ALTERNATIVE SEATING IN MIDDLE SCHOOL MATH: EFFECTS ON STUDENT MOTIVATION

by

Kirk Whitfield Renegar

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

The use of alternative classroom seating has recently become a topic of interest in education. Many teachers have redesigned their classrooms to include many forms of classroom seating aside from traditional student desks. These forms of seating include but are not limited to: therapy balls, therapy cushions, and beanbag chairs. While this movement has certainly caused a buzz, little research has been completed that speaks to its educational impact on students when multiple forms of seating are available to students. Most critically, the potential impact of alternative classroom seating on students' motivation and self-efficacy has also yet to be studied. This causal-comparative research study represents one of the first attempts to fill this research gap. Using the Motivated Strategies for Learning Questionnaire (MSLQ), this study examined the differences in motivational aspects present when students in middle school grades six and seven were either exposed to multiple forms of alternative seating or did not have exposure to alternative seating. Student participant data were collected from the math classes of intermediate schools in rural, southwestern Virginia. Data were then analyzed using a one-way multivariate analysis of variance (MANOVA) with the subscales of the MSLQ of: self-efficacy, intrinsic value, cognitive strategy use, and self-regulation representing the dependent variables of the study. While significant differences between the two groups were not reported, this study is critical as it provides guidance for further research on the topic of alternative classroom seating and insight to the educational impact on the use of alternative classroom seating.

Keywords: alternative classroom seating, academic motivation, self-efficacy, Motivated Strategies for Learning Questionnaire (MSLQ)

Dedication

This work is dedicated to the glory of God and to my family.

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Without question, this entire process would not have been possible without the love and support of my family. I truly lack the words to express my gratitude to my wife Rebecca. You have seen me through to the end of this journey, and I am very blessed to be your husband. To Whit and Eilidh, you have sacrificed without realizing you were sacrificing. I love you very much. Mom, Dad, Eric, Sidney, Sydney, and Andrea and all the rest of my family thank you for your support and encouragement the whole way. I love being a part of our family.

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Attention Deficit Hyperactivity Disorder (ADHD)

Autism Spectrum Disorder (ASD)

Electroencephalography (EEG)

Institutional Review Board (IRB)

Motivated Strategies for Learning Questionnaire (MSLQ)

One-Way Multivariate Analysis of Variance (MANOVA)

CHAPTER ONE: INTRODUCTION

Background

Recently, the most basic component of the classroom setting, student seating, has become the subject of innovation. Teachers and administrators have reimagined the seating options available to students in the hopes of providing a learning environment that is able to, as described by the California Department of Education: School Facilities and Transportation Services Division (2016), "…support diverse teaching and learning needs." In the work *Flexible Learning Environments*, the California Department of Education: School Facilities and Transportation Services Division stated that in order for schools to prepare students for the 21st-century job market, schools should adapt their instruction to allow for more problem solving and collaborative opportunities for students. Therefore, the look and feel of the classroom should also be adapted to meet these demands, specifically by providing seating options that allow for students to be mobile and comfortable (California Department of Education: School Facilities and Transportation Services Division, 2016). By allowing for a more comfortable and mobile environment, alternative seating also serves to improve communication opportunities for students by way of increased student-to-student communication, improved small-group work, and more teacher to student interaction (California Department of Education: School Facilities and Transportation Services Division, 2016). As Delzer (2015) stated, "It's been my dream to make my 2nd grade classroom look more like a 'Starbucks for kids', and less like, well, a classroom." Thus, alternative classroom seating has recently taken on several forms from chairs and desks with wheels to standing desks to simply pillows on the floor (California Department of Education: School Facilities and Transportation Services Division, 2016; Delzer, 2015).

Research examining the movement to provide students with more flexible learning spaces by way of alternative seating has taken several forms. These differing takes on alternative seating can primarily be categorized by the type of alternative seating being studied and by the student population being examined. The most significant body of research on alternative seating has focused on the use of therapy balls in the classroom (Al-Eisa, Buragadda, & Rao Melan, 2013; Bagatell, Mirigliani, Patterson, Reyes, & Test, 2010; Burgoyne & Ketcham, 2015; Fedewa & Erwin, 2011; Mead, Lesley, Gardner, & Dunn, 2016; Wu et al., 2012). These large, inflatable balls traditionally purposed for exercise and physical therapy have moved into the classroom as an option for classroom seating (Tunstall, 2009). Most commonly, studies examining therapy balls have focused on the impact of the seating device on student behavior and academic achievement for students with specific disabilities (Bagatell et al., 2010; Fedewa & Erwin, 2011; Wu et al., 2012). In studying the effects of therapy balls on students with autism spectrum disorder (ASD), Bagatell et al. (2010) found that while student response was varied, the use of the therapy ball did seem to have positive effects for some students with respect to their in-seat behavior and engagement. Positive findings were also noted for studies examining the impact of therapy ball seating with students with attention deficit hyperactivity disorder (ADHD) (Fedewa & Erwin, 2011; Wu et al., 2012). In examining eight students with ADHD, Fedewa & Erwin (2011) found that students improved their level of attention and time on-task while decreasing hyperactive behaviors. Wu et al. (2012) reported similar results in their study of 15 students with ADHD who displayed improvements in reaction time and attentional behavior with the use of therapy balls.

Research studies have also made attempts to extend the use of therapy balls beyond specific population groups to a more generalized student population (Burgoyne & Ketcham,

2015; Mead et al., 2016). In examining a general education second grade classroom, Burgoyne and Ketcham (2015) found that although the use of therapy balls increased the amount of student movement, students were more likely to be on task. Mead et al. (2016) compared sixth-grade students' math achievement data among three student groups: one using therapy balls as seats to students, another receiving periodic breaks for physical activity, and another that did not receive any form of physical activity. Results of this study indicated that students using therapy balls as seats performed better than both the student group receiving no physical activity and the student group receiving periodic breaks for physical activity (Mead et al., 2016).

Physical implications for students using therapy ball have also been the topic of educational research (Al-Esia et al., 2013). Al-Esia et al. (2013) found that the use of therapy balls could prove an effective seating alternative for students that exhibit discomfort when sitting in class.

The use of various forms of cushions as alternative classroom seating has also been the topic of recent educational research (Seifert & Metz, 2016; Umeda & Deitz, 2011). Although the work of Umeda and Deitz (2011) did not report significant differences in on-task and in-seat behavior for student with ASD when using therapy cushions, it is critical to note that the researchers called for further research as the study was limited to only two participants. Seifert and Metz (2016) provided one of those additional studies seeking to examine the educational impact of cushions as seats. Preschool students' attention and persistence were shown to be improved when using the inflatable cushions as the primary method of seating, thus pointing to the possibility of enhanced student engagement for another form of alternative seating (Seifert & Metz, 2016).

In addition to therapy balls and cushions, alternative seating research has examined a wide range of seating options for students (Benden, Zhao, Jeffery, Wendel, & Blake, 2014; Harvey & Kenyon, 2013) Benden et al. (2014) examined the impact of standing desks as opposed to standard desks for elementary school students. The results indicated that students expended more energy when using the standing desk, and as a result, "…may combat obesity among those in the highest risk categories…" (Benden et al., 2014, p. 9372). Harvey and Kenyon (2013) concluded that student satisfaction at the post-secondary level was directly affected by the type of seating style available to them, with students being more satisfied with modern mobile chairs over all other seating options with the exception of a trapezoid table with chairs on casters.

Historically, research on classroom seating has been primarily concerned with classroom seating location and seating arrangement as it relates to student participation (Cinar, 2010; Parker, Hoopes, & Eggett, 2011; Schmidt, Stewart, & McLaughlin,1987; Sommer, 1965), student behavior (Bicard, Ervin, Bicard, & Baylot-Casey, 2012; Van den Berg, Segers, & Cillessen, 2012), and student achievement (Armstrong & Chang, 2007; Meeks, Knotts, James, Williams et al., 2013, Perkins & Wieman, 2005). Sommer (1965) concluded that the arrangement of classroom seating can impact student participation, while Schmidt et al. (1987) found that there was no significant difference in Native American students' participation based on the classroom seating arrangement. Parker et al. (2011) and Cinar (2010) examined the willingness of students to participate in class depending on their seating location in the classroom. Cinar found that students who chose to sit in the front of the class participated at a much higher rate than students sitting in the back of the room. Research has also found that

students are more likely to participate in class when allowed a variety of seating locations rather than a fixed seating assignment (Parker et al., 2011).

With regard to seating affecting student behavior, Bicard et al. (2012) found that disruptive behavior was directly related to students having choice of their seat as opposed to having their seat assigned by the teacher. Students exhibited disruptive behavior twice as often when they were responsible for choosing their seat as compared to when the teacher assigned seats (Bicard et al., 2012). Similarly, Van den Berg et al. (2012) reported that seating impacted students' relationships with other students. The researchers found that when students who initially did not have a positive relationship were seated closer to one another it had a positive impact on their relationship (Van den Berg et al., 2012). This type of seating arrangement not only increased students' likeability but also cut down on the occurrences of student victimization reports (Van den Berg et al., 2012).

Research on student achievement as impacted by classroom seating location has also produced varied results. The work of Ngware, Ciera, Musyoka, and Oketch (2013) and Perkins and Wieman (2005) indicated seating location can have an influential role on student performance, whether it be on students in primary grades (Ngware et al., 2013) or college students (Perkins & Wieman, 2005). Conversely, Armstrong and Chang (2007) found no impactful difference in student performance depending on college level students' distance from the instructor. Meeks et al. (2013), after data collection over a 10-year period focused on college-level students, also concluded that the location of students' seats or even the seating type did not have a significant impact on students' academic performance.

As previously discussed, several studies have attempted to make a connection between student seating location and type with respect to the impact on student performance (Armstrong

& Chang, 2007; Mead et al., 2016; Meeks et al., 2013; Ngware et al., 2013; Perkins & Wieman, 2005). In a similar manner, Tagliacollo, Volpato, and Junior (2010) examined the relationship between the physical location of the student in the classroom and academic performance. However, their study added another dimension to the topic as it suggested that academic performance was not only associated with classroom position but that both were affected by a student's motivation for learning (Tagliacollo et al., 2010). Linking student motivation to academic performance, Coutinho (2008) found that students who had high metacognitive ability and high self-efficacy also performed at a higher level of academic achievement. Thus, from the results of studies by Tagliacollo et al. (2010) and Countinho (2008), it appears that a potential link could exist between student seating and student motivation, and that student motivation could have an impact on academic performance. Kilbourne (2009) hinted at this connection in and reported an increased level of excitement and enthusiasm in college students using therapy balls as seats.

The impact of student motivation and self-efficacy provided the theoretical framework for this study, and primary focus was Bandura's (1977) self-efficacy theory. In his 1977 work, Bandura argued that an individual's self-efficacy was critical in determining one's level of effort and ability to persist. Essentially, if one believes that they are able to accomplish a task, they are more likely to begin the task, work for longer periods of time, and continue when faced with adversity. Bandura (1986) went on to argue that individuals move through a self-appraisal of self-efficacy prior to engaging in an activity. According to Bandura (1986), this self-appraisal involves the consideration of several factors, "…difficulty of the task, the amount of effort they expend, the amount of external aid they receive, the situational circumstances under which they perform, and their mood and physical state at the time" (p. 363).

Since Bandura's (1977) seminal work on self-efficacy theory, additional works have argued for a link between self-efficacy and academic motivation, which was critical for the theoretical framework of this study. Upon review of research on self-efficacy, Zimmerman (2000) claimed there is a clear link between self-efficacy and several factors related to academic motivation such as, "…as choice of activities, level of effort, persistence, and emotional reactions" (p. 86). Bandura and Schunk (1981) added empirical credence to the theoretical framework by reporting a positive link between student self-efficacy and accuracy of mathematical performance. Aydin (2015) also added to the empirical literature and reported a positive, predictive relationship linking self-efficacy and metacognitive strategies to students' intrinsic motivation levels to learn biology.

This critical link between self-efficacy and academic motivation was also discussed by Pajares (1996). Pajares (1996) reviewed research on the presence of this link between self-efficacy and student motivation as well as student achievement. It is important for the current study that Pajares did acknowledge that research seeking to develop a causal relationship between students' self-efficacy and their performance can lead to a "..chicken-or-egg…" (p. 566) argument with it being difficult to discern if students achieve well based on how they feel about themselves or vice versa. However, acknowledging that this potential issue for causal studies, Pajares did go on to state that, "It is possible, however, to develop better understandings of the conditions under which self-efficacy beliefs operate as a causal factors-through influence on choice, effort, and persistence-in human functioning" (p. 566). Thus, the current study sought to add to the body of research on self-efficacy and causal factors that influence one's own self-belief and motivational factors.

As one can clearly see from the research that has been presented, students appear to be impacted in a variety of ways based on their seating in the classroom. In addition, it also appears critical for student learning that students are motivated through the building of their self-efficacy. Thus, the question appears to be, does a potential link exist between the use alternative classroom seating and students' motivation and self-efficacy?

Problem Statement

Alternative seating options such as therapy balls, therapy cushions, standing desks and mobile chairs have been found to influence student behaviors in the classroom (Al-Eisa et al., 2013; Bagatell et al., 2010; Benden et al., 2014; Burgoyne & Ketcham, 2015; Fedewa & Erwin, 2011; Mead et al., 2016; Harvey & Kenyon, 2013; Seifert & Metz, 2016; Umeda & Deitz, 2011; Wu et al., 2012). Classroom seating location has also been found to impact student performance, behavior, and participation (Armstrong & Chang, 2007; Bicard et al., 2012; Cinar, 2010; Meeks et al., 2013; Ngware et al., 2013; Parker et al., 2011; Perkins & Wieman, 2005; Schmidt et al.,1987; Sommer, 1965; Van den Berg & Segers, 2012). Based on this body of research and findings, it appears clear that the type and location of seating can impact students in a variety of ways. However, the presence of a common link between the noted changes in behavior such as on-task behaviors, academic performance, and student participation has been researched in a limited fashion with only DiBitetto (2015) examining the impact of alternative seating's impact on student performance in the math classroom. Additionally, there is limited research that speaks to the availability of multiple forms of alternative seating and its possible impact on students (Harvey & Kenyon, 2013; McEwen, 2014).

It is evident based on existing empirical and theoretical literature that a link between self-efficacy and student motivation as well as student achievement exists (Aydin, 2015; Bandura,

1977; Bandura, 1986; Bandura & Schunk, 1981; Zimmerman, 2000). In bringing all of these issues together, it remains to be seen if alternative seating options affect student self-efficacy to the point of impacting student motivation. Therefore, the problem of this study is that research is needed on the availability of alternative forms of student seating and the impact on student motivation.

Purpose Statement

The purpose of this study was to determine if a statistically significant difference could be found between the motivation of students who were exposed to classrooms where alternative seating was available compared to students whose classrooms did not have alternative seating options. The study sought to add to the literature available on alternative seating. Specifically, this study was intended to help fill the gap in the literature linking alternative seating to effects on student motivation. To accomplish this task, this study employed a quantitative design while focusing on students in middle school grades six and seven from rural, southwestern Virginia. The student participants in this study were drawn from middle school math classrooms. Thus, the sample populations for the study consisted of students from sixth- and seventh-grade math classes that had alternative seating available in their classrooms ($N = 38$) and students that did not have alternative seating available in their middle school math classrooms ($N = 85$). Students' aspects of motivation were measured using the Motivated Strategies for Learning Questionnaire as developed by Pintrich and Degroot (1990), specifically utilizing the subscales of self-efficacy, intrinsic value, cognitive strategy use, and self-regulation, which served as dependent variables of the aspects of motivation. The independent variable for the study was the availability of alternative classroom seating. Data was then be analyzed for both groups across the four variable subscales using a one-way multivariate analysis of variance (MANOVA).

Significance of Study

This study is significant as it filled a number of gaps in the literature currently present on the topic of alternative seating. Most critically, the effects of alternative seating on student motivation had yet to be thoroughly examined. In addition, the results of this study seek to inform teachers and administrators on the use of alternative seating specifically with respect to its effects on student motivation. By examining students in the middle school math setting, this study sough to yield results that will be generalizable to student populations. In addition, while alternative seating has been examined with regards to specific forms of seating (Al-Eisa et al., 2013; Bagatell et al., 2010; Benden et al., 2014; Burgoyne & Ketcham, 2015; DiBitetto, 2015; Fedewa & Erwin, 2011; Mead et al., 2016; Harvey & Kenyon, 2013; Seifert & Metz, 2016; Umeda & Deitz, 2011; Wu et al., 2012), research is very limited with respect to the influence of multiple forms of alternative seating (Harvey & Kenyon, 2013; McEwen, 2014). Thus, this study contributes to the existing body of research on not only classroom seating as a whole (Armstrong & Chang, 2007; Bicard et al., 2012; Cinar, 2010; Meek et al., 2013; Ngware et al., 2013; Parker et al., 2011; Perkins & Wieman, 2005; Schmidt et al., 1987; Sommer, 1965; Van den Berg & Segers, 2012) but specifically to the limited body of research present on alternative seating (Al-Eisa et al., 2013; Bagatell et al., 2010; Benden et al., 2014; Burgoyne & Ketcham, 2015; Fedewa & Erwin, 2011; Mead et al., 2016; Harvey & Kenyon, 2013; Seifert & Metz, 2016; Umeda & Deitz, 2011; Wu et al., 2012).

This study could have far reaching implications with the ever-growing emphasis on developing flexible learning spaces and growing interest in alternative seating (California Department of Education: School Facilities and Transportation Services Division, 2016; Delzer, 2015). With this call for teachers and administrators to reimagine the notion of the flexible

learning space, it is clear that the results of this study could potentially have the ability to be applied to a wider population, outside the study's population of students from rural, Southwestern Virginia. In addition, this study will aid teachers and administrators considering allocating resources to the implementation of alternative seating.

Research Question

The study was based on the following research question:

RQ1: Does the availability of alternative seating have an effect on the *aspects of student motivation* for students in middle school math classes?

