EXAMINING THE EFFICACY OF MULTIPLE INTELLIGENCE-BASED PEDAGOGICAL APPROACHES ON MALES IN ELEMENTARY MATHEMATICS

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Abstract

In education, teachers often struggle with keeping students on task during independent work time. This is especially true for male students. Howard Gardner (1983) established a theory of multiple intelligences, asserting that each individual student learns in a unique way. The purpose of this mixed methods research study was to examine the effect of integrating multiple intelligence based teaching strategies on third grade male students and teachers. Particular emphasis was placed on what impact these strategies might have on male students’ unwanted behavior. Pre-surveys were administered to teachers at two elementary schools to identify baseline teaching preferences/practices. Data on student engagement was gathered using an unwanted behavior tally chart. Teachers then participated in professional development focused on implementing six new multiple intelligence based strategies in third grade mathematics. After each strategy was implemented by the teacher, student reactions were collected via the same behavior tally chart. Upon conclusion, participating teachers completed a post-survey on teaching practices, and data sets were quantitatively analyzed. To corroborate data, the researcher also employed a qualitative approach while reviewing video footage of student and teacher activities, as well as analyzing an open-ended teacher survey administered at the conclusion of the study.

Findings indicated that teachers demonstrated a significant increase in the use of multiple intelligence based approaches as a result of the new methods introduced during the professional development phase. Participating teachers indicated an ongoing commitment to continuing the use of several of the multiple intelligence based strategies and found them both successful and valuable for keeping male students on task during independent work time in mathematics classes.
Student data supported this, indicating that the male subjects demonstrated fewer unwanted behaviors once the new multiple intelligence based teaching approaches were implemented.
Dedication

To my Gram, Betty Smith:

For your continuous support, words of encouragement, and praise. Thank you for shaping me into the person I am today, and for cooking the best meals ever.

I love you.
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1. Pre and Post Unwanted Behavior Tally Chart: Leetonia Elementary
2. Pre and Post Unwanted Behavior Tally Chart: McKinley Elementary
Chapter 1: Introduction

This study explores the most effective pedagogical approaches used in the third grade math classroom to reduce unwanted behaviors. Sousa (2011) stated, “most educators readily admit that schools are predominantly language-oriented institutions, especially in the elementary grades” (p.185). Therefore, language proficient learners, who are typically females, will be more comfortable and engaged during instruction. On the other hand, male learners, who tend to be visual and spatial learners, may be disengaged. This results in showing unwanted behaviors (Sousa, 2011). Based upon this research, educators need to realize that male and female brains do not mature at the same rate. As a result, there is a need to differentiate instruction according to the needs of the students in the classroom. Sousa (2011) stated, “all students will achieve more when teachers purposefully plan strategies that teach the whole brain by addressing strengths and weaknesses of both genders” (p.186). If educators can guide male students into discovering their intelligence strengths and learning preferences, they can use this information to implement appropriate strategies to keep male students engaged during instruction time, and minimize unwanted behaviors.

Background of the Problem

In the field of education there are often multiple requirements put into place in an attempt to provide a higher rate of success for students. Gurian and Steves (2004) reported, that boys account for at least 70% of D’s and F’s in school. Due to the high incidence of struggling male students, researchers need to find what can be done within the classroom in order to engage male learners so that they will become more academically successful.

Orr (2011) suggested that a major reason for lower male performance could be due to how boys and girls are being raised regarding what is socially appropriate. Girls are often raised
to be cooperative and dependent, which tends to fit well in the school setting. Boys are raised to become independent and competitive, positively causing problems in the school setting.

Therefore, teachers are more likely to look favorably on female social characteristics at school, while having more negative attitudes towards the masculine behaviors. For instance, Mullola, Ravaja, Lipsanen, Alatupa, Hintsanen, Jokela, and Keltikangas-Jarvinen (2011) stated, “teachers perceive highly active students as irritable and prickly, and as difficult to teach” (p.187).

Teachers may view the quiet attributes of how most females work as more mature and teachable compared to the difficult behaviors of their male peers (Mullala, et al., 2001). This research has indicated that more masculine traits are being frowned upon by teachers which relates to similar research findings.

Heyder and Kessel (2013) stated:

> studies related to the possibility of feminization of school suggest that the school setting rewards feminine traits and behavior more than it does masculine traits and behavior, as children high on masculinity achieve worse grades and are less liked by teachers. (p.617)

Having a vision of females as being model students due to their behavior could be very damaging to male students. Males may perceive this treatment as a message that they will never be able to succeed due to their gender. Further, they may see female students as being the most successful in the school atmosphere.

Learning styles have been considered a crucial element in attempting to engage male students. Dahlan, Noor, Mustafa, Hashim, and Zulkifli (2010) suggested from their research that the learning styles of both females and males should be addressed in order for both groups to succeed. Their results indicated that male student learning styles favored using active, visual,
and sequential methods. Carrier (2009) suggested that due to the data showing that boys are academically performing lower than females, more focus should be put on introducing new teaching methods that would favor male learning preferences. Teachers must not assume that both males and females learn using the same types of learning styles. Mulvey (2010) underscored the value of stating possible strategies for a change in teaching methods to create a more balanced learning environment such as having single-sex classrooms, combining cooperative teaching strategies, or delaying formal reading instruction until male students are developmentally ready. These methods pose a possible solution by creating a classroom environment that accommodates the intelligence strengths of male students. These changes could result in having a more balanced classroom to support both gender learning styles.

