion to be initiated. Because emotions are influenced by several non-cognitive factors, including physiological temperaments and genetic dispositions, the degree to which one person experiences achievement emotions is quite variable. Subjective control over activities and outcomes, as well as subjective values of these activities and outcomes, are all held to the highest degree by the control-value theory (Pekrun et al., 2007).

Each day classrooms across the United States are overflowing with emotions and many students are simply trying to gain and possess control of the emotions they value the most. More

often than not, students arrive at school with one set of emotions and leave with another.

Research suggests these particular emotions influence students' cognitive performance by

affecting motivational processes, cognitive resources, and the ways in which everyday problems

are approached and solved (Lichtenfeld, Pekrun, Stupnisky, Reiss, & Murayama, 2012; Pekrun,

2006; Pekrun & Stephens, 2009). The effects of achievement emotions on students' daily

instructional routine can depend on the interplay of such mechanisms, the nature of the

mechanisms facilitated by the experienced emotions, and interactions with various task demands.

Understanding the different types of emotions present in the classroom setting on any given day,

as well as understanding that some emotions are considered to be achievement emotions

affecting students' cognitive and motivational abilities, is essential to helping mold and

transform students into productive members of society (Pekrun & Stephens, 2009).

Related Literature

The current quantitative study seeks to determine if there is a difference in the boredom

level experienced by gifted and non-gifted male and female sixth-grade accelerated math

students. Before the level of boredom can be investigated, it is essential to delineate the link

between acceleration and gifted learners. The review of the literature will discuss current

thinking in gifted education, gifted delivery models, engagement, research on boredom, coping

and emotions associated with boredom, gender differences, and interventions, such as CAPs.

Current Thinking in Gifted and Talented Education

Gifted and talented students yearn for control, challenge, and choice due to a high-

achieving analytic frame of mind. When compared to their classmates, gifted and talented

learners conceptualize and internalize information in five very distinct, different ways. Gifted

and talented students learn new material in much less time as compared to their non-gifted

classmates. Gifted and talented students have the innate ability to remember what they have learned, so when educators begin reviewing previously mastered concepts they quickly become bored and disengaged. The aforementioned students perceive ideas and concepts at more abstract levels as compared to their classmates. Gifted and talented students typically become keenly interested in specific topics and want to stay with those topics until they feel satisfied that they have learned as much as they possibly can about them. Lastly, gifted and talented students possess the ability to attend to many activities at the same time. The ability to learn and conceptualize new material differently from their classmates presents the perfect opportunity for gifted and talented students to take advantage of various forms of differentiated instruction in order to maximize the learning process while staying engaged (Caraisco, 2007).

Gifted Delivery Models

Gifted education is not a new term in the world of education because this type of educational intervention has been in existence for many years. Gifted education is "based on the almost universally accepted reality that some learners demonstrate outstanding performance or potential for superior performance in academic, creative, leadership, or artistic domains when compared to their peers" (Renzulli, 2012, p. 150). When compared to their regular education peers, qualifiers of gifted education are exposed to various delivery models that allow for superior performance or at least for the potential for superior performance, in artistic, academic, leadership, or creative domains. Renzulli (2012) elaborates on the two different types of gifted learners, all while mentioning and focusing on the fact that many of the qualities and characteristics typically associated with gifted learners are mutually exclusive. On one hand, according to Renzulli, a gifted learner is the high-achieving, academically-focused, goal-oriented, or schoolhouse-gifted student. Such students excel at learning classroom-related

lessons and can fully function in various classroom settings. This type of gifted learner is also more than willing to participate in rigorous lessons, activities, and assignments. On the other hand, a gifted learner is the productive, creative, and artistic gifted student who excels while applying profound knowledge base to a selected and specified area of interest (Renzulli, 2012).

Regardless of the type of gifted student enrolled, school systems across the world offer differentiated learning environments and a plethora of academic course paths for these students in order to better meet their advanced, demanding, and challenging academic needs (Rogers & Kimpston, 1992). Rogers and Kimpston (1992) discuss 11 different types of gifted delivery models, all with a purpose to accelerate the gifted learner. One of the most common forms of acceleration is early entrance to school. With this type of gifted delivery model, students are allowed to start school early after consistently displaying readiness to learn and perform. After reviewing various state and district level assessments, grade skipping requires school permission. Another type of gifted delivery model that promotes acceleration is the non-graded classroom, which allows gifted learners to work at their own pace in an undifferentiated classroom environment. Curriculum compacting, a widely used and accepted form of acceleration, allows the gifted learner to learn a grade level specific curriculum after educators have filled in any gaps and deficiencies. This type of gifted delivery model allows the gifted learner to move more rapidly through the curriculum, as compared to the rate at which their peers move through the same curriculum. Grade telescoping, or telescoping, is a method designed for a child or group of children of the same age to complete the school's curriculum of several years in less time. In regards to concurrent enrollment, "the school system allows advanced students to enroll in higher level coursework when proficiency at grade level has been demonstrated" (Colangelo et al., 2010, p. 185). Gifted students who choose to take advanced placement courses while enrolled in

high school are given the opportunity to earn college credit if they successfully complete and

pass the accompanying end of the year advanced placement assessment. Another gifted delivery

model commonly used and practiced in the field of education is mentorship. This delivery model

places the gifted learner with a subject area expert enabled with the ability to teach the student

additional concepts, skills, and academic foundations that are not offered in the general

education setting. In order to earn college credit, successful completion of a series of academic

and content specific assessments is the basis for the credit by examination gifted delivery model

for acceleration. Some school systems choose to implement the delivery model of early

admission to college for their gifted learners, which allow them to start college before successful

completion of high school (Rogers & Kimpston, 1992). Acceleration, another type of gifted

delivery model, is a broad term encompassing many accelerative options and is separated into

two distinctive models: grade-based acceleration and content-based, or subject-area, acceleration

(Colangelo et al., 2010).

Grade-based acceleration. Grade-based acceleration shortens the number of years a

student spends in kindergarten through high school. This acceleration option places a student in

a higher grade level regardless of the student's age on a full-time basis for the sole purpose of

providing access to appropriately challenging and rigorous learning opportunities. This type of

acceleration is often referred to as "grade-skipping," but it can also include other means to

shorten the number of years a student remains in the educational system. The only exception to

grade-based acceleration is early entrance to kindergarten, which does not shorten the number of

years the student spends in the K-12 educational system because it simply shortens the wait time

to start school. Examples of grade-based acceleration include, but are not limited to, early

entrance to school, whole-grade acceleration, grade telescoping, and early entrance to college (Colangelo et al., 2010).

        Subject-area acceleration. Subject-area acceleration, the most commonly used form of acceleration, allows the gifted learner the opportunity to accelerate through a grade level–specific curriculum during one academic school year. If successful completion follows, this type of delivery model accelerates the gifted learner one year ahead, as compared to their non-accelerated peers. While this type of gifted delivery model promotes acceleration within a specific content area, students remain on grade level in other content area classes (Rogers & Kimpston, 1992). Colangelo et al. (2010) discuss subject-area acceleration, a commonly and widely used practice for the gifted and talented, with the implementation of an accelerated math curriculum into a subject-area accelerated classroom as one of the many ways to meet the needs of gifted and talented learners. In regards to subject-area acceleration, decisions typically revolve around a personal and concrete understanding of this type of educational intervention. Before making any decisions pertaining to subject-area acceleration one must understand the social and emotional outcomes of this type of educational intervention, which is typically implemented for the gifted and talented (Colangelo et al., 2010). Gifted and talented students have unique cognitive, social, and academic needs with "intelligences outside the normal curve" (Renzulli, 2012, p. 151). When school systems implement subject-area acceleration for gifted and talented learners, they are, according to Colangelo et al. (2010), providing students with more opportunities to learn and excel in an academically challenging classroom setting. Providing this opportunity for gifted and talented learners allows students to develop unique talents, skills, and abilities. Before school systems can recommend or implement a student for subject-area acceleration, designated professionals must collaborate in order to establish a

concrete set of procedures and policies. Formal policies addressing and deciphering the need for subject-area acceleration, as well as listing procedures following approval or denial of this form of educational intervention, should be established prior to the start of the school year. With a goal in mind of allowing gifted and talented students to move through a traditional educational platform more rapidly, as compared to non-accelerated peers, subject-area acceleration is intended for students exhibiting profound readiness and motivation in one content area. Subject-area acceleration is a validated and widely accepted type of educational intervention used for this diverse group of high-ability, high-achieving students, and research supports the use of this form of educational intervention due to robust and consistent results. Participants of this type of educational intervention, a unique and specialized form of differentiation, consistently out-perform grade level peers on various academic levels. However, results also reveal that both groups, those participating and not participating in subject-area acceleration, possess approximately equal levels of social and emotional adjustment. Currently, there is no evidence that suggests subject-area acceleration has a negative effect on the social and emotional development of gifted and talented students (Colangelo et al., 2010).

Although subject-area acceleration has the potential to be an effective educational intervention for gifted and talented students, this particular gifted delivery model is not a universal method (Rogers, 2007). When deciding whether or not to implement the use of subject-area acceleration for a particular student, careful thought, consideration, consultation, and planning is necessary. Administrators, teachers, and parents should hold numerous meetings prior to making any final decisions pertaining to placement in a subject-area accelerated class. Before considering such placement, data should be collected and analyzed before any meetings take place in order to allow administrators, teachers, and parents the opportunity to discuss what

is in the best interest of the student under consideration (Colangelo et al., 2010). Even after a student is granted approval for subject-area acceleration, it is in the best interest of the student to participate in monthly meetings with a group of professionals to ensure the student is on the road to academic success. Educators of subject-area accelerated classes have a responsibility to consistently assess and monitor student's progress in order to ensure the use of this type of educational intervention and differentiation strategy for gifted and talented students is serving its purpose (Rogers, 2007).

   Implications of subject-area acceleration. Although an effective type of educational intervention for gifted and talented students, subject-area acceleration does not work for all students. Acee et al. (2010) concluded that several participants were being over-challenged due to academic demands that exceeded intellectual and academic capabilities following placement into an advanced learning environment, similar to the environment created in a subject-area accelerated class. In the aforementioned study, participants reported consistent feelings of boredom after they were placed into an advanced mathematics class due to their unique academic and social needs. Participants reported that they were often bored in class because the work they were expected to complete was out of their academic reach, as opposed to experiencing boredom due to a repetitious teaching style or a monotonous learning environment (Acee et al., 2010). For years, researchers have "argued that acceleration may be the one practice that most directly circumvents boredom and underachievement" (Rogers & Kimpston, 1992, p. 58). An emotion previously linked to under-challenging situations, this particular conclusion sparked further research on boredom (Acee et al., 2010).

   Tippey and Burnham (2009) concluded that when gifted students were placed in various educational settings that were tailored to their academic needs, they became fearful of the

thought that they possessed the ability to think and behave differently from their peers. The researchers discussed how gifted and talented students exhibit different social and emotional developmental stages as compared to their peers. These specific differences resulted in a higher risk for anxiety and depression due to characteristics such as asynchronous developmental patterns, perfectionism, and early moral concern (Tippey & Burnham, 2009). However, Colangelo et al. (2010) discuss ways in which to eliminate all risks often associated with allowing a student to participate in a subject-area accelerated class. The researchers suggest that school systems establish policies and guidelines for the implementation of subject-area accelerated classes, such as a referral and screening process, an assessment and decision-making process, and a planning process with a constant open line of communication (Colangelo et al., 2010).

Engagement

According to Gasser (2011), students preparing to live and work in the 21st century must learn and implement four essential skills in order to be productive members of society: critical thinking, problem solving, communication, and collaboration. The aforementioned skills are currently being addressed in math curricula, allowing students to stay competitive in the work force by giving them the opportunity to do things that are not currently being done, and that cannot be outsourced or replicated by a computer (Gasser, 2011). School systems can do their part to provide students with "skills and resources that will be valuable to them and applicable in a variety of settings when they enter the work force of the future" (Gasser, 2011, p. 109). Incorporating the following five changes into any classroom would allow students the opportunity to compete against the best of the best: problem-based instruction, student-led

solutions, risk-taking, fun, and collaboration time. These five changes allow students to become more engaged as the content becomes more meaningful (Gasser, 2011).

       Engagement is commonly defined in three ways: behavioral engagement, emotional engagement, and cognitive engagement. Behavioral engagement is following the rules, adhering to classroom norms, involvement in learning and academic tasks, persistence, concentration, attention, asking questions, and contributing to class discussions (Fredricks, Blumenfeld, & Paris, 2004). One factor that seems to hold promise for promoting math achievement in the academic setting is behavioral engagement in learning. Behavioral engagement describes observable behaviors usually occurring during classroom learning activities. Sustained engagement is depicted when a student shows persistence when doing a challenging assignment and exerts intense effort and concentration during the implementation of various learning tasks (Robinson & Mueller, 2014). Emotional engagement is affective reactions in the classroom, including interest, boredom, happiness, sadness, and anxiety (Fredricks et al., 2004). Robinson and Mueller (2014) describe emotional engagement as less observable, more affective responses to school, such as school bonding, degree of liking school, and the value placed on achievement. Cognitive engagement is investment in learning and self-regulation (Fredricks et al., 2004). Robinson and Mueller (2014) describe cognitive engagement as personal goals and autonomy, value of learning, and relevance of schoolwork to future endeavors.

       Finn and Voelkl (1993) researched two aspects of the school environment promoting engagement: structural environment and regulatory environment. Structural and regulatory environments have the potential for affecting the engagement levels of students (Finn & Voelkl, 1993). Structural environment includes school size and the racial/ethnic composition of the school population; the study concluded students favor a smaller school enrollment, which allows

for a warm, inviting, and supportive school environment. Regulatory environment relates to the degree of structure and rigidity of school procedures and the degree of punitive consequences aligning to a school's discipline system; the study found little association between various aspects of the regulatory environment and engagement levels due to student's lack of control over the school's discipline system (Finn & Voelkl, 1993).

Control. Gentry, Gable, and Springer (2000) found that control is one significant factor affecting engagement for gifted and non-gifted students in regards to learning and quality of learning, and meaningful choices should drive learning in order to create autonomous, self-directed learners. Students, specifically gifted and talented, possess a strong desire to have control of their learning situations and environments. These particular students crave the ability to discover new concepts on their own and at their own pace. These students are eager and willing to work, but they appreciate the power to change current learning situations and the authority to implement their choices. Challenge, choice, and control are essential educational components for gifted and talented learners (Kanevsky & Keighley, 2003).

Challenge. One of the most common explanations from gifted and talented students linked to boredom is the lack of educationally challenging and stimulating situations. Gifted and talented students prefer to be challenged on a daily basis by completing work independently, in a group, or through self-discovery. These students associate engagement with self-modified activities that are created to meet their unique, diverse, challenge-craving educational demands (Kanevsky & Keighley, 2003). Research on cognitive engagement stresses the investment in learning and being challenged to go above and beyond the requirements. Cognitive engagement allows students flexibility in problem solving situations with an emphasis on inner psychological qualities and investment in learning. Gifted students are typically focused on learning, mastering

the task, understanding, and trying to accomplish something that is challenging in order to stay engaged in the learning process (Fredricks et al., 2004).

Gentry et al. (2000) discussed how gifted and talented students portray challenging learning environments as essential components for optimal learning and overall quality of education. Researchers discovered that a lack of challenge in the educational setting actually leads to boredom in school for both gifted and non-gifted students. Researchers suggested that instruction be paced just slightly ahead of the student's development in order achieve maximum learning. They also confirmed that moderately differentiated tasks are a prerequisite for maximizing a student's intellectual development. When teachers provide and create challenging lessons and learning environments for gifted and talented students, they offer students ownership and control of their learning by enhancing relevance, achievement, and a sense of belonging (Gentry et al., 2000).

Choice. Viewed by gifted and talented students as one of the most essential aspects of everyday learning, choice enhances the motivation to learn. Students appreciate when their opinions and interests are reflections of their own learning. Not allowing choice to be constant in the educational setting fuels a sense of injustice and resentment towards school, often leading to drug use, eating disorders, frustration, anger, resentment, disengagement, and skipping school. Gifted and talented students thrive for developmentally appropriate, powerful learning experiences. Many times, when these particular students' needs are not academically met they begin to choose not to produce the work that is expected of them, which can lead to deviant behavior. Gifted and talented students desire choice when it revolves around the following educational domains: content, process, and environment. Students desire to have power over their ability to enhance the relevance of the content they are expected to learn. Students also

desire to have control and a voice when it comes to the process or manner in which they are expected to learn, as well as when and with whom they learn (Kanevsky & Keighley, 2003).

Gentry et al. (2000) found choice to be a powerful method to motivate students and is often recommended to enhance their overall quality of education. Gifted and talented students, especially at the middle school level, view choice as support for their increasing decision-making abilities. "Allowing students choices also is a way of imparting responsibility and control to them" (Gentry et al., 2000, p. 79). However, it is imperative the educational choices that students are allowed to make are perceived as equal or structured in such a way that their choice is guided by interest and not by intent to minimize effort, protect feelings or self-worth, or avoid failure. Gifted and talented students, particularly at the middle school level, desire to be independent and to make their own educational decisions in regards to content, environment, and the decision to work with or without a group (Gentry et al., 2000). Involving consistent choices to pursue an activity or topic promotes students' willingness to undertake challenging tasks while keeping them engaged in the learning process (Fredricks et. al, 2004). Research shows that students situated in engaged classrooms benefit more than students situated in unengaged classrooms, and more engaged classrooms mean fewer disruptions and discipline issues, thus allowing for a higher level of instruction and a more demanding pace (Robinson & Mueller, 2014).

Boredom

Boredom is a common emotion experienced in the educational setting, and is also considered a plague of modern society. "Boredom is commonly seen as an affective state composed of unpleasant feelings, lack of stimulation, and low physiological arousal" (Pekrun et al., 2010, p. 532). When compared to other emotions such as fear, anxiety, hope, and pride,

boredom has received far less attention. There is a "clear lack of research on the boredom experienced when performing achievement-related activities" (Pekrun et al., 2010, p. 531). The majority of research describes boredom as a mysterious, silent emotion lacking disruptiveness characteristics anger brings to the educational setting. Although boredom lacks psychopathological relevance, this particular emotion is no less deleterious than other more commonly experienced negative emotions (Pekrun et al., 2010).

Research shows a positive correlation between boredom and alcohol, depression, nicotine, stress, consumption, divorce, juvenile delinquency, dissatisfaction with life, and other health problems. Boredom has been linked to an increase in behavior problems and a decrease in performance in various achievement and academic settings. The achievement emotion of boredom has also been linked to truancy, deviant behavior, and increased dropout rates in the educational setting. "Boredom in school decreases motivation to learn and may lead to underachievement" (Gentry et al., 2000, p. 78). Educators and other school-associated professionals must realize that creating and promoting awareness of the relevance and significance of the negative connotations that encompass boredom is essential to promoting a successful school environment. With the multitude of consequences and negative connotations surrounding the emotion of boredom, keeping a watchful eye for any lingering aspects of this silent emotion is crucial (Pekrun et al., 2010).

Boredom as an achievement emotion. The achievement emotion of boredom is supported by the control-value theory, and is associated with achievement activities or achievement outcomes. Boredom is a deactivating, negative emotion stemming from various achievement-related situations. Most commonly associated as an unpleasant emotion, boredom is the result of a reduction in physiological activation. Historically speaking, the achievement

emotion of boredom has the potential to significantly reduce all forms of activation, even if an increase in activation follows at a later point in time. However, research supports the notion that the absence of interest and positive emotions does not define boredom; the achievement emotion of boredom equates to more than a neutral state of lack of interest or enjoyment (Pekrun et al., 2010).

Boredom in achievement settings. Several research studies have studied, analyzed, described, and drawn conclusions pertaining to the achievement emotion of boredom (Acee et al., 2010; Ahmed, Van der Werf, Kuyper, & Minnaert, 2013; Preckel et al., 2010). Acee et al. (2010) found that students experienced various levels of boredom due to under-challenging and over-challenging situations while participating in an advanced mathematics class. First, researchers analyzed whether or not students had experienced the achievement emotion of boredom after placement in a mathematics classroom; the researchers used the boredom scale of the Achievement Emotions Questionnaire-Mathematics (AEQ-M) in order to measure the level of boredom experienced by students, if one was measured at all. Second, the researchers incorporated another instrument into their quantitative study in order to determine the reason behind why students were bored in the math classroom. Results revealed that a portion of the students were bored in math because they felt under-challenged in a classroom setting repetitive in nature; however, other students were bored in math because they were being over-challenged in a classroom setting that covered mathematical content far exceeding their intellectual capabilities. The researchers conducted more analyses and found a link between students that felt over-challenged in a mathematics classroom with higher scores for the achievement emotions of anxiety, anger, hopelessness, shame, and boredom. The researchers also found a

link between students that felt under-challenged with higher scores for the achievement emotions of anger and boredom (Acee et al., 2010).

Ahmed et al. (2013) studied the effects of four specific and different achievement emotions pertaining to self-regulation and achievement in a mathematics class. In this particular study, the researchers administered four scales from the AEQ-M to a group of seventh grade math students in an effort to determine whether or not these specific achievement emotions were present. On three separate occasions throughout the academic school year, participants completed the boredom, pride, anxiety, and enjoyment scales of the AEQ-M. These specific emotions were analyzed because two of them represent positive emotions (pride and enjoyment) and two represent negative emotions (boredom and anxiety). The researchers were trying to determine if a relationship existed between positive emotions and self-regulation and achievement, as well as if one existed between negative emotions and self-regulation and achievement in a mathematics class. Results yielded a stable and non-significant mean growth rate for anxiety; however, results also yielded a negative correlation with self-regulation and achievement. For boredom, the mean growth rate was positive and significant, and yielded a negative correlation between boredom and self-regulation and achievement. For enjoyment and pride, the mean growth rates were both negative and significant, and yielded a positive correlation with the association of self-regulation and achievement (Ahmed et al., 2013).

In another quantitative study, researchers investigated on three separate occasions the frequency of boredom associated between gifted and non-gifted ninth grade students in a mathematics class (Preckel et al., 2010). In the aforementioned study, researchers used the boredom scale of the AEQ-M to determine the presence of the achievement emotion of boredom. Once this presence was established, researchers took the purpose of their quantitative study one

step further by analyzing the association between the reported antecedents of boredom. Results showed that the placement of gifted students in a regular education classroom correlated with higher frequencies of boredom; this particular correlation was associated with the antecedent of boredom that pertained to an under-challenging academic environment. However, results from the study revealed that the placement of non-gifted students in a regular education setting also correlated with higher levels of boredom, but this correlation was associated with the antecedent of boredom that pertained to an over-challenging academic environment (Preckel et al., 2010).

With the abundance of existing research on the achievement emotion of boredom, research is lacking in the area that pertains to the level of boredom experienced when gifted and talented students are strategically placed in classrooms with a curriculum that is tailored to their unique, challenging, and specific academic needs. The CCSS includes such a curriculum for the gifted and talented mathematics learner and is intended for use in an advanced mathematics classroom; the accelerated mathematics curriculum is implemented at the middle school level for qualifying students. By analyzing the boredom level experienced by gifted and talented learners after placement into an advanced mathematics class with the use of an accelerated curriculum, additional research will either support or deny previous research pertaining to the achievement emotion of boredom.

Boredom and math anxiety. Research shows that students' achievement in a content area class is related to variables relevant to students, teachers, and the overall teaching and learning process. While some students place relevance on the ability to apply content knowledge to an applicable situation, others find relevance in the ability to earn good grades. Nonetheless, researchers found a link between mathematics anxiety and achievement motivation, a characteristic typically associated with gifted and talented learners (Kesici & Erdogan, 2010).

This particular research indicates that classroom practices, procedures, and strategies can actually influence the goals students' set for themselves, both long term and short term. Thus, educators should strive to create mastery-oriented classrooms by examining the nature of the tasks they assign students and the classroom climate they create in order to eliminate the presence of mathematics anxiety (Furner & Gonzalez-DeHass, 2011).

Not only do mastery-oriented mathematics classrooms help eliminate the culprit of anxiety, they also help eliminate the chance that students could become bored when trying to learn or master a new concept, which is especially true when teaching mathematics in a classroom comprised of gifted and talented students. The assumption that a gifted and talented student's abilities can be enhanced and developed when anxiety and boredom are eliminated is supported by knowledge from brain research, where it is understood that experience results in changes in the brain (Mogensen, 2011). Two psychology professors, Beilock and Lyons, examined which parts of the brain are active among students who can overcome their math anxiety and found a link between math success and activity in a network of brain areas in the frontal and parietal lobes; these two parts of the brain are involved in controlling attention and regulating negative emotional reactions, which are linked to both anxiety and boredom in a classroom setting (Quelling Math Anxiety, 2011). Prior research reports that middle school students are bored during 32% of the time they spend in a classroom setting. This supports the notion that boredom is experienced more often than anxiety during class, and that "boredom correlates significantly and negatively with enjoyment" (Nett, Goetz, & Daniels, 2010, p. 627).

Coping with Boredom

Little is known about how students cope with boredom, which means evidence is lacking in the area of successful boredom-related coping strategies. However, Nett et al. (2010)

discovered that a classification system does exist for how students' use particular strategies to cope with boredom. If the type of coping revolves around a cognitive aspect, then approach coping will require the student to think differently in order to change the perception of the situation and avoidance coping will require the student to think of something else not associated with the present situation. If the type of coping revolves around a behavioral aspect, then approach coping will require the student take action in order to change the situation and avoidance coping will require the student to take actions not associated with the present situation (Nett et al., 2010).

Although few to no boredom-related coping strategies exist, there are potential benefits that exist for students' strategies for coping with boredom in a self-regulated context. Research on self-regulated learning reveals that there are two critical challenges for optimizing the learning process: minimize internal and external distractions and regulate one's motivation and emotions. Successful strategies for coping with boredom should not only prevent students from experiencing the negative emotion of boredom, but they should also serve to facilitate effective teaching and learning environments. Research shows boredom is greater in learning situations that are perceived as low in value, and boredom is reduced when students are able to find meaning in a task. Teaching techniques that enhance the value of the domain specific standard being presented is also a way in which teachers can foster motivation and reduce boredom, as well as implementing various interest-enhancing strategies (Nett, Goetz, & Hall, 2011).

Emotions in Learning and Achievement

Emotions in the mathematics classroom, such as boredom, are linked to psychological, biological, and social aspects of student learning and achievement. These emotions differ between males and females due to judgment of competence, self-efficacy expectations, and

expectations for perceived future performance. Over the years, less attention has been paid to emotional variables, such as boredom, in the context of learning and achievement. Emotions are prevalent and inflectional components of various teaching and learning environments and situations. Emotions are highly relevant and important in learning and achievement situations because they decipher how students are able to learn and the extent to which they actually want to learn. Unfortunately, emotions such as boredom have taken a back seat and received very little attention in research with regards to learning and achievement classroom settings due to the majority of emphasis being placed on other more typical emotions, such as anxiety (Frenzel, Pekrun, & Goetz, 2007).

Frenzel et al. (2007) elaborated on three major reasons why studying emotions in learning and achievement are critical aspects of education. First, emotions are important dependent variables to measure because they are key components of subjective well-being and psychological health. The researchers suggest not only are they key variables to measure as a whole class in order to compare data from one teaching aspect to another, but they are also important variables to measure by gender. Males and females often perceive emotions quite differently, thus meaning the emotions experience in a learning environment for males is not necessary the same for females. Second, emotions impact students' learning and achievement by increasing the quality of the learning process by changing the dopamine levels in the brain, thus affecting long-term memory. High quality learning takes a substantial amount of effort and is quite time consuming. "Learners are more willing to invest such effort if learning activities are affectively rewarding – that is, enjoyable and interesting rather than anxiety-laden or boredom-inducing" (Frenzel et al., 2007, p. 498). Third, if students are more emotionally attracted by the content of a particular domain, then they are more likely to want to learn more about the domain

and eventually follow a career in the aforementioned domain (Frenzel et al., 2007).

Gender Differences

Gender differences play a role on influencing choices, self-perceptions, and values, and also in the way it influences parents' views of their children and parental behavior in the way they structure the environment for either boys or girls. One way to express one's gender identity is by participating in and valuing gender-appropriate activities. Participation in activities during elementary school is highly gender typed. Girls participate significantly more than boys in various artistic activities, hobbies, clubs, and individual sports. Boys, on the other hand, participate in team sports more than girls. This behavior instantiation of their social identities is related to children's intrinsic values (Janis, Davis-Kean, Bleeker, Eccles, & Malanchuk, 2005). The size and direction of gender differences change with age, content, measure, and context. Gender differences often appeal to brain-based differences between males and females which leads to a higher incidence of language problems in boys than in girls, symmetry or reversed asymmetry in the size of certain brain areas in dyslexic children, and unexpected empirical links between left-handedness, language disorders, and immune disorders. Several factors contribute to gender difference, such as social, cultural, and cognitive processing (Gallagher & Kaufman, 2005).