Definitions

1. *Academic Motivation* - Academic motivation speaks to a student's student choice of what activity to engage, the level of effort given during the engagement, persistence in completing a task, and emotional reaction to the academic endeavor (Zimmerman, 2000).
2. *Alternative Seating* - Alternative classroom seating refers to various forms of seating that are not traditional desks. Alternative seating allows for movement and flexibility by allowing students to change positions, rock, rotate, and/or roll (California Department of Education: School Facilities and Transportation Services Division, 2016).
3. *Attention Deficit Hyperactivity Disorder* - Attention Deficit Hyperactivity Disorder is neurobehavioral disorder that causes children significant academic and sensory motor problems, which typically comes in the form of difficulty sitting and paying attention (Schilling, Washington, Billingsley, & Deitz 2003).
4. *Autism Spectrum Disorder* - Autism Spectrum Disorder is a developmental disorder that causes children to exhibit varying behaviors and developmental levels. Typically,

difficulty with engagement, attention, and appropriate behavior are common (Schilling & Schwartz, 2004).

5. *Circle Time* - Circle time is structured instructional time in which students are expected to sit on the floor, carpet, or chairs, typically in a circular or semi-circular pattern with the teacher being the presenter (Seifert & Metz, 2016).
6. *Disruptive Behavior* - Disruptive behavior is characterized by a student not performing assigned task in a focused manner, talking without permission from teacher, or touching another student without permission (Bicard et al., 2012).
7. *On-task Behavior* - On-task behavior is characterized by students performing the assigned activity in a focused manner while adhering to the rules set forth for the classroom (Burgoyne & Ketcham, 2015).
8. *Self-Efficacy* - Self-efficacy is the belief that an individual is able to accomplish a desired outcome based on their execution of a particular behavior (Bandura, 1977).
9. *Sensory Integration* - Sensory integration is defined as the brain's ability to take in information and organize the information in order to prepare a motor or behavioral response (Ayers, 1972)
10. *Sensory Modulation* - Sensory modulation is defined as the brain's ability to utilize the information acquired through sensory integration to produce or not produce action (Pfeiffer, Henry, Miller, & Witherell, 2008)
11. *Student Participation* – Student participation is defined as any time a student freely offers a comment, a response to the teacher's question, or asks a question during class (Schmidt et al., 1987).

12. *Therapy Balls* - Therapy balls are inflatable balls that were originally designed and used as a strength training device aimed at aiding in core strength and balance (Tunstall, 2009).
13. *Therapy Cushion* - Therapy cushions are inflatable discs that were originally designed and used as a strength training device aimed at aiding in core strength and balance that can be used as a seating device in a similar manner to therapy ball (Umeda & Deitz, 2011).

CHAPTER TWO: LITERATURE REVIEW

Introduction

The following literature review will establish the theoretical and empirical frameworks for this study examining the impact of alternative classroom seating on student motivation. To accomplish this goal, a comprehensive examination of Bandura's (1977) self-efficacy theory will be established with particular attention to its link to student academic motivation. In addition, this literature review provides a thorough examination of the research available on the topic of alternative classroom seating. The topics of student seating location, selection, preference, and classroom seating arrangement are examined as they relate to the overall body of literature available on student seating. This review of all available literature will effectively identify a gap in the literature dealing with alternative seating with respect to its impact on student motivation.

Theoretical Framework

Self-Efficacy Theory

Bandura's (1977) seminal work, *Self-Efficacy: Toward a Unifying Theory of Behavioral Change*, serves as the basis for the theoretical framework of the current study. In this work, Bandura explained an individual's self-efficacy as a process based on personal expectations of specific behaviors leading to a particular outcome. For Bandura, the individual's belief of being able to perform a given behavior or task is critical to the person taking on the behavior or task to ultimately initiate an expected outcome. As individuals take in a variety of informational pieces, they make a decision as to whether or not they feel as though task performance is possible (Bandura, 1977). As previously discussed, this personal belief in being able to accomplish a task and demonstrate mastery has an impact on an individual's willingness to initially take on the task and their ability to continue the task when faced with difficulty (Bandura, 1977). Therefore,

according to Bandura's (1977) self-efficacy theory, individuals are more likely to "…avoid threatening situations they believe exceed their coping skill, whereas they get involved in activities and behave assuredly when they judge themselves capable of handling situations that would otherwise be intimidating" (p. 194).

Bandura (1977) also identified the sources of an individual's self-efficacy: performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal. For performance accomplishments, an individual's success or lack of success for the given experience determines their level of self-efficacy (Bandura, 1977). Thus, as individuals successfully demonstrate mastery of an experience, their efficacy expectation become higher (Bandura, 1977). Bandura went on to explain that individuals also grow in their self-efficacy by seeing others experience success performing a task or participating in an experience. Bandura also stated that, while not as effective as personal success, an individual's self-efficacy can be raised by watching other be successful in completing tasks. Finally, Bandura argued that an individual's emotional state can play an important role in the person's level of self-efficacy. Essentially, when considering the impact of emotional arousal, a heightened state of stress and anxiety could negatively impact one's belief in their ability to successfully complete the task or participate in the experience (Bandura, 1977).

Bandura, Adams, Hardy, and Howells (1980) added empirical evidence to Bandura's self-efficacy theory. Across two different treatments, one involving participants who had a fear of snakes and another involving agoraphobics, the link between self-efficacy and an individual's performance was tested (Bandura et al., 1980). In both cases, compelling evidence suggested that self-efficacy was related to the individual's ultimate performance and could be used as a predictor of behavior (Bandura et al., 1980).

While Bandura's (1977) work *Self-Efficacy: Toward a Unifying Theory of Behavioral Change* presented a generalized psychological approach that described the role of self-efficacy, for the purposes of the current study, it is critical that Bandura's (1993) work, *Perceived Self-Efficacy in Cognitive Development and Functioning*, applied the theory to student learning. As Bandura (1993) stated, "Children with the same level of cognitive skill development differ in their intellectual performance depending on the strength of their perceived self-efficacy" (p. 136). Thus, Bandura (1993) argued that the higher the students' belief in their ability to demonstrate their learning, the better the chance of the student displaying mastery in differing subject areas and regulating their own learning. Bouffard-Bouchard, Parent and Laviree's (1991) empirical work supports the theoretical assertions made by Bandura with respect to the role of self-efficacy in determining a student's control of their learning behaviors and task persistence. While studying 45 juniors and 44 seniors in high school, Bourffard-Bouchard et al. found that regardless of students' level of cognitive functioning or grade level, student participants' level of self-efficacy played a major role influencing students' willingness to persist with assigned tasks. This willingness to work for longer periods of time was linked to better student performance (Bouffard-Bouchard et al., 1991).

McTigue and Liew (2011) also added to the theoretical framework on the critical impact of students' self-efficacy while focusing on middle school-aged students. As the current study focused on the same target population, it is important to recognize that current theoretical support is present, which focuses on the topic of student self-efficacy (McTigue & Liew, 2011). The researchers used empirical and theoretical research to argue for how teachers in the language arts area should address the topic of self-efficacy (McTigue & Liew, 2011). While the current study examined students in the middle school mathematics target population, the

recommendations made by researchers certainly relate to students in all content areas (McTigue & Liew, 2011). Of particular note, McTigue and Liew (2011) called teachers to help students build their self-efficacy by providing a safe learning environments, integrating social and emotional learning, encouraging students to monitor their own self-efficacy, modeling self-efficacy, providing feedback to students, and facilitating goal-setting opportunities.

Additional theoretical work was completed by Guthrie and Klauda (2012) who emphasized the need for middle school teachers to build student self-efficacy and use motivation to build students' literacy through the reading of textbooks. The authors argued that building students' self-efficacy in reading informational texts primarily from textbooks can be crucial for students' education (Guthrie & Klauda, 2012). Guthrie and Klauda stated that instead of avoiding the use of the textbook because of student struggles, teachers should continue to expose students to informational texts in an effort to build student comfort and confidence. The authors also made the point that this exposure to informational text can and should be matched to the level of reader with the teacher increasing the level of rigor as students build self-efficacy in their ability to read such content appropriate texts (Guthrie & Klauda, 2012). In doing so the authors stated that, "To help students gain confidence in higher-order thinking with complex text, effective teachers gradually increase complexity from lower-level to higher-level tasks" (Guthrie & Klauda, 2012, p. 66). The argument to approach self-efficacy building through the scaffolding of instruction is critical to the present study as the role of alternative seating is also geared to meeting student needs by way of movement and social interaction. As it pertains to social interaction, it is important to note that Guthrie and Klauda went on to argue that students can be motivated to read information texts, such as the textbooks, by utilizing social collaboration to motivate learners. As Guthrie and Klauda (2012) stated, "One simple way to support

collaboration is to arrange desks in pairs and incorporate two-minute paired activities into each lesson" (p. 67).

It is important to note that Bandura (1993) also pointed to the role of socialization concerning how a student's self-efficacy influences one's academic achievement, and how this may affect the child's social acceptance. Thus, the higher the student's self-efficacy, the more likely the student is to achieve academically and be accepted socially (Bandura, 1993). Bandura, Barbaranelli, Carprara, and Pastorelli (1996) studied the connection between self-efficacy and academic achievement. In studying 279 students ranging from 11 to 14 years old, Bandura et al. (1996) reported that findings did support the link between participants' self-efficacy and their academic achievement.

The work of Brown (2014) also supported the link between a student's self-efficacy and the student's level of academic achievement. To attempt to find a link between students' self-efficacy and students' literacy achievement, Brown collected data from 160 middle school students from four middle schools. Students in the sample population engaged in the READ 180 intervention program for an 18-week period. After comparing the students' academic achievement through the use of grade reports and post-test data with student data on self-efficacy, Brown (2005) concluded that there was, "…a strong correlation between self-efficacy (MSLQ) and READ 180 18-week grade checks, and that READ 180 18 week grade checks also increase as self-efficacy scores increase" (p. 66). While this study was important as it supports the work of Bandura (1993), it is also critical to note that the work of Brown (2014) also utilized the MSLQ as the instrument to measure student self-efficacy in the same manner as the current study.

In relation to the present study on the effects of alternative classroom seating on student academic motivation, Bandura's (1977) work pointed to the importance of one's environment on their self-efficacy by stating, "…perceived self-efficacy have directive influence on choice of activities and settings…" (p. 194). In addition, the notion that emotional arousal in feelings such as stress and anxiety influence one's self-efficacy is critical when considering the impacts of one's environment. Bandura (1986) argued, "…whether or not perceived self-efficacy is affected by emotional arousal depends on the source of arousal…the circumstances under which arousal is elicited…" (p. 365). As Bandura (1993) went on to explain, the individual's ability to control their environment could perhaps be a condition that could encourage higher levels of self-efficacy. Thus, if an individual perceives their environment as controllable they could perhaps be more inclined to have higher levels of self-efficacy (Bandura, 1993). This provides a firm theoretical foundation to examine the possibility of the use of alternative seating creating an environment in which students feel more in control and experience less anxiety, therefore potentially experiencing higher levels of self-efficacy.

Academic Motivation

Bandura (1993) also addressed the connection of an individual's self-efficacy and their motivation. For Bandura, motivation is also a process of evaluation and self-regulation by which an individual examines a situation, anticipates outcomes based on potential actions, and plans their action accordingly to achieve a desired outcome. This notion was supported by the commentary of Zimmerman (2000) who claimed, "…the historic wisdom of educators that students' self-beliefs about academic capabilities do play an essential role in their motivation to achieve" (p. 89).

Brophy (1983) also addressed the topic of student motivation with a slightly different slant by emphasizing students' motivation focuses on learning as opposed to academic performance. Brophy (1983) described a student's motivation as a trait that can be developed based on, "…conditioning and learning experiences" (p. 200). It is also important that Brophy acknowledged the importance of the classroom setting for a student's motivation. For Brophy (1983), the classroom was not a free space that allowed for student choice of activity, rather, "…students must cope with activities that are compulsory and subject to evaluation" (p. 201). This is critical as this study sought to examine the impact of alternative seating and its potential impact on student motivation.

The work of Wolters and Pintrich (1998) addressed the role of students' motivation and self-regulated learning strategies among middle school students. After examining the beliefs of 545 students in the seventh and eighth grades, the researchers found that students' motivation was impacted based on the subject area that they were studying (Wolters & Pintrich, 1998). It is important for the current study to note that, according to Wolters and Pintrich, students found that mathematics was of more importance and had greater value than compared to the subject areas of English or social studies. Additionally, the researchers reported that the more value and interest students placed on a particular subject area, the more likely students were to use, "…deeper processing strategies and more self-regulatory strategies" (Wolters & Pintrich, p. 43, 1998). In tying their research to self-efficacy, Wolters and Pintrich also found that student self-efficacy was a clear predictor of student performance in English, mathematics, and social studies. Thus, it seems clear that the higher the level of student motivation, interest, and self-efficacy, the more likely students would be to achieve academically at a higher level.

Bandura and Schunk (1981) worked together to provide empirical evidence to support the connection between self-efficacy, academic motivation, and student performance. After studying 40 elementary school students' mathematical self-efficacy and academic performance, Bandura and Schunk reported that students performed better academically when they set short-term goals that were achievable and worked in a self-directed manner. These students also reported increased levels of self-efficacy and higher intrinsic motivation to complete tasks (Bandura & Schunk, 1981). These findings are critical for the current study in a number of ways. First, the work of Bandura and Schunk (1981) provided support for the connection between a student's self-efficacy and intrinsic motivation, which ultimately can result in improved academic performance. Increased motivation has been shown to have positive effects on student achievement; if a link can be found between the presence of alternative classroom seating and academic motivation, it could be suggested that the presence of alternative seating may affect students' academic achievement. It is also of note that the work of Bandura and Schunk examined the impact of self-efficacy and academic motivation in mathematics, and the current study focused on the impact of alternative seating on middle school students in the mathematics classroom.

Additional studies have also been conducted that empirically link self-efficacy and academic motivation to student performance (Aydin, 2015; Cetin-Dindar, 2016). While studying 243 middle school age students, Cetin-Dindar (2016) studied the connection between constructivist learning environments, student self-efficacy, student motivation, and student achievement. The researcher hypothesized that student self-efficacy and student motivation would be positively affected by a constructivist approach in the science classroom, thus leading to students being more motivated to learn with positive implications for student achievement

(Cetin-Dindar, 2016). Cetin-Dindar's work stands as one of the most critical for the present research study, as in addition to being focused on the same age-group as the current study, the topics discussed by Cetin-Dindar are also clearly linked to this study. As the researcher explained about the constructivist learning environment, "…students are active learners in the learning environment, conduct activities for promoting learning, collaborate with peers during the learning process, take responsibility in the learning environment…" (Cetin-Dindar, 2016, p. 243). While alternative seating is not necessarily born from a constructivist point of view, as noted earlier in the text, the spirit of collaboration and flexibility is at the heart of alternative seating. Even though the data collected by Cetin-Dindar did not support the previously stated hypothesis, data did support the impact of student motivation on student achievement. While the constructivist learning environment was not found to motivate students or drive self-efficacy, data did support the conclusion that when students felt the curriculum was personally relevant, that student motivation was affected in a positive way (Cetin-Dindar, 2016). In addition, Cetin-Dindar found that student self-efficacy was the most impactful variable in relation to the level of student motivation. Thus, it is clear that this study pointed to a strong relationship between self-efficacy and student motivation to learn (Cetin-Dindar, 2016).

Aydin (2015) added to the body of empirical research available that supports the theoretical connection between student self-efficacy and student motivation. Similar to the work of Cetin-Dindar (2016), Aydin (2015) also chose to examine the role of self-efficacy as an influential factor in determining students' academic motivation in the subject area of science. In this particular research study, Aydin (2015) specifically focused on the influence of self-efficacy on the use of metacognitive strategies and motivation for high school students in the subject area of biology. As mentioned previously, after examining 286 high school age students, Aydin

reported that a strong correlation existed between students' level of self-efficacy and their metacognitive strategies and intrinsic motivation. It is critical for the current study to note that Aydin also utilized the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & Degroot, 1990), which was used in the current study. Also important to recognize is that while Aydin (2015) did report a link between self-efficacy and students' intrinsic motivation, data did not support self-efficacy as a predictor of extrinsic motivation. This is critical as the current study on the use of alternative classroom seating is more geared to studying extrinsic motivation of the classroom seating environment. Thus, this study added to the body of literature on self-efficacy and metacognitive strategy use.

Additional empirical evidence has been collected from studies examining the role of self-efficacy and academic motivation as it relates to the classroom learning environment (McMahon, Wernsman, & Rose, 2009; Patrick, Ryan, & Kaplan, 2007). Not only do these studies fit into the theoretical framework as developed around self-efficacy and academic motivation, but also it is important that these studies examined the topics as they related to the environment as experienced by the students. In a study focused on 147 fourth and fifth grade students from low-income backgrounds, McMahon et al. (2009) examined the influence of classroom climate and school belonging as it related to students' self-efficacy in the subject areas of language arts, math, and science. Based on their analysis of the data collected, the researchers concluded that a positive classroom environment in which students feel supported and feel as though they belong had a positive correlation to students' academic self-efficacy in the area of language arts (McMahon et al., 2009). While similar relationships were not found between classroom environment and the sense of school belonging as related to academic self-efficacy in the areas of science and math, McMahon et al. did report that student perceptions of difficulty did have a

negatively correlated relationship with academic self-efficacy in those content areas. This led the researchers to conclude that their findings support educators needing to pay close attention to the learning environment as, "…students who feel they a have a cohesive class also feel satisfied with their class and have a sense of pride and belonging in their school" (McMahon et al., 2009, p. 275). Of particular note for the current study was the researchers' assertion that a possible reason for academic self-efficacy being affected by classroom environment and school belonging in the language arts as opposed to math and science was the instructional strategies and dynamic used in language arts (McMahon et al., 2009). The researchers hypothesized as language arts classrooms typically employ more discussion-based strategies, thus promoting teacher-student and student-student interaction, that positive interactions might play an important role in explaining a more positive perception of the classroom environment and school belonging (McMahon et al., 2009, p. 276). This is critical for the current study as one of the major features of alternative classroom seating is its ability to facilitate more student interaction through movement and flexibility.