Allowing students to identify and apply knowledge of learning preference could assist in the needed supports to give male students the necessary guidance to increase efficacy. Research has shown a discrepancy between the intelligence strengths of students compared to how they are actually being taught (Dahlan et al. 2010). Further, Dahlan et al. (2010) suggested, "not only could accommodation of certain learning styles enhance learning but also increase achievement" (2010, p.19). If students are able to identify their learning preferences, the teacher can carry this over into the type of instruction used in the classroom. This may offer the differentiation needed for male students to become more engaged in the classroom. Carrier (2009) agreed and stated, "strategies for connecting with boys in schools is to provide more action-oriented activities" (p.4). Research indicated that boys respond more favorably to active learning than a lecture-formatted lesson. This supports the theory that teachers should be aware of the preferred learning styles of their students in order to adapt their pedagogy to meet the needs of their students, especially struggling male students.
Research by Costello (2008) found that many teachers are misdiagnosing male students as having difficulties in the classroom. Male students may not be demonstrating misbehaviors, but were instead bored or disengaged in the lesson due to the pedagogical approaches that are implemented. Rather than giving these misdiagnoses, teachers should be implementing research-based teaching strategies to better meet the needs of their male students.

Similar research has stated that teachers often perceive males as irritating, difficult, or annoying because they show problems in adapting to classroom change and routine (Mullolo et al., 2011). In general, results showed that teachers rated boys having a higher rate of activity and a low rate of persistence compared to that of girls. In addition, boys were perceived as having a higher incidence of distractibility and inhibition in comparison to girls (Mullolo et al., 2011). This suggests that boys are not misbehaving, rather they are not being engaged during instructional time. This key evidence supports teacher adaptations to pedagogical approaches to meet the needs of male students.

**Rationale & Significance of the Study**

Many have researched the impact of using Multiple Intelligences in the classroom. However, no specific research has been found focusing on third grade male students in the math classroom. Identifying which differentiated pedagogical approaches to implement would result in decreased unwanted behaviors and would be beneficial to stakeholders to put that into effect in the educational setting.

Gardner (1983) stated that all students in the classroom are not the same. If teachers treat everyone as if they are the same, then teachers are only considering one profile of intelligence, the linguistic profile. Students arrive on teachers' doorsteps with vastly different learning styles. Teachers, perhaps due to lack of training, may be using a "catch all" type of
teaching that is not differentiated to meet the needs of the various types of learners in the classroom. Research is the key in this study to find which methods will target the best learning styles of third grade boys specifically. Rather than using an array of teaching styles, the use of lecture appears to be the most common approach used in teaching. Usak, Bag, and Usak (2006) support this theory by suggesting that the traditional intelligences practiced by teachers are that of the verbal-linguistic and logical-mathematical. This is similar to the thoughts of Garder. Usak et al. (2006) who stated, "students who are weak in those areas are usually disadvantaged in school" (p.62). Male students who are strong in the verbal or mathematical intelligence will more than likely not show signs of difficulty. However, the remaining students sit and struggle on a daily basis because they are not strong in either of the two specific intelligences. This is supporting evidence for the need to adapt instruction based on the preferred intelligences of male students.

Laughlin and Foley (2013) suggested that if teachers aligned multiple intelligences with classroom instruction, they would find that their students might have a higher rate of knowledge transfer. If male students are engaged in the lesson, due to their preferred intelligence being activated, males are more likely to retain the information from the lesson. Consequently, male students who are engaged during classroom time may show fewer unwanted behaviors.

Mullolo (2011) found that teachers rate boys as having a higher rate of activity and a lower rate of persistence compared to girls. Boys were also perceived as having significantly higher distractibility and inhibition in comparison with girls (Mullolo et al., 2011). Male students could benefit from this study because they will be more engaged in the lesson, and by activating preferred intelligences, behavioral problems are reduced. Several different approaches could assist in engaging male students. First, Laughlin and Foley (2012) found that
using teaching strategies aligned with multiple intelligences in education settings enhances student learning. Second, by applying multiple intelligence theory, teachers could change behavior among a variety of learners, thus decreasing unwanted behavior.

Implementing methods addressing appropriate intelligences that are meaningful to the student enables students to become more aware of problems they may be facing (Iflazoglu-Suban & Bal, 2012). Ensuring that students are familiar with their own intelligence strengths may benefit the teacher as well by addressing those specific intelligences in daily classroom instruction. To that point, male students could answer survey questions related to the different intelligences. The teacher then reviews the results with the male students allowing them to be aware of their specific intelligence strengths. Not only would these results guide male self-awareness, but the results would benefit the teacher in becoming aware of which intelligences to address during classroom instruction time.