Gender differences in gifted education. Tippey and Burnham (2009) support the notion that gifted children are often compared to their non-gifted peers, but several differences are apparent. Gifted students tend to be at a higher risk of underachievement due to societal isolation, pressure to conform, family dynamics, lack of academic stimulation, attention seeking or rebelliousness, avoidance of taking various risks, and lack of direction. Gifted students tend to progress through the same developmental stages as their peers, although at a much younger

age, and with an excessive amount of self-criticism (Tippey & Burnham, 2009). Although differences exist between gifted and non-gifted students in terms of characteristics, the same can be said for gender differences of the gifted and talented (Frenzel et al., 2007). Regarding brain-based research, gender differences also exist with respect to the involvement of the right hemisphere for the processing of faces, mental rotation, and verbal stimuli. Gallagher and Kaufman (2005) found that gifted adolescents appear to engage their right hemispheres more often than their non-gifted peers while listening to auditory stimuli or processing facial expressions.

Gender differences in mathematics. The fundamental basis of general intelligence is a characterization of the essence of mathematical ability. According to Chipman (2005), gender difference in math has existed since the 1970s. "There is a perceived societal stereotype that females are less capable in mathematics, achieve poorly in mathematics, and need special help in mathematics" (Chipman, 2005, p. 19). Catsambias (2005) describes the math gender gap as a step function, with male students performing better in comparison to female classmates, while others describe the math gender gap as a complex math equation with social, psychological, and biological factors. The current mathematics gender gap is rooted in a complex array of social-environmental factors and has narrowed over the years and varies across countries. Females have been labeled as having low levels of spatial ability, math confidence, and overall math ability and achievement scores, accompanied with higher levels of math anxiety. Males have been labeled as being more prepared and ready to complete various advanced math courses in order to prepare them for mathematics-centered careers (Gallagher & Kaufman, 2005).

Gender differences in mathematics have existed for many years, with the majority of research focusing on higher achievement for males in this particular content area (Frenzel et al.,

2007). Females tend to be less confident in their overall math abilities and, more often than not, attribute their success in math to luck rather than to natural or learned ability (Catsambias, 2005). Motivational factors that are necessary for persistence in the advanced study of mathematics revolve around external encouragement, internal confidence, and expectation of eventual rewards in employment (Chipman, 2005). It was once assumed males were more equipped to complete jobs and tasks that required mathematical concepts because they performed better in math while in a classroom setting. In more recent years, there has been a push for gender equality in various mathematic-laden professions, thus decreasing the stigma associated with males performing better in math when compared to their female counterparts. "The importance of emotions for educational and occupational career choices makes emotion-related gender differences in mathematics particularly relevant" (Frenzel et al., 2007, p. 498). Catsambias (2005) places the mathematics gender gap in three categories: opportunity, achievement, and choice. The researcher believes, due in part to the stigma that males outperform their female classmates, that males are given more opportunities and choice when it comes to taking advanced mathematics courses at the high school level. This opportunity allows males to be better equipped to take various standardized tests where they can obtain overall greater levels of achievement in the field of mathematics. Gender differences can vary on several factors, including confidence, perceived usefulness, math as a male domain, and attitudes towards math success (Frenzel et al., 2007).

Effort, involvement, engagement, and mentoring play a part in the existence of gender differences in mathematics. Another motivational factor for gender difference in mathematics includes competing interests and demands on the individual student, all of which are statistically higher for males. Female students are less likely to develop the intense, almost obsessive involvement with math that, quite possibly, may be critical to in the ability to develop truly

outstanding mathematical achievement (Chipman, 2005). The majority of research pertaining to gender differences in math has centered on self-related cognitions and affect, which has been proven to be more favorable for males in terms of learning and practicing math (Frenzel et al., 2007). Prior research has focused on gender differences and the emotions that are typically discussed in terms of the positive vs. negative valence of experiences related to learning math. In these studies, girls reported being more anxious when compared to boys. Girls also reported lower levels of pride when performing math problems and more shame when they received a low grade on a math assessment when compared to their male classmates. Essentially, girls have a history of experiencing more negative emotional patterns in a mathematics classroom (Frenzel et al., 2007).

Catsambias (2005) addresses the gender gap in mathematics as being directly related to differences in mathematics test scores and how they were accompanied by gender-stereotyped differences in attitudes towards math, academic self-concept, and course work selection. The researcher believes that the existence of a gender gap in mathematics is a matter of educational equity with far-reaching consequences for the lives of women and their families. "Nationally, female students still show less interest in mathematics, even when their achievement levels are comparable to those of their male classmates" (Catsambias, 2005, p. 223). The researcher concludes with a discussion of three contributing influences to the mathematics gender gap: family and social background, school environment, and community. When considering the relationship between the mathematics gender gap and family and social background, socioeconomic status is considered the most important background characteristic predicting a student's success rate in most academic subjects (Janis et al., 2005). In regards to school environment, organizational characteristics of schools and classrooms, social interactions within

the school, and methods of assessment and curriculum content are the most influential aspects contributing to the current mathematics gender gap (Catsambias, 2005). Community influences revolve around whether students live in advantaged or disadvantaged neighborhoods (Gallagher & Kaufman, 2005).

Several studies examined the emotion of anxiety in the mathematics classroom (Goetz, Preckel, Zeidner, & Schleyer, 2008; Kesici & Erdogan, 2010; Legg & Locker, 2009; Marikyan, 2009; Zakaria & Nordin, 2008), while others expanded emotions to include enjoyment, pride, hopelessness, and shame when examining gender differences (Ahmed et al., 2013; Frenzel et al., 2007; Pekrun, 2006; Pekrun et al., 2011). Frenzel et al. (2007) conducted a study in which they examined the aforementioned five distinct emotions typically associated with a math classroom and yielded similar results when compared to past research studies. Therefore, examining the negative emotional patterns with regards to boredom and gender is relevant to the current quantitative study, with hopes of filling the gap that exists with boredom levels of male and female students in an accelerated math class.

Interventions Addressing Boredom and Engagement

Dunn and Dunn (1978) emphasize the importance of including several key components in the classroom setting in order to implement any type of educational intervention. The instructional area should have clearly stated objectives, usually with some choice permitted. The classroom setting should implement small-group techniques with which the students are familiar, such as circle of knowledge, team learning, brainstorming, or role-playing. Introductory, reinforcement, and evaluative activities related to the essential objectives should be available to all students, as well as self-correcting activities. Students should have access to multisensory resources and multiple options so that students are required to make choices as they progress.

The instructional area should also create opportunities for creative and imaginative projects and possess attractive signs and decorations, as well as a self-contained space to provide privacy and feelings of personal involvement (Dunn & Dunn, 1978).

Interventions used to address boredom and engagement could include, but are not limited to, learning stations, programmed instruction, and CAPs. Learning stations are instructional areas that house multilevel resources that relate to a specific curriculum. These stations use introductory resources for students just beginning to learn about a specific topic, reinforcement materials for students who are struggling to master the specific topic, and advanced resources for students who will grasp the specific topic quickly. Programmed instruction enhances only selected learning styles and characteristics and, therefore, should not be prescribed for all students. Programmed instruction is designed around preselected concepts and skills that must be mastered by students before they can proceed to the next set of concepts and skills. CAPs are one of the three basic methods of individualized interventions. CAPs respond to specific learning style differences and are more effective than a large-group lecture or question and answer session. Implementing interventions to address boredom and engagement is an essential component to any learning environment (Dunn & Dunn, 1978).

Contract Activity Packages (CAPs). CAPs are a form of specialized instruction known to meet the learning preference of gifted and talented students. CAPs are an instructional method that has shown statistically significant academic gains with high-achieving students. This type of specialized instruction enables motivated, independent, nonconforming students to learn effectively, efficiently, and enjoyably. CAPs also provide gifted and talented students with choice, flexibility, and a challenging learning environment. This specific unique instructional method challenges students at a higher level than typically experienced through traditional

teaching methods (Caraisco, 2007). Russo (2009) defines CAPs as an effective type of individualized instruction that allows gifted and talented students to self-pace while discovering new, pertinent, current academic concepts. CAPs can be provided and offered at any academic level while fostering independence and collaboration. CAPs reduce frustration and are easily adaptable to a plethora of environmental and educational needs. One of the main goals of CAPs is to capitalize on each student's interests and strengths, all while providing choice, control, and challenge to the student. CAPs allow students in the same class to learn identical concepts and standards in differentiated ways, add objectives based on personal interests, and demonstrate gained and self-created knowledge creatively through the development of traditional instructional resources (Russo, 2009).

CAPs are effective because they allow students the opportunity to self-pace, allow for behaviors that do not conform to prevailing educational practices, can be provided at any academic level, foster independence and collaboration, reduce frustration and anxiety, and can be easily adapted to any environmental needs. CAPs create differentiated learning environments for those who work well independently and are motivated learners in order to reduce frustration, anxiety, and boredom and raise the level of engagement and retention (Russo, 2009). "Researchers have conducted studies that show statistically significant improvements in achievement using CAPs with gifted and talented students" (Caraisco, 2007, p. 257). Research shows academically gifted and talented students actually prefer to learn through independent study, and conventional schooling, or business as usual, can inhibit high-achieving students from mastering academic skills when they do not perceive instructional practices as enjoyable, thus leading them to feel bored and uninterested. Gifted and talented students find accomplishment through learning new and difficult material, and research confirms the need for a specialized

instruction for this group of unique individuals because "instruction for gifted and talented students must be differentiated to meet their needs" (Caraisco, 2007, p. 257). One such strategy educators are encouraged to use with gifted and talented students is CAPs (Caraisco, 2007).

Designed to permit gifted and talented students to function on the academic level most suitable to them, CAPs ensure self-paced academic progress. CAPs provide a multi-sensory and multimedia approach for students who are able to learn more and better through either a visual, tactual, or kinesthetic means. CAPs enable students to become personally responsible for learning the new and required concepts and standards. This unique differentiated method of instruction if often utilized to allow students the opportunity to understand their learning styles and strengths, as well as how to take responsibility for the choices they make concerning educational options made readily available to them (Santano, 1999).

CAPs include the dual global and analytic title with a purpose to attract students with both processing styles. CAPs entail objectives that identify course content students are required to master, as well as activity alternatives that provide students with choices of an activity that reinforces the content they learned through the resource alternatives. Reporting alternatives help students identify how the activity alternative should be demonstrated and, eventually, shared with a handful of classmates. Resource alternatives provide different ways of learning the information cited in the previously mentioned objectives. Small-group techniques introduce or reinforce new and difficult information and allows for higher-level, cognitive skill development. The last components of CAPs are pre-assessments and post-assessments. These assessments allow students to demonstrate mastery and to verify what has been learned (Russo, 2009).

For the current study, CAPs will be utilized as a boredom-related coping strategy in order to help fill the gap that exists with successful strategies that students use in the math classroom in

order to eliminate the negative emotion of boredom. Nett et al. (2010) discussed how little to no research exists on successful boredom coping strategies because no interventions specifically designed to reduce the presence of boredom have been discussed, and no particular strategies have been subjected to systematic and theory-driven exploration. The researchers imply future research is needed to generalize findings by considering other strategies for coping with boredom in various academic domains, which would help determine the extent to which strategies to cope with boredom are domain specific (Nett et al., 2010). CAPs will be implemented in the current study and will take on the role of a consideration for a boredom-related coping strategy.

Basic Principles of Contract Activity Packages. Dunn and Dunn (1978) believe that CAPs are responsive to most learning style characteristics, where some adhere to flexibility for students and some adhere to exacting structure for others. CAPs facilitate learning by stating objectives in a clear, concise manner where students are keenly aware of what they are expected to learn. Objectives can be written more in depth for more advanced learners and more simplistic for struggling learners. CAPs must incorporate multisensory resources that cover the information presented in the listed objectives. Another component of CAPs is the use of activities through which the information that has been mastered is used in a creative way. A series of alternative ways in which creative activities developed by one student may be shared with one or more, but no more then six to eight, classmates should be utilized when using CAPs in the classroom setting. Also, students must be presented with at least three small-group techniques in order to help them master each specified objective. Students should be assessed before, during, and after completion of the CAPs; assessment can take the form of a formal or an informal disposition (Dunn & Dunn, 1978).

Self-pacing with Contract Activity Packages (CAPs). According to Dunn and Dunn (1978), CAPs are one of the three basic methods implemented in order to obtain individualized instruction. This particular method allows teachers and students to respond to specific learning differences in the classroom setting and is more effective than a large-group lecture or question and answer session. Since many students are only able to absorb delivered content as quickly as they are able to relate to it, more often than not the pace of the information being delivered is way too fast. If content is delivered too fast several of the less abled students are left behind and, conversely, if content is delivered too slow the more advanced students become bored and irritated. This can leave the teacher in the classroom to make the decision of whether or not to vary the pace of instruction in order to allow varying ability groups to absorb new information, thus presenting the possibility of some students missing important learning elements. CAPs permit individualized pacing so students can learn as quickly or as slowly as they are able to master the material being covered in class. CAPs allow students working at a slower pace to worry less about being embarrassed because others are grasping the new content more quickly than they do; CAPs allow those students that work at a faster pace to worry less about being bored because they have to wait for selected classmates to catch up with them before moving on to the next concept. Every student in the classroom learns at a different pace, even while working independently. CAPs allow the opportunity for those working at a similar pace to choose accompanying partners (Dunn & Dunn, 1978).

Varied academic levels with Contract Activity Packages (CAPs). Dunn and Dunn (1978) elaborate on the fact that when an entire class is addressed with new material, instruction is typically geared to the academic level of the largest number of students. However, some students learn and retain new information in its simplest form while others are interested only

when the concepts are complex and challenging. Some students have the ability to hear new a lesson once and are able to retain the information for the duration of class, while others require an extensive amount of reinforcement before they are capable of understanding or remembering for any length of time. Students more apt to retain new information often become bored by the detailed repetition of various aspects of a lesson needed by some of their classmates. Students needing more time to process a new lesson for mastery purposes often become frustrated with their inability to acquire the knowledge that some do with ease. CAPs are designed so students are able to function on the academic level most suitable to their academic needs. CAPs do not force students to cope with concepts or facts that are otherwise inappropriate to their ability (Dunn & Dunn, 1978).

Independence with Contract Activity Packages (CAPs). Dunn and Dunn (1978) support the notion that, for years, students have depended on teachers for intellectual growth and stimulation. During this time, whole group instruction has consisted of all students being required to learn the same content at the same time and at the same extent, even though students often differ in ability, achievement, interests, and learning styles. However, this level of dependence on teachers as a primary source of information seriously limits the academic progress and stimulation of several students in the classroom. Teachers must realize some students learn better through multimedia approach than from an articulate, knowledgeable adult, and whole group instruction, for the most part, does not meet the learning needs of all students. Some students learn better through visual, tactual, or kinesthetic resources rather than through an auditory approach to teaching (Dunn & Dunn, 1978).

Using CAPs in the classroom setting forces students to become personally responsible for learning what is mandated and required. While become personally responsible for their own

learning students are given specific objectives to focus on and they are provided with a choice of media resources to help them meet each objective. Through the use of CAPs, students are told what they must learn and what objectives they must meet, but they are not told which provided resources contain the necessary answers to help them meet each specified objective. Essentially, students are exposed to a variety of materials in their search for explicit information included in their listed objectives, so students are able to obtain a plethora of ancillary knowledge (Dunn & Dunn, 1978).

CAPs are designed to imbed several resources in the required concepts, which provides students with multimedia repetition. Allowing students to choose resources to explore, from a list of pre-approved ones, students are able to strengthen their self-pacing skills because they are permitted to learn as quickly as they can, yet well enough to retain what they have studied. Allowing students to implement the self-selection factor helps improve motivation for learning. As students become accustomed to exercising freedom of choice and assuming responsibility, they become more independent of their teacher and, in return, learn to use resources to their advantage while developing and strengthening the confidence to learn on their own. Eventually, students begin to take pride in the ability to learn on their own and slowly transition into viewing teachers as a guide in the classroom rather than as the sole holder of information and knowledge. Successful implementation of CAPs requires classroom teachers to believe in giving students the love of learning and the tools they need to teach themselves independently at their own pace (Dunn & Dunn, 1978).

Reduced frustration and anxiety with Contract Activity Packages (CAPs). Students have the right to learn at the pace that is most appropriate to them in order to obtain academic success. When the learning style does not match the learning pace more often than not the result

is a frustrated and overly anxious student. Some students are able to hide their anxiety very well, while others are more verbal. One of the most difficult tasks for teachers to tackle is determining how to meet the diverse needs of the students in the classroom. Teachers are often encouraged to use innovative and different approaches to learning in order to help meet the diverse needs of their students, thus lowering the frustration and anxiety level in the classroom. "Contract Activity Packages reduce student anxiety and frustration without requiring extensive change in the organization" (Dunn & Dunn, 1978, p. 83). CAPs can be used in any type of classroom setting, from self-contained classes to classes designed for gifted and advanced students. CAPs permit students to learn in ways that are most amenable to them: by themselves, with a peer or two, in a small group, with the teacher, on the floor, at their seats, or through pre-approved resources. In order for CAPs to reach their full potential it is essential for the classroom teacher to establish a firm set of rules and procedures pertaining to what is and what is not acceptable while using the CAPs. Teachers must trust students to proceed seriously and to accomplish each objective outlined in the CAPs. Students not abiding by the established rules and procedures and not working effectively to complete specified objectives should be cautioned and advised that they will not be permitted to continue learning with the CAPs unless they achieve minimum grades on each exam issued that is related to their studies. Research has shown that when teachers teach students the way in which they learn student motivation and achievement increase significantly, thus decreasing their anxiety and frustration levels (Dunn & Dunn, 1978).

Summary

A gap exists in the current area of research for determining the boredom level experienced by students participating in an accelerated math class, as well as suitable strategies for helping these students avoid the "inconspicuous, 'silent' emotion" (Preckel et al., 2010, p.

454) of boredom. Pekrun (2006) defines boredom as an achievement emotion associated with the control-value theory. Boredom is an important emotion to research and study because this particular emotion is typically associated with advanced students placed in a regular education setting. Several studies suggest more research is needed to determine if boredom is also experienced when advanced students are placed in an advanced learning environment (Preckel et al., 2010; Siegle, Wilson, & Little, 2013; Steenbergen-Hu & Moon, 2011; Vaughn, Feldhusen, & Asher, 1991; Young, Worrell, & Gabelko, 2011). Since math is a critical needs area, analyzing boredom in an accelerated math class is important so educators will be better able to meet the needs of their students. If the existence of boredom in the educational setting is hindering educators' ability to meet the needs of students and the ability for students to be successful in the academic setting, a remedy is necessary. The current study will determine whether or not levels of boredom can be linked to the implementation of CAPs, an effective type of individualized instruction allowing gifted and talented students to self-pace while discovering new, pertinent, and current academic concepts (Russo, 2009).

CHAPTER THREE: METHODS

Overview

Chapter Three begins with an explanation of the research design and then discusses the research questions, null hypotheses, participants, setting, and data collection procedures. Chapter Three ends with a discussion of the statistical analyses that were used in the current quantitative study. This quantitative study sought to determine if incorporating Contract Activity Packages (CAPs) into a sixth-grade accelerated math class comprised of gifted and non-gifted students' resulted in lower levels of boredom as measured by the boredom scale of the Achievement Emotions Questionnaire – Mathematics (AEQ-M). The study also sought to determine if there was a difference in boredom levels in regards to gender and gifted status. Prior research has linked high levels of boredom to students' experiencing depression, dropping out of school, deviant behavior, and an overall lack of interest in becoming a productive member of society (Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010). Prior research also suggests that "boredom can become a severe problem for behavior and performance in achievement settings" (Pekrun et al., 2010, p. 532).

Design

A quasi-experimental static-group comparison design was used for this quantitative study. For this study, the treatment group was a combination of gifted and non-gifted sixth-grade students participating in an accelerated math class who received the instructional strategy of CAPs in addition to regular instruction. The control group was a combination of gifted and non-gifted sixth-grade students participating in an accelerated math class who did not receive the instructional strategy of CAPs in addition to regular instruction. Licensed teachers at each school site implemented the CAPs. A quasi-experimental design was appropriate for this study

because the treatment and control groups were constructed without the use of random assignment (Gall, Gall, & Borg, 2010). Random assignment was not possible and was out of the researcher's hands because the groups, the sixth-grade accelerated math classes, were created prior to the start of the school year. The purpose of a quasi-experimental design is to approximate the conditions of the true experiment in a setting that does not allow for random assignment of participants to treatment and control conditions. This type of design uses existing groups, which makes quasi-experimental designs more convenient and less disruptive to the participants and the researcher (Gall et al., 2010; Rovai, Baker, & Ponton, 2014). Using a static-group comparison design requires the researcher to look for the following sources of internal validity: instrumentation, selection, interactions with selection, and experimental mortality (Gall et al., 2010; Rovai et al., 2014). A static-group comparison design was appropriate for this study because the researcher had no plans to implement a pretest to the treatment and control groups; rather, the researcher implemented a posttest to the treatment and control groups (Gall, Gall, & Borg, 2007). For this study, the posttest served as the boredom scale of the AEQ-M and was administered to the treatment and control groups after the treatment group had completed the CAPs. The CAPs were designed to last approximately five instructional school days. After completion of the CAPs, participants from the control and treatment groups completed the boredom scale of the AEQ-M.

For this quantitative study, the independent variable was generally defined as the instructional strategy of CAPs. The dependent variable, level of boredom, was generally defined as the scores obtained from the boredom scale of the AEQ-M.

Research Questions

The following research questions guided data collection in this study:

RQ1: Is there a statistically significant difference in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

RQ2: Is there a statistically significant difference in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

RQ3: Is there a statistically significant difference in the boredom levels of gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and gifted sixth-grade students who do not receive Contract Activity Packages?

Null Hypotheses

The following null hypotheses were used in this study:

$H_0 1$: There is no statistically significant difference in the boredom levels of sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and sixth-grade students who do not receive Contract Activity Packages.

$H_0 2$: There is no statistically significant difference between the boredom levels of male and female sixth-grade students.

$H_0 3$: There is no statistically significant interaction in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages.

$H_0 4$: There is no statistically significant difference between the boredom levels of gifted and non-gifted sixth-grade students.

H_05: There is no statistically significant interaction in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages.

H_06: There is no statistically significant difference in the boredom levels of gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and gifted sixth-grade students who do not receive Contract Activity Packages.

Participants and Setting

The population for the current study consisted of seven sixth-grade accelerated math classes comprised of gifted and non-gifted students from four middle schools in Northwest Georgia. The study used a convenience sample size of 138 participants in order to create homogeneity for statistical analysis (Warner, 2013). Homogeneity, with regards to variance, refers to the assumption that variances of the populations being compared will be equal (Warner, 2013). The convenience sample was divided into two groups based on gender and giftedness and whether or not they received the CAPs. One group was male and female gifted and non-gifted sixth-grade students participating in an accelerated math class who received the instructional strategy of CAPs for approximately five instructional school days. The other group was male and female gifted and non-gifted sixth grade students participating in an accelerated math class who did not receive the instructional strategy of CAPs for approximately five instructional school days. A sample size of 138 participants was justified by an alpha level of 0.05, a population eta-squared value of 0.05, a desired level of statistical power at 0.70, and a small to medium effect size for a one-way analysis of variance (one-way ANOVA) and a two-way analysis of variance (two-way ANOVA) (Warner, 2013).

The setting for the current study was located in the Smith County school district in Northwest Georgia, which is where the researcher is employed. Based on the most current census, this school district is in the top 25 largest districts in the state. The total population for this school district is approximately 14,721 students (KBB, 2014). The four middle schools located in the Smith County school district used in this study are comprised of approximately 700-1,100 students. Table 3.1 contains demographic information for the four middle schools in the study (BCSS, 2014).

Table 3.1

Demographics for Middle Schools

Middle School	Population	White/Caucasian	African American	Hispanic	Other
A	712	89%	4%	5%	2%
B	928	83%	9%	6%	2%
C	648	74%	7%	16%	3%
D	1,042	73%	13%	12%	2%

Middle Schools A and C each had one sixth-grade accelerated math class. Middle School B had three sixth-grade accelerated math classes, with three different instructors teaching one class each, and Middle School D had two sixth-grade accelerated math classes, with two different instructors teaching one class each. The treatment and control groups were comprised of participants qualifying for a sixth-grade accelerated math class with the use of a sixth grade accelerated math curriculum. A teacher recommendation and a score of 580 or higher on the Georgia Milestones End-of-Grade assessment as an incoming sixth-grade student were two mandatory qualifications for any student to be considered for acceleration at the middle school

level. A third way to qualify for the accelerated math class is parental request. Both gifted and non-gifted students are able to qualify for participation in an accelerated math class so long as they maintain an 80 or higher for the duration of two consecutive academic grading periods. Pedagogy for an accelerated math class is fostered on the notion that students who possess the ability to grasp and master a multitude of mathematical concepts should have the opportunity to be challenged on a daily basis in order to further their mathematical skills and develop a deeper understanding of major mathematics concepts and standards. The accelerated curriculum used in this accelerated math class was derived from the Common Core State Standards (CCSS), which sought to meet the needs of a range of learners with diverse academic needs, such as gifted and advanced mathematics learners. Serving as a challenging, relevant, and academically rich curriculum with an emphasis on argument and reasoning skills, the CCSS was specifically developed to meet the vast array of needs of all learners while participating in different types of learning environments (VanTassel-Baska, 2012).

The treatment group consisted of 85 participants enrolled in one sixth-grade accelerated math class from Middle School A, with 24 participants, and three sixth-grade accelerated math classes from Middle School B, with 29 participants in one class, 30 participants in the second class, and 29 participants in the third class. Table 3.2 contains demographic information for the treatment group.

Table 3.2

Demographics for the Treatment Group

	Male	Female	Gifted	Non-gifted	White/ Caucasian	African American	Hispanic	Other
Number	30	48	22	56	70	5	2	1
%	38%	62%	28%	72%	90%	6%	3%	1%

A convenience sample was used to select participants for the treatment group. A convenience sample is appropriate for this study because this choice suits the purpose of the study and is convenient in nature (Gall, Gall, & Borg, 2007). The researcher was cautious to generalize any significant findings to a larger population that is not representative of the sample used in the study. The researcher approached all results with caution and understood when determining whether or not to accept findings as valid, and when making generalizations from them on the basis of one study, that there would be insufficient evidence due to the fact that the study did not implement a pre-test. The researcher was aware that repeated replication of the findings and the implementation of a pre-test would provide more powerful evidence for validity and the ability to generalize findings, as opposed to accepting a statistically significant result in one study (Gall et al., 2007).

The control group consisted of 78 participants enrolled in one sixth-grade accelerated math classes from Middle School C, with 26 participants, and two sixth-grade accelerated math classes from Middle School D, with 26 participants in one class and 25 participants in the other class. Table 3.3 contains demographic information for the control group.

Table 3.3

Demographics for the Control Group

	Male	Female	Gifted	Non-gifted	White/ Caucasian	African American	Hispanic	Other
Number	27	33	37	23	50	4	2	4
%	45%	55%	62%	38%	83%	7%	3%	7%

A convenience sample was used to select participants for the treatment group. A convenience sample is appropriate for this study because this choice suits the purpose of the study and is convenient in nature (Gall et al., 2007). The researcher was cautious to generalize any

significant findings to a larger population that is not representative of the sample used in the study. The researcher approached all results with caution and understood when determining whether or not to accept findings as valid, and when making generalizations from them on the basis of one study, that there would be insufficient evidence due to the fact that the study did not implement a pre-test. The researcher was aware that repeated replication of the findings and the implementation of a pre-test would provide more powerful evidence for validity and the ability to generalize findings, as opposed to accepting a statistically significant result in one study (Gall et al., 2007).