The work of Patrick et al. (2007) also provided key empirical evidence that supported the theoretical framework for the present study. While studying 602 students from fifth grade, Patrick et al. (2007) examined how student perceptions of the classroom social environment related to "…adaptive engagement in math…" (p. 86), math achievement, and student motivational beliefs. Researchers found that the social classroom environment was critically important as it related to student engagement. According to Patrick et al. (2007), "When students feel a sense of emotional support from their teacher, academic support from their peers, and encouragement from their teacher to discuss their work, they are more likely to use self-regulatory strategies and engage in task-related interactions" (p. 93). The researchers went on to

claim that the students' own motivational beliefs were linked to these classroom environment perceptions and level of student engagement (Patrick et al., 2007). In addition, research findings suggested that student achievement was positively influenced by student interaction (Patrick et al., 2007).

Thus, Patrick et al. (2007) argued that the results of the study suggested, "…perceptions of the social environment affect students' academic social beliefs about themselves, which in turn affect their behavioral and cognitive engagement in class and then their achievement" (p. 94). This assertion is of paramount importance for the current study as it aims to determine whether the presence of alternative classroom seating has any effect on students' motivational beliefs. The work of Patrick et al. is also connected to the present study as the target populations are similar as Patrick et al.'s work focused on fifth grade students and the current study examined sixth- and seventh-grade students. In addition, the content area of math is the same in both studies.

Related Literature

Alternative Classroom Seating

While educational research has long examined the impact of where and how students are seated in the classroom, the research available addressing alternative classroom seating is relatively new with most being conducted in the past 20 years. Cornell (2002) discussed a shift in thinking with regards to classroom furniture and seating in his work *The Impact of Changes in Teaching and Learning on Furniture and the Learning Environment.* For Cornell, as the needs of student learners has shifted with the present economy moving from an "industrial economy" to a "knowledge economy" (p. 33). To successfully complete this shift, Cornell (2002) went on to argue that the classroom environment and furniture should be usable to be, "…more

comfortable, adjustable, intuitive, reconfigurable, technologically-capable, compressible, and attractive" (p. 41). Thus, the research available on alternative seating has focused on pieces of furniture designed to accomplish these tasks. These research studies have predominantly focused on the use of one type of alternative seating on a particular subgroup of the general classroom population. In general, the studies on alternative seating have tended to examine the behavioral impact for students as a result of sensory motor integration and other physical conditions. Educational research is also present that has sought to take the next step examining alternative classroom seating and its impact on student achievement. Finally, a limited body of research is available focused on the impact of multiple forms of alternative classroom seating with no literature present on the impact on student motivation.

Therapy balls. Therapy balls stand as one of the most thoroughly-researched method of alternative classroom seating (Al-Eisa et al., 2013; Bagatell et al., 2010; Burgoyne & Ketcham, 2015; DiBitetto, 2015; Fedewa, Davis, & Ahn, 2015; Fedewa & Erwin, 2011; Jakubeck; 2007; Janulewicz, 2008; Kilbourne, 2009; Krombach, 2016; Mead et al., 2016; Merritt, 2015; Olson, 2015; Schilling & Schwartz, 2004; Schilling et al., 2003; Tunstall, 2009; Witt & Talbot, 1998; Wu et al., 2012). As the current literature focusing on the use therapy balls appears to be the most extensive body of research on alternative seating, a full examination of this body of research is required. As Jakubeck (2007) pointed out, therapy balls, also known as, "…exercise balls, physio-balls, pezzi balls, gymnastic balls, Swiss balls, fit balls, and even birthing balls" (pp. 58-59) have been used for a variety of purposes such as, "…strength training, balance training, orthopedic rehabilitation, physical fitness, flexibility training, flexibility training, physical education, special education, and childbirth" (p. 59). Jakubeck only briefly mentioned the use of therapy balls in the classroom but presented compelling arguments for the wide

ranging benefits of the use of therapy balls to, "…train proprioception, static/dynamic balance, neuromuscular control, joint stability, and core stability" (p. 61). Thus, at face value the use of therapy balls as an alternative seating measure would seem to have positive physical benefits for students.

This notion was supported by the work of physical therapists Witt and Talbot (1998), the work of Al-Eisa et al. (2013), and research conducted by Janulewicz (2008). In their work, *Let's Get Our Kids on the Ball*, Witt and Talbot argued for the implementation of their program which was designed to utilize therapy balls as standard classroom seating in place of traditional student desks. The authors claimed that the use of therapy balls promote spinal health and that the exercises used in the program help to overcome the extended periods of sitting experienced by students (Witt & Talbot, 1998). The article went on to argue that students' awareness of their posture and body movement would also be improved with the use of therapy balls (Witt & Talbot, 1998). Al-Eisa et al. (2013) produced empirical data to support the assertion that when used as classroom seating, therapy balls could improve physical conditions for students. After studying 40 female college students, Al-Eisa et al. found that subjects reported significantly less discomfort in the neck, shoulders, lower back, and hip areas when using therapy balls as seats as compared to standard classroom seats. However, the research team did report that subjects experienced knee discomfort when using therapy balls that was not present when using standard classroom seating (Al-Eisa et al., 2013). In a master's thesis, Janulewicz (2008) examined the impact of therapy balls as classroom seats on the levels of physical activity in fourth grade students. Results from Janulewicz's (2008) study indicated that students not only expended more energy through increased physical activity when sitting on the therapy ball, but their core

strength was also improved. The overall implication from these studies was that the use of therapy balls as a seating device improves the overall health of students.

Building on the physical effects experienced by students when using alternative seating, research has examined how therapy balls affect sensory integration and modulation, thus impacting student behavior. As described by Burgoyne and Ketcham (2015), "…for individuals who experience sensory processing differences, interpreting sensory information becomes difficult, causing challenges with the planning and production of appropriate responses for the environment" (p. 42). As these studies incorporating therapy balls have focused on students with sensory processing difficulties, they have typically been aimed at certain student populations with specific attention to students with Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) (Bagatell et al., 2010; Fedewa & Erwin, 2011; Krombach, 2016; Schilling & Schwartz, 2004; Schilling et al., 2003; Tunstall, 2009; Wu et al., 2012).

Schilling and Schwartz (2004) produced the first significant study examining the use of therapy balls on students diagnosed with ASD. This study focused on four male, preschool-aged students who were reported to have difficulty with their ability to engage in learning and perform while sitting in their seat (Schilling & Schwartz, 2004). Utilizing a single subject withdrawal design, researchers reported that all four subjects displayed improvements in behavior as well as positive results in engagement (Schilling & Schwartz, 2004). Of particular note was that all four subjects displayed worse in-seat behavior and engagement when forced to return to regular classroom seating (Schilling & Schwartz, 2004). Staff questionnaires also suggested that the instructional staff preferred students' use of the therapy balls (Schilling & Schwartz, 2004). Bagatell et al. (2010) completed a very similar study in design and focus by studying the effects

of students with ASD using a therapy ball as their classroom seat. In their study, six male students in kindergarten and first grade participated in an A-B-C, single-subject design. Though the intervention phase of two weeks was similar to Schilling and Schwartz's (2004) study, Bagatell et al. (2010) limited the access to the therapy balls as the seating device to "Circle Time" (p. 897). Results for Bagatell et al. were not as positive with particular attention to student in-seat behavior or engagement. While one student demonstrated an increase in in-seat time when using the therapy ball, other participants' results were either varied or in one case the intervention of the therapy ball correlated to less in-seat time (Bagatell et al., 2010). Bagatell et al. also reported that student engagement was not positively impacted by the use of the therapy ball, and the teacher questionnaire did not reveal positive perceptions regarding the effectiveness of the therapy ball as the mode of seating for the students. This led the researchers to conclude that, "…therapy ball chairs may be more appropriate for children who seek out vestibular-proprioceptive input rather than for children with other patterns of sensory processing" (Bagatell et al., 2010, p. 901).

Most recently, Krombach (2016) attempted to replicate Schilling and Schwartz's (2004) study by examining the impact of therapy ball seating on students with Autism Spectrum Disorder (ASD). Krombach slightly altered the conditions of the study by examining a wider range of students with respect to their age, applying the intervention for a longer period of time, utilizing a period of choice for the students, and most critically, selecting an in-home setting. Results of the study did suggest that student in-seat behavior and engagement was improved with the use of the therapy ball (Krombach, 2016). Interestingly, three out of five involved therapists did not report that they would continue to utilize the alternative seating method, thus negatively impacting the social validity aspect of this study (Krombach, 2016). According to Krombach

(2016), this was due in part because of safety concerns related to students not having necessary spatial skills and bouncing too fast on the balls. In addition, therapists reported at times therapy balls were not utilized because of problem behaviors that existed prior to the use of the therapy balls (Krombach, 2016). Prior to Krombach's study, Tunstall (2009) also a completed a master's thesis on the effects of therapy balls as a method for seating for students with ASD. Utilizing an A-B-A-B single-case design, Tunstall reported that while the use of the therapy balls did improve in-seat behavior and engagement, the results were not consistent over a prolonged period, which was significantly different from the findings of Krombach. In addition, the results of the Tunstall (2009) study did not match the positive findings of Schilling and Schwartz (2004) and Schilling et al. (2003), which Tunstall (2009) attempted to replicate.

In a similar manner to students with ASD, students diagnosed with ADHD have provided researchers a target student population to study sensory integration and modulation effects by using therapy balls as classroom seats (Fedewa & Erwin, 2011; Schilling et al., 2003; Wu et al., 2012). Schilling et al. (2003) provided one of the initial studies on the effects of therapy ball seating for students with ADHD. The study was completed in a similar manner to the Schilling and Swartz (2004) study in terms of employing a single-subject A-B-A-B design and limiting the study to only a few participants; in this case three students from a fourth grade language arts classroom (Schilling et al., 2003). Schilling et al. found that the use of therapy balls resulted in increased in-seat behavior and improvements in the students' ability to write legibly. The researchers concluded, "…this intervention strategy was found to be compatible with inclusive educational practice and interdisciplinary teaming" (Schilling et al., 2003, p. 540).

Fedewa and Erwin (2011) attempted to build on this work by using therapy balls on a more generalized population and broadening the participant group to students in third through

fifth grade. While all of the participants used by Fedewa and Erwin reported to have attention and hyperactivity behaviors, only five of the eight student participants had a formal ADHD diagnosis. Additionally, while only eight students selected for the study, all of the students in the classrooms where the participants were located were provided a therapy ball as their primary classroom seat (Fedewa & Erwin, 2011). The researchers reported that participants performed with higher levels of attention and less hyperactive behavior, thus improving engagement for the students involved in the study (Fedewa & Erwin, 2011). These positive findings were in line with social validity findings that reported the teachers' preference to use the therapy balls for the students (Fedewa & Erwin, 2011). Fedewa and Erwin also noted that initially teachers appeared to be hesitant to use the therapy balls.

Wu et al. (2012) provided an interesting take on the use of therapy balls with students with ADHD. Through using an electroencephalography (EEG), the researchers examined the brain activity of 15 students diagnosed with ADHD and 14 students that did not have ADHD. Results indicated that the reaction time for the students with ADHD was faster when sitting on the therapy ball as compared to sitting on standard chairs, thus Wu et al. (2012) argued that, "…a therapy ball, can indeed improve the attentional abilities of ADHD children" (p. 1180). It is also important to note that no significant differences in reaction time were found for the students that did not have an ADHD diagnosis (Wu et al., 2012).

Recent research studies have examined the impact of therapy balls on a more generalized student population, specifically examining possible effects on student behavior (Burgoyne & Ketcham, 2015; Fedewa et al., 2015; Olson, 2015). As the current study sought to examine the impact of alternative seating on students in a general education classroom, these studies that extended the research base to general education students provide a significant impact to the

empirical framework. Burgoyne & Ketcham (2015) used an observational approach to study 19 students from a second grade classroom in North Carolina with specific focus on behaviors exhibited when students used therapy balls as seats and when they did not. The methodology of the study can be questioned, as a definitive timeline between observations was not made clear. However, data from the study did point to student participants exhibiting more on-task behaviors when seated on the therapy ball, and Burgoyne and Ketcham (2015) stated, "Observations of students using therapy balls versus standard chairs indicate that therapy balls create more opportunities for sensory stimulation that ultimately result in high frequencies of observed on task behavior" (p. 47). In a very similar study, Olson (2015) also examined the impact of therapy balls seats on student on-task and out-of-seat behavior. Unlike Burgoyne and Ketcham, a significant difference was not noted between student participants using therapy balls as seats and students using standard forms of classroom seating, though teachers did seem to approve of the use of the therapy balls by the students (Olson, 2015).

Fedewa et al. (2015) also studied second grade students while using therapy balls as classroom seats. This study not only examined how the use of therapy balls affected on-task behavior but also students' literacy and math achievement as well as discipline referrals (Fedewa et al., 2015). Duration and number of participants also presented differences for the Fedewa et al. study as compared to the study conducted by Burgoyne and Ketcham (2015). Fedewa et al. (2015) used 36 participants, and the study was conducted over a nine-month period. Ultimately, the researchers reported that only discipline referrals seemed to be positively impacted by the use of therapy balls, as academic achievement and on-task behavior were not significantly different between the treatment and control groups (Fedewa et al., 2015). It is critical to note that Fedewa et al. (2015) hypothesized that because the treatment group, who were using the therapy balls as

seats, reported lower levels of on-task behavior, it was possible that the therapy balls acted as a distraction. Of particular importance, Fedewa et al. (2015) concluded that evidence does not support the use of therapy balls in the general education classroom, as academic achievement does not seem to support their use. Once again, as the present study on alternative seating will focus on a generalizable student sample, the findings presented by Fedewa et al. (2015) are significant.

Additional studies on the relationship between the use of therapy balls and academic achievement have been conducted (DiBitetto, 2015; Mead et al. 2016; Merritt, 2015). Merritt (2015) examined the effects of therapy ball seating on 51 preschool students' literacy achievement after a six-week treatment period. Results were in line with Fedewa et al. (2015), as no significance difference in student literacy achievement was noted (Merritt, 2015). However, Merritt (2015) did report that teacher findings indicated that they, "…had to stop instruction less often to address misbehavior, or off-task behavior while using alternative seating" (p. 73).

Of most critical importance for the present study dealing with mathematics classrooms was the work of Mead et al. (2016) and DiBitetto (2015). As previously discussed, Mead et al. (2016) found that students utilizing therapy balls had higher levels of academic achievement as compared to students that received periodic breaks for physical activity and students that did not receive any type of physical activity treatment over the course of an entire school year for sixth-grade students. These results supported the work of DiBitetto (2015), who also found that subgroups of sixth-grade students' math achievement was positively affected as a result of using therapy balls as a classroom seat. Through the employment of a causal-comparative design, DiBitetto used data from 148 student participants split into a control group, using standard chairs

and a treatment group that used therapy balls. Upon analysis of extant data collected over the course of one school year, it was reported that while no significant difference was reported for the two sample groups, significant differences in academic achievement were present for population subgroups as determined by class status, ethnicity, and gender (DiBitetto, 2015).

Upon review of the literature discussed, further research appears necessary to measure the effects of alternative seating on students in mathematics classrooms. In addition, the current study seeks to measure the impact of alternative seating on student motivation, thus it is critical to mention that Kilbourne (2009) found that, "The student's responses to the questionnaires clearly demonstrated an excitement and enthusiasm for having the option to use an exercise ball for a seat in a lecture class" (p. 14). By collecting questionnaire responses of 24 college level students, Kilbourne identified feelings that could point to a potential link to increased level of student motivation.

Therapy cushions. In a similar fashion to therapy balls, the use of therapy cushions have also been a key topic researched as a means of alternative seating (Pfeiffer et al., 2008; Seifert & Metz, 2016, Umeda & Deitz, 2011). As with most of the present research on therapy balls, studies examining the effects of therapy cushions have focused on the role of sensory integration on specific subgroups of the student population (Pfeiffer et al., 2008; Seifert & Metz, 2016; Umeda & Deitz, 2011). The first critical study was conducted by Pfeiffer et al. (2008). In this study, the researchers examined the impact of "Disc 'O' Sit" cushions on students' attention to task (Pfeiffer et al., 2008). Utilizing 61 second-grade participants that reportedly had attention difficulty, Pfeiffer et al. (2008) reported that after a two-week period intervention period students in the treatment group scored significantly better in respect to their ability to stay on attention to task. This led the researchers to hypothesize that as the therapy cushions have positive influence

on the vestibular and proprioceptive sensory systems, children with attentional behavioral issues could display better attention to task when using the therapy cushions (Pfeiffer et al., 2008).

Umeda and Deitz (2011) conducted additional research on the use of therapy cushions by focusing on their effects on children with Autism Spectrum Disorder (ASD). As this study was rooted in the theoretical framework of sensory integration, it followed a similar design to the studies performed using therapy balls for students with ASD (Bagatell et al., 2010; Krombach, 2016; Schilling & Schwartz, 2004). Umeda and Deitz (2011) utilized a single-subject design using an A-B-A-B-C format for two male students with ASD where the "A" phase students used standard classroom seating, the "B" phase participants used the therapy cushion intervention, and the "C" phases allowed for student choice. With each phase lasting one and half to three weeks, researchers reported that no distinct differences in terms of the participants in-seat or on-task behaviors (Umeda & Deitz, 2011). This lead to the conclusion that, "…the effectiveness of alternative seating devices may be linked to their ability to impose substantial postural and balance demands or to provide intense amounts of sensory feedback" (Umeda & Deitz, 2011, p. 158), all of which Umeda and Deitz claimed the therapy cushions could not accomplish.

Seifert and Metz (2016) provided the most recent research into the use of therapy cushions as a form of classroom seating. After examining the effects of the cushions on 25 preschool students, the researchers found that student engagement was significantly better for students utilizing this form of classroom seating during circle time (Seifert & Metz, 2016). With regard to social validity findings, the teachers involved in the study reported that once student participants moved past initial exposure, their approach to the use of the cushions was similar to standard classroom seating (Seifert & Metz, 2016). Additionally, Seifert and Metz (2016)

reported that the teachers in the control group wanted to try the therapy cushions with their students.