Usak et al. (2006) stated:

> it provides educators with a conceptual framework for organizing and reflecting on curriculum assessment and pedagogical practices. In turn, this reflection has led many educators to develop new approaches that might better meet the needs of the range of learners in the classroom. (p.62)

For that reason, increasing awareness of the intelligence strengths in the classroom will give the teachers an opportunity to adapt and implement new pedagogical approaches to best fit their students. Due to the implementation of the new approaches, teachers who have taught using the same methods for years would be provided the opportunity to try new methods that would better fit the learning needs of their students.
This research has potential benefit for teachers, principals, and parents of male students. The discovery of specific intelligence strengths, coupled with which pedagogical methods appear to be the most effective with third grade males, could assist in engaging these students while keeping unwanted behaviors to a minimum. Once parents are aware of the intelligence profiles, they could benefit by incorporating suggested strategies at home to complete homework, or any other task that may be challenging for their child. Concurrently, teachers would benefit from this research in knowing how to use multiple intelligences in the classroom to keep male students engaged in learning and to retain more knowledge to be prepared for the state requirements of third grade. Lastly, principals who may be faced with a male student showing behavior issues in the classroom could use this research to assist in getting the student back on track, or by suggesting ideas to teachers in the building on how to implement teaching methods that target intelligences and better support third grade male students.

**Purpose of the Study**

Teachers are trained with a variety of skills and methods incorporated in daily classroom lessons. With this, teachers are taught about the diversity of learners in the classroom who need to be considered when planning for instruction. As Kim (2009) suggested, all learners possess different mindsets while performing daily skills. The learning styles or strategies demonstrated by students are critical when deciding on the successes and failures of student learning. Educators should assess and reflect on these learning styles along with strengths and weaknesses of students in order to incorporate differentiated practices. This study analyzed the most effective pedagogical approaches, based on the influence of Howard Gardner's Multiple Intelligences (1983), to help third grade boys demonstrate fewer unwanted behaviors. The
results from the research will help provide educators with knowledge of the most effective pedagogical approaches to implement in the third grade math classroom for struggling males.

**Theoretical Framework**

Multiple Intelligence Theory, a term coined by Howard Gardner (1983), began when Gardner (2003) stated he received an, "assignment to write a book about what has been established about human cognition through discoveries in the biological and behavioral sciences. Thus was born the research program that led to the theory of multiple intelligences" (p.3). At first, Gardner was not interested in researching the educational aspects of multiple intelligences, but soon realized he needed to discover the educational implications of multiple intelligences. Gardner (2003) noted three distinctive uses of the term intelligence:

- a property of all human beings (all of us possess these 8 or 9 intelligences), a dimension in which human beings differ (no two people- not even identical twins, possess exactly the same profile of intelligences), and the way in which one carries out a task in virtue of one's goals (Joe may have a lot of musical intelligence but his interpretation of that piece made little sense to us). (p.8)

These definitions of the term intelligence made Gardner's point of view extremely concrete which gave educators a clear understanding of the proper interpretation of learning styles.

While doing further research on the educational aspects of multiple intelligences, Gardner (2003) made several assumptions, “we all have intelligences, individuals differ for both genetic and experiential reasons in their respective profiles of intellectual strengths and weaknesses" (p. 5). This is the lens through which this study is approached. Namely, this research applies the knowledge of the variety of intelligence profiles in order to effectively differentiate instruction to accommodate every student.
Howard Gardner (2003) drew conclusions from implementing multiple intelligences in the educational setting. He suggested, "multiple intelligences should not in itself be an educational goal. Educational goals need to reflect one's own values, and these can never come simply or directly from a scientific theory" (p.9). He continued to discuss that once educators reflect on their own values, then the existence of multiple intelligence strategies in the classroom setting could prove to be beneficial.

**Research Questions**

Educators may struggle with male students in the classroom because of their lack of engagement. Due to this problem, teachers need to design instruction using multiple intelligences strategies, and focus on the individual needs of the male students to keep them engaged which will decrease unwanted behaviors. To gain the knowledge of the most effective pedagogical approaches to use to meet the needs of third grade males, the following are the specific research questions that will be addressed in the study:

1. Which teaching styles aligned with one or more of the following multiple intelligences described by Howard Gardner (1983) do teachers typically demonstrate during math instruction before the study?

2. Was there a change in teaching styles after the study?

3. Was there a reduction of challenging behaviors based on change in instruction?

**Definition of Terms**

These are the following definitions of key terms used throughout this study.

1. Pedagogical Approaches- Methodologies in education for teachers to implement in the classroom setting.
2. Multiple Intelligences- Howard Gardner developed a series of multiple intelligences for psychologist and educators to guide in developmental learning (Gardner, 1983).

3. Linguistic Intelligence- Adams (2001) stated learners with this style, “provide written and oral written justifications of their learning actions” (p. 88).

4. Logical/Mathematic Intelligence- Adams (2001) stated learners with this style, “gather, record, and use numerical data to solve problems” and “solve problems with numbers used in various contexts” (p.88).

5. Visual/ Spatial Intelligence- Adams (2001) stated learners with this style, “use drawings and diagrams as problem solving strategies” and “build physical models as tools for solving problems” (p.88).

6. Musical Intelligence- Adams (2001) stated learners with this style, “translate problem-solving strategies to a musical tune to help recall strategies” and “write a song (to a known tune, if necessary) that expresses understanding for a mathematical concept” (p. 88).

7. Intrapersonal Intelligence- Adams (2001) stated learners with this style, “consider a set of problems to be solved and conjecture about their own abilities or confidence to solve the problems” (p.88).