Instrumentation

The independent variable was generally defined as the instructional strategy of CAPs. Qualifying students for the accelerated math classes in this study and those who completed the CAPs were a combination of male and female students who qualified for the program at the beginning of sixth grade. Classes were comprised of gifted and non-gifted students who scored a 580 or higher on the Georgia Milestones End-of-Grade assessment and received either a teacher recommendation or were placed in the program via parental request. In order to maintain their position in the accelerated math class, students must maintain a grade of 80 or higher during each nine-week grading period. Subject-area acceleration, or acceleration, is generally defined as an opportunity allowing a small group of students to accelerate through a grade level specific curriculum during one academic school year (Rogers & Kimpston, 1992).

The dependent variable, level of boredom, was measured using the scores obtained from the Achievement Emotions Questionnaire – Mathematics (AEQ-M). The AEQ-M is a multidimensional self-report instrument (see Appendix B) created by three professors in the department of psychology at the University of Munich and contains 60 items measuring seven

discrete emotions that are linked to those typically associated with a mathematics class:

enjoyment, pride, anger, anxiety, shame, hopelessness, and boredom. The AEQ-M is appropriate

for use in a middle school accelerated math class because it was specifically designed for a

middle school math classroom (Pekrun, Goetz, & Frenzel, 2005). This particular instrument has

been used in multiple middle school settings to measure students' boredom levels (Acee et al.,

2010; Ahmed, Van der Werf, Kuyper, & Minnaert, 2013; Preckel, Götz, & Frenzel, 2010).

The construction of the AEQ-M was based on the control-value theory, which is fostered

on the notion that emotions are interrelated psychological processes that encompass affective,

cognitive, motivational, and psychological components (Pekrun, 2006). The AEQ-M is based on

a program of qualitative and quantitative research that specifically examined students' emotions

experienced in various diverse settings, including the content area of mathematics. Items on the

questionnaire were derived from scales on the original Achievement Emotions Questionnaire

(AEQ) (Pekrun, Goetz, & Perry, 2005). Determining the appropriateness for students in grades

five through ten, as well as considering the relevancy for emotional experiences in mathematics,

was used when choosing items for the AEQ-M. Researchers determined that the instrument was

appropriate for use at the middle school level, or in grades five to ten, and is "predictive for

students' learning and achievement in mathematics, and for their choice of courses and study

programs" (Pekrun, 2006, p. 3). Item analysis and scale revision were both utilized in three

samples of German secondary school students, and final items were eventually translated into

English by a team of two bilingual experts. In order to ensure there was equivalence among

content-related items, a backtranslation procedure was used. Items on the AEQ-M assess

mathematics emotions that directly relate to components of student learning, such as interest in

mathematics, extrinsic and intrinsic motivation to learn mathematics, metacognitive and

cognitive strategies for actually learning mathematics, the self-regulation of academic learning in the mathematics classroom, and the actual investment of study effort in a mathematics classroom setting. Alternative directions are provided in the AEQ-M in order to allow the researcher to assess state mathematics emotions, as opposed to assessing participants' general, typical emotional experiences in mathematics, or their trait mathematics emotions (Pekrun et al., 2005). For this study, the researcher did not utilize the alternative directions in hopes of measuring participants' trait mathematical emotions as related to boredom. To date, several studies have studied, analyzed, described, and drawn conclusions pertaining to the achievement emotion of boredom (Acee et al., 2010; Ahmed et al., 2013; Preckel et al., 2010). See Appendix C and Appendix D for permission to use the instrument in the current study.

The AEQ-M contains 60 items measuring seven discrete emotions that are linked to those typically associated with a mathematics class: enjoyment, pride, anger, anxiety, shame, hopelessness, and boredom. Within each of these seven scales, the included items refer to emotional experiences in studying and completing homework, attending class, and taking tests and exams, all while in a mathematics class. The questionnaire is organized into three sections with the following titles as they pertain to the seven aforementioned emotions: class-related (19 items), learning-related (18 items), and test-related (23 items). Each section of the questionnaire poses statements that assess the specific emotion before, during, and after being in various achievement situations. Sequencing the order of the items by before, during, and after allows participants to access their emotional memories, and is in conjunction with principles of situation-reaction inventories. Descriptive item statistics and scale statistics are reported for each scale used in the questionnaire. The item and scale statistics also indicate that item-total correlations are robust and there is good variation of scale scores for each scale used in the

questionnaire. Cronbach alpha reliabilities are high and are supported by alpha coefficients that range from 0.84 to 0.92 for the AEQ-M (Pekrun et al., 2005). The enjoyment scale has ten questions and a Cronbach alpha coefficient of 0.90. The pride scale has six questions and a Cronbach coefficient of 0.87. The anger scale has nine questions and a Cronbach coefficient of 0.88. The anxiety scale has 15 questions and a Cronbach coefficient of 0.92. The shame scale has eight questions and a Cronbach coefficient of 0.84. The hopelessness scale has six questions and a Cronbach coefficient of 0.89. The boredom scale has six questions and a Cronbach coefficient of 0.89. Scale correlations are provided for each emotion on the questionnaire and show low to medium correlations, which indicate discriminant validity (Pekrun et al., 2005).

The AEQ-M is scored using a five point Likert scale, ranging from strongly disagree (1) to strongly agree (5). Scale scores are computed by summing the scores of the scale items. The combined possible score on the AEQ-M ranges from 60 to 300. A score of 60 is the lowest possible score, meaning that the level of achievement emotions experienced in a mathematics class is low. A score of 300 is the highest possible score, meaning that the level of achievement emotions experienced in a mathematics class is high. If the researcher is more interested in analyzing the level of one specific achievement emotion experienced in a mathematics class, then only that specific scale would be administered and scores would be interpreted accordingly. The AEQ-M, as well as the Achievement Emotions Questionnaire (AEQ), are designed to be modular and to fit the needs of the researcher so "different emotion scales can also be used separately" (Pekrun et al., 2005, p. 6). For this study, the researcher only administered the boredom scale of the AEQ-M (see Appendix A), which contains 6 items. On this scale, items are answered using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Scale scores are computed by summing the scores of the scale items. The combined possible

score on the AEQ-M boredom scale ranges from 6 to 30. A score of 6 is the lowest possible score, meaning that the level of the achievement emotion of boredom experienced in a sixth-grade accelerated mathematics class is low. A score of 30 is the highest possible score, meaning that the level of the achievement emotion of boredom experienced in a sixth grade accelerated mathematics class is high (Pekrun et al., 2005).

The AEQ-M can be administered during class and takes approximately 40 to 50 minutes if administering all scales, and approximately 10 to 15 minutes if different emotion scales are being used separately. It is preferred that the AEQ-M be administered on a voluntary basis, due to the danger of bias under unfavorable circumstances. "Because self-report measures of emotions can generally be subject to response bias under unfavorable circumstances, the AEQ-M should preferably be administered on a voluntary basis, and the data be used in a depersonalized way" (Pekrun et al., 2005, p. 4). Data collected from the AEQ-M should also be used in a way that protects the anonymity of each participant. Specific directions are provided in the questionnaire for participants to read before they begin answering the items in the AEQ-M. Overall directions are provided for each of the three main parts of the AEQ-M (class-related, learning-related, and test-related), and then there are instructions that precede each of the three sections presented in each main part (before class, during class, and after class). Participants can circle their responses on the five-point Likert scale or they can use some type of score sheet provided by the researcher. Once complete, the researcher will score each questionnaire by taking the sum of the responses to all 60 items included on the AEQ-M, or to all the items on the chosen scale if the researcher is not administering all portions of the AEQ-M. No training, nor rater training, is necessary to score the AEQ-M (Pekrun et al., 2005).

Procedures

Submission for approval by the Institutional Review Board (IRB) was the first step taken by the researcher. Prior to submitting the study for IRB approval, the researcher designed one CAP (see Appendix E) for the intervention which was evaluated and approved by a gifted expert (C. Trinter, personal communication, April 15, 2016) to evidence the researcher's capability for designing an appropriate intervention to be implemented in the current study. Russo (2009) defines CAPs as an effective type of individualized instruction allowing gifted and talented students to self-pace while discovering new, pertinent, current academic concepts. After the researcher gained IRB approval (see Appendix F), she developed the CAP that was implemented for this quantitative study (see Appendix J).

During the IRB process, the researcher prepared child assent (see Appendix H) and parental consent (see Appendix I) letters for the seven sixth-grade accelerated math classes that were used in the study. The researcher also prepared a scripted letter (see Appendix G) that was read in each of the seven sixth-grade accelerated math classes in order to recruit participants for the study. The researcher was acutely aware approval from the superintendent was necessary before research could occur in any school system in Northwest Georgia. Therefore, the researcher completed the application to conduct research in the Smith County school system and included pertinent aspects of the study in order to gain approval at the system level, a policy and requirement set forth by the local school board. Once approval was granted from the district level and from the IRB, the researcher contacted principals at each of the four middle schools and asked for email addresses for the sixth-grade accelerated math teachers at each accompanying middle school. Then, the researcher contacted each sixth-grade accelerated math teacher by email in order to give them the details of the study. Child assent and parental consent

letters for the seven sixth-grade accelerated math classes used in this study were prepared and ready for dispersal upon receiving the official stamped documents from the IRB. Due to the voluntary nature of the study and the fact that participants were students, the researcher assured participants in the scripted letter that was read they would be protected from harm or risk of harm while using research procedures that were consistent with sound research design and that did not unnecessarily expose them to risk, establishing adequate provisions to protect their privacy and confidentiality during the data collection portion of the study, and by obtaining informed consent from each participant and their legal authorized representative (Gall et al., 2007). The researcher communicated with the seven sixth-grade accelerated math teachers and scheduled a time to come to each class and read the scripted letter, which outlined the details of the study and how she would de-identify all identifiable information during the data collection portion of the study in order to preserve confidentiality. The researcher assured classroom teachers from Middle School A, B, C, and D that any personal information collected would be de-identified on all levels and their anonymity would be preserved and protected as well. The researcher anticipated gaining IRB and superintendent approval would take approximately four to six weeks. Once approval was granted, the researcher anticipated the data collection and analysis portion of the study would take approximately four months.

Next, the researcher met with classroom teachers from the sixth-grade accelerated math classes at Middle School A and B in order to discuss the process in which the CAPs would be implemented at each respective school. Classroom teachers were trained on how to implement and administer the CAPs in each respective classroom while using the implementation checklist (see Appendix K). At Middle School A, there was one sixth-grade accelerated math class. At Middle School B, there were three sixth-grade accelerated math classes, each taught by three

different classroom teachers. The classroom teachers at Middle School A and B implemented the CAPs in their sixth-grade accelerated math classes. Middle School A and Middle School B were conveniently chosen for the current study. At Middle School C, there was one sixth-grade accelerated math class. At Middle School D, there were two sixth-grade accelerated math classes, each taught by two different classroom teachers. The classroom teachers at Middle School C and D did not implement the CAPs in their sixth-grade accelerated math classes. Middle School C and Middle School D were conveniently chosen for the current study. For the three sixth-grade accelerated math classes not receiving the instructional strategy of CAPs, the classroom teachers conducted the educational setting on a business-as-usual basis.

Next, the researcher made hard copies of the CAPs so they would be ready for distribution when the researcher met with the treatment teachers to train them on how to implement and use the CAPs, along with the implementation checklist. The CAPs covered one sixth-grade accelerated math standard as outlined by the CCSS curriculum. The aforementioned math standard was one component covered in unit one for the sixth-grade accelerated math curriculum and took approximately one week, or approximately five instructional school days, for participants to learn. The one mathematical standard covered on the CAPs paralleled the one mathematical standard covered in the classes not receiving the CAPs; the specific mathematical standard for which the CAPs were developed was dependent on the timing of the actual implementation of the current study. Essentially, all four sixth-grade accelerated math classes at Middle School A and B, the treatment group, and all three sixth-grade accelerated math classes at Middle School C and D, the control group, learned the same mathematical standard around the same time over the course of one week. The four classes at Middle Schools A and B, however, implemented the CAPs and the three classes at Middle Schools C and D did not.

The teachers in the treatment group were instructed to have students complete the CAPs on an individual basis. Teachers verified completion using the implementation checklist. Treatment teachers were made aware that the CAPs were to be completed by individual students, not as group work. During this time, the researcher stayed in constant communication with the classroom teachers at Middle School A and Middle School B in order to ensure procedures were effectively and appropriately implemented via a daily implementation checklist. The researcher was careful not to disclose information to one treatment teacher that could have affected implementation that the other treatment teacher was not privy to. The researcher also stayed in constant communication with the classroom teachers at Middle School C and D to ensure all classes were learning the same mathematical standard that was covered in the CAPs.

While the treatment group was completing the CAPs, the researcher prepared pre-filled (name and school) copies of the boredom scale of the AEQ-M in preparation for administering them at the four middle schools used in the study. The researcher administered the AEQ-Ms to both treatment and control classes within one week of the treatment group completing the CAPs. The researcher read the scripted instructions provided on the AEQ-M to the research participants. Then, the researcher distributed copies of the questionnaire to participants and allowed sufficient time for completion. According to the AEQ-M, completion takes approximately 10 to 15 minutes (Pekrun et al., 2005). Once all participants completed the questionnaire, the researcher collected all copies and placed them in a secure folder which only she had access to. Then, the researcher made a list of the participants with corresponding name and school codes. This list was kept in a secure location separate from the actual data. The participants' names and schools were blackened out on each form and replaced with a label with the corresponding de-identified information. The researcher reminded participants that their questionnaires would remain

anonymous and that the information provided in the questionnaires would remain confidential. The researcher informed parents and participants, via the scripted letter that was read, that the de-identified questionnaires would be kept on file for research purposes for three years, at the end of time which, they would be shredded and disposed of.

Data Analysis

Data analysis procedures were conducted via IBM® SPSS version 21 using a two-way ANOVA for RQ1 and RQ2 and a one-way ANOVA for RQ3. For RQ1 and RQ2, a two-way ANOVA was used to analyze data because the research questions addressed two factors and a dependent variable, and each factor divided cases into two or more levels while the dependent variable described cases on a quantitative dimension (Green & Salkind, 2011). The researcher chose this analysis because an AVONA is a statistical procedure that compares the amount of between-groups variance in one set of scores with the amount of within-groups variance (Gall et al., 2007), which is consistent with RQ1 and RQ2. The researcher ran F tests on the main effects for the two factors and the interaction between the two factors. Follow-up tests were not conducted to evaluate specific hypotheses because main effect results and interaction results yielded non-significant findings. Initial tests evaluated for a first main effect, a second main effect, and an interaction effect, but all results showed no statistically significant differences.

A two-way ANOVA was used to analyze scores on the boredom scale of the AEQ-M in an effort to reject the null hypothesis in the study for RQ1 and RQ2. The independent variable was generally defined as the instructional strategy of CAPs. The dependent variable, level of boredom, was generally defined as the scores obtained from the boredom scale of the AEQ-M.

Before any analyses were performed for RQ1 and RQ2, the researcher conducted several assumptions tests. Assumptions for a two-way ANOVA address the level of measurement,

which assume the dependent variable is measured on an interval scale. A two-way ANOVA assumes all observations are independent. Assumptions for random sampling assume that the sample in the study is a random sample from the population, and assumptions for normality assume that the population distributions are normal. Equal variance assumes that the population distributions have the same variance. Descriptive data was included and reported for the dependent variable. An alpha level of $\alpha = 0.05$ was used to describe the data from the two-way ANOVA. A partial eta-squared value was calculated and reported to determine the level of practical significance for the effect size (Warner, 2013).

Data screening for outliers included examining histograms, box-and-whisker plots, and z-scores. The simplest form of a standard score is the z-score because it expresses how far a raw score deviates from the mean in standard deviation units (Fraenkel & Wallen, 2006). According to Warner (2013), a z-score provides a fixed relationship between a distance from the mean and the proportion of the area in the distribution that lies beyond the z-score. A z-score describes the distance of an individual score from a sample or population mean in terms of standard deviations from the mean. Since, for this study, the location of the distribution is measured in terms of mean, measuring outliers in terms of standard deviation distances is appropriate. In order for z-scores to be acceptable, they must fall between ± 3.0, meaning no more than three standard deviations from the mean. Assumption of normality testing included checking for normality and homogeneity of variance of the two groups. For the treatment and control groups, the assumption of normality was verified by examining the Kolmogorov-Smirnov value because the sample size was greater than 50. For the assumption of equal variance, homogeneity of variance was assessed using Levene's test of equality or error variance (Warner, 2013).

For RQ3, a one-way ANOVA required that each individual or case had scores on two variables: a factor and a dependent variable. The factor divided individuals or cases into two or more groups or levels, while the dependent variable separated individuals on a quantifiable measure (Green & Salkind, 2011). The ANOVA *F* test evaluated whether or not group means differed significantly from each other on the dependent variable. An overall ANOVA test was conducted to determine whether or not means on a dependent variable differed significantly among groups (Gall et al., 2007). For this study, the overall ANOVA was not significant and no follow-up tests were conducted by the researcher. A one-way ANOVA is a generalization of the *t* test; a *t* test provides information about the distance between the means on a quantitative dependent variable for just two groups, where a one-way ANOVA compares means on a quantitative dependent variable across any number of groups. For this study, the independent variable, or categorical predictor variable, in an ANOVA represents groups that have been previously formed and then exposed to different interventions (Warner, 2013).

A one-way ANOVA was used to analyze scores on the boredom scale of the AEQ-M in an effort to reject the null hypothesis in the study for RQ3. The independent variable was generally defined as the instructional strategy of CAPs. The dependent variable, level of boredom, was generally defined as the scores obtained from the boredom scale of the AEQ-M.

Before any analyses were performed for RQ3, the researcher conducted several assumptions tests. Assumptions for a one-way ANOVA address the level of measurement, which assumes the dependent variable is measured on an interval scale. A one-way ANOVA assumes all observations are independent. Assumptions for random sampling assume that the sample in the study is a random sample from the population, and assumptions for normality assume that the population distributions are normal. Equal variance assumes that the population

distributions have the same variance. Descriptive data was included and reported for the dependent variable. An alpha level of $\alpha = 0.05$ was used to describe the data from the one-way ANOVA. A partial eta-squared value was calculated and reported to determine the level of practical significance for the effect size (Warner, 2013).

Data screening for outliers included examining histograms, box-and-whisker plots, and z-scores. According to Warner (2013), a z-score provides a fixed relationship between a distance from the mean and the proportion of the area in the distribution that lies beyond the z-score. A z-score describes the distance of an individual score from a sample or population mean in terms of standard deviations from the mean. Since, for this study, the location of the distribution is measured in terms of mean, measuring outliers in terms of standard deviation distances is appropriate. In order for z-scores to be acceptable, they must fall between ±3.0. Assumption of normality testing included checking for normality and homogeneity of variance of the two groups. For the treatment and control groups, the assumption of normality was verified by examining the Shapiro-Wilks value because the sample size was less than 50. For the assumption of equal variance, homogeneity of variance was assessed using Levene's test of equality or error variance (Warner, 2013).

CHAPTER FOUR: FINDINGS

Overview

Chapter Four begins with the research questions and hypotheses used in the current study, as well as presents the results of the statistical analyses conducted using IBM® SPSS version 21. Chapter Four covers the descriptive data that was collected in the study and the results as they pertain to each hypothesis. Chapter Four concludes with a summary of the results. The purpose of this quasi-experimental static-group comparison study was to test the control-value theory relating the level of boredom experienced by 138 students participating in a sixth-grade accelerated math class in Northwest Georgia. The quasi-experimental static-group comparison study implemented the instructional strategy of Contract Activity Packages (CAPs) in order to determine if a difference in boredom levels existed between participants who do and do not receive the CAPs. Scores from the boredom scale of the Achievement Emotions Questionnaire – Mathematics (AEQ-M) were obtained from 138 sixth-grade students participating in a sixth-grade accelerated math class and analyzed using a one-way analysis of variance (ANOVA) and a two-way ANOVA. The independent variable was generally defined as the instructional strategy of CAPs. The dependent variable, level of boredom, was measured using the scores obtained from the boredom scale of the Achievement Emotions Questionnaire – Mathematics (AEQ-M).

Research Questions

The following research questions guided data collection in this study:

RQ1: Is there a statistically significant difference in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

RQ2: Is there a statistically significant difference in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

RQ3: Is there a statistically significant difference in the boredom levels of gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and gifted sixth grade students who do not receive Contract Activity Packages?

Null Hypotheses

The following null hypotheses were used in this study:

$H_0 1$: There is no statistically significant difference in the boredom levels of sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and sixth-grade students who do not receive Contract Activity Packages.

$H_0 2$: There is no statistically significant difference between the boredom levels of male and female sixth-grade students.

$H_0 3$: There is no statistically significant interaction in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages.

$H_0 4$: There is no statistically significant difference between the boredom levels of gifted and non-gifted sixth-grade students.

$H_0 5$: There is no statistically significant interaction in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages.

H$_0$6: There is no statistically significant difference in the boredom levels of gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and gifted sixth-grade students who do not receive Contract Activity Packages.

Descriptive Statistics

A total of 138 scores from the boredom scale of the AEQ-M were analyzed, of which 78 participants received the CAPs ($N = 78$, $M = 12.17$, $SD = 5.81$) and 60 participants did not receive the CAPs ($N = 60$, $M = 11.88$, $SD = 4.56$). Table 4.1 contains descriptive statistics of scores obtained on the boredom scale of the AEQ-M for overall grouping, which shows participants were somewhat bored based on their mean scores.

Table 4.1

Descriptive Statistics of Scores Obtained on the AEQ-M for Overall Grouping

	N	Mean	Standard Deviation
CAPs	78	12.17	5.81
No CAPs	60	11.88	4.56

A total of 138 scores from the boredom scale of the AEQ-M were analyzed, of which 59 participants were gifted ($N = 59$, $M = 12.51$, $SD = 5.54$) and 79 participants were non-gifted ($N = 79$, $M = 11.70$, $SD = 5.01$). Table 4.2 contains descriptive statistics of scores obtained on the boredom scale of the AEQ-M for overall giftedness, which shows participants were somewhat bored based on their mean scores.

Table 4.2

Descriptive Statistics of Scores Obtained on the AEQ-M for Overall Giftedness

	N	Mean	Standard Deviation
Gifted	59	12.51	5.54
Non-gifted	79	11.70	5.01

A total of 138 scores from the boredom scale of the AEQ-M were analyzed, of which 57 participants were males ($N = 57$, $M = 12.68$, $SD = 5.13$) and 81 participants were females ($N = 81$, $M = 11.59$, $SD = 5.37$). Table 4.3 contains descriptive statistics of scores obtained on the boredom scale of the AEQ-M for overall gender, which shows participants were somewhat bored based on their mean scores.

Table 4.3

Descriptive Statistics of Scores Obtained on the AEQ-M for Overall Gender

	N	Mean	Standard Deviation
Males	57	12.68	5.13
Females	81	11.59	5.37

Group distribution was 56% CAPs (CAPs $N = 78$) and 44% No CAPs (No CAPs $N = 60$) in the overall sample. Giftedness distribution was 43% gifted (gifted $N = 59$) and 57% non-gifted (non-gifted $N = 79$) in the overall sample. Gender distribution was 41% male (male $N = 57$) and 59% female (female $N = 81$) in the overall sample. The ethnicity distribution was 87% White/Caucasian (White/Caucasian $N = 120$), 6% African American (African American $N = 9$), 3% Hispanic (Hispanic $N = 4$), and 4% other (other $N = 5$) in the overall sample.

Results

The researcher had no control over how well the math teachers actually implemented the

CAPs. In order to decrease the implementation threat to internal validity, the researcher asked

sixth-grade accelerated math teachers to document the implementation process of the CAPs via a

daily implementation checklist to ensure treatment fidelity (Rovai, Baker, & Ponton, 2014;

Warner, 2013). Teachers were trained on how to complete the checklists, and these lists were

collected upon culmination of the data collection phase of the study. According to information

gathered from the implementation checklists, all sixth-grade accelerated math teachers upheld

expectations during the implementation phase of the CAPs to the four treatment groups used in

the study.

Null Hypothesis One

$H_0 1$: There is no statistically significant difference in the boredom levels of sixth-grade

students participating in an accelerated math class who receive Contract Activity Packages and

sixth-grade students who do not receive Contract Activity Packages.

A two-way ANOVA was used to analyze the first null hypothesis that looked at the

difference between the boredom levels of sixth-grade students who did and did not receive

CAPs. A two-way ANOVA was used to analyze data for the first null hypothesis because RQ1

addressed two factors and a dependent variable, and each factor divided cases into two or more

levels while the dependent variable described cases on a quantitative dimension (Gall, Gall, &

Borg, 2007), which makes it appropriate to test this hypothesis. For the first hypothesis, the

dependent variable, level of boredom, was measured using the scores obtained from the boredom

scale of the AEQ-M with the CAPs serving as the independent variable as they pertain to overall

grouping. Table 4.4 contains descriptive statistics of the dependent variable, scores on the AEQ-

M, disaggregated by the independent variable as it pertains to overall grouping for the first null hypothesis.

Table 4.4

Descriptive Statistics of Scores Obtained on the AEQ-M for Overall Grouping

	N	Mean	Standard Deviation
CAPs	78	12.17	5.81
No CAPs	60	11.88	4.56

Prior to conducting the two-way ANOVA for the first null hypothesis, assumption testing was completed. For level of measurement, it was assumed that the dependent variable was measured on an interval scale because the numerical value was known, as well as the order and the difference between two meaningful numerical values. This was confirmed by the scores on the AEQ-M ranging from a minimum score of six to a maximum score of 30, where order and value between each score was recordable. It was also assumed that all observations were independent; this was confirmed since each participant submitted one score each. The sample was assumed to be random and, for normality, it was assumed that the population distributions were normal. The assumption of normality was evaluated using the Kolmogorov-Smirnov test. For this hypothesis, the Kolmogorov-Smirnov test was used because $N > 50$ (Warner, 2013). Results indicated that normality for the CAPs group at $p < 0.05$ could not be assumed. According to Warner (2013), the ANOVA is reasonably robust to violations of normality when the group sizes are similar. The results, however, indicated that normality for the no CAPs group at $p > 0.05$ could be assumed. Table 4.5 shows the results for normality testing for the first null hypothesis.

Table 4.5

Normality Testing for Null Hypothesis One

	Group	Komogorov-Smirnov Statistic	df	Sig.
AEQ-M	CAPs	0.157	78	0.000
	No CAPs	0.110	60	0.067

Normality was also assessed using histograms, box-and-whisker plots, and analyzing the kurtosis and skew values in order to look for the presence of extreme outliers. Normality was confirmed after analyzing histograms and box-and-whisker plots for the CAPs group ($N = 78$, $M = 12.17$, $SD = 5.81$) and the No CAPs group ($N = 60$, $M = 11.88$, $SD = 4.56$), which are displayed in Figures 4.1 and 4.2. These figures indicated that scores were positively skewed, which is acceptable due to the nature of the ANOVA being robust. The ANOVA can handle this type of skewness with only a small effect on the Type I error rate (Warner, 2013). Therefore, normality was assumed for overall grouping (CAPs $N = 78$, $M = 12.17$, $SD = 5.81$; No CAPs $N = 60$, $M = 11.88$, $SD = 4.56$). Normality of data for overall grouping was also adequate based on the kurtosis and skew values being close to zero.
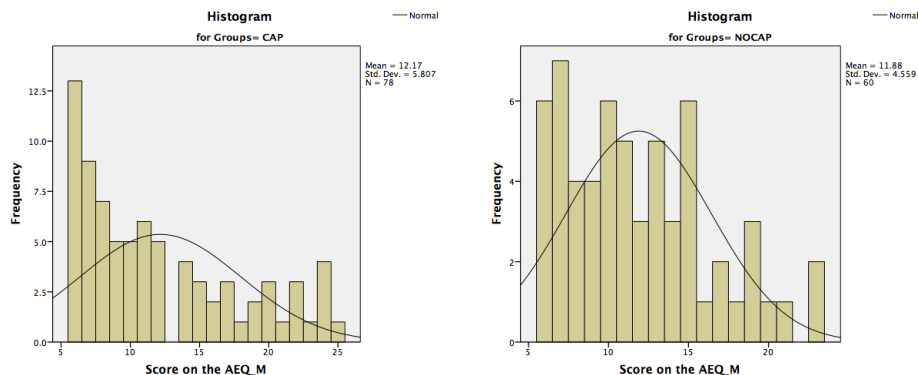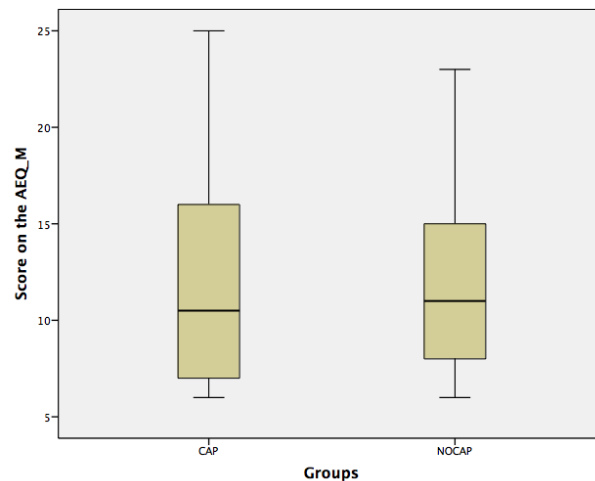

Figure 4.1. Histograms for overall grouping

Figure 4.2. Box-and-whisker plots for overall grouping

Equal variance assumed that the population distributions have the same variance. Levene's test was used to test the first hypothesis in order to determine if the error variance of the dependent variable is equal across groups. This assumption of the homogeneity of variance was found to be tenable based on the results of Levene's test of equality of error provided. The significance level produced was $p > 0.05$, which is a statistical indication assumption for variance was not violated, illustrating that the differences between the overall groups were not evident. Data screening for outliers was also conducted for the first null hypothesis by looking at the z-scores for the dependent variable. According to Warner (2013), z-scores can be used to detect outliers for normally distributed scores. When normality is assumed, about 99% of the scores should fall within ±3.0 standard deviations from the sample mean (Warner, 2013). In this study, all z-scores were found to be acceptable because they fell within ±3.0.