Multiple Forms of Alternative Seating

As previously discussed, the term alternative seating is very broad and encompasses many forms of classroom seating (California Department of Education: School Facilities and Transportation Services Division, 2016). While recent publications highlighting these many forms of alternative seating (California Department of Education: School Facilities and Transportation Services Division, 2016; Delzer, 2015) have become more prevalent, the empirical body of research is quite limited. Thus, the body of literature that exists outside of that concerning therapy balls and therapy cushions is limited to studies focused on differing forms of desks (Benden et at., 2014; Harvey & Kenyon, 2013; Ogilvie, 2008) and the utilization of multiple forms of alternative seating (McEwen, 2014).

By framing the use of standing desks as a means to fight childhood obesity, Benden et al. (2014) studied the effects of this form of alternative seating on 326 student participants in grades two through four. When comparing the amount of energy expended and steps taken between the control group that used standard classroom desks and the experimental group that used the standing desks, the researchers found there was a significant difference in the amount of energy expended when using the standing desk compared to a standard desk (Benden et al., 2014).

The style of student desk was also addressed in the research of Harvey and Kenyon (2013). As opposed to focusing on the physical effects on students (Benden et al., 2014), this study sought to address impact of the type of student desk on student satisfaction and preference (Harvey & Kenyon, 2013). Data were collected from 817 student participants that were found in one of five classroom samples, each with its own specific type of classroom desk (Harvey &

Kenyon, 2013). Harvey and Kenyon (2013) found that, "…students seemed more satisfied with the modern mobile chair than most other seating styles with the exception of trapezoid tables with chairs on casters" (para. 20). The other three methods of seating studied were tablet arm chairs, fixed tiered seating with table arms, and rectangle tables with standard chairs (Harvey & Kenyon, 2013). The researchers concluded that the modern, mobile-type desk allows for storage of multiple items along with an ability to be moved to collaborative learning groups as well as traditional seating arrangements with rows (Harvey & Kenyon, 2013). The Harvey and Kenyon (2013) article was important for the purposes of this study as it moves away from a theoretical background of sensory integration to more of an affective framework as it measured seating satisfaction. This is critical as the present study sought to extend the impact of alternative seating to a more generalized population of students.

Another study of note, as it spoke to the impact of the style of student seating on student interaction, is the work of Ogilvie (2008). When comparing student achievement in college courses between students who attended class sitting in traditional, fixed lecture hall seats versus students who sat in a lecture hall with swivel chairs, Ogilvie (2008) reported that achievement differences did occur between the two groups. While Ogilvie (2008) could not conclude that the differences were a function of increased student flexibility or student discussion, for the purposes of the current study, it is important that Ogilvie's (2008) study made an attempt to address the possible effects of a more flexible student seating option on student seating.

The work of McEwen (2014) is also of paramount significance. This work stands as one of the only known studies focusing on the effects of multiple types of alternative seating (McEwen, 2014). McEwen studied 30 special education students from three different classes with students using various forms of alternative seating: therapy balls, T-stools, bean bags,

therapy cushions, and stand-up desks/podiums. McEwen sought to determine if the use of alternative seating improved student on-task behavior by analyzing students' math achievement scores. Results did not indicate a statistically significant improvement from math achievement pretest to posttest score when using alternative seating (McEwen, 2014). However, McEwen (2014) found that teachers reported that students made efforts to improve classroom behavior in an effort to utilize classroom seating. These findings are critical to frame the current study examining the effects of alternative seating on student motivation, especially as the setting for this study was that of mathematics classrooms.

Classroom Seating Location, Selection, and Preference

Historically, the most well-researched aspect of classroom seating has covered the topic of student seating location and selection. Students' seating position has been examined from a myriad of different perspectives. Most essential to the current study are the perspectives of the impact of seating location on student achievement (Armstrong & Chang, 2007; Kalinowski & Taper, 2007; Meeks et al., 2013; Ngware et al., 2013; Perkins & Wieman; Tagliacollo et al., 2010), student participation (Cinar, 2010; Parker et al., 2011; Wulf, 1976), and as a function of personality and motivational beliefs (Burda & Brooks, 1996; Fernandes, Huang, & Rinaldo, 2011; Hemyari et al., 2013; Mercincavage & Brooks, 1990; Rebeta, Brooks, O'Brien, & Hunter, 1993; Totusek & Staton-Spicer, 1982; Wulf, 1976).

Research studies that have examined the impact of student seating location on student achievement vary greatly in terms of design, sample population, and ultimately results (Armstrong & Chang, 2007; Kalinowski & Taper, 2007; Meeks et al., 2013; Ngware et al., 2013; Perkins & Wieman; Tagliacollo et al., 2010). The works of Perkins and Wieman (2005), Ngware et al. (2013), and Tagliacollo et al. (2010) all pointed to student academic achievement

being positively affected by student seating location. Perkins and Wieman (2005) focused on student achievement in a college physics course with results indicating that classroom seating location impacts overall student achievement. The impact on student achievement was also found for students ranging from upper elementary to middle-school aged children (Ngware, 2013; Tagliacollo et al., 2010). As students were provided freedom of choice in their seating location, it was found that students sitting near the front of the classroom had higher levels of academic achievement (Tagliacollo et al., 2010). This lead Tagliacollo et al. (2010) to conclude that, "…students at the front position are significantly more motivated for learning…" (p. 201). These conclusions provides significant implications for the present study that sought to examine the motivational impact of alternative seating as alternative seating typically results in the change of student seating location.

Conversely, the work of Armstrong and Chang (2007), Kalinowski and Taper (2007), and Meeks et al. (2013) argued that seating position has little to no impact on student achievement. Each of these studies focused on the impact for a sample population of college level student (Armstrong & Change, 2007; Kalinowski & Taper, 2007 Meeks et al., 2013). Also of note is that Meeks et al. (2013) added the dimension of seating type to their study, finding no significant impact on student achievement. This is interesting in light of Harvey and Keyon's (2013) findings suggesting students do prefer one type of seating over another.

The work of Wulf (1976), Parker et al. (2011), and Cinar (2010) focused on the topic of student participation as it relates to seating location and selection. The work of Wulf (1976) provided one of the earliest studies examining the academic effects of student choice of classroom seating. In examining two college level classes, one of which was given the opportunity to choose their own seat and the other in which seats were assigned, Wulf (1976)

concluded that students in the class that were free to choose their own seat produced more active participation patterns in "action zone" (p. 9). Also of note was that when the highest achieving students in the classroom with assigned seating were asked about their seating preference, these students preferred to sit in the front row-center area, which was one of the "action zone areas" (Wulf, 1976, p. 9). Additionally, Wulf (1976) went on to argue for a link between student seat location and ultimate academic performance as based on the data collected during the study.

A study by Cinar (2010) also spoke to the link between student participation and achievement as impacted by student selection and location of classroom seat. Cinar's (2010) study allowed 566 college-level student participants to freely select their own seat and found that students sitting in the front were more willing to participate in class based on survey results. Cinar implied that instructors should adjust their instructional patterns and student seating to meet the needs of classroom learner. Parker et al. (2011) offered a different take on the issue of student participation. Parker et al. (2011) reported that while students that where assigned to the front of the classroom did have higher rates of participation, similar results were not reflected among the other sample groups. The critical aspect of the study was that students were assigned to different parts of the classroom seating on a consistently changing basis (Parker et al., 2011). This led Parker et al. (2011) to conclude that, "…seat location is not a causal variable in participation and performance effects" (p. 83) and to imply that students' willingness to participate is driven by the social expectation to participate and adaptation to the social role of a student sitting in the front or back of the classroom.

As the current study was focused on the role of student motivation and alternative seating, the body of literature that exists on student seating location and selection as impacted by student personality and motivational beliefs is highly important. Totusek and Staton-Spicer

(1992) and Hemyari et al. (2013) examined how students' personality traits potentially affect the location of students' seats. While research results for Totusek and Staton-Spicer (1992) did not point an overly conclusive link between personality traits and student seating position, limited evidence was found that supported this notion. The work of Hemyari et al. (2013) was able to provide more compelling evidence that, when given choice, students' seating location is a function of their personality. After 93 medical school students completed the NEO-Five Factor Inventory on personality, Hemyari et al. (2013) reported that results indicated significant differences among students' level of "...agreeableness and conscientiousness…" (p. 873) depending on their selected seating location.

Student academic achievement motivation as it relates to student seating location and selection has been addressed by Burda and Brooks (1996), Mercincavage and Brooks (1990), and Rebeta et al. (1993). All three studies were conducted in a similar setting with a similar target population of college freshmen (Burda & Brooks, 1996; Mercincavage & Brooks, 1990; Rebeta, et al., 1993). Thus, it is not surprising to find that the results for all three studies suggested that students seated near the front of the class had higher level of achievement motivation, and that personality traits may play a key role in determining student selected location (Burda & Brooks, 1996; Mercincavage & Brooks, 1990; Rebeta, et al., 1993). Once again, as the present study addressed the impact of student motivation as it relates to the availability of alterative classroom seating, the results of these studies provided an important link to seating choice and student motivation.

While empirical evidence does seem to point to a link between student motivation and achievement as it relates to student selection of seat, the work of Fernandes et al. (2011) did caution teachers to consider other factors when allowing students to select their own seat.

Fernandes et al. (2011) certainly addressed the empirical support for student selection of seat as a function of student motivation; however, the research team also stated that it "…may be ill advised to rely on such first impressions to influence the teacher-student relationship" (p. 75). For Fernandes et al. (2011), as the classroom, "…is a very diverse and highly dynamic setting," (p. 74) there are a variety of factors that can influence all relationships in the classroom with one of them being the students' choice of seat. With a number of factors at play, the researchers concluded that student location as based on student seat selection may not directly impact student learning (Fernandes et al., 2011). For the current study, it is important to mention that Fernandes et al. pointed out that in their examination of the literature available on the topic that most studies addressed students at the secondary or post-secondary level. The writers identified this gap in the present literature, and the current study focused on students at the middle school level.

Classroom Seating Arrangements

As the use of alternative classroom seating also entails changes to the physical seating layout of the classroom (Delzer, 2015), the body of research that has been established on the impact of classroom seating arrangements is also pivotal to the current study. The most critical areas of research as related to the current study addressed the impact that seating arrangement has on a variety of student classroom behaviors (Bicard et al., 2012; Hastings & Schwieso, 1995; Marx, Fuhrer, & Hartig, 2000; Schmidt et al., 1987; Sommer, 1965; Van den Berg et al., 2012; Wheldall & Lam, 1987).

In a similar manner to research conducted on student seat location, the impact on student participation has been examined as it relates to classroom arrangement (Marx et al., 2000; Schmidt et al., 1987; Sommer, 1965). Sommer (1965) provided one of the first studies focused on the impact of student seating position and classroom seating arrangement. By measuring

student participation and behaviors across several differing types of classroom seating arrangements and classroom environments, Sommer (1965) drew a few interesting conclusions. In addition to reporting that participation was impacted by the type of classroom seating arrangement, Sommer (1965) also suggested that classroom participation was impacted by the seating location in the classroom. Of particular note for the current study on alternative seating was Sommer's (1965) assertion that the student's ability to move in the chair during classes in a seminar room seating arrangement decreased the student's participation rates. While this was simply a hypothesis for Sommer (1965), it remains intriguing that student movement as a result of classroom seating was noted in one of the earliest research studies focused on classroom seating.

Marx et al. (2000), Wheldall and Lam (1987), Schmidt et al. (1987), and Hastings and Schwieso (1995) conducted research studies that examined classroom arrangements as it related to student behaviors such as questioning, participation through response, and on-task behavior. While very limited in its scope, with only five Native American participants, Schmidt et al. (1987) did note classroom seating arrangement as having an impact on student participation. While participation did seem to increase in most participants, the researchers did not report statistically significant differences in terms of academic responding (Schmidt et al., 1987). Marx et al. (2000) also researched the impact of classroom arrangements on the frequency with which fourth-grade students ask questions. Results of this study indicated that student participants asked more questions when sitting in a semi-circle than in traditional rows, which according to Marx et al. (2000), could possibly be influenced by more face-to-face interaction. These results indicated that a change in the physical layout of the classroom could potentially impact student participation.

Student engagement and on-task behavior were addressed in the works of Hasting and Schwieso (1995) as well as Wheldall and Lam (1987). Wheldall and Lam (1987) examined four different seating arrangements used on children with moderate learning difficulties and observed significant changes in student behavior. When student participants were seated in rows, Wheldall and Lam (1987) reported that they were better able to stay on-task and performed with less disruptive behaviors. These results were reinforced by the work of Hastings and Schwieso (1995) who also reported that student participants were more on-task when sitting in rows. It is critical to note that student participants were drawn from a more generalized population (Hasting & Schwieso, 1995).

Bicard et al. (2012) studied students' ability to choose their own seat in a given seating arrangement. The researchers noted that students' disruptive behavior was higher when students were allowed to self-select their seat, regardless of being seated in a group setting or on an individual setting (Bicard et al., 2012). This is critical for the current study as in many alternative seating arrangements students are allowed to choose their individual option. Also of note, is the work of Van Den Berg et al. (2012) that examined the impact of student seating arrangement on student relations and classroom climate. Van Den Berg et al. (2012) found that the relationships and "likability" (p. 403) between student participants were affected by the distance with which students were seated apart, which provided additional evidence regarding the impact of student seating arrangements.

Summary

It is clear based on the research presented that a student's self-efficacy is a critical factor in their education (Bandura; 1993; Bandura et al., 1996; Zimmerman, 2000). Furthermore, self-efficacy very clearly relates to a student's academic motivation (Bandura, 1993; Bandura &

Schunk, 1981; Brophy, 1983; Zimmerman, 2000). These two personal factors play a critical role in a child's ability to learn and to demonstrate learning through effective performance (Aydin, 2015; Bandura et al., 1996; Cetin-Dindar, 2016). As educators are constantly looking for every angle which to improve student performance, increasing a child's self-efficacy and ultimately their motivation to learn must be considered.

Alternative seating, while certainly a trending topic in education, does not yet have a wealth of research that points to its effectiveness to the student body at large. It is clear that research has been conducted on individual pieces of alternative seating to examine their impact on student performance, most typically on student of a particular subgroup. While this research is important as compelling arguments regarding the effective use of a specific type of alternative seating can be found, additional research is needed to measure the effects of multiple types of alternative seating options. Most critically, as self-efficacy and academic motivation mentions the importance of the classroom environment (Bandura, 1977; Brophy, 1983), it is important to fill the gap in the literature present regarding the use of alternative seating as it potentially impact student motivation.

CHAPTER THREE: METHODS

Overview

Through a complete analysis of the present literature on the topic of alternative seating, it is clear that a gap in the literature exists regarding its impact on student motivation. In an effort to partially fill this gap, this study sought to examine the effects of alternative seating on the aspects of motivation for students in middle school math classrooms. This chapter will outline the methods employed in this study by establishing a clear research question and null hypothesis. A complete understanding of the selected research design, participants and setting, instrumentation, procedures, and data analysis should also be established upon a thorough reading of this chapter.

Design

This study employed the use of an ex post facto causal-comparative research design as shown in Figure 1 and as described by Gall, Gall, and Borg (2007). This research design was selected over a correlational design as clear independent and dependent variables were present (Gall et al. 2007). The causal-comparative design was also selected over a quasi-experimental design as the presence of alternative classroom seating was naturally occurring as determined by the teacher and/or administrator in the school selected to participate in the study (Gall et al., 2007). Thus, the researcher did not purposefully manipulate the independent variable of alternative classroom seating, which would have been necessary in an experimental or quasi-experimental design (Gall et al., 2007). In addition, the causal-comparative design was appropriate as the study sought to determine if there was a cause-and-effect relationship between the availability of alternative classroom seating on aspects of student motivation (Gall et al., 2007). In utilizing this design, the study used a convenience sample of participants that was split

into comparison groups of an experimental, exposed to alternative seating, and a control group, not exposed to alternative seating utilizing a posttest only method (Gall et al., 2007).

Experimental Designs and Their Potential Sources of Invalidity

Posttest-only control-group design

R	X	O
R		O

R=Random assignment
X=Experimental treatment
O=observation, either a pretest or posttest

Figure 1. Experimental designs and their potential sources of invalidity. Adapted from *Educational research: An introduction* (8th ed.), by M. D. Gall, J. P Gall, and W. R. Borg, 2007, p. 398. Copyright 2007 by Pearson.

As described by Gall et al. (2007), the main weakness of this design is that without the use of a pretest it was difficult to account for extraneous variables and levels of motivation of students prior to the treatment of alternative seating by the experimental group. However, as the instrument selected for this study, the Motivated Strategies for Learning Questionnaire (MSLQ) as developed by Pintrich and DeGroot (1990), has only one form and deals with student self-reporting of attitudes, repeated administration of testing and use of instrumentation would have served as a threat to internal validity (Gall et al., 2007; Trochim, 2006). In addition, the use of a pretest when dealing with student attitudes could serve as a threat to the external validity (Gall et al., 2007). Thus, the study used the causal-comparative research design with a post-test only to control for these potential threats to internal and external validity. The ex post facto causal-comparative research design has been employed in several other recent research studies (e.g. Kiarie, 2016; Körük, Öztürk, & Kara, 2016; Kursun, 2016).

Research Question

The study was based on the following research question:

RQ1: Does the availability of alternative seating have an effect on the *aspects of student motivation* for students in middle school math classes?

Null Hypothesis

The null hypothesis for this study was:

$H_0$1: There is no statistically significant difference in *aspects of student motivation* between students whose math classrooms have alternative seating available, and students whose math classrooms do not have alternative seating available as shown by the Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot, 1990).