8. Interpersonal Intelligence- Adams (2001) stated learners with this style, “solve problems through cooperative learning” and are “leaders or guides of a problem solving team” (p.88).

9. Bodily/Kinesthetic Intelligence- Adams (2001) stated learners with this style, “use bodily movement to express feelings and attitudes about problem solving” and “use their bodies to reason about concepts” (p.88).
10. Naturalistic- Rettig (2005) stated learners with this style, “have a strong interest in nature and playing in the outdoors” (p.256).

11. Intelligence Strength- The specific intelligence where students demonstrate a skill within the intelligence.

12. Intelligence Profile- A representative portrayal of students and their intelligence preferences.

**Limitations**

This study identified specific pedagogical approaches that focused on Gardner’s multiple intelligences. This study does not address student motivation or purpose of observable behaviors as seen in the classroom. Students for this study included one Caucasian third grade male student from Leetonia Elementary and 16 Caucasian male students from McKinley Elementary. Both rural school districts are located in Columbiana County, Ohio. The study focuses on third grade male subjects; therefore, the results may only be pertinent to this specific population. Teacher participation was limited to only third grade mathematics teachers. The time of year may have played a factor in student behaviors. The implementation timeline of this study spanned two different school years including 2015-2016 and 2016-2017. During this time students participated in Halloween, Christmas and Valentine parties, spring and Christmas breaks, snow days, and absences of the practicing classroom teachers. These events may have contributed to the reasons that students may have demonstrated unwanted behaviors in the classroom.

**Researcher Bias**

To limit the occurrence of social desirability bias in this study, the survey questions were designed to allow participating teachers to answer in a way that did not have to be socially
desirable. Binary questions were not used; rather, participating teachers self-identified their teaching approaches by selecting from a given list of intelligences. This allowed the teachers to answer accurately rather than answering to be socially correct.

The researcher used a series of open-ended questions at the end of the study to explore the thoughts of each participating teacher. When discussing each of the participant’s responses, the researcher used the respondent’s direct language and thoughts rather than summarizing. This allowed for a true representation of each teacher's opinion of each question, rather than the thoughts of the researcher.

This study’s researcher is employed at one of the participating school districts. During the time of the study, the researcher had every participating male student in her class. However, the researcher did not teach mathematics or use any of the pedagogical approaches that were used in the study in her own classroom. The researcher does have a background in using multiple intelligence based methods, prompting her interest in the researching of these questions.

Summary

This study focused on finding the most effective pedagogical approaches to implement in the elementary math classroom for third grade males with regard to behavior. The main purpose was to discover if using multiple intelligence-based methods could assist in reducing the occurrences of unwanted behaviors demonstrated by male students. One of the main tasks and responsibilities of educators is not only to teach students, but to differentiate instruction to best meet the needs of all students in the classroom. Incorporating multiple intelligence-aligned methods could assist the participating educators with the knowledge of how to differentiate instruction to provide the most appropriate learning environment for students.
Establishing a classroom to benefit all students by adapting teaching methods may be challenging for some educators. Incorporating multiple intelligence based approaches detailed in this study may be challenging for some educators, however, there are countless benefits when this is done properly. Research by Isik and Tarum (2007) discussed the importance of incorporating multiple intelligence learning in the classroom by stating, "it provides opportunities to the educationalists to arrange programs that value the individual differences of the students" (p. 466). Understanding and developing lessons that value the variety of student profiles could be extremely important when considering the success of classroom learners. Taking smalls steps with the implementation of multiple intelligence based pedagogical approaches could further lead to building multiple intelligence based programs and curricula that provide unique, positive learning situations for children.
Chapter II. Literature Review

This literature review addresses different concepts such as gender gaps in education, traditional versus multiple intelligences theory classrooms, benefits of incorporating multiple intelligence methods in special education settings, and how to begin the steps of implementing multiple intelligence approaches in the classroom. A number of studies indicated that male student achievement is affected by the type of instruction they receive in the classroom.

In Ohio public education, policies such as Annual Yearly Progress (AYP) protocols attempt to provide a system that closely monitors all students' annual academic growth. Research indicates that boys were scoring lower on academic achievement assessments than their female peers. Gurian and Steves (2004) reported that boys account for at least 70% of D’s and F’s in school. Due to the preponderance of data documenting struggling male students from elementary through high school, educators need to narrow this learning gap between males and females. By doing so they will provide a higher rate of success for the struggling male students. By conducting additional research addressing this need, learning opportunities and resources can be identified in order to provide male students a more engaging, successful experience in the classroom.

The understanding of diverse learning styles has served as a critical element in attempting to increase male performance. Dahlan, Noor, Mustafa, Hashim, and Zulkifli (2010) posited that the learning styles of both females and males must be addressed in order for both groups to succeed. Results of their research indicated that male student learning styles favored active, visual, and sequential methods. Carrier (2009) suggested data indicate that boys are academically performing lower than females, more emphasis must be put on introducing new teaching methods favoring male learning preferences. Teachers must not assume that both males
and females grasp classroom content addressing the same types of learning styles. Mulvey (2010) identified several strategies for creating more balanced learning environments including: single-sex classrooms, combining cooperative learning styles, and delaying formal instruction until male students were developmentally ready. These changes could result in establishing a more balanced classroom which supports both genders’ learning styles.