Since there were no threats to initial variance and data screening did not indicate the presence of any outliers, the researcher proceeded to conduct the two-way ANOVA. An alpha level of 0.05 was used to test the first null hypothesis while conducting a two-way ANOVA.

The researcher found there was no statistically significant difference in the boredom levels, $F(1,$

$134) = .415$, $p > 0.05$, partial $\eta^2 = .00$, of sixth-grade students participating in an accelerated

math class who receive CAPs ($N = 78$, $M = 12.17$, $SD = 5.81$) and sixth-grade students who do

not receive CAPs ($N = 60$, $M = 11.88$, $SD = 4.56$). Therefore, the researcher failed to reject the

first null hypothesis.

Null Hypothesis Two

$H_0 2$: There is no statistically significant difference between the boredom levels of male

and female sixth-grade students.

A two-way ANOVA was used to analyze the second null hypothesis that looked at the

difference between the boredom levels of male and female sixth-grade students. A two-way

ANOVA was used to analyze data for the second null hypothesis because RQ1 addressed two

factors and a dependent variable, and each factor divided cases into two or more levels while the

dependent variable described cases on a quantitative dimension (Gall et al., 2007), which makes

it appropriate to test this hypothesis. For the second hypothesis, the dependent variable, level of

boredom, was measured using the scores obtained from the boredom scale of the AEQ-M with

the CAPs serving as the independent variable as they pertain to overall gender. Table 4.6

contains descriptive statistics of the dependent variable, scores on the AEQ-M, disaggregated by

the independent variable as it pertains to overall gender for the second null hypothesis.

Table 4.6

Descriptive Statistics of Scores Obtained on the AEQ-M for Overall Gender

	N	Mean	Standard Deviation
Males	57	12.68	5.13
Females	81	11.59	5.37

Prior to conducting the two-way ANOVA for the second null hypothesis, assumption

testing was completed. For level of measurement, it was assumed that the dependent variable

was measured on an interval scale because the numerical value was known, as well as the order

and the difference between two meaningful numerical values. This was confirmed by the scores

on the AEQ-M ranging from a minimum score of six to a maximum score of 30, where order and

value between each score was recordable. It was also assumed that all observations were

independent; this was confirmed since each participant submitted one score each. The sample

was assumed to be random and, for normality, it was assumed that the population distributions

were normal. The assumption of normality was evaluated using the Kolmogorov-Smirnov test.

For this hypothesis, the Kolmogorov-Smirnov test was used because $N > 50$ (Warner, 2013).

Results indicated that normality for males and females at $p < 0.05$ could not be assumed.

According to Warner (2013), the ANOVA is reasonably robust to violations of normality when

the group sizes are similar, so the researcher continued with the analyses. Table 4.7 shows the

results for normality testing for the second null hypothesis.

Table 4.7

Normality Testing for Null Hypothesis Two

	Group	Komogorov-Smirnov Statistic	df	Sig.
AEQ-M	Males	0.167	57	0.000
	Females	0.156	81	0.000

Normality was also assessed using histograms, box-and-whisker plots, and analyzing the kurtosis

and skew values in order to look for the presence of extreme outliers. Normality was confirmed

after analyzing histograms for males ($N = 57$, $M = 12.68$, $SD = 5.13$) and females ($N = 81$, $M =$

11.59, $SD = 5.37$), which are displayed in Figure 4.3. These figures indicated that scores were positively skewed, which is acceptable due to the nature of the ANOVA being robust. The ANOVA can handle this type of skewness with only a small effect on the Type I error rate (Warner, 2013). Therefore, normality was assumed for overall gender (males $N = 57$, $M = 12.68$, $SD = 5.13$; females $N = 81$, $M = 11.59$, $SD = 5.37$). Normality was confirmed on the box-and-whisker plots for females, but the presence of an outlier existed on the box-and-whisker plot for males in case nine. When the associated score on the AEQ-M was converted to a z-score ($z = 2.45$) the value fell within ±3.0, which is an acceptable range to assume normality according to Warner (2013). According to Warner (2013), z-scores can be used to detect outliers for normally distributed scores. When normality is assumed, about 99% of the scores should fall within ±3.0 standard deviations from the sample mean (Warner, 2013). Therefore, the score was used for all statistical analyses. Figure 4.4 shows the box-and-whisker plots for overall gender (males $N = 57$, $M = 12.68$, $SD = 5.13$; females $N = 81$, $M = 11.59$, $SD = 5.37$). Normality of data for overall gender was also adequate based on the kurtosis and skew values being close to zero.
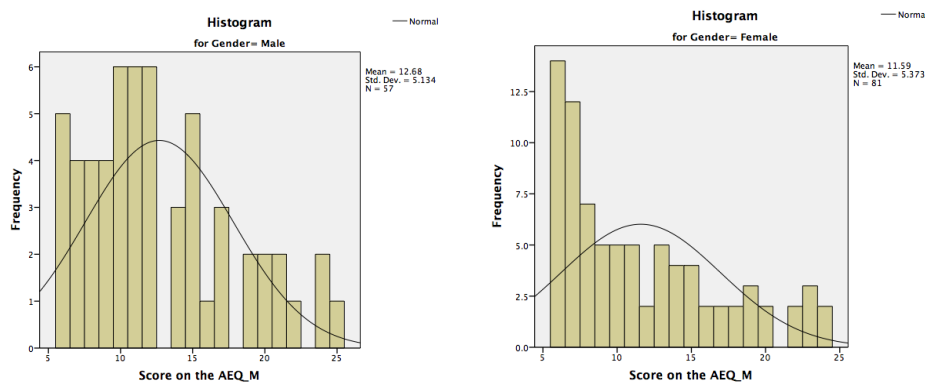

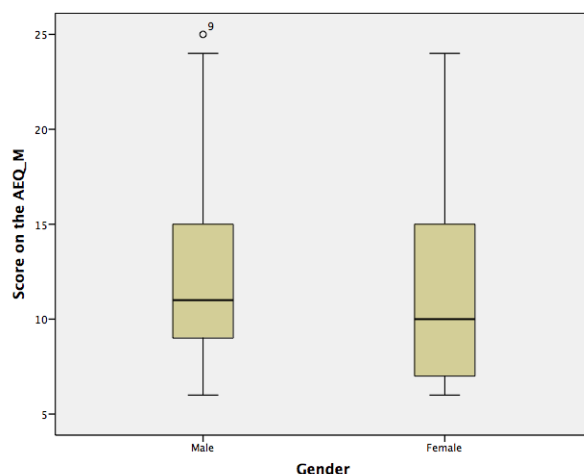*Figure 4.3.* Histograms for overall gender

Figure 4.4. Box-and-whisker plots for overall gender

Equal variance assumed that the population distributions have the same variance.

Levene's test was used to test the second hypothesis in order to determine if the error variance of

the dependent variable is equal across groups in regards to gender. This assumption of the

homogeneity of variance was found to be tenable based on the results of Levene's test of equality

of error provided. The significance level produced was $p > 0.05$, which is a statistical indication

assumption for variance was not violated. Data screening for outliers was also conducted for the

second null hypothesis by looking at the z-scores for the dependent variable. In this study, all z-

scores were found to be acceptable because they fell within ±3.0.

Since there were no threats to initial variance and data screening did not indicate the

presence of any outliers, the researcher proceeded to conduct the two-way ANOVA. An alpha

level of 0.05 was used to test the second null hypothesis while conducting a two-way ANOVA.

For the second null hypothesis, the researcher found there was no statistically significant

difference, $F(1, 134) = 1.083$, $p > 0.05$, partial $\eta^2 = .01$, between the boredom levels of male ($N =$

57, $M = 12.78$, $SD = 5.13$) and female ($N = 81$, $M = 11.59$, $SD = 5.37$) sixth-grade students.

Therefore, the researcher failed to reject the second null hypothesis.

Null Hypothesis Three

$H_0 3$: There is no statistically significant interaction in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages.

A two-way ANOVA was used to analyze the third null hypothesis that looked at the interaction in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive CAPs and those who do not receive CAPs. A two-way ANOVA was used to analyze data for the third null hypothesis because RQ1 addressed two factors and a dependent variable, and each factor divided cases into two or more levels while the dependent variable described cases on a quantitative dimension (Gall et al., 2007), which makes it appropriate to test this hypothesis. For the third hypothesis, the dependent variable, level of boredom, was measured using the scores obtained from the boredom scale of the AEQ-M with the CAPs serving as the independent variable in regards to overall grouping and overall gender. Table 4.8 contains descriptive statistics of the dependent variable, scores on the AEQ-M, disaggregated by the independent variable for overall grouping and overall gender for the third null hypothesis.

Table 4.8

Descriptive Statistics for Overall Grouping and Overall Gender

Gender	Grouping	N	Mean	Std. Deviation
Male	CAPs	30	13.67	5.74
	No CAPs	27	11.59	4.21
	Total	57	12.68	5.13
Female	CAPs	48	11.23	5.71
	No CAPs	33	12.12	4.88
	Total	81	11.59	5.37

Prior to conducting the two-way ANOVA for the third null hypothesis, assumption testing was completed. For level of measurement, it was assumed that the dependent variable was measured on an interval scale because the numerical value was known, as well as the order and the difference between two meaningful numerical values. This was confirmed by the scores on the AEQ-M ranging from a minimum score of six to a maximum score of 30, where order and value between each score was recordable. It was also assumed that all observations were independent; this was confirmed since each participant submitted one score each. The sample was assumed to be random and, for normality, it was assumed that the population distributions were normal. The assumption of normality was evaluated using the Shapiro-Wilk test. For this hypothesis, the Shapiro-Wilk test was used because $N < 50$ (Warner, 2013). Results indicated that normality for males in the CAP group was tenable and could be assumed because $p > 0.05$. Males in the No CAP group, females in the CAP group, and females in the No CAP group

resulted in $p < 0.05$ and, therefore, normality was not tenable and could not be assumed.

According to Warner (2013), the ANOVA is reasonably robust to violations of normality when

the group sizes are similar, so the researcher proceeded with the analyses. Table 4.9 shows the

results for normality testing for the third null hypothesis.

Table 4.9

Normality Testing for Null Hypothesis Three

	Gender	Group	Shapiro-Wilk Statistic	df	Sig.
AEQ-M	Males	CAPs	0.933	30	0.059
		No CAPs	0.922	27	0.043
AEQ-M	Females	CAPs	0.824	48	0.000
		No CAPs	0.931	33	0.036

Normality was also assessed using histograms, box-and-whisker plots, and analyzing the kurtosis

and skew values in order to look for the presence of extreme outliers. Normality was confirmed

after analyzing histograms for overall grouping and overall gender (males CAPs $N = 30$, $M =$

13.67, $SD = 5.74$; males No CAPs $N = 27$, $M = 11.59$, $SD = 4.21$; females CAPs $N = 48$, $M =$

11.23, $SD = 5.71$; females No CAPs $N = 33$, $M = 12.12$, $SD = 4.88$), which are displayed in

Figure 4.5. These figures indicated that scores were positively skewed, which is acceptable due

to the nature of the ANOVA being robust. The ANOVA can handle this type of skewness with

only a small effect on the Type I error rate (Warner, 2013). Therefore, normality was assumed

for overall grouping and overall gender. Normality was also confirmed on the box-and-whisker

plots for overall grouping and overall gender (males CAPs $N = 30$, $M = 13.67$, $SD = 5.74$; males

No CAPs $N = 27$, $M = 11.59$, $SD = 4.21$; females CAPs $N = 48$, $M = 11.23$, $SD = 5.71$; females

No CAPs $N = 33$, $M = 12.12$, $SD = 4.88$). Figure 4.6 shows the box-and-whisker plots for

overall grouping and overall gender. Normality of data for overall grouping and overall gender

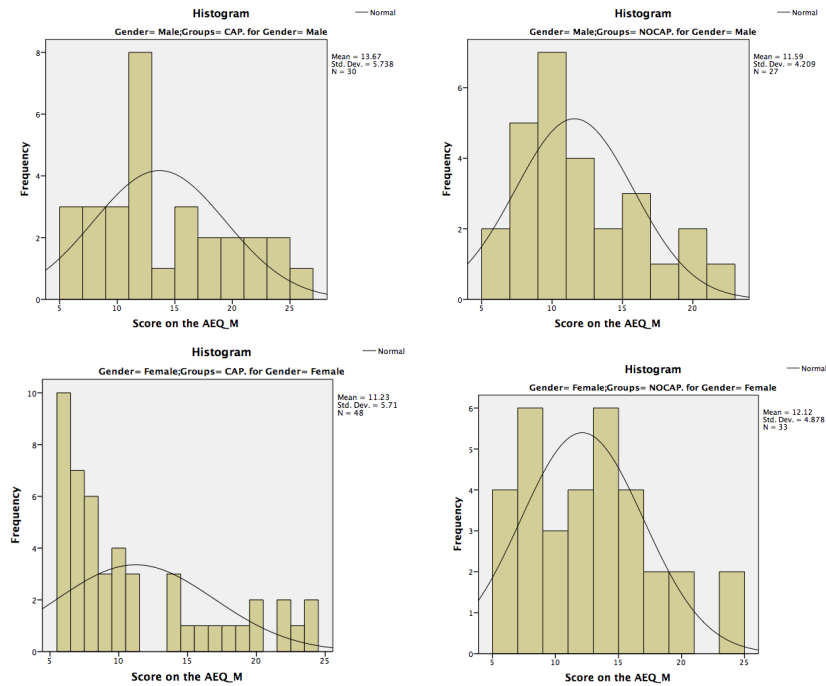was also adequate based on the kurtosis and skew values being close to zero.

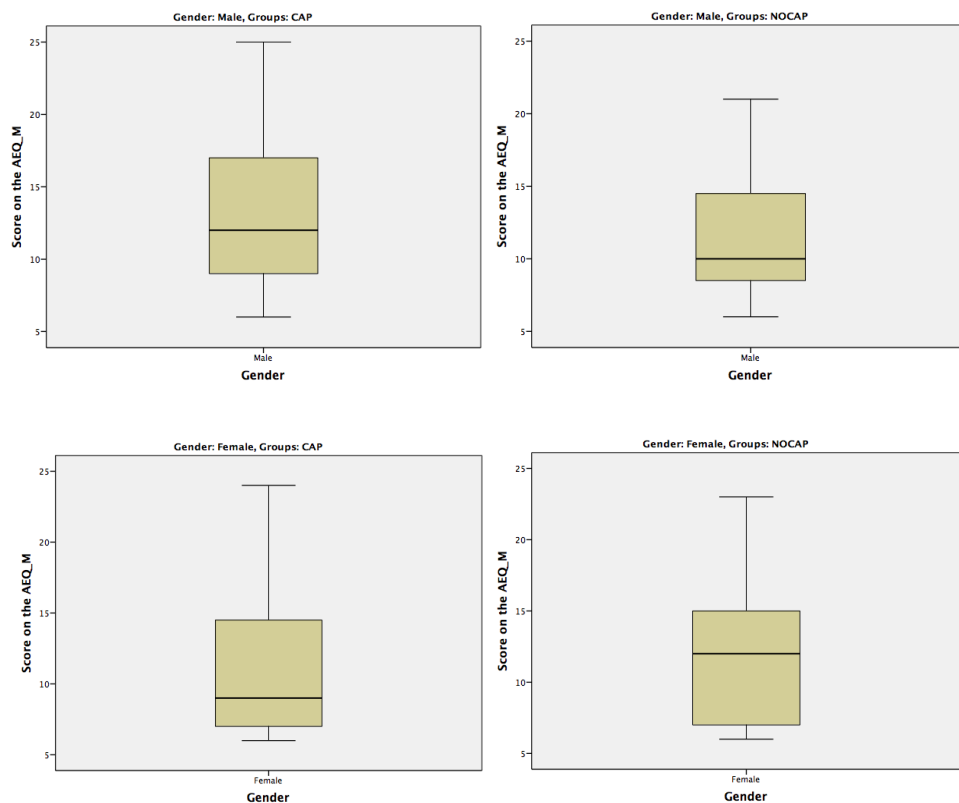*Figure 4.5*. Histograms for overall grouping and overall gender

Figure 4.6. Box-and-whisker plots for overall grouping and overall gender

      Equal variance assumed that the population distributions have the same variance. Levene's test was used to test the third hypothesis in order to determine if the error variance of the dependent variable is equal across groups in regards to overall grouping and overall gender. This assumption of the homogeneity of variance was found to be tenable based on the results of Levene's test of equality of error provided. The significance level produced was $p > 0.05$, which is a statistical indication assumption for variance was not violated, illustrating that the differences between the overall groups were not evident. Data screening for outliers was also conducted for the third null hypothesis by looking at the z-scores for the dependent variable. According to Warner (2013), z-scores can be used to detect outliers for normally distributed scores. When normality is assumed, about 99% of the scores should fall within ±3.0 standard

deviations from the sample mean (Warner, 2013). In this study, all z-scores were found to be acceptable because they fell within ±3.0.

Since there were no threats to initial variance and data screening did not indicate the presence of any outliers, the researcher proceeded to conduct the two-way ANOVA. An alpha level of 0.05 was used to test the third null hypothesis while conducting a two-way ANOVA. The researcher found there was no statistically significant interaction in the boredom levels, $F(1, 134) = 2.616$, $p > 0.05$, partial $\eta^2 = .02$, for overall grouping and overall gender (males CAPs $N = 30$, $M = 13.67$, $SD = 5.74$; males No CAPs $N = 27$, $M = 11.59$, $SD = 4.21$; females CAPs $N = 48$, $M = 11.23$, $SD = 5.71$; females No CAPs $N = 33$, $M = 12.12$, $SD = 4.88$). Therefore, the researcher failed to reject the third null hypothesis.

Null Hypothesis Four

H$_0$4: There is no statistically significant difference between the boredom levels of gifted and non-gifted sixth-grade students.

A two-way ANOVA was used to analyze the fourth null hypothesis that looked at the difference between the boredom levels of gifted and non-gifted sixth-grade students. A two-way ANOVA was used to analyze data for the fourth null hypothesis because RQ2 addressed two factors and a dependent variable, and each factor divided cases into two or more levels while the dependent variable described cases on a quantitative dimension (Gall et al., 2007), which makes it appropriate to test this hypothesis. RQ2 only has two hypotheses because the first technical hypothesis for RQ2 was already addressed by RQ1 in null hypothesis one. For the fourth hypothesis, the dependent variable, level of boredom, was measured using the scores obtained from the boredom scale of the AEQ-M with the CAPs serving as the independent variable as they pertain to overall giftedness. Table 4.10 contains descriptive statistics of the dependent

variable, scores on the AEQ-M, disaggregated by the independent variable as it pertains to overall giftedness for the fourth null hypothesis.

Table 4.10

Descriptive Statistics of Scores Obtained on the AEQ-M for Overall Giftedness

	N	Mean	Standard Deviation
Gifted	59	12.51	5.54
Non-gifted	79	11.70	5.10

Prior to conducting the two-way ANOVA for the fourth null hypothesis, assumption testing was completed. For level of measurement, it was assumed that the dependent variable was measured on an interval scale because the numerical value was known, as well as the order and the difference between two meaningful numerical values. This was confirmed by the scores on the AEQ-M ranging from a minimum score of six to a maximum score of 30, where order and value between each score was recordable. It was also assumed that all observations were independent; this was confirmed since each participant submitted one score each. The sample was assumed to be random and, for normality, it was assumed that the population distributions were normal. The assumption of normality was evaluated using the Kolmogorov-Smirnov test. For this hypothesis, the Kolmogorov-Smirnov test was used because $N > 50$ (Warner, 2013). Results indicated that normality for gifted and non-gifted at $p < 0.05$ could not be assumed; however, according to Warner (2013) the ANOVA is reasonably robust to violations of normality when the group sizes are similar. Table 4.11 shows the results for normality testing for the fourth null hypothesis.

Table 4.11

Normality Testing for Null Hypothesis Four

	Group	Komogorov-Smirnov Statistic	df	Sig.
AEQ-M	Gifted	0.120	59	0.035
	Non-gifted	0.162	79	0.000

Normality was also assessed using histograms, box-and-whisker plots, and analyzing the kurtosis and skew values in order to look for the presence of extreme outliers. Normality was confirmed after analyzing histograms for gifted ($N = 59$, $M = 12.51$, $SD = 5.54$) and non-gifted ($N = 79$, $M = 11.70$, $SD = 5.10$), which are displayed in Figure 4.7. These figures indicated that scores were positively skewed, which is acceptable due to the nature of the ANOVA being robust. The ANOVA can handle this type of skewness with only a small effect on the Type I error rate (Warner, 2013). Therefore, normality was assumed for overall giftedness. Normality was also confirmed on the box and-whisker plots for overall giftedness (gifted $N = 59$, $M = 12.51$, $SD = 5.54$; non-gifted $N = 79$, $M = 11.70$, $SD = 5.10$). Figure 4.8 shows the Box and Whisker plots for overall giftedness. Normality of data for overall giftedness was also adequate based on the kurtosis and skew values being close to zero.
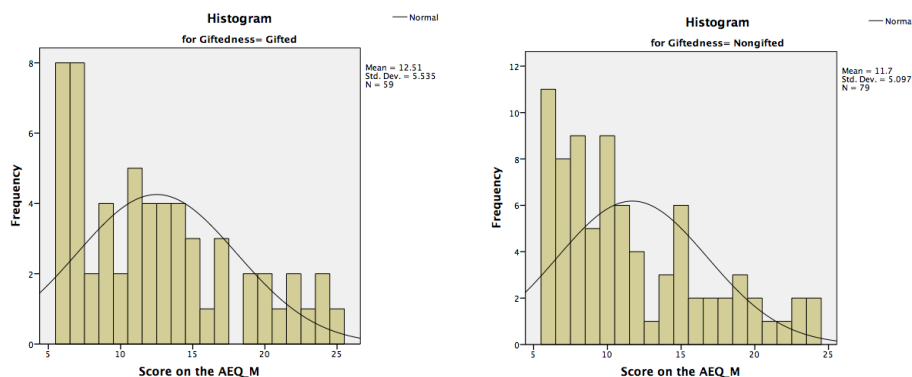
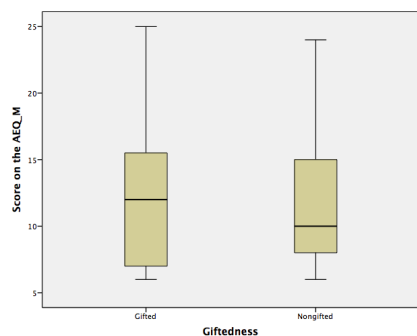*Figure 4.7*. Histograms for overall giftedness

Figure 4.8. Box and Whisker plots for overall giftedness

Equal variance assumed that the population distributions have the same variance. Levene's test was used to test the third hypothesis in order to determine if the error variance of the dependent variable is equal across groups in regards to overall grouping and overall gender. This assumption of the homogeneity of variance was found to be tenable based on the results of Levene's test of equality of error provided. The significance level produced was $p > 0.05$, which is a statistical indication assumption for variance was not violated. Data screening for outliers was also conducted for the fourth null hypothesis by looking at the z-scores for the dependent variable. According to Warner (2013), z-scores can be used to detect outliers for normally distributed scores. When normality is assumed, about 99% of the scores should fall within ±3.0 standard deviations from the sample mean (Warner, 2013). In this study, all z-scores were found to be acceptable because they fell within ±3.0.

Since there were no threats to initial variance and data screening did not indicate the presence of any outliers, the researcher proceeded to conduct the two-way ANOVA. An alpha level of 0.05 was used to test the fourth null hypothesis while conducting a two-way ANOVA. For the fourth null hypothesis, the researcher found there was no statistically significant difference between the boredom levels, $F(1, 134) = 1.044$, $p > 0.05$, partial $\eta^2 = .01$, of gifted (*N*

= 59, M = 12.51, SD = 5.54) and non-gifted (N = 79, M = 11.70, SD = 5.10) sixth-grade students. Therefore, the researcher failed to reject the fourth null hypothesis.

Null Hypothesis Five

$H_0$5: There is no statistically significant interaction in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages.

A two-way ANOVA was used to analyze the fifth null hypothesis that looked at the interaction in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive CAPs and those who do not receive CAPs. A two-way ANOVA was used to analyze data for the fifth null hypothesis because RQ2 addressed two factors and a dependent variable, and each factor divided cases into two or more levels while the dependent variable described cases on a quantitative dimension (Gall et al., 2007), which makes it appropriate to test this hypothesis. For the fifth hypothesis, the dependent variable, level of boredom, was measured using the scores obtained from the boredom scale of the AEQ-M with the CAPs serving as the independent variable in regards to overall grouping and overall giftedness. Table 4.12 contains descriptive statistics of the dependent variable, scores on the AEQ-M, disaggregated by the independent variable for overall grouping and overall giftedness for the fifth null hypothesis.

Table 4.12

Descriptive Statistics for Overall Grouping and Overall Giftedness

Giftedness	Grouping	N	Mean	Std. Deviation
Gifted	CAPs	22	13.27	6.75
	No CAPs	37	12.05	4.71
	Total	59	12.51	5.54
Non-gifted	CAPs	56	11.73	5.40
	No CAPs	23	11.61	4.39
	Total	79	11.70	5.10

Prior to conducting the two-way ANOVA for the fifth null hypothesis, assumption testing was completed. For level of measurement, it was assumed that the dependent variable was measured on an interval scale because the numerical value was known, as well as the order and the difference between two meaningful numerical values. This was confirmed by the scores on the AEQ-M ranging from a minimum score of six to a maximum score of 30, where order and value between each score was recordable. It was also assumed that all observations were independent; this was confirmed since each participant submitted one score each. The sample was assumed to be random and, for normality, it was assumed that the population distributions were normal. The assumption of normality was evaluated using the Kolmogorov-Smirnov test and the Shapiro-Wilk test. For this hypothesis, the Kolmogorov-Smirnov test was used for the non-gifted CAP group because $N > 50$ (Warner, 2013). The Shapiro-Wilk test was used for the gifted CAP group, the gifted No CAP group, and the non-gifted No CAP group because $N < 50$ (Warner, 2013). Results indicated that normality for the non-gifted No CAP group was tenable

and could be assumed because $p > 0.05$. However, the gifted CAP group, the gifted No CAP

group, and the non-gifted No CAP group resulted in $p < 0.05$ and, therefore, normality was not

tenable and could not be assumed. According to Warner (2013), the ANOVA is reasonably

robust to violations of normality when the group sizes are similar, so the researcher proceeded

with analyses. Table 4.13 shows the results for normality testing for the fifth null hypothesis.