Participants and Setting

The participants for this study were selected from a convenience sample of 55 sixth- and 68 seventh-grade students in rural, southwestern Virginia during the fall semester of the 2017-2018 school year. Upon written permission being received by the superintendent from the selected school division, participants for this study were derived from five intermediate schools from a school district in that area. One of the schools selected serves grades four through seven, and the four other schools serve grades kindergarten through seven. The schools described in this study were assigned pseudonyms by the researcher to protect the identity of the participants. All schools involved in the study have a considerably high economically-disadvantaged rate as each school participates in a school-wide Title I program. The economically-disadvantaged rate for each school was reported as follows for the 2016 school year: Washington Intermediate 53.4%, Adams Intermediate 50.7%, Jefferson Intermediate 64.7%, Madison Intermediate 57.6%, and Monroe Intermediate 60.6% (Virginia Department of Education, 2017). Each school involved in the study reported demographic information for their student population in the following manner: Washington Intermediate reported 76.3% of their students were white and 19.1% of students had learning disabilities, Adams Intermediate reported 81.9% of their students were white and 15.3% of students had learning disabilities, Jefferson Intermediate reported

86.8% of their students were white and 24.9% of students had learning disabilities, Madison Intermediate reported 68.9% of their students were white and 8.1% of students had learning disabilities, and Monroe Intermediate reported 89.7% of their students were white and 14% of students had learning disabilities (Virginia Department of Education, 2017) (see Table 1).

Table 1

Demographic Information for Washington Intermediate, Adams Intermediate, Jefferson Intermediate, Madison Intermediate, and Monroe Intermediate

	Econ. Dis. %	White Pop. %	Learning Dis. Pop. %
Washington Int.	53.4	76.3	19.1
Adams Int.	50.7	81.9	15.3
Jefferson Int.	64.7	86.8	24.9
Madison Int.	57.6	68.9	8.1
Monroe Int.	60.6	89.7	14

The total number of participants (*N*=123) used in the study met the minimum required number of participants, 100, for a large effect size with a statistical power of .7 at the .05 alpha (Gall et al., 2007). This sample was drawn from the five intermediate schools previously described with a response rate of 34% for student participants. The student participants in these classes covered content in the subject area of mathematics as set forth by the Virginia Standards of Learning at each grade level (Virginia Department of Education, 2016). In addition, content topics were taught at a similar pace as defined by the school district from which the sample was drawn.

The sample was randomized as the participants were not be purposefully placed into the control or experimental groups, and as the application of alternative seating was determined by the teachers participating in the study. Instead, by convenience sampling procedures, the control group and the experimental group were naturally occurring as selected by the school administration and teachers in the classrooms.

Specifically, the sample was comprised of two classes of sixth-grade students and five classes of seventh-grade students in the control group. The control group consisted of 20 sixth-grade math students and 65 seventh-grade math students whose classrooms did not contain alternative seating options. With respect to the age of the student participants, the control group was comprised of eight 13-year-old students, 62 12-year-old students, and 15 11-year-old students. In terms of sex, there were 49 female students and 36 male students in the control group (see Table 2).

The experimental treatment group was comprised of three sixth-grade classes and one seventh-grade class. The experimental group was comprised of 35 sixth-grade math students and three seventh-grade math students whose classrooms did contain alternative seating options (See Table 2). In the one sixth-grade class from Washington Intermediate, students had available three desks using therapy balls, three with fidget bands ("…1.5" wide stretchy band you 'string' around desk or chair legs to keep fidgeting feet busy," Therapy Shoppe, 2017, para.1), and one with a camping chair. The 23 students from Washington Intermediate were able to use the alternative seating throughout the entire class on a rotational basis, in which students took turns using the alternative seating options based on the day of the week. A total of 11 students from one sixth-grade math class from Adams Intermediate made up another portion of the experimental group. Student participants in this group were exposed to six therapy balls that were available on a first-come, first-served basis during cooperative learning groups portions of class. The other sixth and seventh-grade class involved in the experimental group came from Madison Intermediate, where had one sixth-grade student and three seventh-grade students participated in the study. Students at Madison Intermediate were able to use four camping chairs and five standing desks on a voluntary basis.

Collectively, the students in the experimental group ages were as follows: one 10-year-old student, 25 11-year-olds students, and 12 12- year-old students. Student participants in the experimental group included 21 females and 17 males (see Table 2).

Table 2

Demographic Information of Age, Sex, and Grade for Control and Experimental Treatment Groups

		Control	Experimental
Age	10 years	0	1
	11 years	15	25
	12 years	62	12
	13 years	8	0
Sex	Male	36	17
	Female	49	21
Grade	6th grade	20	35
	7th grade	65	3

Instrumentation

The instrument for this study was the Motivated Strategies for Learning Questionnaire (MSLQ) as developed and adapted for use with middle school students by Pintrich and DeGroot (1990). See Appendix A for the instrument. The MSLQ was used in this study as it is a self-report questionnaire that seeks to measure students' perceptions of their own levels of academic motivation based on a number of different aspects of student motivation. By utilizing this instrument, this study sought to analyze the effects of the availability of alternative classroom seating on the aspects of students' motivation.

The MSLQ was initially developed by Pintrich and DeGroot (1990) to allow college students to self-assess their own motivational beliefs as it pertains to their academic performance. Pintrich and DeGroot utilized several instruments that were aimed at the various

aspects of student motivation and cognitive use strategies. The MSLQ is comprised of two different dimensions, motivational beliefs and self-regulated learning strategies (Pintrich & DeGroot, 1990). The researchers defined the dimension of motivational beliefs as how important a task is to complete for students and how interested the student is in the particular task assigned (Pintrich & DeGroot, 1990). For this dimension, there are three subscales: self-efficacy, intrinsic value, and test anxiety (Pintrich & DeGroot, 1990). Self-efficacy is defined by the researchers as the level of confidence a student feels regarding their ability to successfully complete a given task (Pintrich & DeGroot, 1990). Intrinsic value is defined by Pintrich and DeGroot as the level of importance or internal value that a student places on a given task. Finally, test anxiety is defined as the level of concern or anxiousness experienced by a student during an assessment and how this level of anxiety affects their overall ability to perform on the assessment (Pintrich & DeGroot, 1990). The self-regulated learning strategies dimension is comprised of two subscales, cognitive strategy use and self-regulation (Pintrich & DeGroot, 1990). The cognitive strategy use subscale is defined as a student's ability to use specific learning strategies in an effort to successfully complete an assignment, while the self-regulation subscale measures a student's ability to use metacognitive strategies successfully (Pintrich & DeGroot, 1990).

For the purposes of this study, all of the subscales were used with the exception of the test anxiety subscale. The decision to eliminate this subscale was made in order to focus primarily on the aspects of academic motivation and self-efficacy. This decision to exclude the subscale of test anxiety should not affect the validity or reliability of the instrument. As Duncan and McKeachie (2005) explained in their review of the MSLQ, scales can be used together as one instrument or separately. The subscales of self-efficacy and intrinsic value were clearly tied to the research question and null hypothesis of the study with regard to academic motivation.

The decision to include the dimension of self-regulated learning strategies, specifically the subscales of cognitive strategy use and self-regulation, was made based on their relation to academic motivation. The MSLQ as adapted for use with middle school students has been used in several peer-reviewed studies (e.g. Eom & Reiser, 2000; Hamman, Berthelot, Saia, & Crowley, 2000; Liu, 2003; Sachs, Law, & Chan, 2002; Wolters, 2004).

The Motivated Strategies for Learning Questionnaire has been found to be valid through the use of factorial analysis (Pintrich & DeGroot, 1990). During this analysis, the instrument was refined by eliminating 12 items resulting in a total of 44 items. Each of the subscales was found to be reliable through the use of Cronbach's alpha and were as follows: self-efficacy, 0.89, intrinsic value, 0.87, test anxiety, 0.75, cognitive strategy use, 0.83, and self-regulation, 0.75 (Pintrich & DeGroot, 1990). Results were similar for the MSLQ as adapted for use with Turkish students (Erturan Ilker, Arslan, & Demirhan, 2014). Erturan et al. (2014) found the MSLQ for middle school students to be a valid and reliable instrument with a Cronbach's alpha score of 0.88 for the entire instrument. Additionally, Cronbach's alpha was reported at 0.81 for the dimension of motivational beliefs and 0.81 for the dimension of self-regulated learning strategies (Erturan et al., 2014). Each of the subscales were also found to have a Cronbach's alpha score of greater than 0.70 (Erturan et al., 2014).

After eliminating the use of the test anxiety subscale, the overall instrument was comprised of 40 total items. Nine items each were present on the self-efficacy subscale and the intrinsic value subscale of the motivational beliefs dimension (Pintrich & DeGroot, 1990). The self-regulated learning strategies dimension consisted of 13 items on the cognitive strategy use subscale and nine items on the self-regulation subscale (Pintrich & DeGroot, 1990). Each item for the instrument used a seven-point Likert scale which required participants to evaluate

themselves on a range of 1=not at all true of me to 7=very true of me (Pintrich & DeGroot, 1990). Values found between the extremes of the scale were not assigned a descriptive value (Pintrich & DeGroot, 1990). Items that were reverse worded were reverse coded and scored appropriately before totaling the participants' scores (Pintrich, Smith, Garcia, & McKeachie, 1991). Thus, for the entire instrument, each item score was added to create a composite score for the MSLQ, resulting in a possible range between 40 and 280 (Pintrich et al., 1991). The low score of 40 indicated that the participant experienced low academic motivation and did not effectively use self-controlled learning strategies (Pintrich & DeGroot, 1990). A high score of 280 indicated that the participant experienced a high level of academic motivation and effectively implemented self-controlled learning strategies (Pintrich & DeGroot, 1990). The possible range of scores for the self-efficacy subscale was 9, indicating low self-efficacy beliefs, to 63, indicating high self-efficacy beliefs (Pintrich & DeGroot, 1990). The possible range of scores for intrinsic value was similar at a range of 9 to 63, with a score of 9 indicating the student seeing little value in completing tasks, and 63 indicating the student seeing great value in task completion (Pintrich & DeGroot, 1990). For the subscale of cognitive strategy used scores ranging from 13, meaning the participant was weak in their ability to use learning strategies, to 91, meaning the participant was strong in their ability to use learning strategies (Pintrich & DeGroot, 1990). Self-regulation subscale scoring ranged from 9, indicating poor self-regulation skills, to 63, indicating strong self-regulation skills (Pintrich & DeGroot, 1990).

The MSLQ currently exists in public domain by the University of Michigan (2016). Therefore, the MSLQ can be used for all legitimate educational research free of charge and without express permission being granted (University of Michigan, 2016). In order to collect

basic demographic information from the students, questions were added to the MSLQ to determine participants' age, grade level, and sex.

Procedures

Prior to beginning the study, the researcher submitted an application to the Liberty University Institutional Review Board (IRB). Upon approval by the IRB, the researcher sought formal approval from the superintendent of the school division from which the convenience sample was derived. Once approval was granted from the school division, the researcher contacted the principals and the guidance counselors from the schools involved in the study. Principals at the schools were contacted in order to determine the math classrooms using alternative seating in the sixth and seventh grade. Student participants were assigned into the classrooms by the schools' administration. The math teachers in the schools were responsible for making the decision as to whether or not their class would feature alternative seating. As the classroom teachers made the decision as to whether or not alternative classroom seating would be available to students in their classroom, student participants' access to alternative classroom seating was randomly assigned based on teacher preference with principals having administrative oversight. Thus, the experimental and the control groups were determined based on the random assignment of students and the use of alternative seating based on teachers' preferences. The researcher then trained the school guidance counselors from each school to administer the MSLQ to the student participants as instructed by Pintrich et al. (1991). In addition, the researcher trained the school counselors to distribute, explain, and collect the consent and assent forms from student participants and parents. This training took place one week prior to the beginning of the school year, at this training the researcher along with guidance counselors set the dates for the recruitment of participants and for data collection. Assent and consent forms were then

distributed to the sample population and collected by the school counselors before being delivered to the researcher. The researcher also provided scripts for the guidance counselors to use during the recruitment of participants and the data collection phases, including the administration of the MSLQ. Based on the return rate of the consent and assent forms, the researcher determined the exact size of the control and experimental groups (N = 123), which met the minimum requirement for total participants involved in the study of 100 as previously described (Gall et al., 2007).

After a nine-week period of experimental treatment with the use of multiple forms of alternative classroom seating, the school guidance counselors administered the MSLQ to the student participants per instructed by the guidelines (Pintrich et al., 1991). Due to conflicts in the guidance counselors' schedules, data collection for the student participants occurred over a similar four-day period at the completion of the nine-week grading period. Once the researcher collected the questionnaires from the school counselors, each questionnaire was assigned a unique identification number beginning with 01 for the control group and T01 for the experimental group. These numbers moved upward with each questionnaire that corresponded to the participant number when data were entered into Microsoft Excel. The student responses were then tabulated and scores recorded for each student participant by the researcher in Microsoft Excel. Participants' dependent variable scores were then be entered into SPSS software to conduct the data analysis for the study. The researcher also entered demographic information into Microsoft Excel with regard to student participants' age, grade level, and sex. To ensure that the data were transcribed appropriately into SPSS, the researcher asked one of the guidance counselors who aided in the data collection to randomly verify scores were correctly transcribed for 10% of the questionnaires collected from student participants. Prior to the

verification of scores, the researcher explained the format of the scores and method for verification to the guidance counselor. The guidance counselor then verified correct transcription of both questionnaire data from the MSLQ and demographic data for 12 of the questionnaires, which were selected using a random number generator. In addition, the researcher ran a feasibility analysis in Microsoft Excel prior to data analysis to ensure that the scores entered fell into the appropriate range available per the requirements of the MSLQ.

Data Analysis

A one-way multivariate analysis of variance (MANOVA) was used to analyze the data collected from the student participants using the MSLQ. This method of analysis allowed the researcher to examine the differences between group means for more than one dependent variable (Gall et al., 2007; Warner, 2008). The MANOVA was the most appropriate choice for analysis, as the subscales of the MSLQ (self-efficacy, intrinsic value, cognitive strategy use, and self-regulation) served as dependent variables of the aspects of motivation. Thus, this study used four dependent variables across two independent variable groups, those with alternative seating available in middle school math classrooms and those without alternative seating available in middle school math classrooms. In addition, as described earlier, the demographic information regarding student participants age, grade level, and sex was collected with additional questions being added to the MSLQ. This information was entered and summarized in Microsoft Excel in an effort to provide more information that describes the student sample population.

As the researcher manually entered data from each of the questionnaires into Microsoft Excel and then copied variable data into SPSS from the hardcopy format of each questionnaire, one of the guidance counselors involved in data collection of student data verified the correct entry of data into SPSS. The guidance counselor involved assessed the data from 12 of the

questionnaires in order to verify accurate transcription into Microsoft Excel and into SPSS. The researcher then conducted a feasibility study to ensure that all values entered from the questionnaires were within allowable ranges per the requirements of the Likert scale used on the MSLQ. As a part of the feasibility study, the researcher also checked to ensure that the composite score values for each of the dependent variables were within the allowable ranges. All of the participant responses and composite variable scores were within allowable ranges.

The MANOVA required several assumption tests to be conducted (Green & Salkind, 2014; Warner, 2008). The researcher checked for normality by using a histogram and Kolmorgorov-Smirnov test as the sample size was greater than 50. A scatterplot matrix was used to check for multivariate normal distribution. Box's *M* test was then conducted to check for homogeneity of variance-covariance matrices, while Pearson's Product Moment test was used to check for absence of multicollinearity. The researcher used simple observation to meet the assumptions of level of measurement and independent observations (Green & Salkind, 2014, Warner 2008).

The MANOVA was assessed at a 95% confidence level using Wilk's lambda λ with a significance level of α=.05. The effect size for this study was interpreted using $\eta 2$. The MANOVA was not found to be statistically significant, thus post hoc analyses were not conducted.

Summary

This causal-comparative research study examined the effects of alternative classroom seating on the aspects of student motivation. To do this, 123 sixth- and seventh-grade students from intermediate schools in rural, southwestern Virginia were assessed across four variables: self-efficacy, intrinsic value, cognitive strategy use, and self-regulation. These variables were

assessed using the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & DeGroot, 1990), and the participants (N =123) were divided into an experimental treatment group (N = 38) and a control group (N = 85) based on students who were either exposed to alternative seating or who were not exposed to alternative seating. As will be discussed in greater detail in Chapter Four, the results of the MSLQ were analyzed using a MANOVA, which failed to show a statistically significant difference between the two groups.

CHAPTER FOUR: FINDINGS

Overview

A one-way multivariate analysis of variance (MANOVA) was used to analyze the data between the control group of students that did not have alternative classroom seating available and the treatment group of students that was exposed to alternative classroom seating in the middle school math setting. Results are outlined in this chapter along with the descriptive statistics and assumption testing for the MANOVA analysis. The results of the data analysis supported the null hypothesis of no statistically significant difference between the control and the treatment groups.

Research Question

This quantitative study was designed to answer the following research question:

RQ1: Does the availability of alternative seating have a significant effect on the *aspects of student motivation* for students in middle school math classes?

Null Hypothesis

The null hypothesis for this quantitative study was:

$H_0$1: There is no statistically significant difference in *aspects of student motivation* between students whose math classrooms have alternative seating available, and students whose math classrooms do not have alternative seating available as shown by the Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot, 1990).

Descriptive Statistics

Data were obtained for the four dependent variables of self-efficacy, intrinsic value, cognitive strategy use, and self-regulation that comprise the aspects of motivation scores using the Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot, 1990). Student data

were collected from sixth- and seventh-grade students who participated in math classrooms in which various forms of alternative classroom seating were available on a daily basis or those whose classroom did not have alternative classroom seating available. Students in the control group that did not have alternative seating available reported mean and standard deviation scores for the variables as follows: self-efficacy (M = 51.53, SD = 8.53), intrinsic value (M = 50.39, SD = 7.78), cognitive strategy use (M = 64.31, SD = 14.44), and self-regulation (M = 44.42, SD = 8.88). Students in the experimental treatment group that had alternative classroom seating available reported mean and standard deviation scores for the variables as follows: self-efficacy (M = 54.76, SD = 6.88) intrinsic value (M = 51.61, SD = 10.1) cognitive strategy use (M = 68.97, SD = 17.33), and self-regulation (M = 46.71 and SD = 8.33) (see Table 3).