Providing educators with professional development opportunities that increase the knowledge of multiple intelligence based learning preferences for boys may keep male students more engaged. This would offer teachers needed information to implement multiple intelligence based methods in their own classrooms. Gerzon-Kessler (2006) cited the need for educators to have a true sense of developing high expectations and fostering a joy of learning for students by implementing multiple intelligences. If this is done successfully, students may become more academically and socially successful in the classroom.

**Incorporating Multiple Intelligences with Special Education**

An emphasis on incorporating multiple intelligences with special education students is relevant when working with elementary students. Rettig (2005) stated the importance of addressing multiple intelligences with students with disabilities to discover possible hidden talents that students may have. Rettig (2005) cited the need for this in order to allow students with disabilities to find what they are good at which will put their focus on their intelligence strengths rather than their disability.

There have been several cases where male students, including those with Attention Deficit Hyperactivity Disorder (ADHD) diagnoses, are characterized as being easily distracted, causing disruptions in the classroom (Schiedaun & Case, 2004; Coles, Slavec, Cernstein, & Baronia, 2012). Teachers have incorporated interventions based on student intelligence strengths
in order to provide a better learning environment for students with ADHD and/or other
disabilities. Schirduan and Case (2004) studied 87 students with ADHD in grades two through
seven and 17 participating teachers. Teachers were then given a multiple intelligence based
curriculum to investigate the impact this curriculum had on students who were diagnosed with
ADHD. The study used the Multiple Intelligences Developmental Assessment Scale (2004), the
Piers-Harris Children's Self-Concept Scale (2004), and the Teacher Perception of Achievement
Level in Students with ADHD Survey (2004) to collect data. Students were to examine their
dominant intelligence, achievement levels, and self-concepts while in the classroom.
Quantitative findings suggest that the students who were involved with the School of Multiple
Intelligence felt more positive regardless of the given academic task (Schiedaun & Case, 2004).
Research indicated that over half of the students with ADHD preferred the naturalistic and
spatial intelligences. Schirduan and Case (2004) suggested "students with ADHD are frequently
encountering problems in the regular classroom. These students not only experience academic
and social difficulties but often disrupt classroom activities and others' learning" (p.88). Case
(2004) recommended that curricular strategies need to be adapted to students with ADHD to
allow them to have a positive self-concept in the classroom. Implementing multiple intelligence
based methods allows students the opportunity to cause less disturbances within the classroom,
and provide them with the opportunity to become academically successful.

Powell and Kusuna-Powell (2007) called attention to "neural rest states" in male students.
King and Gurian (2006) define neural rest as when some areas of brain functioning shut down.
These rest states are more commonly noticeable in male students compared to female students
(Powell & Kusuna-Powell, 2007). Powell and Kusuna-Powell stated, "we see boys day
dreaming, staring off into space, zoning out, or drifting out" (p.17). They continued to note that,
"boys will fight against these rest states by becoming fidgety and showing disruptive behaviors that may indicate an attentional problem or hyperactivity" (p.17). When girls enter neural rests they are more likely to continue to concentrate and listen carefully. Research has indicated that female brains during the neural rests appeared to be as active as male brains when fully activated (Powell & Kusuna-Powell, 2007). Due to the differences in observable behaviors during neural rests, more male students are being categorized as having behaviors associated with ADHD.

A study by Katz, Mirenda and Auerbach (2002) documented how students in special education were actively integrated in the typical classroom, resulting in achievement in a typical classroom setting. This study asserted that students appeared to be more frequently engaged in a multiple intelligence classroom incorporating music, dance, and movement compared to that of a traditional classroom. Students demonstrated a higher rate of social interaction than that of the traditional class (Katz, Mirenda, & Auerbach, 2002).

In similar research by Rubado (2002), a prominent goal was to have students with disabilities discerning their personal intelligence areas of strength and weakness, as well as the understanding that intelligence comes in many different forms (Rubado, 2002). Rubado underscored the importance of students understanding that they possess all of the intelligences, and to find the benefits and qualities of demonstrating each of the intelligences in the classroom. Students identified which intelligences were dominant and which were weaker in their profiles. Students developed a clear perception that they were fully capable of leveraging each of the intelligences. Identifying each student’s intelligence strength and weakness could allow the educator to use this knowledge to assist in guiding instruction and assessments performed in the classroom (Katz Mirenda, & Auerbach, 2002).
Students with special needs benefited from acknowledging their own emotional intelligences. Tragedies and disasters, such as school shootings, have been attributed to individuals who are emotionally unstable (Obiakor, 2001). Focusing on the area of emotional intelligence and taking appropriate actions during elementary school offered a possible solution to curb such violence. For example, school districts could assist by implementing partnership programs, having social skills courses, mentorship programs, and self-management programs to aid these students who have emotional needs (Obiakor, 2001). Students may benefit from gaining the ability to self-assess their feelings and actions. Once students have these insights, they can use that knowledge to regulate their emotions and react positively to a negative situation.