Table 4.13

Normality Testing for Null Hypothesis Five

	Giftedness	Group	Kolmogorov-Smirnov or Shapiro-Wilk Statistic	df	Sig.
AEQ-M	Gifted	CAPs	0.872	22	0.008
		No CAPs	0.941	37	0.049
AEQ-M	Non-gifted	CAPs	0.179	56	0.000
		No CAPs	0.929	23	0.104

Normality was also assessed using histograms, box-and-whisker plots, and analyzing the kurtosis

and skew values in order to look for the presence of extreme outliers. Normality was confirmed

after analyzing histograms for overall grouping and overall giftedness (gifted CAPs $N = 22$, $M =$

13.27, $SD = 6.75$; gifted No CAPs $N = 37$, $M = 12.05$, $SD = 4.71$; non-gifted CAPs $N = 56$, $M =$

11.73, $SD = 5.40$; non-gifted No CAPs $N = 23$, $M = 11.61$, $SD = 4.39$), which are displayed in

Figure 4.9. These figures indicated that scores were positively skewed, which is acceptable due

to the nature of the ANOVA being robust. The ANOVA can handle this type of skewness with

only a small effect on the Type I error rate (Warner, 2013). Therefore, normality was assumed

for overall grouping and overall giftedness. Normality was also confirmed on the box-and-

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whisker plots for overall grouping and overall giftedness (gifted CAPs $N = 22$, $M = 13.27$, $SD = 6.75$; gifted No CAPs $N = 37$, $M = 12.05$, $SD = 4.71$; non-gifted CAPs $N = 56$, $M = 11.73$, $SD = 5.40$; non-gifted No CAPs $N = 23$, $M = 11.61$, $SD = 4.39$). Figure 4.10 shows the box-and-whisker plots for overall grouping and overall giftedness. Normality of data for overall grouping and overall giftedness was also adequate based on the kurtosis and skew values being close to zero.
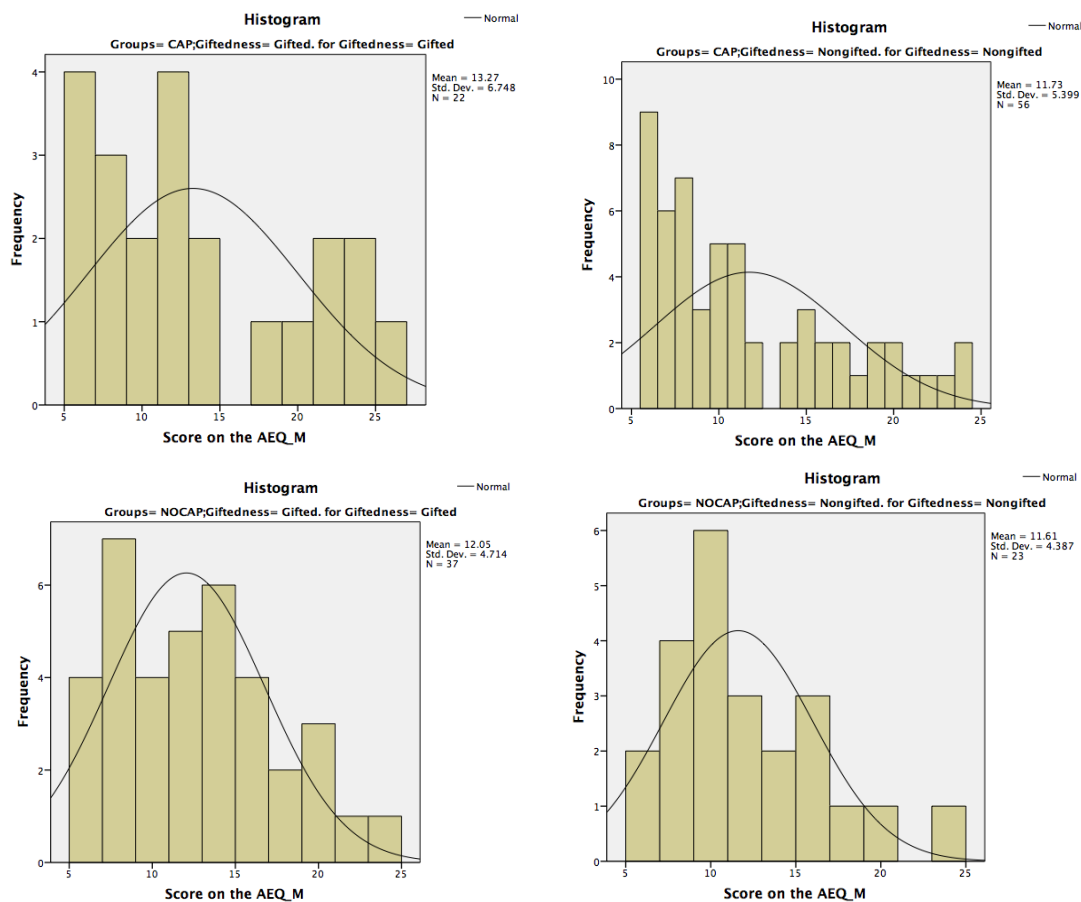

Figure 4.9. Histograms for overall grouping and overall giftedness
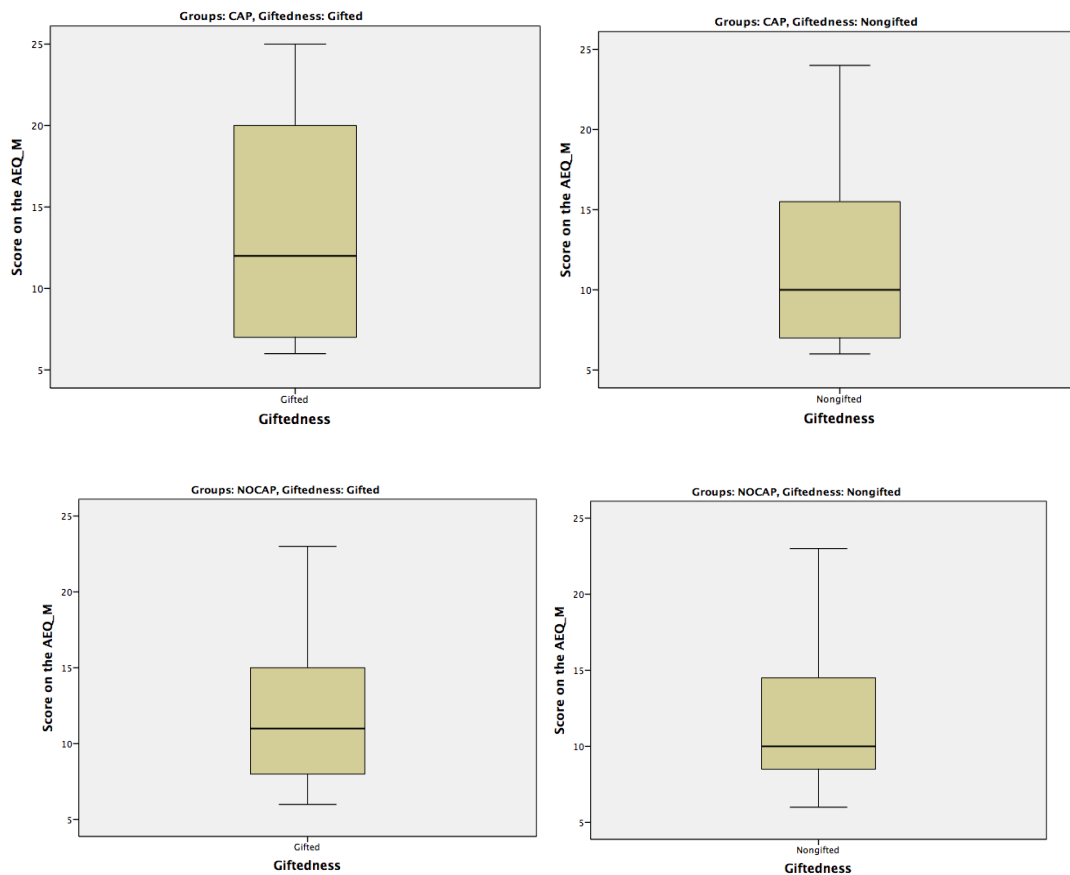
Figure 4.10. Box-and-whisker plots for overall grouping and overall giftedness

Equal variance assumed that the population distributions have the same variance. Levene's test was used to test the fifth hypothesis in order to determine if the error variance of the dependent variable is equal across groups in regards to overall grouping and overall giftedness. This assumption of the homogeneity of variance was found to be tenable based on the results of Levene's test of equality of error provided. The significance level produced was *p* > 0.05, which is a statistical indication assumption for variance was not violated. Data screening for outliers was also conducted for the fifth null hypothesis by looking at the z-scores for the dependent variable. According to Warner (2013), z-scores can be used to detect outliers for normally distributed scores. When normality is assumed, about 99% of the scores should fall

within ±3.0 standard deviations from the sample mean (Warner, 2013). In this study, all z-scores were found to be acceptable because they fell within ±3.0.

Since there were no threats to initial variance and data screening did not indicate the presence of any outliers, the researcher proceeded to conduct the two-way ANOVA. An alpha level of 0.05 was used to test the fifth null hypothesis while conducting a two-way ANOVA. The researcher found there was no statistically significant interaction in the boredom levels, $F(1, 134) = .318$, $p > 0.05$, partial $\eta^2 = .00$, for overall grouping and overall giftedness (gifted CAPs $N = 22$, $M = 13.27$, $SD = 6.75$; gifted No CAPs $N = 37$, $M = 12.05$, $SD = 4.71$; non-gifted CAPs $N = 56$, $M = 11.73$, $SD = 5.40$; non-gifted No CAPs $N = 23$, $M = 11.61$, $SD = 4.39$). Therefore, the researcher failed to reject the fifth null hypothesis.

Null Hypothesis Six

$H_0 6$: There is no statistically significant difference in the boredom levels of gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and gifted sixth-grade students who do not receive Contract Activity Packages.

A one-way ANOVA was used to analyze the sixth null hypothesis that looked at the difference between the boredom levels of gifted sixth-grade students who did and did not receive CAPs. A one-way ANOVA was used to analyze data for the sixth null hypothesis because RQ3 required that each individual or case had scores on two variables: a factor and a dependent variable. The factor divided individuals or cases into two or more groups or levels, while the dependent variable separated individuals on a quantifiable measure (Green & Salkind, 2011). The ANOVA F test was used to evaluate whether or not group means differed significantly from each other on the dependent variable. An overall ANOVA test will be conducted to determine whether or not means on a dependent variable differed significantly among groups (Gall et al.,

2007), which makes it appropriate to test this hypothesis. A one-way ANOVA is a generalization of the *t* test; a *t* test provides information about the distance between the means on a quantitative dependent variable for just two groups, where a one-way ANOVA compares means on a quantitative dependent variable across any number of groups. For this study, the independent variable, or categorical predictor variable, in the one-way ANOVA represented groups that had been previously formed and then exposed to different interventions (Warner, 2013). For the sixth hypothesis, the dependent variable, level of boredom, was measured using the scores obtained from the boredom scale of the AEQ-M with the CAPs serving as the independent variable as they pertain the gifted group. Table 4.14 contains descriptive statistics of the dependent variable, scores on the AEQ-M, disaggregated by the independent variable as it pertains to the gifted group for the sixth null hypothesis.

Table 4.14

Descriptive Statistics of Scores Obtained on the AEQ-M for the Gifted Group

	N	Mean	Standard Deviation
CAPs	22	13.27	6.75
No CAPs	37	12.05	4.71

Prior to conducting the one-way ANOVA for the sixth null hypothesis, assumption testing was completed. For level of measurement, it was assumed that the dependent variable was measured on an interval scale because the numerical value was known, as well as the order and the difference between two meaningful numerical values. This was confirmed by the scores on the AEQ-M ranging from a minimum score of six to a maximum score of 30, where order and value between each score was recordable. It was also assumed that all observations were

independent; this was confirmed since each participant submitted one score each. The sample

was assumed to be random and, for normality, it was assumed that the population distributions

were normal. The assumption of normality was evaluated using the Shapiro-Wilk test. For this

hypothesis, the Shapiro-Wilk test was used because $N < 50$ (Warner, 2013). Results indicated

that normality for the gifted CAPs group and the gifted No CAPs group at $p < 0.05$ could not be

assumed. According to Warner (2013), the ANOVA is reasonably robust to violations of

normality when the group sizes are similar, so the researcher proceeded with the analyses. Table

4.15 shows the results for normality testing for the sixth null hypothesis.

Table 4.15

Normality Testing for Null Hypothesis Six

	Group	Shapiro-Wilk Statistic	df	Sig.
AEQ-M	CAPs	0.872	22	0.008
	No CAPs	0.941	37	0.049

Normality was also assessed using histograms, box-and-whisker plots, and analyzing the kurtosis

and skew values in order to look for the presence of extreme outliers. Normality was confirmed

after analyzing histograms and box-and-whisker plots for the gifted CAPs group ($N = 22$, $M =$

13.27, $SD = 6.75$) and the gifted No CAPs group ($N = 37$, $M = 12.05$, $SD = 4.71$), which are

displayed in Figure 4.11 and 4.12. These figures indicated that scores were positively skewed,

which is acceptable due to the nature of the ANOVA being robust. The ANOVA can handle this

type of skewness with only a small effect on the Type I error rate (Warner, 2013). Therefore,

normality was assumed for each of the two gifted groups. Normality of data for the gifted CAPs

group and the gifted No CAPs group was also adequate based on the kurtosis and skew values
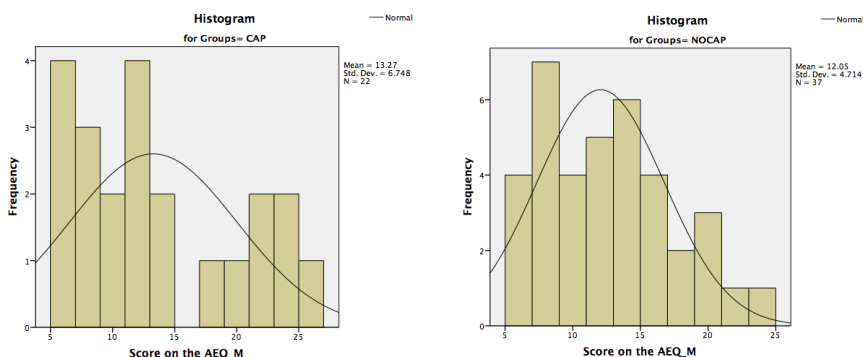
being close to zero.

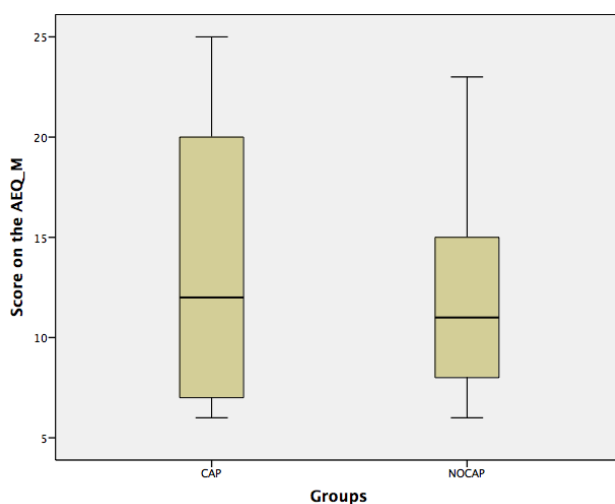

Figure 4.11. Histograms for the gifted group

Figure 4.12. Box-and-whisker plots for the gifted group

Equal variance assumed that the population distributions have the same variance.

Levene's test was used to test the sixth hypothesis in order to determine if the error variance of

the dependent variable is equal across groups. This assumption of the homogeneity of variance

was found to not be tenable based on the results of Levene's test of equality of error provided.

The significance level produced was $p < 0.05$, which is a statistical indication assumption for

variance was violated, illustrating that the differences between the overall groups were evident.

Data screening for outliers was also conducted for the sixth null hypothesis by looking at the z-scores for the dependent variable. According to Warner (2013), z-scores can be used to detect outliers for normally distributed scores. When normality is assumed, about 99% of the scores should fall within ±3.0 standard deviations from the sample mean (Warner, 2013). In this study, all z-scores were found to be acceptable because they fell within ±3.0.

Although there were threats to initial variance, data screening procedures did not indicate the presence of any outliers, so the researcher proceeded with the analysis portion of the study by conducting the one-way ANOVA. An alpha level of 0.05 was used to test the sixth null hypothesis while conducting a one-way ANOVA. For the sixth null hypothesis, the researcher found there was no statistically significant difference in the boredom levels, $F(1, 57) = .665, p > 0.05$, partial $\eta^2 = .01$, of gifted sixth-grade students participating in an accelerated math class who receive CAPs ($N = 22, M = 13.27, SD = 6.75$) and gifted sixth-grade students who do not receive CAPs ($N = 37, M = 12.05, SD = 4.71$). Therefore, the researcher failed to reject the sixth null hypothesis.

Summary

Three research questions were used to determine if any significant differences existed for six null hypotheses. For RQ1 and RQ2, a two-way ANOVA was used and yielded no significant findings. The researcher determined there was no significant difference in boredom levels of male and female sixth-grade students participating in an accelerated math class who received and did not receive CAPs. The researcher also determined there was no significant difference in boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who received and did not receive CAPs. For RQ3, a one-way ANOVA was used and yielded no significant findings. The researcher determined there was no significant difference in

the boredom levels of gifted sixth-grade students participating in an accelerated math class who received and did not receive CAPS.

CHAPTER FIVE: CONCLUSIONS

Overview

Since little was known about implementing Contract Activity Packages (CAPs) into a sixth-grade accelerated math class and the boredom levels of those sixth-grade students, the current study sought to contribute to the existing field of research as it pertains to boredom in the classroom setting. A study on boredom and the implementation of CAPs was important because the existence of boredom could be hindering educators' ability to meet the needs of students and the ability for students to be successful in the academic setting. This may be remedied with the implementation of CAPs. Chapter Five provides a discussion of the researcher's findings after performing various analyses, the researcher's implications, limitations that surfaced during the study, and the researcher's recommendations for future research.

Discussion

The purpose of this quasi-experimental static-group comparison study was to test the control-value theory relating the level of boredom experienced by sixth-grade students participating in an accelerated math class with and without the use of CAPs. CAPs were used because they allow students placed in a classroom setting to demonstrate various levels of mastery about what they have been learning while working at their own pace (Russo, 2009). Allowing students to obtain a level of mastery while working at their own, comfortable pace is an essential component of the control-value theory as it pertains to activity-related emotions, such as boredom, and is directly influenced by mastery goals (Pekrun & Stephens, 2009). Overall analyses concluded no significant difference in mean scores existed between gender, nor did it exist between overall giftedness. Essentially, the implementation of CAPs did not contribute to a significant difference between mean scores obtained from the boredom scale of

the Achievement Emotions Questionnaire – Mathematics (AEQ-M) for any of the six hypotheses used in the study.

Research Question One

RQ1: Is there a significantly significant difference in the boredom levels of male and female sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

Three null hypotheses were analyzed for RQ1 and the researcher failed to reject each one. Results suggest that the achievement emotion of boredom was present for the groups that did and did not receive the CAPs. The control-value theory implies appraisals of both control and value are necessary components for an achievement emotion, such as boredom, to be initiated (Pekrun, Frenzel, Goetz, & Perry, 2007). Even though the researcher failed to reject all three null hypotheses for RQ1, results indicated that mean scores for the treatment group were higher when compared to the control group. These results contradict prior research as it pertains to CAPs, which have been used to reduce frustration, anxiety, and boredom while raising the level of engagement (Russo, 2009). These results could suggest that the treatment group preferred learning the mathematical concept covered in the CAPs in a teacher-centered classroom setting as opposed to a student-centered one. Results could also suggest that the CAPs simply did not engage students in the learning process, or that they were poorly constructed, suggesting the CAPs ignited an emotional engagement that contributed to various negative reactions in the classroom, such as boredom (Fredricks, Blumenfeld, & Paris, 2004). For RQ1, the treatment group recorded higher mean scores as compared to the control group, which implies they were more bored and, possibly, less engaged during the learning process and while completing the CAPs. Scores for the level of boredom recorded by both the treatment and control groups was

low and positively skewed, suggesting the presence of engagement on some level. This level of engagement could be contributed to the school environment promoting engagement, such as the structural and regularity environment portrayed at each school site (Finn & Voelkl, 1993).

Results for RQ1 also indicated that males experienced a higher level of boredom compared to females. Since students possess a strong desire to have control of their learning situations and environments (Kanevsky & Keighley, 2003), results suggest that females might be better able to control their emotions as they pertain to boredom in a classroom setting. Research has found that gender differences play a major role on influencing self-choices, self-perceptions, and values (Janis, Davis-Kean, Bleeker, Eccles, & Malanchuk, 2005). Prior research has labeled females with having low levels of spatial ability, math confidence, and overall math ability, which is typically accompanied with higher levels of math anxiety. This same research noted higher enrollment of males in advanced math classes (Gallagher & Kaufman, 2005), which was not the case for the current study. Results from the current study compared the mean scores of 81 females to 57 males all enrolled in an accelerated math class. There were more females enrolled in the sixth-grade accelerated math classes used in this study and, according to mean scores, females were less bored. Results also showed lower mean scores for the females in regards to the level of boredom experienced in the classroom setting, which suggests they felt more confident while learning the math concept that was being covered, yet another contradiction to prior research. Prior research has stated that females tend to be less confident of their overall math abilities and often attribute their success to luck rather than natural, learned ability (Catsambias, 2005).

Results from the current study also showed that males who received the CAPs recorded the highest mean scores in regards to the level of boredom experienced, which means this

particular group was more bored when compared to all other groupings, but not to a significant degree. In the control-value theory, learning activities can ignite various achievement emotions, such as boredom, brought on due to a number of task-related demands (Pekrun et. al, 2007), such as the implementation of CAPs. Even though males receiving the CAPs recorded the highest mean scores, the researcher is not able to support this aspect of the control-value without a significant difference in mean scores. Although CAPs are designed to foster independence and reduce frustration while promoting engagement and lowering the presence of boredom (Russo, 2009), results from the current study appear to be going in the direction to contradict this notion due to the high mean scores obtained from males. A high score on the boredom scale of the AEQ-M implies that male participants were more bored in the classroom setting due to the implementation of CAPS, but not to a significant degree. Another interesting finding from this study revealed that females in the CAPs group experienced the lowest level of boredom, which means this particular group was less bored when compared to all other groupings. Since CAPs allow students to choose resources to explore while mastering a certain objective (Dunn & Dunn, 1978), and Gentry, Gable, and Springer (2000) found choice to be a powerful method one could use to motivate students, results from the current study suggest that CAPs might be more effective for females due to the low scores they recorded. A low score on the boredom scale of the AEQ-M implies that female participants were less bored in the classroom setting due to the implementation of CAPS which provided them with choice while mastering a certain objective, but not to a significant degree. With the perceived societal stereotype that females are less capable in an advanced math class when compared to their male counterparts, results from the study further suggest that the preconceived notion of the existence of a gender gap in the field of mathematics (Catsambias, 2005) could be closing in.

Research Question Two

    RQ2: Is there a significantly significant difference in the boredom levels of gifted and non-gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages?

    Two null hypotheses were analyzed for RQ2 and the researcher failed to reject each one. Results showed that gifted students experienced higher levels of boredom when compared to their non-gifted peers. This result is important to the field of education due to the lack of research on the "inconspicuous, 'silent' emotion" (Preckel, Götz, & Frenzel, 2010, p. 454) of boredom. Several studies support the notion that gifted students are bored in a regular education setting (Acee et al., 2010; Ahmed, Van der Werf, Kuyper, & Minnaert, 2013; Preckel et al., 2010). Other studies suggested the need for more research on the levels of boredom experience by advanced students placed in an advanced academic environment (Preckel et al., 2010; Siegle, Wilson, & Little, 2013; Steenbergen-Hu & Moon, 2011; Vaughn, Feldhusen, & Asher, 1991; Young, Worrell, & Gabelko, 2011), such as an accelerated math class. Results from the current study show that gifted students placed in an advanced math class designed to meet their challenging academic needs are still experiencing higher levels of boredom when compared to their non-gifted peers, although not to a significant degree. This result indicates that factors other than the type of class in which gifted students are enrolled are contributing to the level of boredom they are experiencing. These factors could be classroom environment, school environment, teacher effectiveness, available classroom resources, or rigor of the presented lesson. It is important to note that although the gifted group experienced higher levels of boredom, both the gifted and the non-gifted group recorded low mean scores on the boredom scale of the AEQ-M. These low mean scores indicate that although the presence of boredom was

detected, it was very low, meaning they were not often bored in the math classroom. Without a significant difference between the means, the researcher is not able to claim that this result supports the control-value theory where it states that emotions can be controlled once control and value are placed on an achievement emotion once it is activated (Pekrun et al., 2007).

For RQ2, results also showed that gifted students who received the CAPs recorded the highest mean scores in regards to the level of boredom experienced, which means this particular group was more bored when compared to all other groupings. This result supports the control-value theory, though not to a significant degree. In the control-value theory certain learning activities can ignite various achievement emotions, such as boredom, brought on due to a number of task-related demands (Pekrun et. al, 2007), such as the implementation of CAPs. The effects of achievement emotions on students' daily instructional routines and procedures depends on the interplay of such mechanisms and interactions with various task demands, which directly affects motivational processes (Lichtenfeld, Pekrun, Stupnisky, Reiss, & Murayama, 2012; Pekrun, 2006; Pekrun & Stephens, 2009) and could contribute to higher levels of boredom experienced in the classroom setting. Although CAPs are designed to foster independence and reduce frustration while promoting engagement and lowering the presence of boredom (Russo, 2009), results from the current study contradict this notion, though not to a significant degree. Gifted students in the CAPs group experiencing the highest levels of boredom could suggest that gifted students prefer to be challenged in a more traditional teacher-centered classroom setting, or that they prefer a different type of instructional implementation other than a CAP in order to master a given objective. Research supports the claim that gifted students yearn for a challenging classroom environment and portray challenging learning environments as essential components for optimal learning and overall quality of education (Gentry, Gable, & Springer, 2000).

Another interesting finding from this study revealed that non-gifted students in the group that did not receive the CAPs experienced the lowest levels of boredom, which means this particular group was less bored when compared to all other groupings. Perhaps non-gifted students placed in a subject-area accelerated math class, the most commonly used form of acceleration (Rogers & Kimpston, 1992), are more engaged because their academic needs are being met.

Research Question Three

RQ3: Is there a statistically significant difference in the boredom levels of gifted sixth-grade students participating in an accelerated math class who receive Contract Activity Packages and gifted sixth-grade students who do not receive Contract Activity Packages?

One null hypothesis was analyzed for RQ3 and the researcher failed to reject it. Results showed that gifted students who received the CAPs recorded the highest mean scores in regards to the level of boredom experienced, which means this particular group was more bored when compared to gifted students that did not receive the CAPs. This result supports the control-value theory, though not to a significant degree. The control-value theory is supported in terms of how certain learning activities can ignite various achievement emotions, such as boredom, brought on due to a number of task-related demands (Pekrun et. al, 2007), such as the implementation of CAPs. The effects of achievement emotions on students' daily instructional routines and procedures depends on the interplay of such mechanisms and interactions with various task demands, which directly affects motivational processes (Lichtenfeld et al., 2012; Pekrun, 2006; Pekrun & Stephens, 2009) and could contribute to higher levels of boredom experienced in the classroom setting. CAPs are designed to capitalize on each student's strengths and interests, all while providing choice, control, and challenge to the student (Russo, 2009). Results from the current study indicate that gifted students are more bored when they complete a CAP covering a

math standard as compared to other gifted students learning the same math standard in a traditional teacher-directed classroom setting. CAPs allow students in the same class to learn identical concepts and objectives in differentiated ways while demonstrating gained and self-created knowledge creatively through the development of traditional instructional resources (Russo, 2009). The use of CAPs has been more successful in motivating the gifted learner because the gifted learner typically prefers to learn through independent study (Caraisco, 2007). However, results from this study contradict this claim, though not to a significant degree. These results suggest that gifted students actually experience higher levels of boredom when they are allowed to self-pace through a given mathematical concept, thus suggesting they prefer a more teacher-centered classroom environment.

Before this study began, little was known about implementing CAPs into a sixth-grade accelerated math class and boredom levels. This study took gender and overall giftedness into consideration based on findings and conclusions from prior research in order to add to the existing field of research while closing any current gaps that existed on boredom. While there may be extensive research supporting boredom, there was a lack of research aimed at determining the boredom level experienced by sixth-grade students participating in an accelerated math class, as well as suitable strategies aimed at helping these students avoid the "inconspicuous, 'silent' emotion" (Preckel et al., 2010, p. 454) of boredom. There was also a lack of research that existed on the association of giftedness and boredom levels. A study on the achievement emotion of boredom was important to the researcher because this particular emotion is typically linked to advanced students placed in a regular education setting. Prior studies suggested that more research was needed to determine if boredom was also experienced when advanced students were placed in an advanced learning environment (Preckel et al., 2010; Siegle

et al., 2013; Steenbergen-Hu & Moon, 2011; Vaughn et al., 1991; Young et al., 2011). One such environment could be a sixth grade accelerated math class. Since math is a critical needs area, analyzing the "inconspicuous, 'silent' emotion" (Preckel et al., 2010, p. 454) of boredom in this content area was important to study and analyze so educators would be better able to meet the needs of their students. The problem encompassing the current study is that the existence of boredom in the educational setting may be hindering educators' ability to meet the needs of students and the ability for students to be successful in the academic setting (Frenzel, Pekrun, & Goetz, 2007).