Table 3

Descriptive Statistics for Self-Efficacy, Intrinsic Value, Cognitive Strategy Use, and Self-Regulation Scores

	Group	M	SD	N
Self-Efficay	No Alternative Seating	51.529	8.532	85
	Alternative Seating Available	54.763	6.875	38
	Total	52.526	8.168	123
Intrinsic Value	No Alternative Seating	50.388	7.780	85
	Alternative Seating Available	51.605	10.096	38
	Total	50.764	8.538	123
Cognitive Strategy Use	No Alternative Seating	64.306	14.444	85
	Alternative Seating Available	68.974	17.329	38
	Total	65.748	15.473	123
Self-Regulation	No Alternative Seating	44.424	8.880	85
	Alternative Seating Available	46.711	8.327	38
	Total	45.130	8.744	123

Results

Data Screening

Data screenings for this research study were conducted on each groups' dependent variable (self-efficacy, intrinsic value, cognitive strategy use, and self-regulation) with specific attention given to outliers. Prior to searching for outliers, the researcher scanned for

inconsistencies after sorting data for each variable. In addition, 10% of the student questionnaires were verified for accurate transcription by one of the guidance counselors that assisted with the study. No data errors or inconsistencies were recognized. The researcher used a box and whiskers plot to detect outliers for the dependent variables (see Figure 2 for box and whisker plot). Outliers were identified for 10 of the cases, and two were extreme outliers. Though outliers can have a negative effect on the results of the MANOVA due to their influence on the mean and standard deviations of the groups (Laerd Statistics, 2015), the researcher made the decision to include all outliers in the statistical analysis. This decision was made, as the elimination of the two extreme outliers had no effect on the overall MANOVA results, and no significant difference was noted between the sample groups (see Table 8).

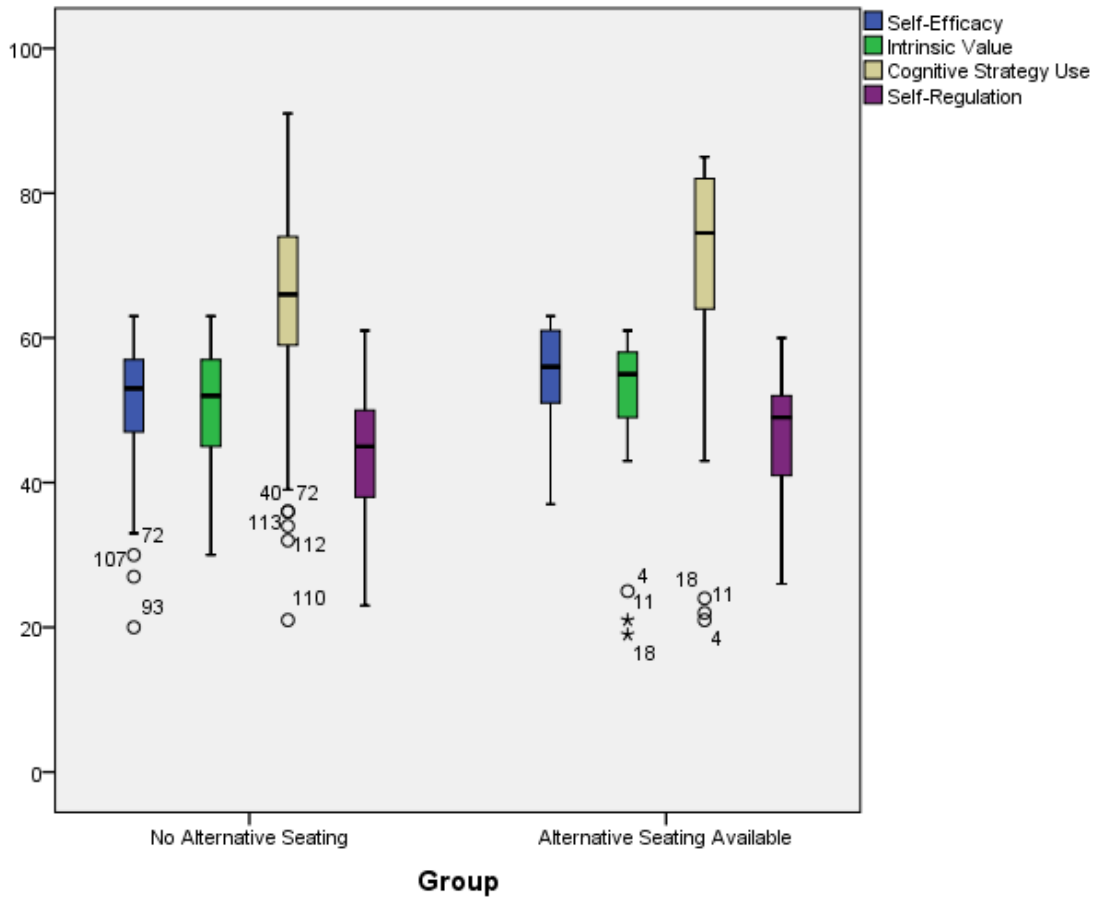

Figure 2. Box and Whisker distribution of self-efficacy, intrinsic value, cognitive strategy use, and self-regulation scores

Assumptions

A one-way multivariate analysis of variance (MANOVA) was used to test the null hypothesis examining the differences among self-efficacy, intrinsic value, cognitive strategy use, and self-regulation scores of students who participated in middle school math classes that either had alternative classroom seating available or did not have alternative classroom seating available. The MANOVA test required that the assumptions of normality, multivariate normal distribution, absence of multicollinearity, homogeneity of variance-covariance, and independence of scores were met. The researcher used the Kolmogorov-Smirnov test to assess

normality as the total sample size was greater than 50 (N = 123). In addition, the researcher utilized histograms to detect normality for all sample groups (see Figures 3, 4, 5, 6, 7, 8, 9, and 10). The assumption of normality was violated for all groups as evaluated by the Kolmogorov-Smirnov test, as a significance of less than 0.05 was reported for each sample group, with the exception of the control group and the experimental treatment group for the variable of self-regulation (see Table 4). The researcher made the decision to continue with the MANOVA test as it is fairly robust against deviations from normality (Laerd Statistics, 2015).

Table 4

Test of Normality for Self-Efficacy, Intrinsic Value, Cognitive Strategy Use, and Self-Regulation Scores

		Kolmogorov-Smirnov[a]		
	Group	Statistic	df	Sig.
Self-Efficacy	No Alternative Seating	.133	85	.001
	Alternative Seating Available	.145	38	.042
Instrinsic Value	No Alternative Seating	.126	85	.002
	Alternative Seating Available	.187	38	.002
Cognitive Strategy Use	No Alternative Seating	.124	85	.003
	Alternative Seating Available	.182	38	.003
Self-Regulation	No Alternative Seating	.072	85	.200*
	Alternative Seating Available	.135	38	.080

Notes. * = a lower bound of the true significance, a = Lilliefors significance correction.

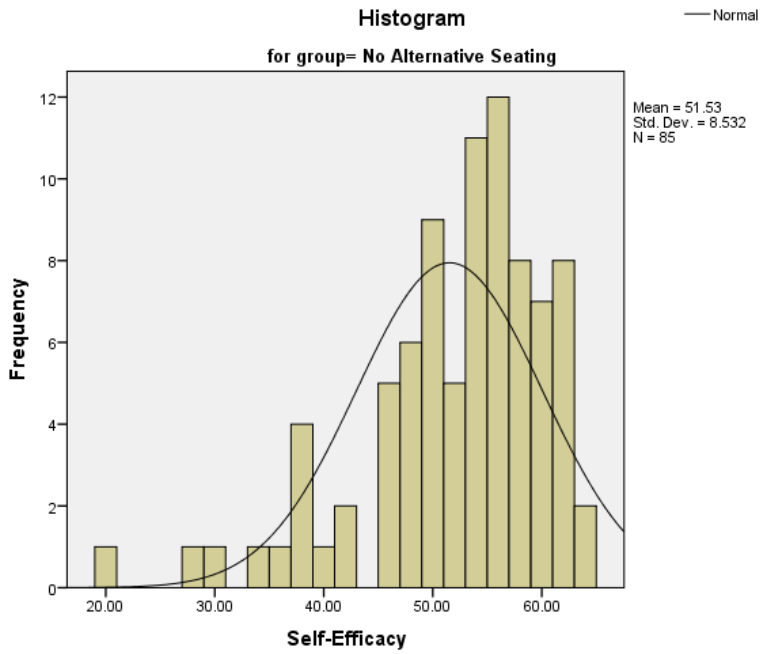

Figure 3. Histogram of self-efficacy scores for students who did not have alternative classroom seating available.

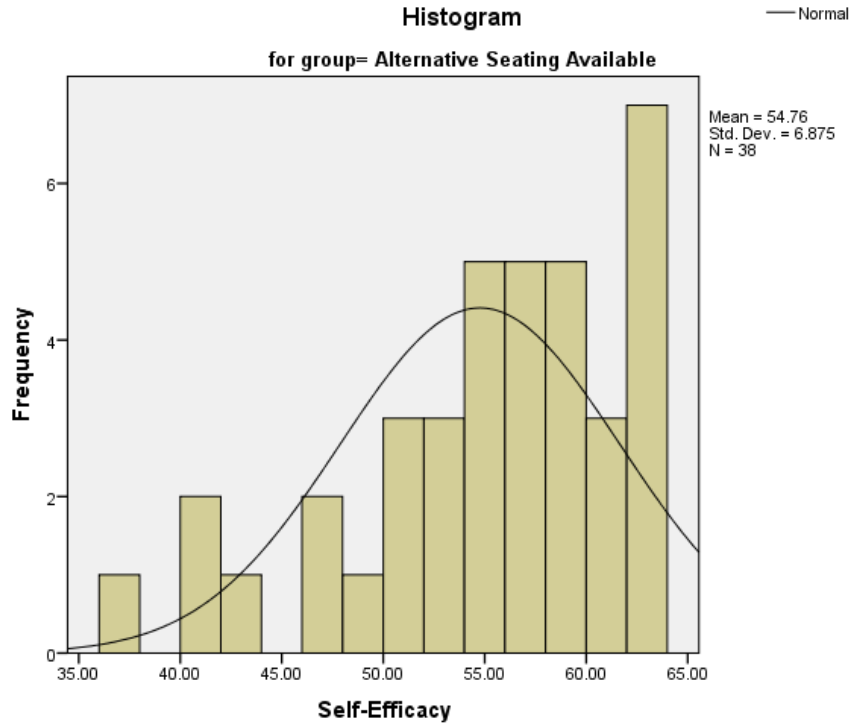

Figure 4. Histogram of self-efficacy scores for students who did have alternative classroom seating available.

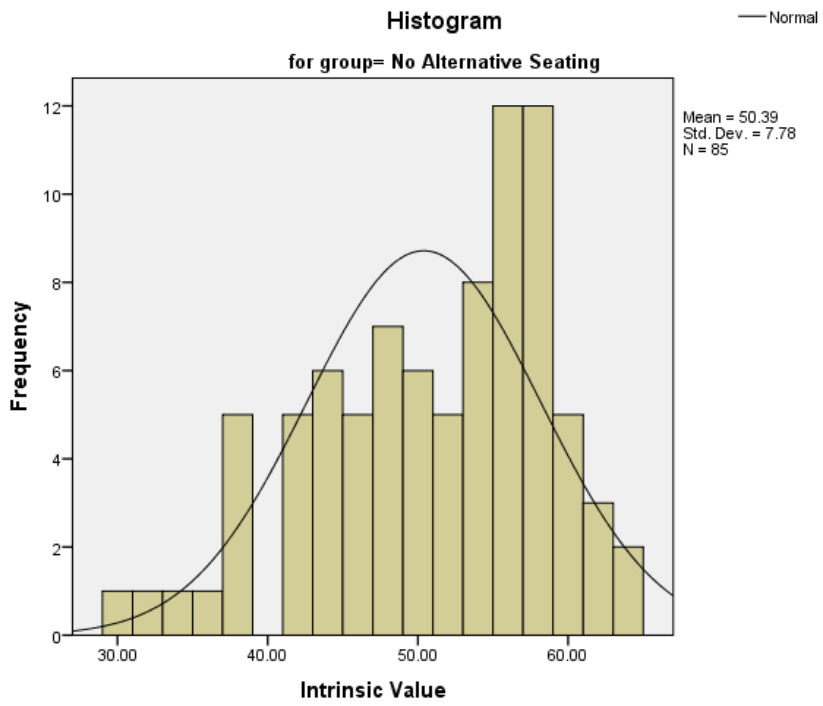

Figure 5. Histogram of intrinsic value scores for students who did not have alternative classroom seating available.

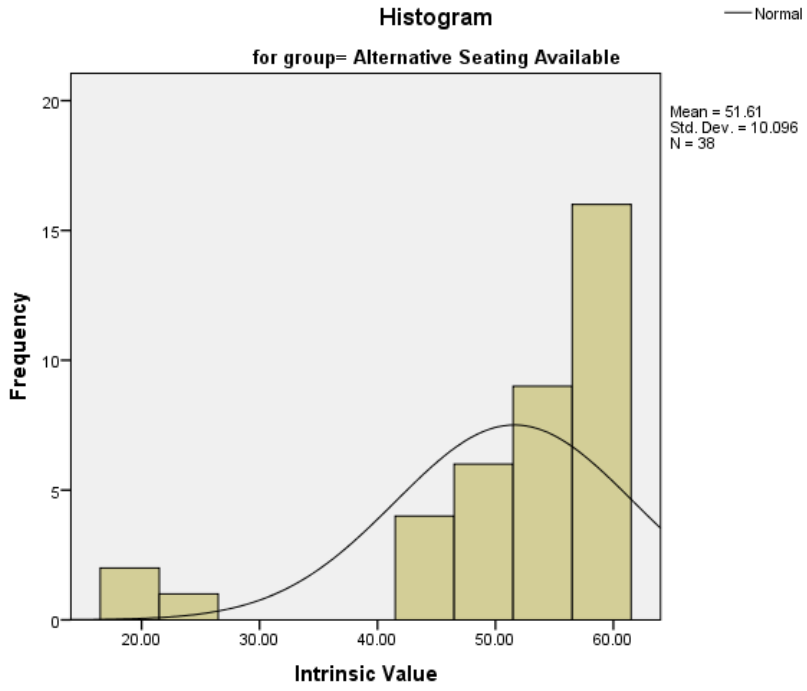

Figure 6. Histogram of intrinsic value scores for students who did have alternative classroom seating available.

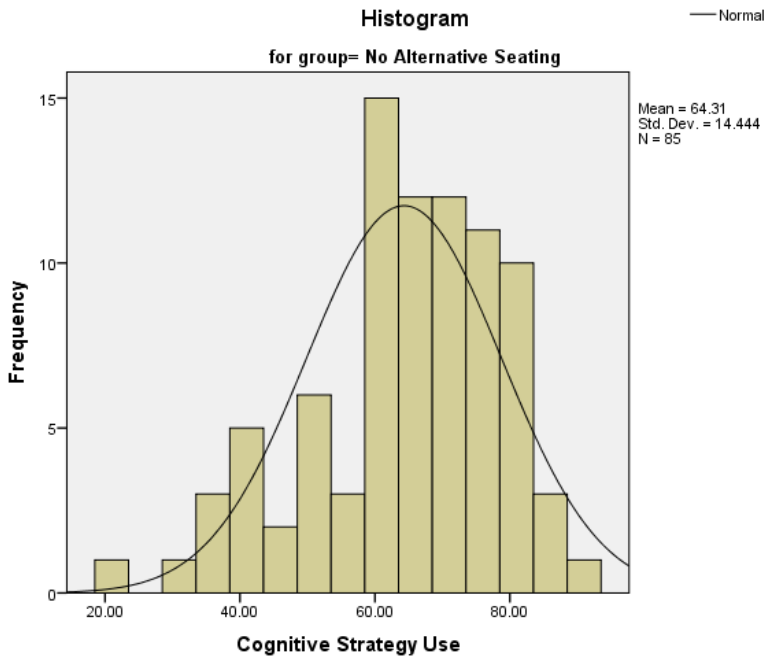

Figure 7. Histogram of cognitive strategy use scores for students who did not have alternative classroom seating available.

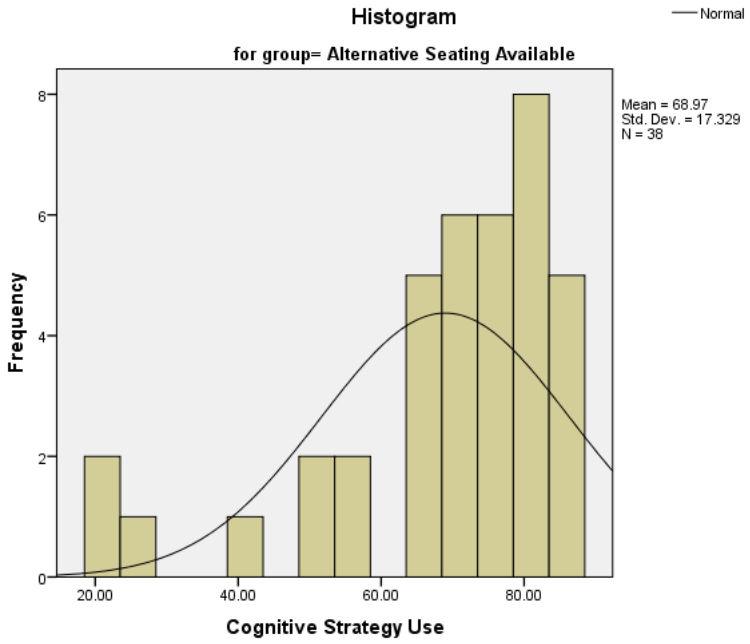

Figure 8. Histogram of cognitive strategy use scores for students who did have alternative classroom seating available.