**Implementation**

The traditional elementary classroom consists of teachers instructing by lectures, providing worksheets, and writing notes on the board (Stanford, 2003). Using these limited, traditional techniques may not benefit all of the students in the classroom, especially those who may be lacking in the specific intelligence that the methods address. Hooer (2004) and Chung (2006) posited that teachers should focus on the intelligence strengths of their students to provide them with a greater chance of success in the classroom. Further, Chung (2006) asserted that implementing multiple intelligences in the classroom provides students with opportunities to thrive and grow in several intelligence areas resulting in a well-rounded learner (Cheung, 2006). Receiving instruction employing these methods and techniques allowed students to solve problems in a variety of ways that connected to real world problems while often addressing several intelligences (Hooer, 2004).
Silver, Strong, and Perini (1997) established an important connection between learning styles and multiple intelligences. They discussed how these two concepts work more efficiently together rather than separately. Learning styles are defined as the different ways people feel and think as they problem solve and interact with their environment. Multiple intelligences are seen as how one focuses on the content of one’s work and the final outcome or product. The authors provided a variety of suggestions on the steps needed to incorporate multiple intelligences in the classroom. They used a "how to" lesson plan that broke each intelligence down into learning processes and the learning style that accompanied each process. Silver, Strong & Perini (1997) illustrated that educators needed to focus on one intelligence at a time while planning and to build content based on student interest.

Simply implementing multiple intelligences methods during classroom instruction has not been the answer to student struggles. Teachers should consider the intelligence strengths of the students when designing assessments for students. For example, if students were strong in the musical/rhythmic intelligence, they should not be assessed using paper and pencil, but rather with a measure that required the application of their music intelligence in order to establish proficiency in the outcomes to be measured (Stanford, 2003; Hoeer, 2004). Hoeer (2004) suggested using a variety of different assessments addressing several intelligences. These assessment formats included portfolios, multiple intelligence progress reports, and student profiles.

Research conducted by Mokhtar, Majid, and Foo (2008) focused on the effects of implementing multiple intelligence methods, and how they enhanced student development of informational literacy (IL). During this study, 274 students ages 14 to 15 years old participated in a design where a random group was IL trained while the other group was not. Students were
then administered a multiple intelligence survey. Based on those results, students were grouped into clusters by preferred intelligences. Data indicated that there was a significant difference in the post scores of the students who completed the IL training. Also, the students who were placed into the intelligence clusters performed better on their final project compared to that of the other groups (Mokhrat, Majid, & Foo, 2008).

Several districts have found multiple intelligence based methods to be successful for their staff and students, though many educators may have been wary of the beginning steps of the implementation process of multiple intelligences curriculum. Head of New City Schools in St. Louis, Tom Hoeer, offered his staff the opportunity to meet after school to read and discuss Howard Gardner’s “Frames of Mind”. 13 of the 29 teachers opted to become part of this committee. Members were placed into teams of two that would each read two chapters of the book then teach the content to the other members of the Talent committee. This committee continued for two years as it led to the development of the Parent Communications Committee, the Assessment Committee, the Portfolio Committee, the Multiple Intelligence Push and Pull Committees, a Naturalist Committee, and a Space Committee all of which revolved around the Multiple Intelligences Theory. Hoeer (2004) indicated that the key element for success was providing staff and administrators with multiple intelligence instruction training and communication. He further noted that teachers and parents must have a strong sense of communication for discussing how the child has interacted and played at home to aid in the process of discovering the intelligence strength of that child. The results of Hoeer's research indicated that students averaged many years above grade level on standardized assessments. It was noted by Hoeer (2004), "students from New City Schools took leadership positions within school communities, they seek complex problems and extra credit options, and know themselves
as a learner” (p.46). Overall, the schools that have implemented a multiple intelligence curriculum have found great successes in their students (Hoeer, 2004).

With the ever-changing mandates in education such as state assessments and new standards, educators have reported feeling overwhelmed and as though they needed to be teaching to the test rather than focusing on the needs of the students in the classroom (Gerzon-Kessler, 2006). With these extra factors in education, most educators had been teaching to their best abilities in order for students to be successful, but may not have been given that opportunity to truly learn due to these requirements (Skoning, 2010). Research indicated that if educators invest time to identify student intelligences, scores on high-stakes assessments improve.

**Increasing Student Motivation**

Buschick, Shipton, Winner and Wise (2007) identified a comprehensive effort to integrate multiple intelligences in order to motivate student learning. The researchers served as educators in an elementary school where teachers identified a lack of motivation in the area of reading. The participants for their study included a total of 133 students in grades two, four, six, and eight. Some of the behaviors that students demonstrated included staring, not paying attention, showing a lack of interest, laying heads on their desk, wasting time, being indecisive, and exhibiting signs of boredom. Results found that these unwanted behaviors were occurring 723 times over a course of four days of monitoring. After collecting data based upon students’ intelligence strengths, these action researchers then adapted their teaching methods to meet the needs of the students. The teachers designed activities that revolved around multiple intelligences including; student centered activities, learning centers, journaling, use of diagrams, and role playing. Each week of the study, the teachers focused upon specific intelligences.
Results indicated that students demonstrated the unwanted behaviors less, performed better on projects, and had a higher rate of reading motivation (Buschick, et al., 2007).