Results from the study concluded no significant differences for any of the six tested hypotheses. Although no significant differences were found while analyzing mean differences for gender and overall giftedness, the researcher was still able to draw some pertinent conclusions from the mean scores that were recorded. Scores obtained from the boredom scale of the AEQ-M that were low, or closer to six, revealed low levels of boredom from participants. Scores obtained from the boredom scale of the AEQ-M that were high, or closer to 30, revealed high levels of boredom from participants. All mean scores yielded results less than 14, which on a scale from six to 30, means that although boredom was detected, those levels were still low. A low mean score indicates that participants experienced low levels of boredom, which was true for all analyses. Although engagement was not measured in this study, this result suggests that participants might have exhibited some level of engagement in the classroom setting. One factor that holds appraisal and value for promoting math achievement in the academic setting is engagement in the learning process (Robinson & Mueller, 2014). Results from the study indicated that males experienced higher levels of boredom when compared to females. Results from the study also indicated that males in the CAPs group experienced higher levels of boredom

when compared to all other groupings. The aforementioned conclusions are pertinent to existing research on gender differences that suggest motivational factors necessary for persistence in the advanced study of mathematics revolve around external encouragement, internal confidence, and expectation of eventual rewards in employment (Chipman, 2005). Another conclusion was drawn as it pertains to overall giftedness, where results showed that gifted students, more specifically gifted students in the CAPs group, experienced higher levels of boredom when compared to all other groupings. This result is pertinent to existing research on gifted and talented students. When compared to their classmates, gifted and talented learners conceptualize and internalize information in five very distinct, different ways (Caraisco, 2007). Gifted and talented students learn new material in much less time when compared to others and have the innate ability to remember what they have learned, perceive ideas and concepts at more abstract levels, become keenly interested in specific topics, and possess the ability to attend to many activities at the same time. The ability to learn and conceptualize new material differently from their classmates presents the perfect opportunity for gifted and talented students to take advantage of various forms of differentiated instruction in order to maximize the learning process while staying engaged (Caraisco, 2007). Results from this study suggest that although gifted and talented students prefer to learn and conceptualize new material in a differentiated way, they might not prefer to do so with the use of CAPs. The same can be said for gifted students in the CAPs group, who yielded higher levels of boredom when compared to their gifted peers who were not in the CAPs group.

Implications

The current literature has not adequately addressed the level of boredom experienced by sixth-grade students participating in an accelerated math class. Although current literature

addresses successful strategies aimed at combatting levels of boredom by differentiating curriculum (Johnson, 2008), a lack of evidence existed as to whether or not levels of boredom could be linked to the implementation of these successful strategies based on gender and overall giftedness. The scope of this study was examining whether or not the implementation of CAPs in to a sixth grade accelerated math class created lower levels of boredom obtained from the boredom scale of the AEQ-M. While no significant differences were found, this study adds to the existing body of literature in two ways. First, when considering the placement of advanced students in an advanced learning environment, results showed that students are still experiencing boredom in these particular environments based on mean scores collected. Results also showed that even though a differentiation strategy was presented, students still experienced boredom in the advanced classroom setting. Mean scores obtained from the boredom scale of the AEQ-M suggest that CAPs might not be a sufficient way to deter boredom in an advanced class, or, perhaps, that the CAPs were not designed to effectively meet the needs of the advanced learner. Results suggest the need for more research on differentiation strategies that will create lower levels of boredom.

Second, males appear to be experiencing higher levels of boredom when compared to females. Catsambias (2005) describes the math gender gap as step function, with male students outperforming female students in every imaginable aspect. Results from this study add to this body of literature because the majority of students in the study were female and the females recorded lower levels of boredom as compared to their male classmates. Since effort, involvement, and mentoring play a part in the existence of gender differences in math (Chipman, 2005), results from the study could be used to shed light on the fact that the preconceived notion of the existence of a gender gap in the field of mathematics (Catsambias, 2005) could be closing.

Limitations

Limitations existed for the current study. First, the overall generalizability of the results from this study are narrow and only specific to the target population. The implications from this study must be analyzed through the lens of the limitations that existed.

Second, the current study had an experimenter effect (Gall, Gall, and Borg, 2007). Since results indicated higher levels of boredom for the CAPs group, there is a possibility that an experimental treatment was ineffective because of the way the CAPs were created and constructed by the researcher. The researcher determined which mathematical concept would be covered in the CAPs, the way in which it would be covered, and the extent to which it would be covered, which might have affected the results in this study. The presence of this effect limits the ability to generalize findings.

A third limitation was the concept chosen by the researcher for the CAPs. The researcher determined which mathematical concept would be covered in the CAPs, the way in which it would be covered, and the extent to which it would be covered, which might have effected the results in this study. The concept presented in the CAPs, converting between fractions, decimals, and percents, is a more rigorous sixth grade mathematical standard. Since CAPs allow students to self-pace through investigation of a particular concept, it is possible the researcher chose a mathematical concept that would be better taught as a teacher-centered lesson as opposed to a student-centered one.

Recommendations for Future Research

One recommendation for future research would be to analyze the contributing factors of boredom for gifted students. Results from this study suggest that gifted students are more bored in the classroom when compared to their non-gifted peers, so a study that focuses on the

examination of the contributing factors of boredom for gifted and talented students would be important to the field of education. Results from this study also suggest that more attention is needed in regards to the contributing factors of boredom for males in the math classroom. Since there is little existing research on boredom, a research study that focuses on the boredom levels of males or on the boredom levels of gifted students would be pertinent to building the field of research on the achievement emotion of boredom in order to help educators better understand how to meet the needs of their students.

A second recommendation for future research would be to conduct the current study again, but as a qualitative study. A qualitative study allows the researcher the opportunity to interview participants to gain their perspective on whether or not they thought the implementation of CAPs helped to lower the level of boredom they experienced in the classroom. Gaining the perspective of the learner in the classroom is a key component to understanding when students are bored, why they are bored, and strategies that would help lower or eliminate the overall presence of boredom (Nett, Goetz, & Hall, 2011).

A third recommendation for future research would be to analyze the boredom levels of participants with the use of a pre-test and a post-test. Assessing levels of boredom via a pre-test would give the researcher a better idea of how bored students were before any type of implementation was presented. It would be important to analyze boredom levels at the beginning and end of a study in order to strengthen the results and findings of the study. Using a pre-test would help eliminate any initial differences that might already exist (Gall et. al, 2007).

A fourth recommendation for future research would be to implement other educational strategies to see if they could create lower levels of boredom. In the current study, CAPs were used and were found to have no significant effect in creating lower levels of boredom for

participants in various groups. Future research needs to address other strategies that could help eliminate the presence of boredom in the classroom setting. This future research on successful strategies that create lower levels of boredom should take in to consideration the boredom levels of gifted and talented students, as well as male students.

A fifth recommendation for future research would be to redesign the CAPs with a new math standard. There is a possibility that the CAPs were not effectively designed, which could have affected the results. There is also the possibility that the math standard that was covered in the CAPs was not an appropriate choice. The math standard that was used in the implemented CAPs is one of the more difficult sixth grade concepts and requires more explanation from the educator in the classroom. A future study could redesign the CAPs by using a more simplistic and less evasive sixth grade math concept.

Summary

No significant difference of mean scores was detected for the current study, regardless of gender or overall giftedness. Data suggest that future research should be aimed at examining the factors that contribute to boredom in the classroom setting. Future research should also be aimed at determining if initial levels of boredom exist, as well as successful strategies for lowering those detected levels of boredom. Although implications from the study are presented, each should be approached with caution due to the limitations that existed. Three research questions were used in the current study and all yielded no significant findings. Thus, it is quite difficult for the researcher to fully contradict or support previous research on the achievement emotion of boredom in regards to gender and overall giftedness.

References

Acee, T. W., Kim, H., Kim, H. J., Kim, J., Chu, H. R., Kim, . . . Wicker, F. W. (2010). Academic boredom in under- and over-challenging situations. *Contemporary Educational Psychology, 35*(1), 17–27. doi:10.10l6/j.cedpsych.2009.08.002

Ahmed, W., Van der Werf, G., Kuyper, H., & Minnaert, A. (2013). Emotions, self-regulated learning, and achievement in mathematics: A growth curve analysis. *Journal of Educational Psychology, 105*(1), 150–161. doi:10.1037/a0030160

BCSS. (2014). Community and School District Profile. Retrieved from http://www.bartow.k12.ga.us/education/components/scrapbook/default.php?sectiondetaili d=20876

Caraisco, J. (2007). Overcoming lethargy in gifted and talented education with contract activity packages "I'm choosing to learn!" *Clearing House*, *80*(6), 255–259. doi:10.3200/tchs.80.6.255-260

Catsambias, S. (2005). The gender gap in mathematics: Merely a step function? In A. M. Gallagher & J. C. Kaufman (Eds.), *Gender differences in mathematics: An integrative psychological approach* (pp. 220–245). New York, NY: Cambridge University Press.

Chipman, S. F. (2005). Research on the women and mathematics issue: A personal case history. In A. M. Gallagher & J. C. Kaufman (Eds.), *Gender differences in mathematics: An integrative psychological approach* (pp. 1–24). New York, NY: Cambridge University Press.

Colangelo, N., Assouline, S. G., Marron, M. A., Castellano, J. A., Clinkenbeard, P. R., Rogers, K., . . . Smith, D. (2010). Guidelines for developing an academic acceleration policy. *Journal of Advanced Academics*, *21*(2), 180–203. doi:10.1177/1932202x1002100202

Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Thousand

    Oaks, CA: Sage.

Daschmann, E. C., Goetz, T., & Stupnisky, R. H. (2014). Exploring the antecedents of boredom:

    Do teachers know why students are bored? *Teaching and Teacher Education, 39*, 22–30.

    doi:10.1016/j.tate.2013.11.009

Dunn, R., & Dunn, K. (1978). *Teaching students through their individualized learning styles: A*

    practical approach (1st ed.). Reston, VA: Reston Publishing Company, Inc.

Finn, J. D., & Voelkl, K. E. (1993). School characteristics related to student engagement.

    Journal of Negro Education, 62(3), 249–268. doi:10.2307/2295464

Fraenkel, J. R., & Wallen, N. E. (2006). *How to design and evaluate research in education*. New

    York, NY: McGraw-Hill Companies, Inc.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the

    concept, state of the evidence. *Review of Educational Research, 74*(1), 59–109.

    doi:10.3102/00346543074001059

Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Girls and mathematics — A "hopeless" issue? A

    control-value approach to gender differences in emotions towards mathematics.

    European Journal of Psychology of Education, 22(4), 497–514. doi:10.1007/bf03173468

Furner, J. M., & Gonzalez-DeHass, A. (2011). How do students' mastery and performance goals

    relate to math anxiety? *EURASIA Journal of Mathematics, Science & Technology*

    Education, 7(4), 227-242. doi:10.12973/eurasia.2019

Gall, D. G., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction* (8th ed.).

    Boston, MA: Pearson.

Gall, J. P., Gall, M. D., & Borg, W. R. (2010). *Applying educational research: A practical guide* (6th ed.). New York, NY: Pearson.

Gallagher, A. M., & Kaufman, J. C. (2005). Gender differences in mathematics: What we know and what we need to know. In A. M. Gallagher & J. C. Kaufman (Eds.), *Gender differences in mathematics: An integrative psychological approach* (pp. 316–331). New York, NY: Cambridge University Press.

Gasser, K. W. (2011). Five ideas for 21st century math classroom. *American Secondary Education, 39*(3), 108–116. Retrieved from http://www.jstor.org/stable/23100426

Gentry, M., Gable, R. K., & Springer, P. (2000). Gifted and nongifted middle school students: Are their attitudes toward school different as measured by the new affective instrument, My Class Activities—? *Journal for the Education of the Gifted*, *24*(1), 74–95. doi:10.1177/016235320002400104

Goetz, T., Preckel, F., Zeidner, M., & Schleyer, E. (2008). Big fish in big ponds: A multilevel analysis of test anxiety and achievement in special gifted classes. *Anxiety, Stress & Coping, 21*(2), 185–198. doi:10.1080/10615800701628827

Green, S. B., & Salkind, N. J. (2011). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (6th ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.

Hanushek, E. A., Peterson, P. E., & Woessmann, L. (2011). Teaching math to the talented. *Education Next*, *11*(1), 10-18. Retrieved from http://educationnext.org/teaching-math-to-the-talented/

Janis, E. J., Davis-Kean, P., Bleeker, M., Eccles, J. S., & Malanchuk, O. (2005). I can, but I don't want to: The impact of parents, interests, and activities on gender differences in math. In A. M. Gallagher & J. C. Kaufman (Eds.), *Gender differences in mathematics: An*

integrative psychological approach (pp. 246–263). New York, NY: Cambridge University Press.

Johnson, A. (2008). Internet Strategies for Gifted Students. *Gifted Child Today, 31*(2), 58. doi:10.4219/gct-2008-754

Kanevsky, L., & Keighley, T. (2003). To produce or not to produce? Understanding boredom and the honor in underachievement. *Roeper Review*, *26*(1), 20–28. doi:10.1080/02783190309554235

KBB School Recycling Program (2014). Bartow County Georgia. Retrieved from http://www.bartowga.org/index.php?option=com_content&view=category&layout=blog &id=76&Itemid=336&limitstart=2

Kesici, S., & Erdogan, A. (2010). Mathematics anxiety according to middle school students' achievement motivation and social comparison. *Education, 131*(1), 54–63. Retrieved from http://go.galegroup.com.ezproxy.liberty.edu/ps/i.do?p=AONE&u=vic_liberty&id= GALE%7CA239813824&v=2.1&it=r&sid=summon&authCount=1#

Legg, A., & Locker, L. (2009). Math performance and its relationship to math anxiety and metacognition. *North American Journal of Psychology, 11*(3), 471–485. Retrieved from https://www.researchgate.net/profile/Angela_Legg/publication/264622690_Math_perfor mance_and_its_relationship_to_math_anxiety_and_metacognition/links/55194b500cf21b 5da3b828e2.pdf

Lichtenfeld, S., Pekrun, R., Stupnisky, R. H., Reiss, K., & Murayama, K. (2012). Measuring students' emotions in the early years: The Achievement Emotions Questionnaire – Elementary School (AEQ – ES). *Learning and Individual Differences, 22*(2), 190–201. doi:10.1016/j.lindif.2011.04.009

Marikyan, G. (2009). Notes on math anxiety among students: Cause-and-effect, pro-and-con. *International Journal of Learning, 16*(1), 211–221. doi:10.18848/1447-9494/cgp/v16i01/46095

Mogensen, A. (2011). The proficiency challenge: An action research program on teaching of gifted math students in grades 1-9. *Montana Mathematics Enthusiast, 8*(1/2), 207–225. Retrieved from http://scholarworks.umt.edu/cgi/viewcontent.cgi?article=1213& context=tme

Morrison, M. (2011). Math tracks: What pace in math is best for the middle school child? *Montessori Life*, *23*(4), 26-35. Retrieved from http://search.proquest.com. ezproxy.liberty.edu/docview/906522589?pq-origsite=summon&accountid=12085

Nett, U. E., Goetz, T., & Daniels, L. M. (2010). What to do when feeling bored? Students' strategies for coping with boredom. *Learning & Individual Differences*, *20*(6), 626–638. doi:10.1016/j.lindif.2010.09.004

Nett, U. E., Goetz, T., & Hall, N. C. (2011). Coping with boredom in school: An experience sampling perspective. *Contemporary Educational Psychology*, *36*(1), 49–59. doi:10.1016/j.cedpsych.2010.10.003

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*(4), 315–341. doi:10.1007/s10648-006-9029-9

Pekrun, R., Frenzel, A. C., Goetz, T., & Perry, R. P. (2007). The control-value theory of achievement emotions: An integrative approach to emotions in education. In P. A. Schutz & R. Pekrun (Eds.), *Emotion in education: Educational psychology series* (pp. 13–36). San Diego: Academic Press.

Pekrun, R., Goetz, T., Daniels, L. M., Stupnisky, R. H., & Perry, R. P. (2010). Boredom in achievement settings: Exploring control-value antecedents and performance outcomes of a neglected emotion. *Journal of Educational Psychology*, *102*(3), 531–549. doi:10.1037/a0019243

Pekrun, R., Goetz, T., & Frenzel, A. C. (2005). *Achievement Emotions Questionnaire Mathematics – User's manual*. Munich: Department of Psychology, University of Munich.

Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology, 36*(1), 36–48. doi:10.1016/j.cedpsych.2010.10.002

Pekrun, R., Goetz, T, & Perry, R. P. (2005). *Achievement Emotions Questionnaire – User's manual*. Munich: Department of Psychology, University of Munich.

Pekrun, R. & Stephens, E. J. (2009). Goals, emotions, and emotion regulation: Perspectives of the control-value theory. *Human Development, 52*, 357–365. doi:10.1159/000242349

Preckel, F., Götz, T., & Frenzel, A. (2010). Ability grouping of gifted students: Effects on academic self-concept and boredom. *British Journal of Educational Psychology*, *80*(3), 451–472. doi:10.1348/000709909x480716

Quelling Math Anxiety. (2011). *Science Teacher*, *78*(9), 16–18. Retrieved from http://search.proquest.com.ezproxy.liberty.edu/docview/915260711?pq-origsite=summon&accountid=12085

Renzulli, J. S. (2012). Reexamining the role of gifted education and talent development for the

    21st century: A four-part theoretical approach. *Gifted Child Quarterly*, *56*(3), 150–159.

    doi:10.1177/0016986212444901

Robinson, K., & Mueller, A. S. (2014). Behavioral engagement in learning and math

    achievement over kindergarten: A contextual analysis. *American Journal of Education,*

    120(3), 325–349. doi:10.1086/675530

Rogers, K. B. (2007). Lessons learned about educating the gifted and talented: A synthesis of the

    research on educational practice. *Gifted Child Quarterly*, *51*(4), 382–396.

    doi:10.1177/0016986207306324

Rogers, K. B., & Kimpston, R. D. (1992). Acceleration: What we do vs. what we know.

    Educational Leadership, *50*(2), 58–61. Retrieved from

    http://www.ascd.org/publications/educational-leadership/oct92/vol50/num02/The-

    Acceleration-of-Students@-What-We-Do-vs.-What-We-Know.aspx

Rovai, A. P., Baker, J. D., & Ponton, M. K. (2014). *Social science research design and statistics:*

    A practitioner's guide to research methods and IBM SPSS analysis. Chesapeake, VA:

    Waterfree Press LLC.

Russo, K. (2009). Contract activity packages: Captivate your at-risk non-conformists with

    choices. *Insights on Learning Disabilities*, *6*(2), 1–16. Retrieved from

    http://www.ldworldwide.org/pdf/journal/2009/09-09_Russo.pdf

Santano, T. (1999). Effects of contract activity packages on social studies achievement of gifted

    students. *Journal of Social Studies Research, 23*(1), 3. Retrieved from

    http://search.proquest.com/docview/211087335?accountid=12085

Siegle, D., Wilson, H. E., & Little, C. A. (2013). A sample of gifted and talented educators'

    attitudes about academic acceleration. *Journal of Advanced Academics*, *24*(1), 27–51.

    doi:10.1177/1932202X12472491

Steenbergen-Hu, S., & Moon, S. M. (2011). The effects of acceleration on high-ability learners:

    A meta-analysis. *Gifted Child Quarterly*, *55*(1), 39–53. doi:10.1177/0016986210383155

Tippey, J. G., & Burnham, J. J. (2009). Examining the fears of gifted children. *Journal for the*

    Education of the Gifted, *32*(3), 321–339. Retrieved from

    http://files.eric.ed.gov/fulltext/EJ835863.pdf

VanTassel-Baska, J. (2012). A case for common core state standards. *Gifted Child Today*, *35*(3),

    222–223. doi:10.1177/1076217512445990

Vaughn, V. L., Feldhusen, J. F., & Asher, J. W. (1991). Meta-analyses and review of research on

    pull-out programs in gifted education. *Gifted Child Quarterly, 35*(2), 92–98.

    doi:10.1177/001698629103500208

Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques* (2nd

    ed.). Thousand Oaks, CA: Sage Publications.

Young, A. E., Worrell, F. C., & Gabelko, N. H. (2011). Predictors of success in accelerated and

    enrichment summer mathematics courses for academically talented adolescents. *Journal*

    of Advanced Academics, 22(4), 558–577. doi:10.1177/1932202X11413886

Zakaria, E., & Nordin, N. (2008). The effects of mathematics anxiety on matriculation students

    as related to motivation and achievement. *Eurasia Journal of Mathematics, Science &*

    Technology Education, 4(1), 27–30. Retrieved from

    http://www.ejmste.com/v4n1/Eurasia_v4n1_Zakaria_Nordin.pdf?pagewanted=all

Appendix A

The Achievement Emotions Questionnaire – Mathematics

The image has been blocked for copyright purposes.

Appendix B

Boredom Scale from the AEQ-M

The image has been blocked for copyright purposes.

Appendix C

Email Confirmation to use the AEQ-M

From: "Reinhard Pekrun"
Subject: RE: The Achievement Emotions Questionnaire
Date: May 19, 2014 9:44:56 AM EDT
To: "JoAnna Bartlett"

Dear JoAnna,

thanks for your interest in the AEQ. Enclosed please find the manuals for the AEQ and the AEQ-Mathematics.

Best wishes for your work,

Reinhard Pekrun

Dr. Reinhard Pekrun
Professor of Psychology
Institute of Educational Psychology
University of Munich

"Bartlett, JoAnna"

Dr. Pekrun,

My name is JoAnna Bartlett and I am a current doctoral student at Liberty University in Lynchburg, Virginia, located in the United States of America. For my dissertation, I plan to use The Achievement Emotions Questionnaire-Mathematics (AEQ-M), particularly the boredom domain, to determine if there is a significant difference between the frequency of boredom experienced by gifted and non-gifted students participating in an sixth grade accelerated math class. The purpose of this email is to ask if I could have permission to use the aforementioned instrument, and to ask for help in finding and obtaining a copy of the instrument. I appreciate any help you have to offer, and I look forward to hearing from you.

Thank you,
JoAnna Bartlett
Doctoral student at Liberty University in Lynchburg, Virginia

Appendix D

Email Confirmation to use the AEQ-M

From: "Anne Frenzel"
Subject: Antw: The Achievement Emotions Questionnaire - Mathematics
Date: May 20, 2014 3:58:02 AM EDT
To: "JoAnna Bartlett"

Dear JoAnna,
thanks for your mail and interest in the AEQ. Attached please find the Manual for the AEQ-M, along with a corresponding paper on the AEQ (general); as well as a publication from our group on boredom among gifted students in particular.
Good luck with your research,
Anne Frenzel

Prof. Anne C. Frenzel
University of Munich (LMU)
Department of Psychology
Munich Center of the Learning Sciences

"Bartlett, JoAnna"

Dr. Frenzel,

My name is JoAnna Bartlett and I am a current doctoral student at Liberty University in Lynchburg, Virginia, located in the United States of America. For my dissertation, I plan to use The Achievement Emotions Questionnaire-Mathematics (AEQ-M), particularly the boredom domain, to determine if there is a significant difference between the frequency of boredom experienced by gifted and non-gifted students participating in an sixth grade accelerated math class. The purpose of this email is to ask if I could have permission to use the aforementioned instrument, and to ask for help in finding and obtaining a copy of the instrument or its corresponding manual. I appreciate any help you have to offer, and I look forward to hearing from you.

Thank you,
JoAnna Bartlett
Doctoral student at Liberty University in Lynchburg, Virginia

Appendix E

Contract Activity Package: Cubes and Right Rectangular Prisms

Name: _____

Class Period: _____

<u>Objectives</u>

By the time you finish this Contract Activity Package, you will be able to:

1. Identify the net for a cube.
2. Identify the net for a right rectangular prism.
3. Determine how many faces, edges, and vertices create a cube.
4. Determine how many faces, edges, and vertices create a right rectangular prism.
5. Identify and sketch the net of a cube and a right rectangular prism and determine how many faces, edges, and vertices they have by completing the posttest on Page J with at least a 90% accuracy.

<u>Contract</u>

You will have approximately one week (five instructional school days) to complete the contract activity package. Completing the Contract Activity Package will require you to choose and complete TWO activity alternatives and accompanying reporting alternatives for each of the five objectives listed above. You will complete the contract activity package independently and to the best of your ability. After you have completed objectives 1-4, please complete the posttest on Page J.

Date Started (with teacher initials): _____

Date Finished (with teacher initials): _____

Activity and Reporting Alternatives Completed

|	Date Completed	Teacher Signature
Objective 1		
Objective 2		
Objective 3		
Objective 4		
Objective 5 Posttest Grade = _____		

Objective 1: Identify the net for a cube.

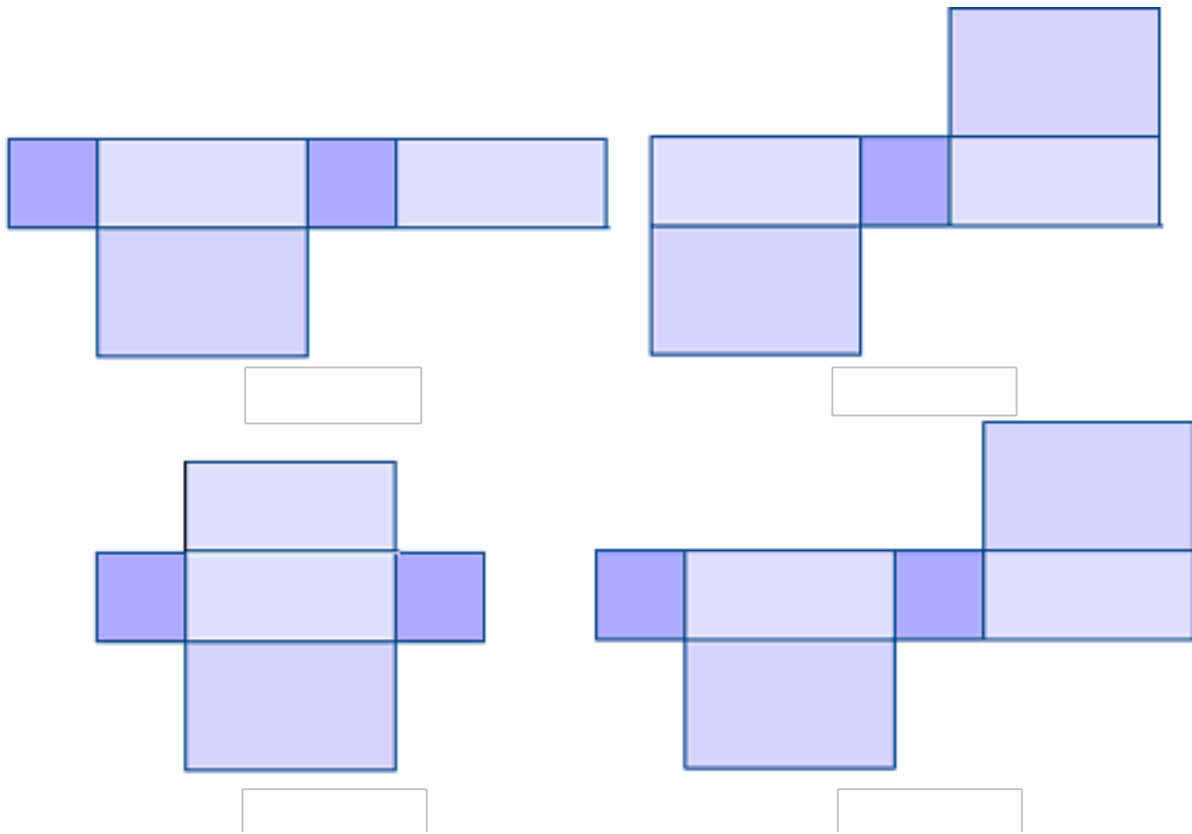|	Activity Alternatives	Reporting Alternatives
Choose two pairs of alternatives to complete	Research and sketch at least three different nets for a cube.	Show your sketches to your teacher.
	Cut out all 4 nets on Page A and determine which one(s) create a cube.	Staple the nets that create a cube to the back of your contract activity package and throw the other nets in the trash.
	Watch the following video and write at least three lessons you learned about the net of a cube: https://www.youtube.com/watch?v=JJ0VGIzwXUU	Show your notes to your teacher.
	Color the eleven nets on Page B that create a cube.	Staple this page to the back of your contract activity package.