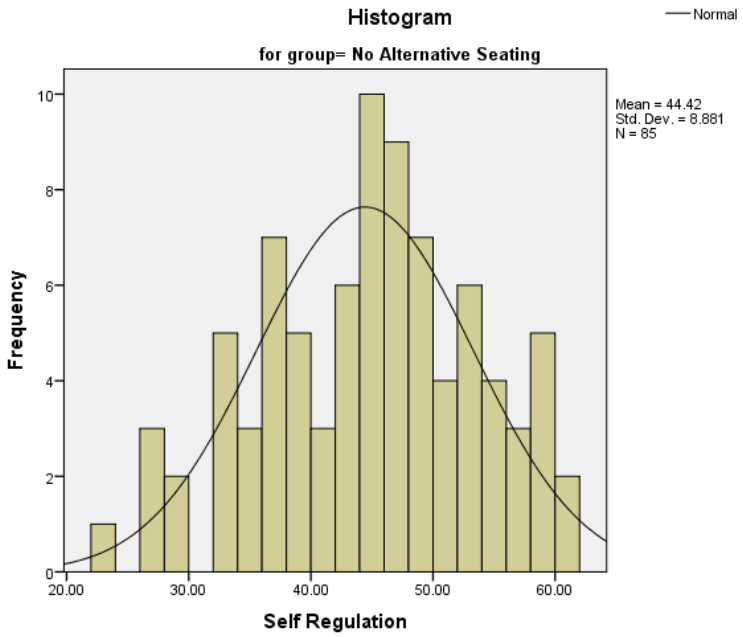

Figure 9. Histogram of self-regulation scores for students who did not have alternative classroom seating available.

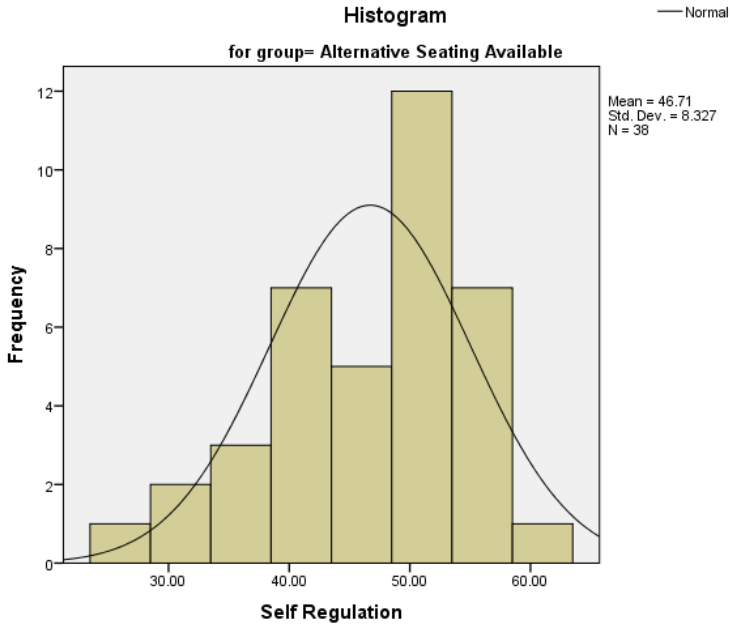

Figure 10. Histogram of self-regulation scores for students who did have alternative classroom seating available.

The researcher examined the homogeneity of variance-covariance matrices using Box's *M* test at a level of statistical significance $\alpha = 0.001$ (Laerd Statistics, 2015; Warner, 2008). As results for Box's *M* were not significant ($p = 0.002$), equal variances-covariance was assumed. Thus, the assumption of homogeneity of variance-covariance matrices was met (see Table 5).

Table 5

Box's Test of Equality of Covariance for Self-Efficacy, Intrinsic Value, Cognitive Strategy Use, and Self-Regulation Scores

Box's M	*F*	df1	df2	Sig.
29.394	2.809	10	25027.497	.002

Note. Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

The researcher used scatterplot matrices to examine the dependent variables to address the assumption of multivariate normal distribution. Upon observation of the scatterplots, the classic cigar-shape was evident for the distribution, thus the assumption of multivariate normal distribution was tenable (see Figure 11).

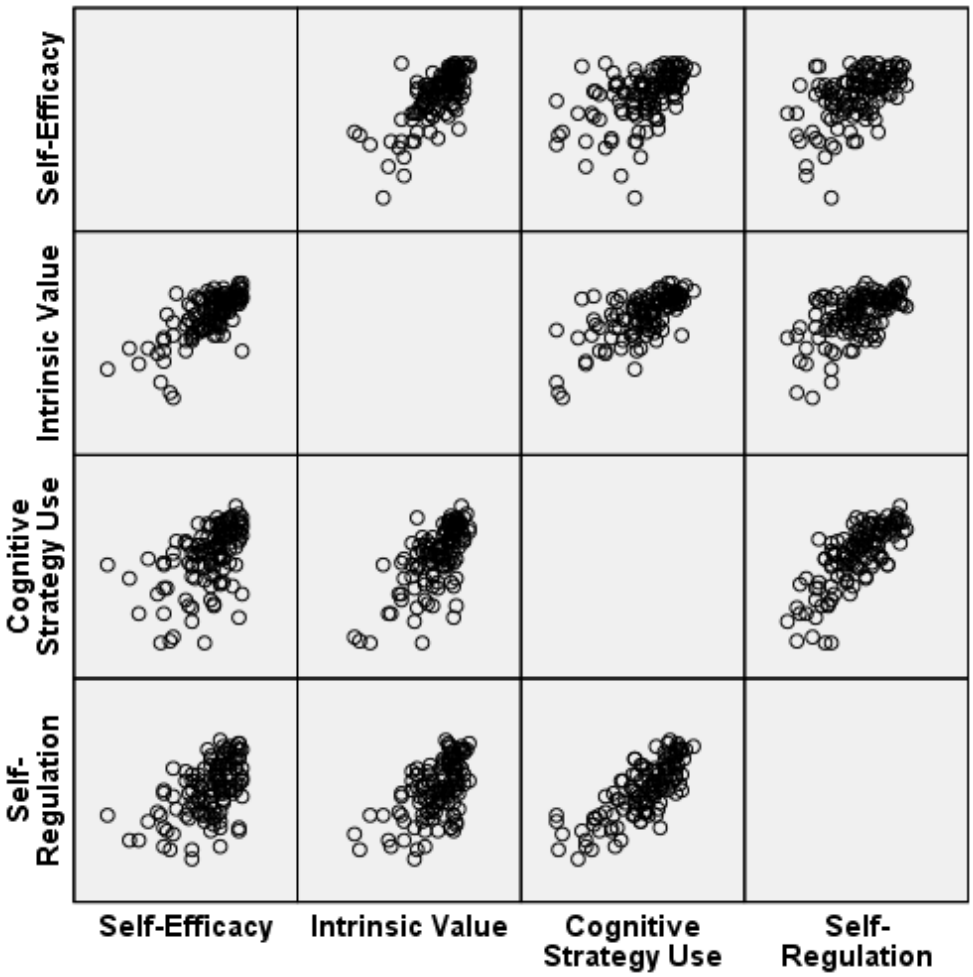

Figure 11. Scatterplot distribution of self-efficacy, intrinsic value, cognitive strategy use, and self-regulation scores.

The absence of multicollinearity was examined by the use of Pearson's Product Moment test. Correlations between all dependent variables were significant as $p < 0.001$ for all correlations. However, the correlations score did not violate the assumption at the 0.90 level, thus there was no multicollineraity (Laerd Statistics, 2015) (see Table 6).

Table 6

Pearson's Product Correlations for Self-Efficacy, Intrinsic Value, Cognitive Strategy Use, and Self-Regulation Scores

		Self-Efficacy	Intrinsic Value	Cognitive Strategy Use
Self-Efficacy	Pearson Correlation			
	Sig. (2-tailed)			
Intrinsic Value	Pearson Correlation	.719**		
	Sig. (2-tailed)	.000		
Cognitive Strategy Use	Pearson Correlation	.503**	.680**	
	Sig. (2-tailed)	.000	.000	
Self-Regulation	Pearson Correlation	.531**	.560**	.767**
	Sig. (2-tailed)	.000	.000	.000

Notes. N = 123, ** Correlation is significant at the .01 level (2-tailed).

Results for Null Hypothesis

A one-way multivariate analysis of variance (MANOVA) was used to determine the effects of exposure to alternative classroom seating on aspects of student motivation for students in the middle school math setting. Four variables (self-efficacy, intrinsic value, cognitive strategy use, and self-regulation) were measured using the Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot, 1990) between the two sample groups (students who had alternative classroom seating available and those that did not have alternative classroom seating available). The differences between the two groups on the combined dependent variables were not found to be stastistically significant at a 95% confidence level as Wilk's $\Lambda = 0.941$; $F(4, 118) = 1.845$; $p = 0.125$; $\eta^2 = 0.059$ (see Table 7). As the results for the MANOVA were not statistically significant, no post hoc analysis was conducted. As stated earlier in the text, two extreme outliers were noted during data screening, and the researcher made the decision to keep

them in the total sample as the results of the MANOVA without the outliers were also not significant at a 95% confidence level as Wilk's $\Lambda = 0.926$; $F(4, 116) = 2.31$; $p = 0.062$; $\eta^2 = 0.074$ (see Table 8).

Table 7

Multivariate Tests for Self-Efficacy, Intrinsic Value, Cognitive Strategy Use, and Self-Regulation Scores

Effect		Value	F	Hyp df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.977	1280.721[b]	4.000	118.000	.000	.977
	Wilks' Lambda	.023	1280.721[b]	4.000	118.000	.000	.977
	Hotelling's Trace	43.414	1280.721[b]	4.000	118.000	.000	.977
	Roy's Largest Root	43.414	1280.721[b]	4.000	118.000	.000	.977
Group	Pillai's Trace	.059	1.845[b]	4.000	118.000	.125	.059
	Wilks' Lambda	.941	1.845[b]	4.000	118.000	.125	.059
	Hotelling's Trace	.063	1.845[b]	4.000	118.000	.125	.059
	Roy's Largest Root	.063	1.845[b]	4.000	118.000	.125	.059

Note. b = Exact Statistic.

Table 8

Multivariate Tests for Self-Efficacy, Intrinsic Value, Cognitive Strategy Use, and Self-Regulation Scores with Two Extreme Outliers Removed

Effect		Value	F	Hyp df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.980	1429.373[b]	4.000	116.000	.000	.980
	Wilks' Lambda	.020	1429.373[b]	4.000	116.000	.000	.980
	Hotelling's Trace	49.289	1429.373[b]	4.000	116.000	.000	.980
	Roy's Largest Root	49.289	1429.373[b]	4.000	116.000	.000	.980
Group	Pillai's Trace	.074	2.310[b]	4.000	116.000	.062	.074
	Wilks' Lambda	.926	2.310[b]	4.000	116.000	.062	.074
	Hotelling's Trace	.080	2.310[b]	4.000	116.000	.062	.074
	Roy's Largest Root	.080	2.310[b]	4.000	116.000	.062	.074

Summary

As described in this chapter, a one-way multivariate analysis of variance (MANOVA) was used to analyze student motivation data collected from 123 sixth- and seventh-grade middle school math students who were either exposed to alternative classroom seating or who were not. Results indicated that there was no statistically significant difference between the two groups at $p = 0.125$. Prior to the conducting the MANOVA, data screening indicated two extreme outliers in the data set. The researcher decided to include these as the results of the MANOVA still indicated no statistically significant between the control and experimental treatment groups when the extreme outliers were removed from the data set. The researcher also reported the descriptive statistics for both sample groups across the four variables that defined the aspects of student motivation, which indicated slightly higher scores across all four variables for the sample group that was exposed to . In addition, assumption testing was conducted for normality, multivariate normal distribution, absence of multicollinearity, homogeneity of variance-covariance, and independence of scores. All assumptions were met for the MANOVA with the exception of normality for which the researcher made the decision to proceed as the MANOVA is fairly robust against variations in normality (Laerd Statistics, 2015). Post hoc testing was not conducted as the MANOVA did not indicate a statistically significant difference between groups.

CHAPTER FIVE: CONCLUSIONS

Overview

The purpose of this causal-comparative research study was to determine if there was a statistically significant difference in the aspects of motivation as measured by four variables: self-efficacy, intrinsic value, cognitive strategy use, and self-regulation between middle school math students who either were exposed to alternative classroom seating or were not exposed to alternative classroom seating. These variables were measured using the Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot, 1990) after a nine-week treatment period for students in the sixth and seventh-grade (N = 123). In Chapter Four, a complete statistical analysis was provided utilizing a MANOVA test, which reported that no statistically significant difference was present between the two groups. This chapter will use those results to discuss the findings of the study and the possible implications that exist as result of the finding. In addition, Chapter Five will discuss the limitations associated with this study, and finally the recommendations for future studies on the topic of alternative classroom seating.

Discussion

The research question for this study was directly linked to the purpose of determining if a statistically significant difference between the aspects of motivation was present between middle school math students who were exposed to classrooms where alternative classroom seating was available compared to students whose classrooms did not have alternative seating options available. Thus, this study focused on one central research question. Does the availability of alternative seating have an effect on the aspects of student motivation for students in middle school math classes? Though the mean for each variable was higher for the experimental treatment group, data analysis using the MANOVA indicated that no statistically significant

difference existed between middle school students whose math classrooms had alternative classroom seating available and those middle school students that did not have alternative classroom seating available.

When looking at the results of this study as compared to the existing body of literature on the topic, it is important to note that this study represents the only known study on the effects of alternative classroom seating on student motivation. With that being said, the findings of this study do support the work of McEwen (2014) who found no statistically significant difference between math achievement scores for 30 special education students who were exposed to different classroom settings, some containing multiple forms of alternative classroom seating. It is important to note that the forms of alternative seating used in both studies contained therapy balls and standing desks.

In addition, as two of the classes in the experimental group of this study had therapy balls available for students, the lack of statistically significant findings supports other work on the topic of the use of therapy balls (Bagatell et al., 2010; DiBitetto, 2015; Fedewa et al., 2015; Merritt, 2012; Olson, 2015; Wu et al., 2012). While Olson (2015) found no significant differences for second grade students with respect to their on-task and out-of-seat behavior, Fedewa et al. (2015) took their research a step further by also examining student's literacy and math achievement for second grade students using therapy balls. Fedewa et al. (2015) reported no significant differences with respect to student on-task or literacy and math achievement. Results of the current study were also supported by Merritt's (2012) inability to find a significant difference between 51 preschool students' literacy achievement when using therapy balls and when not using the therapy ball as a means of seating. Though DiBetto (2015) was able to find differences among subgroups according to class status, ethnicity, and gender, the researcher was

not able to report statistically significant differences in terms of math achievement scores between all 148 sixth-grade students in the sample when either using therapy balls or using standard chairs. As much of the literature on the use of alternative classroom seating is limited to the use of one type of seating device on one particular subgroup of a student population, it is important to note that the findings of the current study also support studies of this type (Bagatell et al., 2010). In examining students diagnosed with Autism Spectrum Disorder (ASD), Bagatell et al. (2010) did not produce results that would indicate that the use of therapy balls improved student attention or in-seat behavior. Perhaps of most interesting would be the findings of Wu et al. (2012). Though Wu et al. (2012) did note significant differences with respect to the reaction time of students with Attention Deficit Hyperactivity Disorder (ADHD) while using therapy balls, no significant differences could be noted for students that did not have an ADHD diagnosis.

While the classrooms that comprised the experimental treatment group of the current study did not utilize therapy cushions, it is of note that the lack of significant findings also supports the work of Umeda and Deitz (2011). Once again, this study limited its scope to students with ASD, while focusing on students in-seat and on-task behaviors. Upon an examination of two male students, the researchers concluded that no significant differences could be found when using therapy cushions with regard to student behavior (Umeda & Deitz, 2011). As the student populations and areas of focus were different for each of these studies, it is significant that the findings of this study focusing on the impact of alternative seating fell in line with the findings of these studies, thus growing the body of literature on the topic.

In contrast to the findings of the current research study in which no statistically differences could be discerned, several research studies are available that present significant

differences in terms of student achievement and student behavior when utilizing forms of alternative classroom seating (Fedewa & Erwin, 2011; Krombach, 2016; Mead et al., 2016; Schilling & Schwartz, 2004; Schilling et al., 2003). The works of Mead et al. (2016), Schilling and Schwartz (2004), Schilling et al. (2003), Krombach (2016), and Fedewa and Erwin (2011) stand as the most critical studies in which the use of therapy balls had significant effects on students. The work of Mead et. al (2016) presented research findings in most stark contrast to the findings of the current research study. Mead et al. (2016) found that there was a positive impact on student achievement for students in sixth-grade math who utilized therapy balls as their method of classroom seating. It is important to note that these significant findings were derived from a similar sample group of participants with respect to grade level and content area.

As previously mentioned, many of the studies focused on the use of therapy balls did so with a particular subgroup of the student population and with a limited sample size. Students with a diagnosis of ASD were the subjects of the works of Schilling and Schwartz (2004) and Krombach (2016). In both of these works researchers reported improvements with regard to students' in-seat behavior and classroom engagement (Krombach, 2016; Schilling & Schwartz, 2004). Schilling et al. (2003) and Fedewa and Erwin (2011) also focused on students of a particular subgroup with significant results when using therapy balls. For these studies, the students selected to participate either had a formal diagnosis of ADHD or reported attention difficulties (Fedewa & Erwin, 2011; Schilling et al., 2003). While the results of both studies suggested positive impacts on student attention and in-seat behavior, it is important note that both studies utilized very small sample sizes.

As the theoretical framework of the current study is rooted in the work of Bandura's (1977) self-efficacy theory, it is important to note the study's findings as they pertain to

Bandura's self-efficacy theory and to the topic of academic motivation. While significant evidence was presented in Chapter Two that links students' self-efficacy to academic achievement as well as academic motivation (Bandura, 1993; Bandura et al., 1996; Brown, 2014; Zimmerman, 2000), it is important to note that little difference was found between the control group and the experimental treatment group with respect to the dependent variable of self-efficacy. The following results were reported for the control that did not have alternative classroom seating available (M = 51.52, SD = 8.53) and for the experimental treatment group that did have alternative classroom seating available (M = 54.76, SD = 6.88). Thus, while there was slightly a higher level of self-efficacy was reported for students who were exposed to alternative classroom seating at a level of p = 0.125, the difference between the groups was not significant for the entire motivational level of the students involved, as tested by the MANOVA.