Another approach to increase student motivation could be to incorporate different intelligence centers in the classroom. Skoning (2010) indicated that by having students move freely among centers helped them to understand that movement is part of everyday learning, rather than a disturbance to the classroom. Incorporating regular movement into classroom routines and transitions provided a better classroom management style and allowed students to see that movement was part of their daily classroom routine (Gibson & Govendo, 1999; McFarlane, 2011).

Educators could incorporate multiple intelligences in their classroom rules. For example, using the “Ask 3 Before Me” rule. This rule is applied when a student has a question and rather than asking the teacher first, was required to ask peers to try to answer the question before directing the question to the teacher. This rule allowed students to strengthen their interpersonal and intrapersonal skills as they became more self-sufficient at problem solving (Gibson & Govendo, 1999; Ozemire, 2006). Gibson (1999) suggested having students record each other on video while participating in classroom activities, which enabled students to visually observe and reflect on their behaviors. This approach correlated with kinesthetic and visual-spatial intelligences.

Another strategy to motivate students was having students work in cooperative groups. This provided students with the opportunity to demonstrate a variety of intelligences personally, as well as working together as a group to accomplish a goal (Skoning, 2010). Such an approach offered students the opportunity to become aware of their more dominant intelligences, which would result in enhancing their social and academic performance (McFarlane, 2011).
There have been several benefits for students when the use of multiple intelligence based approaches were implemented in the classroom. After experiencing pedagogical approaches in the classroom, researchers indicated that students have increased self-awareness of their own learning (MacFarlane, 2001). When students discovered how they best learn, it allowed them to operationalize the information on their intelligences and how to use this knowledge to assist in the steps to excel in stronger intelligence areas and grow in the area of weaker intelligences (MacFarlane, 2001).

**Gender Gaps**

Since the 1960's, the debate on whether there is a learning gap between male and female students has been discussed. Research has shown that females in eighth grade had a higher success rate in communication skills in schools compared to male students (Hunter, 2005). Coles, Bernstein, and Baroni (2012) confirmed another aspect of gender gaps which stated that boys typically tend to show more frequent behaviors of hyperactivity and inattentiveness than female students. This may have affected their success in the classroom. With research showing these gender gaps, the question must be asked if there was a specific reason why these gaps were occurring, and more importantly, what was done to lessen the gaps?

One suggestion provided by Taylor (2004) indicated that teachers should incorporate not only multiple intelligence methods, but also instructional methods that focus upon male-preferred intelligences. For example, male students received more active learning experiences and more time to complete these types of activities (Taylor, 2004). Research by Gunzelmann and Connell (2006) affirmed this by suggesting more active learning lessons, as well as incorporating movement to release energy and being thoughtful of the specifics of how males learn (Gunzelmann & Connell, 2006; Taylor 2004).
Gunzelmann and Connell (2006) discussed research conducted with male and female children and the development of each gender's brain. Research found that different parts of the brain develop at different rates when comparing the two genders. In females, the left hemisphere of the brain develops before that of males. Rettig (2007) provided an explanation of the left hemisphere by stating, "the left hemisphere is usually associated with logical thinking, phonics, abstract symbols, verbal memory, and sequencing objects (p.256). This provides biological implications regarding why female students typically read and write in classrooms at a younger age. In young males, the right hemisphere of the brain is more developed which indicates that males may learn better in a non-traditional setting, which incorporates active learning more movement and spatial skills (Gunzelmann & Connell, 2006). Rettig (2007) agreed by stating, "the right hemisphere is associated with non-verbal learning, drawing, nouns, holistic thinking, body awareness, and musical hearing" (p.256).

Research by King and Gurian (2006) focused on a literacy gap at Douglass Elementary in Boulder, Colorado. The results of the 2005 Colorado State Assessment Program indicated a significant literacy gap in the school’s population of 470 students. Male students accounted for 50% of the total population and 75% of the special education population. Males underperformed the female students on average by 13 points in grades three to five (King & Gurian, 2006). Based on the results of the program, teachers soon began to implement “boy-friendly” teaching strategies in the classroom. Within the year of the implementation of these strategies, Douglass Elementary teachers closed the gender gap with boys gaining 24.4 percentage points in reading and writing. During the year of the implementation of the new strategies, girls showed significant improvements (King & Gurian, 2006). Research suggested that schools should consider teaching with a variety of methods to better meet the needs of all students.
Finally, another possible reason for pre-existing gender gaps could be because of the behavior of young male students. Research by Legewie and DiPrete (2012) found that educators had negative stereotypes about the performance or achievement of male students more often than that of female students because males appeared to be have more behavioral problems in traditional classrooms where active learning and movement were restricted. This relates to research by Coles, Slavec, Bernstein, and Baroni (2012) asserting that male students are more frequently recommended for ADHD testing due to their higher level of hyperactivity and inattentiveness in the classroom. Male students demonstrated characteristics of being more emotionally tough and independent than females, which educators could see these behaviors as disturbing and rebellious. This could have negative impacts on their academic performance (Gunzelmann & Connell, 2006). Therefore, boys may be less likely to participate in class and are less likely to ask for help if they are having difficulties and become frustrated (Gunzelmann & Connell, 2006). Perhaps if educators incorporated a multiple intelligence approach in the classroom that better fit the needs of male students, the result could be an increase in positive behaviors demonstrated by males in the classroom.