Page A
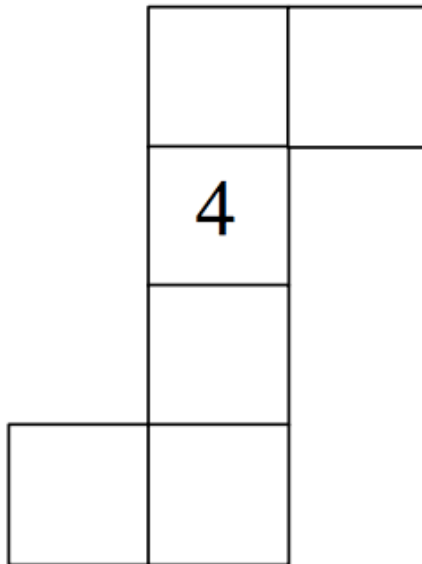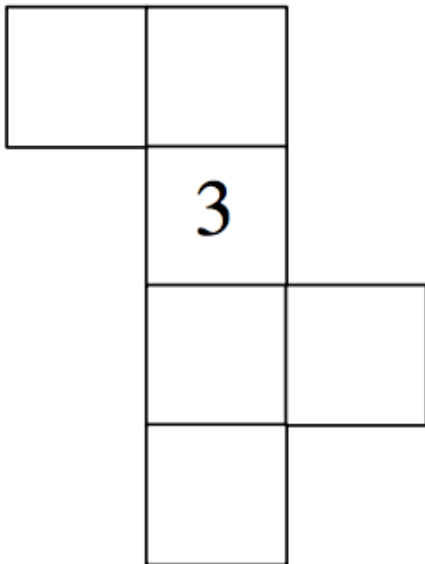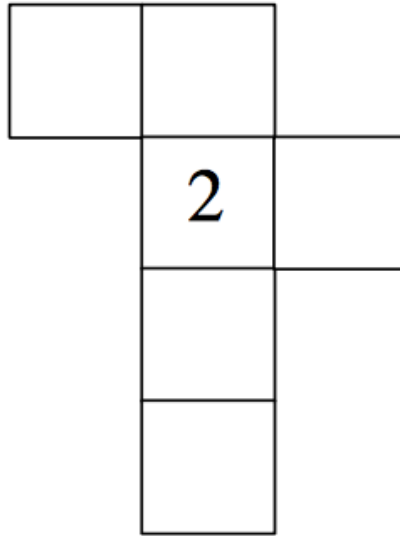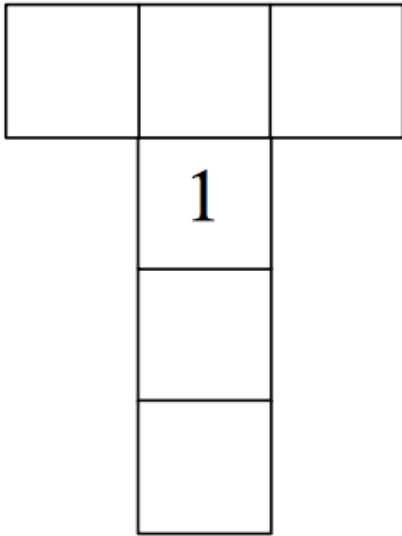
Page B
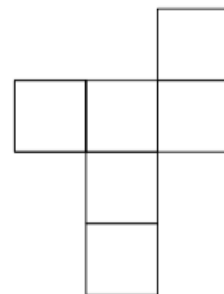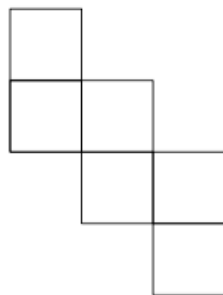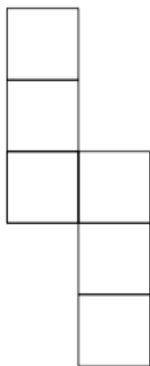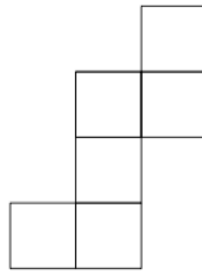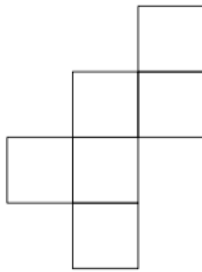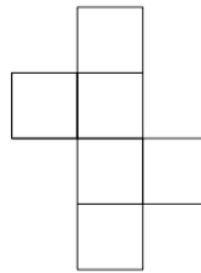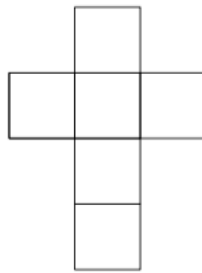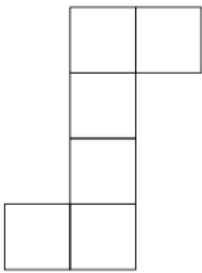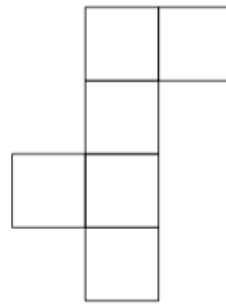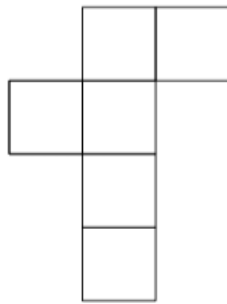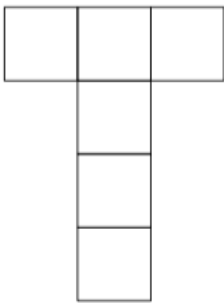
*Objective 2: Identify the net for a right rectangular prism.*

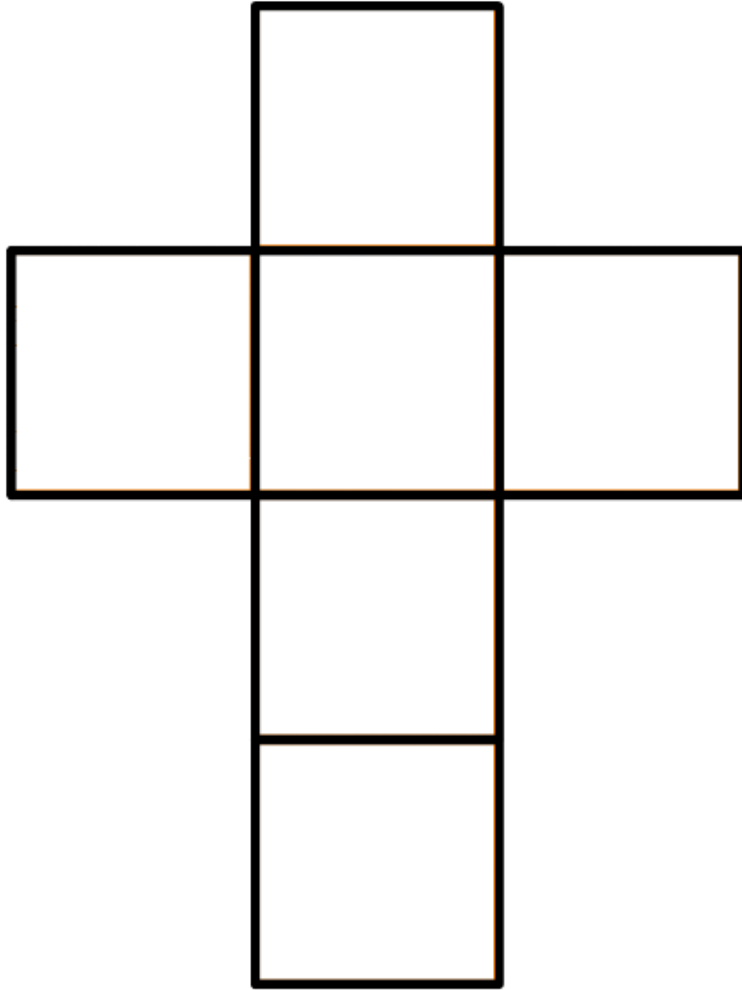|	Activity Alternatives	Reporting Alternatives
Choose two pairs of alternatives to complete	Research and sketch at least three different nets for a right rectangular prism.	Show your sketches to your teacher.
	Cut out all 4 nets on Page C and determine which one(s) create a right rectangular prism.	Staple the nets that create a right rectangular prism to the back of your contract activity package and throw the other nets in the trash.
	Watch the following video and write at least three lessons you learned about the net of a right rectangular prism: https://www.youtube.com/watch?v=fNfcj5Y-9d0	Show your notes to your teacher.
	In a minimum of five complete sentences, write one paragraph that explains the difference between the net of a cube and a right rectangular prism. In a minimum of five complete sentences, write one paragraph that explains the similarities between the net of a cube and a right rectangular prism.	Staple this page to the back of your contract activity package.

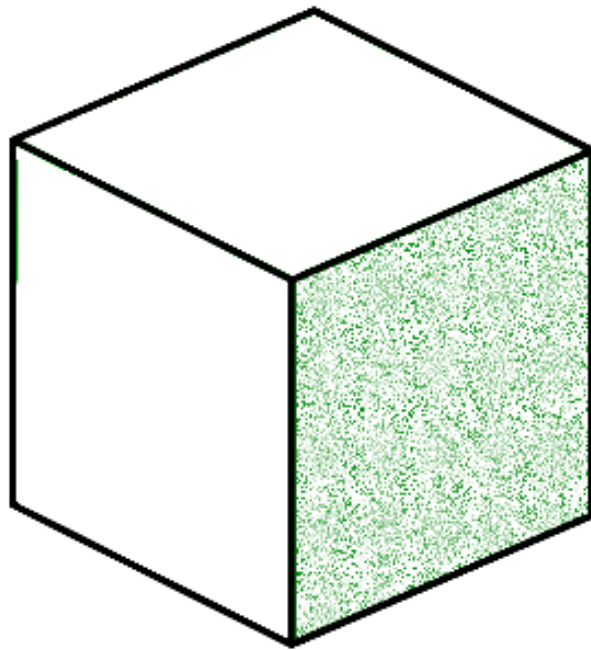**Page C**

Objective 3: Determine how many faces, edges, and vertices create a cube.

|	Activity Alternatives	Reporting Alternatives
Choose two pairs of alternatives to complete	Research how many faces, edges, and vertices create a cube.	Show your findings to your teacher.
	Cut out the net on Page D and construct the cube, but do not tape or glue together. Once you have determined how many faces, edges, and vertices create a cube write your findings on the inside of the net.	Staple the net to the back of your contract activity package.
	Cut out the net on Page E. Label each face, edge, and vertex on the cube.	Show your labels to one of your classmates. Then, staple the net to the back of your contract activity package.
	Cut out the cube on Page F. Color each face you can see blue, each edge you can see orange, and each vertex you can see black. Record on the back the total number of faces, edges, and vertices that create a cube.	Staple this page to the back of your contract activity package.

Page D

Page E

Page F
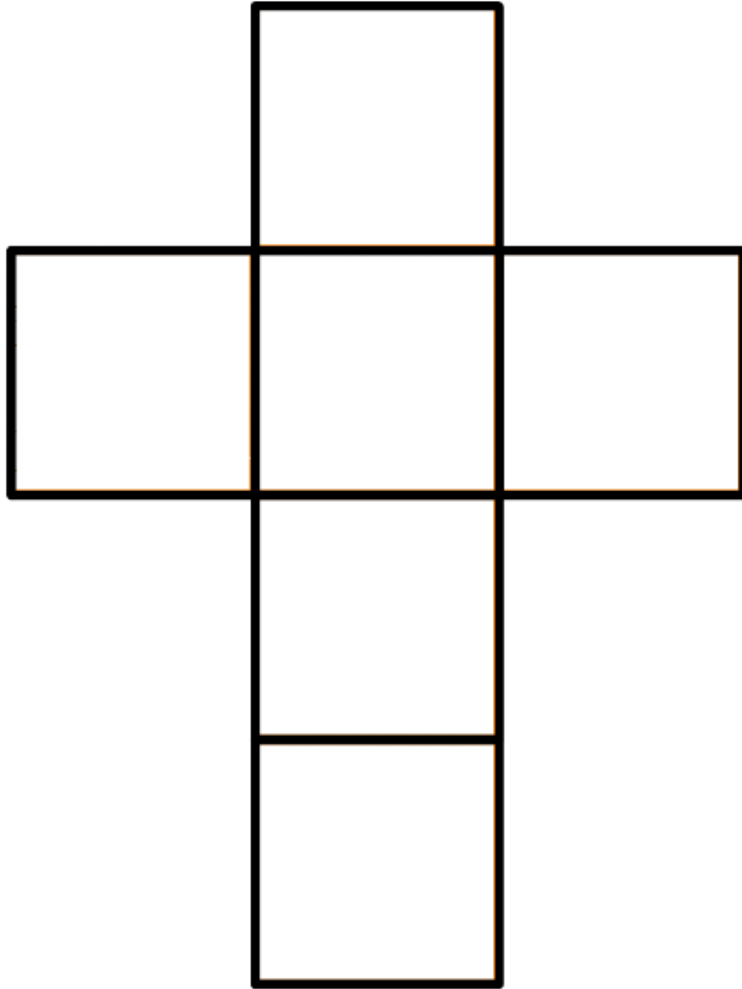
Objective 4: Determine how many faces, edges, and vertices create a right rectangular prism.

	Activity Alternatives	Reporting Alternatives
Choose two pairs of alternatives to complete	Research how many faces, edges, and vertices create a right rectangular prism.	Show your findings to your teacher.
	Cut out the net on Page G and construct the right rectangular prism, but do not tape or glue together. Once you have determined how many faces, edges, and vertices create a right rectangular prism write your findings on the inside of the net.	Staple the net to the back of your contract activity package.
	Cut out the net on Page H. Label each face, edge, and vertex on the right rectangular prism.	Show your labels to one of your classmates. Then, staple the net to the back of your contract activity package.
	Cut out the right rectangular prism on Page I. Color each face you can see blue, each edge you can see orange, and each vertex you can see black. Record on the back the total number of faces, edges, and vertices that create a right rectangular prism.	Staple this page to the back of your contract activity package.

Page G

Page H

Page I
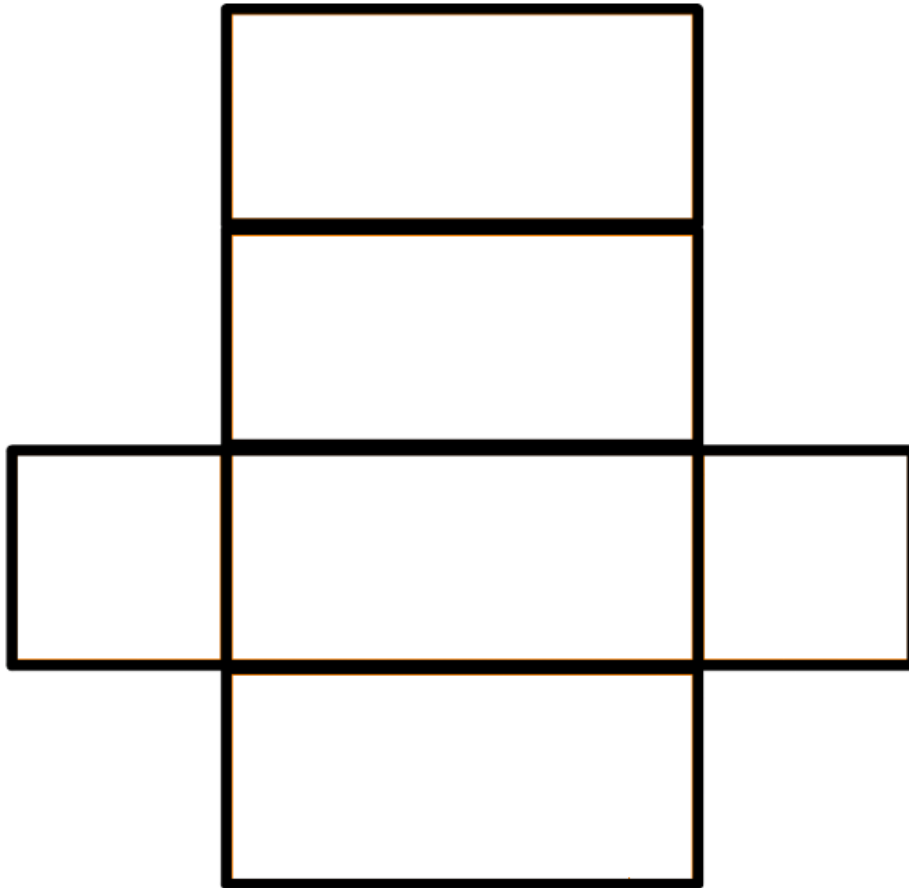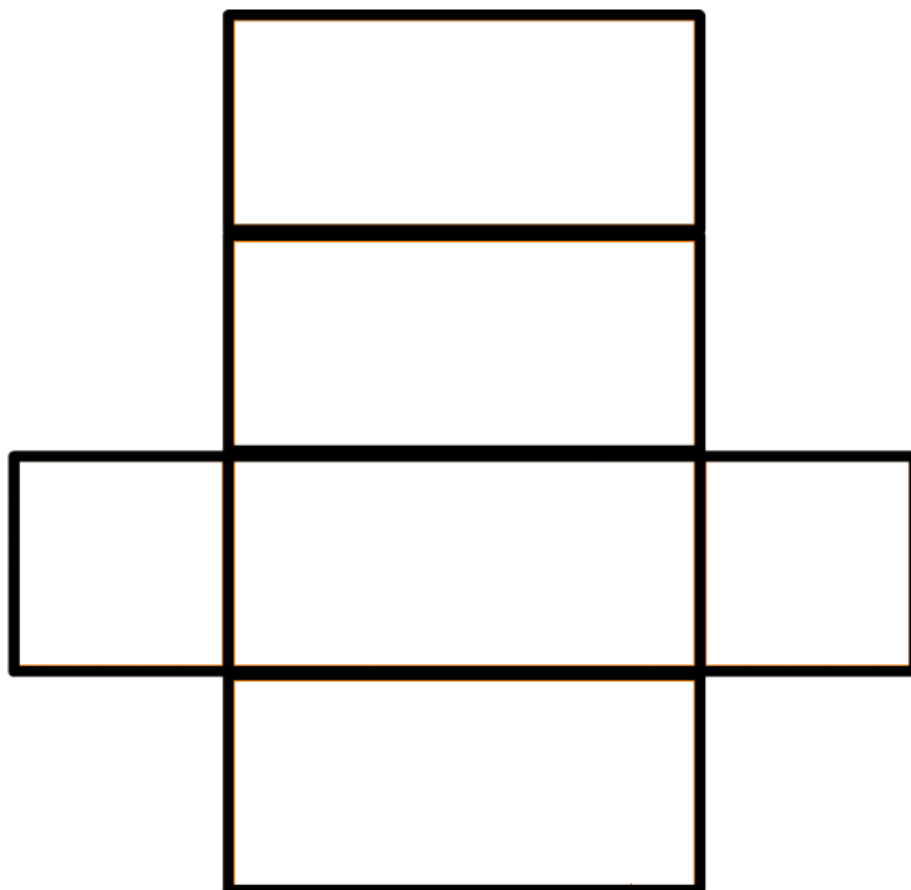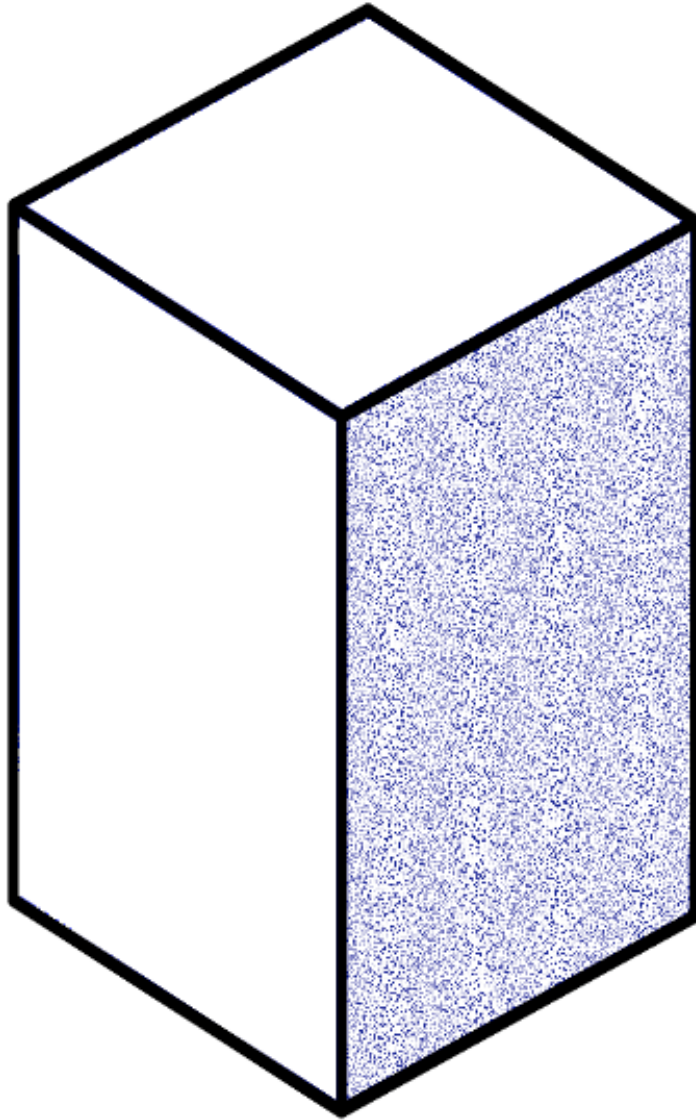
Page J

Name: _____   Posttest
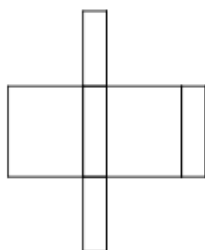
Date: _____

Nets of a Cube/Right Rectangular Prism

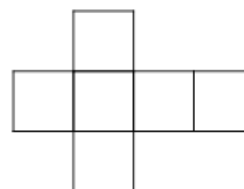**Identify each solid given its net.**

1)

2)

3)
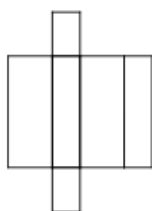
4)

5)

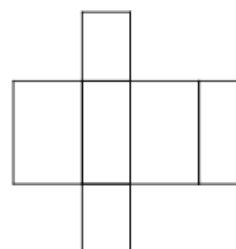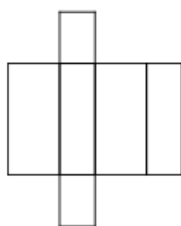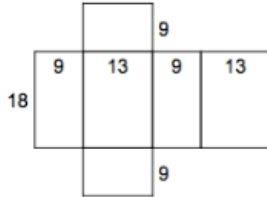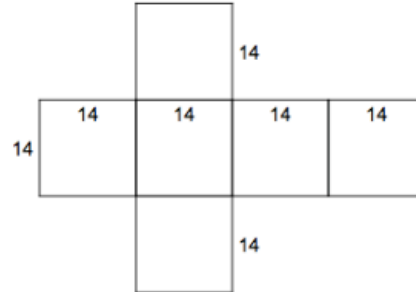**Sketch the solid of each net. Label the measurements given. Then, determine how many faces, edges, and vertices each figure has.**

6)

9
9 | 13 | 9 | 13
18
9

7)

14
14 | 14 | 14 | 14
14
14

8)

8
8 | 8 | 8 | 8
8
8

9)

6
6 | 6 | 6 | 6
6
6

10)

15
15 | 19 | 15 | 19
10
15
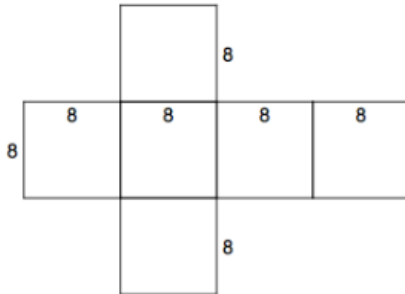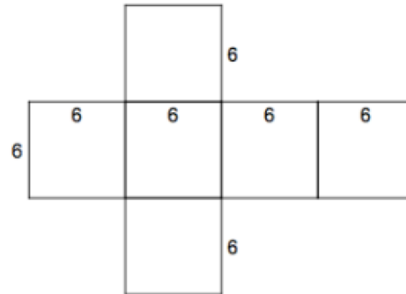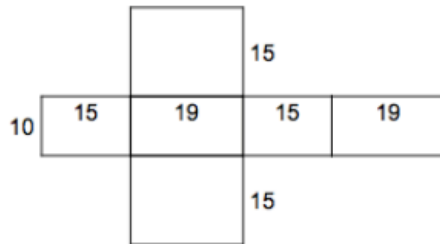
Appendix F

IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

7/28/2016

JoAnna Bartlett
IRB Approval 2572.072816: The Effects of Contract Activity Packages on Boredom in a Sixth
Grade Accelerated Math Class

Dear JoAnna Bartlett,

We are pleased to inform you that your study has been approved by the Liberty IRB. This
approval is extended to you for one year from the date provided above with your protocol
number. If data collection proceeds past one year, or if you make changes in the methodology as
it pertains to human subjects, you must submit an appropriate update form to the IRB. The
forms for these cases were attached to your approval email.

Your IRB-approved, stamped consent form is also attached. This form should be copied and used
to gain the consent of your research participants. If you plan to provide your consent information
electronically, the contents of the attached consent document should be made available without
alteration.

Please retain this letter for your records. Also, if you are conducting research as part of the
requirements for a master's thesis or doctoral dissertation, this approval letter should be included
as an appendix to your completed thesis or dissertation.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,

`

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

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UNIVERSITY.
Liberty University | Training Champions for Christ since 1971

Appendix G

Recruitment Letter

August 10, 2016

JoAnna Bartlett
Doctoral Student
Liberty University
1971 University Blvd.
Lynchburg, VA 24515

Dear students participating in a sixth grade accelerated math class:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree in Curriculum and Instruction. The purpose of my research is to determine if there is a difference in the boredom levels of sixth grade students participating in an accelerated math class who receive Contract Activity Packages and those who do not receive Contract Activity Packages, and I am reading this letter to invite you to participate in my study once parental/guardian permission is granted.

If you are currently enrolled in a sixth grade accelerated math class and are willing to participate in my study, and you have parental/guardian permission, you will be asked to do the following:
- learn a mathematical concept either with or without the use of Contract Activity Packages for approximately five school days
- do your very best to learn the presented mathematical concept for approximately five school days, despite the form of delivery
- complete a survey that will measure the level of boredom experienced while learning the new mathematical concept, either with or without the use of Contract Activity Packages

Your name and/or other identifying information will be requested as part of your participation, but the information will remain confidential.

A consent document will be given to you after I finish reading this letter. The consent document contains additional information about my research and will need to be signed by a parent/guardian and returned to your sixth grade accelerated math teacher as soon as possible. An assent document will also be provided to you. If you choose to participate, signing the assent document lets me know that you understand and are willing to participate in my research study.

In order to participate in the study, complete and return the consent document to your sixth grade accelerated math teacher.

If you choose to participate, you will receive one "No Homework Pass" coupon, which can be used for any homework assignment during the 2016/2017 school year. If you choose not to participate, your classroom teacher will present you with alternative opportunities to receive a "No Homework Pass" which could also be used during the 2016/2017 school year.

Sincerely,
JoAnna Bartlett
Gateway Math Teacher

Appendix H

Child Assent Letter

ASSENT OF CHILD TO PARTICIPATE IN A RESEARCH STUDY

What is the name of the study and who is doing the study?
JoAnna Bartlett, a doctoral student in the Department of Education at Liberty University, is performing the following study: *The Effects of Contract Activity Packages on Boredom in a Sixth Grade Accelerated Math Class*.

Why are we doing this study?
We are interested in studying the effects and result of using Contract Activity Packages, a strategy specifically related to reducing boredom for gifted and talented students, in a sixth grade accelerated math class.