Implications

Though data analysis results did not indicate a statistically significant difference between the control and the experimental treatment groups, this study does fill an important gap in the literature on alternative classroom seating and marks a critical jumping off point for further research on the topic. The first critical area addressed by this study was its focus on the effects of alternative classroom seating on student motivation. While it is clear that research is present that speaks to the effects of different modes of alternative classroom seating on a variety of topics and with a variety of student populations (Al-Eisa et al., 2013; Bagatell et al., 2010; Burgoyne & Ketcham, 2015; DiBittetto, 2015; Fedewa et al., 2015; Fedewa & Erwin, 2011; Harvey & Kenyon, 2013; Jakubeck; 2007; Janulewicz, 2008; Kilbourne, 2009; Krombach, 2016; McEwen, 2014; Mead et al., 2016; Merritt, 2015; Olson, 2015; Pfeiffer et al., 2008; Schilling & Schwartz, 2004; Schilling et al., 2003; Seifer & Metz, 2016; Tunstall, 2009; Umeda & Deitz;

2011; Witt & Talbot, 1998; Wu et al., 2012), this study represents the first known study examining the effects of alternative classroom seating on student motivation. As this area of research has such a limited catalogue of information present, this study serves as point from which many other studies can begin.

Additionally, this study does serve the purpose of providing educators some empirical evidence to inform their use of alternative classroom seating. As noted earlier, the results of the MANOVA did not prove to be different from a statistically significant perspective; thus one can certainly take the position that teachers and administrators should proceed with caution when making the decision to implement forms of alternative seating. From a point of practically, if the use of alternative classroom seating does not clearly provide a positive impact on student motivation, then the position could certainly be taken that educators should either avoid spending precious resources on these types of seating devices or do so in a limited manner. However, it is important to note that all four variables as measured by the four subscales of the MSLQ did indicate higher mean values for the experimental group as compared to the control group. Thus, with this being the first known study of its kind and differences between the two groups noted across all four variables, it can be argued that further research studies on the topic are warranted before forming a conclusion on the use of alternative seating on student motivation. Additionally, from a practical application for teacher and administrators, noted differences in the means between the two groups with the experimental treatment group reporting the higher mean across all four variables could serve as an indication of potential positive benefits for students.

As noted throughout this study, the vast majority of research conducted on the topic of alternative classroom seating has focused on one particular method of alternative classroom seating as only McEwen (2014) presented results based on the study of multiple forms of

alternative classroom seating. As the current study along with the work of McEwen (2014) provides educators the only known empirical insights on the effects of multiple forms of alternative classroom seating, the current study certainly fills another gap in the literature on the topic. It is also clear with such a limited body of quantitative literature available on the topic that further research is needed. Additionally, in a similar manner to McEwen (2014), while significant differences were not noted for the groups using alternative seating as compared to student not using alternative seating, some level of evidence of impact was noted. As the teachers in McEwen's (2014) study noted improvements in student behavior, the reporting of higher means for the experimental group across all four variables in this study could indicate some level of impact.

This research study is also important, as it stands as one of the few studies that focused on a more generalizable student population than the majority of research on the subject of alternative classroom seating. Of all of the research available on the topic of alternative classroom seating, the total body of work that speaks to the effects on general population of students and not focused on one particular student subgroup is quite limited (Burgoyne & Ketcham, 2015; DiBitetto, 2015; Fedewa et al., 2015; Mead et al., 2016; Merritt, 2015; Olson, 2015). As this study used a convenience sample aimed a general population of students (N = 123) in middle school math classes, it once again fills a need in the overall body of literature on alternative classroom seating and offers educational professionals some empirical data to inform their decisions on the use of these types of seats with respect to a general population of students.

Limitations

The main limitations to the current study stem from the use of a convenience sample and a causal-comparative design. In order to comply with IRB guidelines, student participants were

asked to participate on a volunteer basis with no pressure to participate and were not compensated for their participation. In order to participate, these students required informed parental consent. As described by Gall et al. (2007), there are differences in students that participate in research studies that require informed parental compared to students that do not participate. Students that voluntarily participate in research studies requiring parental consent in general show differences in a variety of areas ranging from academic competency to level of aggression (Gall et al., 2007, p. 188).

Additionally, as teachers and administrators made the decision to select whether or not to use alternative classroom seating, a causal-comparative design was used in which the potential classrooms using alternative seating was limited to three sixth-grade classes and one seventh-grade class as opposed to four seventh-grade and two sixth-grade classes for the control group. Ultimately, these factors led to a response rate in the control (N = 85) and experimental treatment (N = 38) groups that made the groups quite uneven with respect to participation. More importantly, the study could have been limited internally by selection-maturation interaction as described by Gall et. al (2007). While both groups contained sixth and seventh-grade students, the limited pool of possible participants for the experimental treatment group resulted in not only a much lower rate of participation but also a group heavily dominated by sixth-grade students with only three total seventh-grade participants in the experimental treatment group.

Limitations with respect to external validity for this particular study mainly stems from concerns of population validity as described by Gall et al. (2007). Once again, as a convenience sample was used by the researcher, results are be only generalizable to school divisions from a similar geographic and demographic area. As was noted in Chapter Three, the sample for the study was drawn from a group of five schools from the same school division that served a

relatively homogenous population of students. Each of the schools involved in the study had a student population that ranged from 68.9% to 89.7% white, 50.7% to 64.7% economically disadvantaged, and 8.1% to 24.9% with special education needs. Thus, the results of the study could only truly be generalized to schools and school divisions of a similar makeup.

While the researcher made the conscious decision to use a post-test only approach for the research design of the study, this could cause other limitations for the study's results. As discussed earlier in this work, the use of a pre-test was not incorporated in an effort to control for threats to internal validity by means of testing and instrumentation. As described by Gall et al. (2007), the use of pretest could cause subjects to show improvement simply because of their experience with the test or the participants becoming predisposed to believe a positive change has occurred. Additionally, the elimination of a pretest protected the study against the ecological validity issue of pretest sensitization. This seemed to be of paramount importance as the current study employed the use a self-report questionnaire measuring student attitudes which according to Gall et al. (2007), is the most likely scenario for pretest sensitization to impact external validity. With that being said, the study was not able to account for student motivational attitudes prior to the study. Thus, while results indicated the experimental group had slightly higher mean averages for the four measured variables, it is impossible for the researcher to claim that these differences did not exist prior to the application of the treatment. It is also unknown to the researcher the experience level of students with alternative classroom seating that may or may not have influenced their responses. Additionally, the current study was not able to account for the effectiveness of the teachers involved in the study or their attitude toward the use of alternative classroom seating with respect to either overall teacher instructional effectiveness or

student motivation. Thus, it was impossible for the researcher to control for any of these confounding variables using this type of research design and methodology presented.

Recommendations for Future Study

Based on the literature reviewed and the results presented from this study, several recommendations for future study are suggested. The first two are based not only the findings of this current study, but on the overall limited nature of the body of literature present on alternative classroom seating. Further research is certainly needed utilizing settings in which students are exposed to multiple forms of alternative seating devices. As only one other known study that utilized multiple forms of alternative seating (McEwen, 2014) is currently present in the literature, an increased body of empirical data on the subject is needed to inform educational professionals. As utilized in this study, further research studies are needed to examine the impact of alternative classroom seating devices on a generalizable population of students, most specifically, in settings in which general education students and special education students are placed together in an inclusion classroom. It is advised that such studies also add a method by which to discern which student participants are receiving special education services. This is a piece of datum that was not collected for this study, but as previous studies have tended to focus on the use of alternative classroom seating for students with special needs, it could be interesting to see if differences exist between students with and without disabilities. This was a method employed by DiBitetto (2015) by reporting statistics by subgroups of class status, ethnicity, and gender in addition to overall differences between groups based on seating device. In an effort to make research results more generalizable and to build on the overall catalogue of professional literature, it is recommended studying the effects of alternative classroom seating on student motivation for students of other age groups. It could be intriguing to see if results would be

similar with students at the high school level if conducted in a similar manner as the current study.

With respect to the limitations previously presented in this chapter, further research on the same topic is needed with broader scope of student participants and a more equal representation of students in each of the sample groups. The limiting factors of the unequal groupings made the limited differences between groups dependent variable means difficult to generalize to larger populations. Thus, studies that encompass a higher number of student participants, potentially also including eighth grade students, would add greater strength to the findings of future studies as it pertains to middle school students. Additionally, future studies should strive to maintain control and experimental treatment groups that are comprised of approximately the same number of students with a more similar makeup with regard to the age of the students participating. It would also be desirable for the classes involved with and without alternative classroom seating to be equally distributed, thus providing a more equitable opportunity for participation in the sample groups.

While this particular study focused on the effects of alternative classroom seating on student motivational aspects, it is recommended that in addition student achievement also be considered as either a separate topic of study or as an additional research question while studying student motivation. As presented in the theoretical framework for this study, self-efficacy and academic motivation have been shown to have an effect on students' academic achievement (Aydin, 2015; Bandura, 1993; Bandura et al., 1996; Bandura & Schunk, 1981; Brown, 2014; Cetin-Dindar, 2016).

Other possibilities for study on the topic of alternative classroom seating could potentially center on perceived classroom environment on the part of the students and of the

teachers. Thus, the use of a different instrument for data collection that measures perceived classroom environment could add valuable insights into the use of alternative classroom seating. Additionally, a study that measures the correlation between a teacher's choice of using and attitude towards alternative classroom seating could prove to be beneficial for taking into account teacher attitudes. Further insights may be gleaned by analyzing teachers' use of alternative classroom seating and other instructional methods. This type of study could also be useful when considering the effects of teachers' attitude on the classroom environment.

A mixed methods or qualitative approach to a study on this topic could lead to additional insights that a quantitative approach might be not able to yield. First-hand accounts of student and teachers thought on the use alternative classroom seating could provide tremendous insight on its use, especially if conducted over an extended amount of time. Qualitative data produced from teachers with regard to administrative support for using alternative classroom seating could also provide useful information on the use of this type of classroom seating.

All of the recommendations provided in this study are made with an eye toward continuing to close the present gaps in the literature on alternative classroom seating, thus providing professional educators a more complete data picture from which to inform decisions.

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APPENDIX A

Motivated Strategies for Learning Questionnaire
(MSLQ exists in public domain: http://www.soe.umich.edu/faqs/tag/education and psychology/)
Please circle the answer that best describes you.

Age: 11 12 13 14 15

Sex: Male Female

Grade: 6th 7th

Please rate the following items based on your behavior in this class by circling the statement that best describes you. Find the number between 1 and 7 that best describes you and circle it. Your rating should be on a 7- point scale where:

1-not at all true of me **3**-not very true of me **5**-somewhat true of me **7**-very true of me

1. I prefer class work that is challenging so I can learn new things.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. Compared with other students in this class I expect to do well.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3. It is important for me to learn what is being taught in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4. I like what I am learning in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. I'm certain I can understand the ideas taught in this course.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6. I think I will be able to use what I learn in this class in other classes.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7. I expect to do very well in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8. Compared with others in this class, I think I'm a good student.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9. I often choose paper topics I will learn something from even if they require more work.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10. I am sure I can do an excellent job on the problems and tasks assigned for this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11. I think I will receive a good grade in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Scale: **1**-not at all true of me **3**-not very true of me **5**-somewhat true of me **7**-very true of me

12. Even when I do poorly on a test I try to learn from my mistakes.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
13. I think that what I am learning in this class is useful for me to know.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
14. My study skills are excellent compared with others in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
15. I think that what we are learning in this class is interesting.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
16. Compared with other students in this class I think I know a great deal about the subject.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
17. I know that I will be able to learn the material for this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
18. Understanding this subject is important to me.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
19. When I study for a test, I try to put together the information from class and from the book.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
20. When I do homework, I try to remember what the teacher said in class so I can answer the questions correctly.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
21. I ask myself questions to make sure I know the material I have been studying.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
22. It is hard for me to decide what the main ideas are in what I read.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
23. When work is hard I either give up or study only the easy parts.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
24. When I study I put important ideas into my own words.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
25. I always try to understand what the teacher is saying even if it doesn't make sense.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
26. When I study for a test I try to remember as many facts as I can.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
27. When studying, I copy my notes over to help me remember material.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Scale: **1**-not at all true of me **3**-not very true of me **5**-somewhat true of me **7**-very true of me

28. I work on practice exercises and answer end of chapter questions even when I don't have to.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
29. Even when study materials are dull and uninteresting, I keep working until I finish.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
30. When I study for a test I practice saying the important facts over and over to myself.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
31. Before I begin studying I think about the things I will need to do to learn.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
32. I use what I have learned from old homework assignments and the textbook to do new assignments.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
33. I often find that I have been reading for class but don't know what it is all about.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
34. I find that when the teacher is talking I think of other things and don't really listen to what is being said.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
35. When I am studying a topic, I try to make everything fit together.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
36. When I'm reading I stop once in a while and go over what I have read.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
37. When I read materials for this class, I say the words over and over to myself to help me remember.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
38. I outline the chapters in my book to help me study.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
39. I work hard to get a good grade even when I don't like a class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
40. When reading I try to connect the things I am reading about with what I already know.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

APPENDIX B

PARENT/GUARDIAN CONSENT FORM

ALTERNATIVE SEATING IN MIDDLE SCHOOL MATH: EFFECTS ON STUDENT MOTIVATION

Kirk W. Renegar
Liberty University
School of Education

Your child/student is invited to be in a research study of effects of alternative classroom seating (Ex. standing desks, therapy balls, therapy cushions, camping chairs, etc.) on student motivation in the middle school math classroom He or she was selected as a possible participant because they are currently enrolled in a math class that meets the age and grade requirements for a student in middle school and they may or may not be assigned to classroom where alternative classroom seating is present. Please read this form and ask any questions you may have before agreeing to allow him or her to be in the study.

Kirk W. Renegar, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this study is to examine the effects of alternative classroom seating (Ex. standing desks, therapy balls, therapy cushions, camping chairs, etc.) on certain aspects of student motivation. Student participants will simply carry out their duties in the classroom as directed by the teacher. The researcher will collect data through the use of a self-report questionnaire (survey) that will seek to measure their level of academic motivation for the following factors: self-efficacy, intrinsic value, cognitive strategy use, and self-regulation. The researcher will compare the data collected between classes in which teachers utilize alternative classroom seating to those where teachers have made the decision not to use alternative seating to see if certain aspects of student motivation are affected.

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. Participate and engage in their math class as they normally would for a period of nine weeks.
2. At the end of the first nine weeks grading period, complete a self-report questionnaire (survey) known as the Motivated Strategies for Learning Questionnaire. The questionnaire will ask students to rate themselves on a 1-7 scale for a number of statements, thus measuring their levels of academic motivation for the factors described above. This questionnaire should be completed in approximately 30 minutes.

Risks and Benefits of being in the Study: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life. As I am mandatory reporter of child abuse, child neglect, elder abuse, or intent to harm self or others, it is necessary for me to disclose that I could potentially be exposed to information that triggers that reporting.

Participants should not expect to receive a direct benefit from taking part in this study.

Benefits to society include providing data and analysis on an educational strategy that could impact a child's education.
Compensation: Your child/student will not be compensated for participating in this study.

Confidentiality: The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher will have access to the records.

- In order to protect the privacy of the individuals participating in the study, the data collected will not include personally identifiable information. Only demographic information such as grade level, age, and sex will be collected. The researcher will assign unique identification numbers for use in data transcription, but that number will not allow students to be identified. The data will be handled only by the school counselors and the researcher. The researcher will be the only individual to score and handle data with the exception of one of the counselors who will assist the researcher in verification of transcription of 10% of the questionnaires. This form along with student assent form will serve as the only documents used in the study that contains personally identifiable information.
- Data collected for the study will be stored secured in a locked filling cabinet at the researcher's private residence. After the three year federally required time period, the research will dispose of the data by shredding questionnaires and properly disposing of the remains at the waste transfer station. Data collected will be used only for the study as described above.
- The limits of confidentiality for this particular study are based on the student participants' ability to maintain the confidential nature of their own responses. Thus, the researcher cannot assure the parent/guardian that the student participant will not share their responses with other members of the sample population.

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 his or her current or future relations with Liberty University. If you decide to allow your student to participate, he or she is free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

Contacts and Questions: The researcher conducting this study is Kirk W. Renegar. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact him at krenegar@liberty.edu. You may also contact the researcher's faculty advisor, Dr. Gary Kuhne, at gwkuhne@liberty.edu.

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, Green Hall 1887, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information 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.

(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 C

ASSENT OF CHILD TO PARTICIPATE IN A RESEARCH STUDY

What is the name of the study and who is doing the study?
Title: Alternative Classroom Seating in Middle School Math: Effects on Student Motivation
Author: Mr. Kirk W. Renegar

Why are we doing this study?
We are interested in studying if the use of alternative classroom seating (Ex. standing desks, therapy balls, therapy cushions, camping chairs, etc.) affects aspects of student motivation.

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 math class that meets the age and grade requirements for a student in middle school, and you may or may not be assigned to classroom where alternative classroom seating is present.

If you agree, what will happen?
If you are in this study you will engage in regular classroom instruction as you normally would. At the end of the first nine weeks grading period you would complete a self-report questionnaire (survey) that will ask you rate yourself on your motivational beliefs.

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

Researcher Contact Information:
Kirk W. Renegar, 3597 Dogwood Rd., Critz, VA 24082 or email at krenegar@liberty.edu
Faculty Advisor: Dr. Gary Kuhne, email gwkuhne@liberty.edu

Liberty University Institutional Review Board,
1971 University Blvd, Green Hall 1887, Lynchburg, VA 24515
or email at irb@liberty.edu.

APPENDIX D

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

June 28, 2017

Kirk Renegar
IRB Approval 2902.062817: Alternative Classroom Seating in Middle School Math: Effects on Student Motivation

Dear Kirk Renegar,

We are pleased to inform you that your study has been approved by the Liberty University 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.

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

Sincerely,

[redacted]

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

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