Why are we asking you to be in this study?
You are being asked to be in this research study because you are currently enrolled in a sixth grade accelerated math class. The following information is provided for you to decide whether or not you wish to participate in the study. We ask that you read this consent form and ask any questions you may have before agreeing to participate in the study.

If you agree, what will happen?
If you are in this study you will be asked to do the following:
-learn a math concept either with or without the use of Contract Activity Packages for approximately five school days
-do your very best to learn the math concept covered in the Contract Activity Package for approximately five school days, whether or not you actually complete the Contract Activity Package during the study
-upon completion of learning the math concept for approximately five school days, complete a survey that pertains to the level of boredom experienced while learning the new math concept, either with or without the use of Contract Activity Packages; the survey will be completed in class and will take approximately 10 to 15 minutes to complete

Do you have to be in this study?
No, you do not have to be in this study. If you want to be in this study, then tell the researcher. If you don't want to, it's OK to say no. The researcher will not be angry. You can say yes now and change your mind later. It's up to you.

Do you have any questions?
You can ask questions any time. You can ask now. You can ask later. You can talk to the researcher. If you do not understand something, please ask the researcher to explain it to you again.

Signing your name below means that you want to be in the study.

_____

Signature of Child   Date

Appendix I

Parent/Guardian Consent Letter

PARENT/GUARDIAN CONSENT FORM

"The Effects of Contract Activity Packages on Boredom in a Sixth Grade Accelerated Math
Class"
JoAnna Bartlett
Liberty University
Department of Education

Your child/student is invited to be in a research study that seeks to determine if there is a difference in the boredom levels of sixth grade students in an accelerated math class who receive Contract Activity Packages (CAPs) and those who do not. He or she was selected as a possible participant because he or she is currently enrolled in a sixth grade accelerated math class. I ask that you read this form and ask any questions you may have before agreeing to allow him or her to be in the study.

JoAnna Bartlett, a doctoral student in the Department of Education at Liberty University, is conducting this study.

Background Information: The purpose of this study is to test a theory that relates the level of boredom experienced by students in a sixth grade accelerated math class with the use of CAPs. This study seeks to determine if there is a difference in the boredom levels of sixth grade students in an accelerated math class who receive CAPs and those who do not receive CAPs. CAPs are effective because they allow students to self-pace, they have more opportunity for choice, they can be used at any academic level, they encourage independence, and they can be easily changed to meet specific needs.

Procedures: If you agree to allow your child/student to be in this study, I would ask him or her to do the following things:
1. Learn a math concept either with or without the use of CAPs for approximately five school days. There will be six 6th grade accelerated math classes used in the study. The researcher will choose three classes to complete the CAPs and the other three classes will not complete the CAPs. Students completing the CAPs in class will be allowed to keep the packages upon completion of the study. Students not completing the CAPs will be given the opportunity to complete the packages on their own once the researcher has finished collecting data for the study.
2. Do his or her very best to learn the presented concept for approximately five school days.
3. Complete a survey that will measure the level of boredom experienced while learning the new math concept, either with or without the use of CAPs. Surveys will be completed in class and will take approximately 10 to 15 minutes to complete. Your child's/student's personal information on the survey will remain private.

The Liberty University Institutional
Review Board has approved
this document for use from
7/28/2016 to 7/27/2017
Protocol # 2572.072816

Risks and Benefits of being in the Study: There are no risks expected from participating in this study. The risks involved in this study are minimal, no more than you would encounter in everyday life. Participants receiving the CAPs may experience decreased boredom and enhanced learning.

Compensation: Your child/student will receive one "No Homework Pass" coupon which can be used for any homework assignment during the 2016/2017 school year. Your child/student will receive his or her coupon from the sixth grade accelerated math teacher upon completion of the survey. If your child does not participate in the study, another opportunity to earn a "No Homework Pass" will be provided by his or her teacher at a later time.

Confidentiality: The records of this study will be kept private. In any sort of report that the researcher might publish, she will not include any information that will make it possible to identify your child/student. Research records will be stored securely, and only the researcher will have access to them. After survey responses are collected, the researcher will use a coding system to keep information private.. All data and surveys will be destroyed after three-years. Data will be stored in a locked cabinet and only the researcher will have access.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to allow your child/student to participate will not affect your or his/her current or future relations with Liberty University. If you decide to allow your child/student to participate, he or she is free to not answer any question or withdraw at any time without affecting those relationships.

How to Withdraw from the Study: If you decide to withdraw your child/student during the study, please contact the researcher by the email address or phone number listed below.

Contacts and Questions: The researcher conducting this study is JoAnna Bartlett. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at _____ or by phone at _____ You may also contact the researcher's faculty advisor, Dr. Gary Kimball, at _____ or by phone at _____

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd, Carter 134, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information to keep for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to allow my child/student to participate in the study.

159

(NOTE: DO NOT AGREE TO ALLOW YOUR CHILD/STUDENT TO PARTICIPATE
UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN
ADDED TO THIS DOCUMENT.)

_____
Signature of Parent   Date

_____
Signature of Investigator   Date

Appendix J

Contract Activity Package: Fractions, Decimals, and Percents

Name: _____

Class Period: _____

Objectives

By the time you finish this Contract Activity Package, you will be able to:

1. Convert a fraction to a decimal and a percent.
2. Convert a decimal to a fraction and a percent.
3. Convert a percent to a decimal and a fraction.
4. Convert between a fraction, decimal, and percent.

Contract

You will have approximately one week (five instructional school days) to complete this contract activity package. Completing this Contract Activity Package will require you to choose and complete TWO activity alternatives and accompanying reporting alternatives for objectives one through three; you will be required to choose and complete ONE activity alternative and accompanying reporting alternative for objective four. Please complete this contract activity package independently and to the best of your ability. After you have completed objectives 1-4, please complete the posttest on Page T.

Date Started (with teacher initials): _____

Date Finished (with teacher initials): _____

Activity and Reporting Alternatives Completed

	Date Completed	**Teacher Signature**
Objective 1		
Objective 2		
Objective 3		
Objective 4		

Posttest Grade = _____

Objective 1: Convert a fraction to a decimal and a percent.

	Activity Alternatives	Reporting Alternatives
Choose two activity alternatives to complete for Objective 1; then complete the corresponding reporting alternatives for each activity alternative you chose	Copy the notes you see on Page A on the bottom of Page A; highlight steps 1, 2, and 3 after you copy them. Copy the notes you see on Page B on the bottom of Page B; highlight steps 1, 2, and 3 after you copy them. Then, complete the problems you see on Page C. Show all of your work on Page C and then circle your answers.	Show your copied notes for Pages A and B to your teacher; show Page C to your teacher once you have completed all problems
	Copy the notes you see on Page D on the bottom of Page D; highlight examples 1, 2, and 3. Copy the notes you see on Page E on the bottom of Page E; highlight steps 1, 2, and 3 after you copy them. Then, complete the problems you see on Page F. Show all of your work on Page F and then circle your answers.	Show your copied notes for Pages D and E to your teacher; show Page F to your teacher once you have completed all problems
	Get out a clean piece of notebook paper. Write the following title at the top: Objective 1. Watch the following videos; write at least five facts you learned from EACH video; label your facts as Video 1, 2, and 3 (write your facts as you watch each video) Video 1: https://www.khanacademy.org/math/7th-engage-ny/engage-7th-module-2/7th-module-2-topic-b/v/converting-fractions-to-decimals-ex2 Video 2: https://www.khanacademy.org/math/7th-engage-ny/engage-7th-module-2/7th-module-2-topic-b/v/converting-fractions-to-decimals-example Video 3: https://www.khanacademy.org/math/7th-engage-ny/engage-7th-module-2/7th-module-2-topic-b/v/converting-fractions-to-decimals-ex1	Show your facts on your notebook paper to your teacher; there should be a minimum of five facts per video; then staple to the back of your Contract Activity Package
	Get out a clean piece of notebook paper. Write the following title: Objective 1. Watch the following video; write at least five facts you learned from the video (write your facts as you watch the video) https://www.youtube.com/watch?v=IJ0d_VdoUko	Show your facts on your notebook paper to your teacher; there should be a minimum of five facts for the video; then staple to the back

Page A

To convert a fraction to a decimal:

Go to the following link and copy the steps you see:

https://www.mathsisfun.com/converting-fractions-decimals.html

Page B

To convert a fraction to a percent:

Go to the following link and copy the steps you see:

https://www.mathsisfun.com/converting-fractions-percents.html

Page C

Write each as a decimal. Round to the hundredths place.

1) $\dfrac{2}{25}$

2) $\dfrac{7}{10}$

3) $\dfrac{4}{15}$

4) $\dfrac{3}{5}$

5) $\dfrac{7}{15}$

6) $\dfrac{79}{80}$

7) $\dfrac{19}{25}$

8) $\dfrac{3}{10}$

9) $\dfrac{1}{2}$

10) $\dfrac{1}{5}$

Write each as a percent. Round to the nearest percent.

11) $\dfrac{28}{45}$

12) $\dfrac{4}{5}$

13) $\dfrac{3}{500}$

14) $\dfrac{19}{25}$

15) $\dfrac{5}{12}$

16) $\dfrac{47}{50}$

17) $\dfrac{17}{20}$

18) $\dfrac{7}{25}$

19) $\dfrac{6}{17}$

20) $\dfrac{1}{170}$

Page D

To convert a fraction to a decimal:

Every fraction can be written as a decimal. To write a fraction as a decimal,
divide the numerator (top) of the fraction by the denominator (bottom)
of the fraction. The answer may be rounded to the nearest tenth or hundredth.

Ex. 1   Convert $\dfrac{1}{2}$ to a decimal

$$2\overline{)1.0} \quad \begin{array}{r} .5 \\ \hline \end{array}$$

$$\begin{array}{r} .5 \\ 2\overline{)1.0} \\ -1\,0 \\ \hline 0 \end{array}$$

$\dfrac{1}{2} = .5$

Ex. 2   Convert $\dfrac{3}{4}$ to a decimal

$$\begin{array}{r} .75 \\ 4\overline{)3.00} \\ -2\,8 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

$\dfrac{3}{4} = .75$

Ex. 3   Convert $\dfrac{3}{8}$ to a decimal

$$\begin{array}{r} .375 \\ 8\overline{)3.000} \\ -2\,4 \\ \hline 60 \\ -56 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

$\dfrac{3}{8} = .375$

Page E

To convert a fraction to a percent (using long division):

Go to the following link and copy the notes you see:

https://bconline.broward.edu/shared/CollegeReadiness/Math/U05_L05_ConFracPerc/U05_L05_ConFracPerc3.html

Page F

Convert Fraction to Decimal

$\dfrac{1}{25} =$ $\dfrac{4}{10} =$ $\dfrac{18}{50} =$

$\dfrac{7}{10} =$ $\dfrac{24}{25} =$ $\dfrac{24}{50} =$

$\dfrac{7}{25} =$ $\dfrac{9}{10} =$ $\dfrac{5}{10} =$

$\dfrac{22}{25} =$ $\dfrac{20}{25} =$ $\dfrac{47}{50} =$

$\dfrac{8}{10} =$ $\dfrac{4}{10} =$ $\dfrac{46}{50} =$

Convert Fraction to Percent

$\dfrac{1}{10} =$ $\dfrac{4}{10} =$ $\dfrac{13}{20} =$

$\dfrac{8}{20} =$ $\dfrac{17}{20} =$ $\dfrac{47}{50} =$

$\dfrac{28}{50} =$ $\dfrac{14}{20} =$ $\dfrac{9}{25} =$

$\dfrac{49}{50} =$ $\dfrac{24}{50} =$ $\dfrac{22}{50} =$

$\dfrac{3}{25} =$ $\dfrac{41}{50} =$ $\dfrac{2}{20} =$

Objective 2: Convert a decimal to a fraction and a percent.

	Activity Alternatives	Reporting Alternatives
Choose two activity alternatives to complete for objective 2; then complete the corresponding reporting alternative for each activity alternative you chose	Copy the notes you see on Page G at the bottom of Page G; highlight steps 1, 2, and 3 after you copy them. Copy the notes you see on Page H at the bottom of Page H; highlight the step after you copy it. Then, complete the problems you see on Page I. Show all of your work on Page I and then circle your answers.	Show your copied notes for Pages G and H to your teacher; show Page I to your teacher once you have completed all problems
	Study the table that in on Page J. Highlight each decimal that is written in the table on Page J. Study the table that in on Page K. Highlight each decimal that is written in the table on Page K.	Show Page J and K to your teacher after you have studied and highlighted
	Get out a clean piece of notebook paper. Write the following title at the top: Objective 2. Watch the following videos; write at least five facts you learned from EACH video; label your facts as Video 1 and 2 (write your facts as you watch each video) Video 1: https://www.khanacademy.org/math/in-seventh-grade-math/comparing-quantities/percentage-comparing-quantities/v/converting-decimals-to-percents-ex-1 Video 2: https://www.khanacademy.org/math/in-fifth-grade-math/tenths-hundredths-1/decimals-1-1/v/converting-decimals-to-fractions-1-ex-1	Show your facts on your notebook paper to your teacher; there should be a minimum of five facts per video; then staple to the back of your Contract Activity Package
	Get out a clean piece of notebook paper. Write the following title: Objective 2. Watch the following videos; write at least five facts you learned from EACH video; label your facts as Video 1 and 2 (write your facts as you watch each video) Video 1: https://www.youtube.com/watch?v=Wwg1br9-8yk Video 2: https://www.youtube.com/watch?v=s_DA3qW9pjc	Show your facts on your notebook paper to your teacher; there should be a minimum of five facts for the video; then staple to the back of your Contract Activity Package

Page G

To convert a decimal to a fraction:

Decimal to Fraction:

Step 1: Drop the decimal point.

Step 2: Place the decimal part over a denominator equal to its place value.

Step 3: Reduce.

Example: $0.47 = \dfrac{47}{100}$

Example: $7.45 \rightarrow 7\dfrac{45}{100} = 7\dfrac{9}{20}$

Step 1: $0.15\dfrac{1}{3} = \dfrac{46}{3}$ Now, multiply by $\dfrac{1}{100}$

Step 2: $\dfrac{46}{3} \times \dfrac{1}{100} = \dfrac{46}{300} = \dfrac{23}{150}$

Page H

To convert a decimal to a percent:

___Decimal to Percent___: Move the decimal point **two** places to the **right** or multiply by 100.

Example: .08 = 8%   *Example:* .50 = 50%

172

Page I

Write each as a fraction.

1) 0.22

2) 0.8

3) 0.875

4) 0.43

5) 0.1

6) $0.\overline{3}$

7) 0.9

8) $0.\overline{313}$

9) $0.\overline{47}$

10) $0.\overline{8}$

Write each as a percent. Use repeating decimals when necessary.

11) 0.93

12) 0.03

13) 0.731

14) 0.1

15) 0.999

16) 0.8

17) 0.632

18) 0.87

19) 0.3

20) 0.482

Page J

Study the table at the following link:

http://www.factmonster.com/ipka/A0876706.html

Page K

Study the table at the following link:

https://s-media-cache-ak0.pinimg.com/564x/88/7c/f9/887cf96ef1d850862738617857c5a1bd.jpg

Objective 3: Convert a percent to a decimal and a fraction.

	Activity Alternatives	Reporting Alternatives
Choose two activity alternatives to complete objective 3; then complete the corresponding reporting alternative for each activity alternative you chose	Copy the notes you see on Page L at the bottom of Page L; highlight step 1 after you copy it. Copy the notes you see on Page M at the bottom of Page M; highlight example 6 and 7 after you copy them. Then, complete the problems you see on Page N. Show all of your work on Page N and then circle your answers.	Show your copied notes for Pages L and M to your teacher; show Page N to your teacher once you have completed all problems
	Copy the figure you see on Page O at the bottom of Page O. Highlight the directions for how to convert from a percent to a fraction. Copy the figure you see on Page P at the bottom of Page P. Highlight the directions for how to convert from a percent to a decimal.	Show your copied figures for Pages O and P to your teacher
	Get out a clean piece of notebook paper. Write the following title at the top: Objective 3. Watch the following videos; write at least five facts you learned from EACH video; label your facts as Video 1 and 2 (write your facts as you watch each video) Video 1: https://www.khanacademy.org/math/in-seventh-grade-math/comparing-quantities/percentage-comparing-quantities/v/representing-a-number-as-a-decimal-percent-and-fraction Video 2: https://www.khanacademy.org/math/in-seventh-grade-math/comparing-quantities/percentage-comparing-quantities/v/converting-percents-to-decimals-ex-1	Show your facts on your notebook paper to your teacher; there should be a minimum of five facts per video; then staple to the back of your Contract Activity Package
	Get out a clean piece of notebook paper. Write the following title: Objective 3. Watch the following video; write at least five facts you learned from the video (write your facts as you watch the video) https://www.youtube.com/watch?v=04eEAxkc4bk	Show your facts on your notebook paper to your teacher; there should be a minimum of five facts for the video; then staple to the back of your Contract Activity Package

Page L

<div align="center">To convert a percent to a decimal:</div>

Percent to Decimal: Move the decimal point **two** places to the **left** or divide by 100.

Example: 50% = .50

Example: $2\frac{1}{2}$% = $2\frac{1}{2}$ ÷ 100 = $\dfrac{5}{2}$ ÷ 100

$$= \dfrac{5}{2} \text{ x } \dfrac{1}{100}$$

$$= \dfrac{5}{200} \quad \text{Divide 200 into 5 and you get .025}$$

$$= .025$$

Page M

To convert a percent to a fraction:

To convert a percent to a fraction, write the given percent as the numerator of the fraction. The denominator is 100 since percent means "*per hundred*". Then reduce as necessary.

Example 6. Convert 55% to a fraction.

$$55\% = \frac{55}{100} = \frac{55 \div 5}{100 \div 5} = \frac{11}{20}$$

Example 7. Convert 120% to a fraction.

$$120\% = \frac{120}{100} = \frac{120 \div 20}{100 \div 20} = \frac{6}{5} = 1\frac{1}{5}$$

Page N

Write each as a fraction.

1) 62.5%

2) 87.5%

3) 50%

4) 20%

5) 4.5%

6) 11%

7) 48%

8) 59%

9) 30%

10) 75%

Write each as a decimal. Round to the thousandths place.

11) 70%

12) 8%

13) 97%

14) 7%

15) 60%

16) 22.3%

17) 65%

18) 89%

19) 35%

20) 52%

Page O
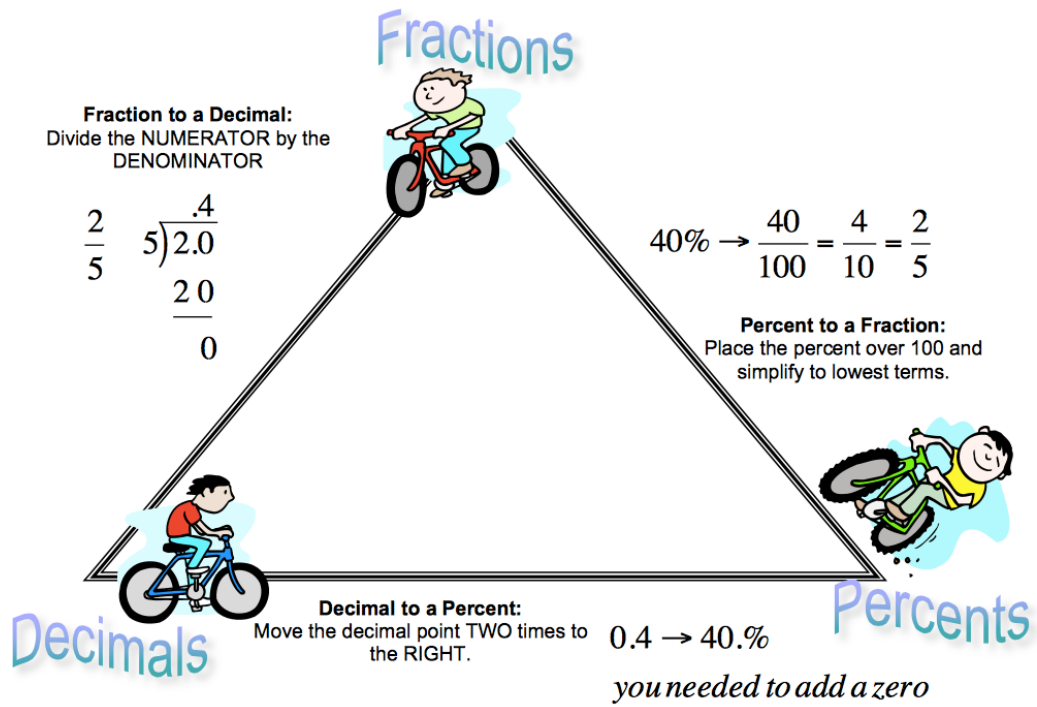
Fractions

Fraction to a Decimal:
Divide the NUMERATOR by the DENOMINATOR

$$\frac{2}{5} \qquad 5\overline{)2.0} \;\; \begin{array}{r} .4 \\ \hline \end{array}$$

$$\begin{array}{r} 2\,0 \\ \hline 0 \end{array}$$

$$40\% \rightarrow \frac{40}{100} = \frac{4}{10} = \frac{2}{5}$$

Percent to a Fraction:
Place the percent over 100 and simplify to lowest terms.

Percents

Decimal to a Percent:
Move the decimal point TWO times to the RIGHT.

$$0.4 \rightarrow 40.\%$$

you needed to add a zero

Decimals

Page P

Fractions

Decimals

Percents

Fraction to a Percent:
Set up a proportion a/b = x/100.
Cross-multiply and divide.
Add the percent sign.

$$\frac{1}{4} = \frac{x}{100}$$

$$100 \cdot 1 = 100$$

$$100 \div 4 = 25$$

$$25\%$$

$.25 = twenty - five\ hundredths$

$$\frac{25}{100} = \frac{5}{20} = \frac{1}{4}$$

Decimal to a Fraction:
Put the decimal number over its place value and reduce to simplest terms.

Percent to a Decimal:
Move the decimal point TWO times to the LEFT.

$$25.\% \to .25$$

Objective 4: Convert between a fraction, decimal, and percent.

	Activity Alternatives	Reporting Alternatives
Choose one activity alternative to complete for objective 4; then complete the corresponding reporting alternative for the one activity alternative you chose	Cut out the puzzle on Page Q. Follow the directions by completing the puzzle. Glue down the completed version of the puzzle on to a clean piece of notebook paper. At the top of your notebook paper write the following title: Objective 4.	Show your teacher the puzzle once you finish; then staple to the back of your Contract Activity Package
	Complete the table on Page R and the table on Page S. Show all of your work on each corresponding page.	Show your teacher Page R and Page S after you have completed each one

Page Q

Go to the following link and print out the puzzle on page 19:

https://books.google.com/books?id=4nTxCgAAQBAJ&pg=PA19&lpg=PA19&dq=fraction+decimal+percent+cut+out+puzzle+with+letters&source=bl&ots=Sw79WnOnQQ&sig=bltKZhfZ4L3mDRBd020phQn6c4w&hl=en&sa=X&ved=0ahUKEwjg19biqYTTAhWHy4MKHdzLDe0Q6AEIOzAM#v=onepage&q=fraction%20decimal%20percent%20cut%20out%20puzzle%20with%20letters&f=false

Page R   **Complete the table.**

Fraction	Decimal	Percentage
$\frac{1}{10}$		
$\frac{1}{5}$		
$\frac{3}{10}$		
$\frac{2}{5}$		
$\frac{1}{2}$		
$\frac{3}{5}$		
$\frac{7}{10}$		
$\frac{4}{5}$		
$\frac{9}{10}$		
$\frac{1}{4}$		
$\frac{3}{4}$		

Page S

Fill in the gaps to complete the table at the following link:

https://www.google.com/imgres?imgurl=http%3A%2F%2Fwww.11plusforparents.co.uk%2F2FMaths%2Fimages%2Fpercent%2Fpcent5.gif&imgrefurl=https%3A%2F%2Fwww.tes.com%2Flessons%2Fg9vQZ2erxkGVKg%2Fgeometry&docid=BmhjuvJdLWm75M&tbnid=GAuWN3EWdQ2LJM%3A&vet=1&w=945&h=1215&client=safari&bih=815&biw=1393&ved=0ahUKEwjVgtWjq4TTAhVC2oMKHVO8DdcQxiAIFSgB&iact=c&ictx=1#h=1215&imgrc=GAuWN3EWdQ2LJM:&vet=1&w=945

Page T

<u>Posttest</u>

Go to the following link and complete the table:

http://www.mathgoodies.com/worksheets/pdf/unit4_wks3.pdf

Appendix K

Implementation Checklist with Contract Activity Packages

Teacher: _____

School site: _____

Please complete the implementation checklist each day you use the contract activity packages. Please check yes or no for each section of the checklist. You are highly encouraged to add any additional comments for each day of implementation in the comments section. If at any time you have questions during the implementation process while using the contract activity packages, please do not hesitate to contact me at   or

Date _____

Day 1 of Implementation	Yes	No
1. Contract activity packages were distributed to each student in the class.		
2. Students worked independently to complete the contract activity packages.		
3. The teacher monitored while students worked independently to complete the contract activity packages.		
4. The students worked diligently while completing the contract activity packages.		
5. The students were engaged while completing the contract activity packages.		
6. The students were able to complete the contract activity packages without needing too much help/guidance/assistance from the teacher.		
7. The teacher collected the contract activity packages from each student at the end of class.		
Comments:		

Date _____

Day 2 of Implementation	**Yes**	**No**
1. Contract activity packages were distributed to each student in the class.		
2. Students worked independently to complete the contract activity packages.		
3. The teacher monitored while students worked independently to complete the contract activity packages.		
4. The students worked diligently while completing the contract activity packages.		
5. The students were engaged while completing the contract activity packages.		
6. The students were able to complete the contract activity packages without needing too much help/guidance/assistance from the teacher.		
7. The teacher collected the contract activity packages from each student at the end of class.		
Comments:		

Date _____

Day 3 of Implementation	**Yes**	**No**
1. Contract activity packages were distributed to each student in the class.		
2. Students worked independently to complete the contract activity packages.		
3. The teacher monitored while students worked independently to complete the contract activity packages.		
4. The students worked diligently while completing the contract activity packages.		
5. The students were engaged while completing the contract activity packages.		
6. The students were able to complete the contract activity packages without needing too much help/guidance/assistance from the teacher.		
7. The teacher collected the contract activity packages from each student at the end of class.		
Comments:		

Date _____

Day 4 of Implementation	**Yes**	**No**
1. Contract activity packages were distributed to each student in the class.		
2. Students worked independently to complete the contract activity packages.		
3. The teacher monitored while students worked independently to complete the contract activity packages.		
4. The students worked diligently while completing the contract activity packages.		
5. The students were engaged while completing the contract activity packages.		
6. The students were able to complete the contract activity packages without needing too much help/guidance/assistance from the teacher.		
7. The teacher collected the contract activity packages from each student at the end of class.		
Comments:		

Date _____

Day 5 of Implementation	**Yes**	**No**
1. Contract activity packages were distributed to each student in the class.		
2. Students worked independently to complete the contract activity packages.		
3. The teacher monitored while students worked independently to complete the contract activity packages.		
4. The students worked diligently while completing the contract activity packages.		
5. The students were engaged while completing the contract activity packages.		
6. The students were able to complete the contract activity packages without needing too much help/guidance/assistance from the teacher.		
7. The teacher collected the contract activity packages from each student at the end of class.		
Comments:		

Date _____

Day 6 of Implementation (extra copy for use as needed)		
	Yes	**No**
1. Contract activity packages were distributed to each student in the class.		
2. Students worked independently to complete the contract activity packages.		
3. The teacher monitored while students worked independently to complete the contract activity packages.		
4. The students worked diligently while completing the contract activity packages.		
5. The students were engaged while completing the contract activity packages.		
6. The students were able to complete the contract activity packages without needing too much help/guidance/assistance from the teacher.		
7. The teacher collected the contract activity packages from each student at the end of class.		
Comments:		

Date _____

Day 7 of Implementation (extra copy for use as needed)		
	Yes	**No**
1. Contract activity packages were distributed to each student in the class.		
2. Students worked independently to complete the contract activity packages.		
3. The teacher monitored while students worked independently to complete the contract activity packages.		
4. The students worked diligently while completing the contract activity packages.		
5. The students were engaged while completing the contract activity packages.		
6. The students were able to complete the contract activity packages without needing too much help/guidance/assistance from the teacher.		
7. The teacher collected the contract activity packages from each student at the end of class.		
Comments:		