Narrowing Effects

Silver and Strong (1997) identified a gap in the theory of multiple intelligences. They noted that there has been a great focus on the content of learning which in turn limits the process of individualizing learning (Silver & Strong, 1997). This coincided with the thoughts of Hatch (1997) in that focusing on specific intelligences of children has actually been limiting their ability and not giving students the opportunity to grow in other intelligences (Hatch, 1997). Targeting specific intelligences of students may have several benefits; however, lessening their exposure to learning opportunities in other intelligences may have a negative impact on their
academic success. Students should be exposed to activities that incorporate not only their preferred intelligence, but also exposure to the others to give students the opportunity to strengthen those weak areas.

Discussion

Based upon the reviewed literature, implementing teaching methods that address multiple intelligence is necessary to allow for the most appropriate classroom experience for students. Hamos (2006) cited the need for educators to, "become significant to attend to the various ways of learning in order to garner the greatest capacity of the learner" (p.286). Hamos (2006) advanced the notion that if teaching and learning are done with a true appreciation of multiple intelligences, then students will experience a variety of intelligences, operating at different levels, in order to utilize the full cognitive range of each learner in the classroom. As a result of these findings, the researcher hypothesized that incorporating multiple intelligence pedagogical methods in the elementary classroom will best fit the academic needs of third grade male students. As a result of this approach, male students will be more engaged and demonstrate fewer unwanted behaviors.

As mentioned above, various articles have demonstrated that educators face a plethora of difficulties on a daily basis. These challenges, in turn, prohibit teachers from incorporating effective methods in the classroom. Teachers should use research-based practices based on multiple intelligences and student interest to promote academic success (Gerzon-Kessler, 2006). Educators may find teaching inclusion classrooms very demanding. Research by Katz, Mirenda, and Auerbach (2002), indicated that students in an inclusion multiple intelligence classroom were engaged more actively and frequently because of the incorporation of music, movements, or dance. Providing this type of learning opportunity not only benefits students, but reduces the
frustrations of the classroom teacher. Furthermore, Katz, Mirenda, and Auerbach (2002) found that students in the multiple intelligence classroom participated more in social interaction than that of the traditional class. Incorporating these multiple intelligence-based methods is proving students to be more engaged in the classroom and teachers to be less frustrated.

Educators must be aware of the different needs and intelligence strengths of male students. Sousa (2011) stated, "most teachers will readily admit that schools are predominately language-oriented institutions, especially in the elementary grades" (p.185). Sousa's statement indicated that language-proficient learners who are typically females, are more comfortable in this classroom environment (Sousa, 2011). On the other side of the spectrum are male learners who tend to be visual- and spatial-learners that are feeling uncomfortable in the typical elementary setting due to the teaching approaches being implemented (Sousa, 2011). Sousa (2011) stated, "this could explain why most teachers admit they have many more discipline problems with boys than with girls (p. 186). Teachers must then use this knowledge to develop lessons and use appropriate methods to meet the needs of each individual student. More research is needed on the implementation of multiple intelligence theories on specific genders, specific grade levels, and specific content areas. Conducting research on these unique attributes will provide teachers with valuable data regarding lesson design, pedagogical approaches, and motivation considerations in order to maximize the learning experience for male third grade students.
Chapter III: Methodology

This chapter presents a detailed description of the research design chosen including: rationale for use, setting and population studied, instruments, collection procedures, data analysis, and assumptions. The purpose of this study was to analyze the efficacy of multiple intelligence based interventions on third grade male students as measured by a pre-post-teacher survey, student behavior tally sheet, and video analysis. These activities address the research questions of: which teaching styles aligned with one or more of the following multiple intelligences described by Howard Gardner (1983) do teachers typically demonstrate during math instruction before the study, was there a change in teaching styles after the study, and was there a reduction of challenging behaviors based on change in instruction?

Research Questions

1. Which teaching styles aligned with one or more of the following multiple intelligences described by Howard Gardner (1983) do teachers typically demonstrate during math instruction before the study?

2. Was there a change in teaching styles after the study?

3. Was there a reduction of challenging behaviors based on change in instruction?

Research Design

This study was conducted using a mixed methods research design. O’Neil (2006) stated that using a quantitative approach for research, “can allow for great objectivity and accuracy of results.” A main focus of this research was to provide accurate results to benefit the stakeholders involved with the content of the study. Conducting teacher surveys allowed the researcher to gain an understanding regarding the different aspects that influence the behavior of third grade male students as a result of varying educators' pedagogical methods.
The use of pre- and post-surveys as seen in Appendix A and B provided the background information on the participating teachers and their teaching styles that were implemented in the classroom prior to the start of the formal study. The pre- and post-survey, adapted from Saban and Bal (2012), aligned with Gardner’s Multiple Intelligences (1982) and provided baseline data on the instructional approaches participating teachers were using.

“Unwanted behavioral” tally-charts were implemented during the first and last four weeks of the study. The unwanted behavior tally-chart as seen in Appendix B was adapted from an established instrument from Buschick, Shipton, Winner, and Wise (2007). They recorded the number of unwanted behaviors during silent reading time. The use of research tools that have been previously implemented within formal studies strengthened the validity and reliability of the instruments employed in this study. This approach correlates with O’Neil (2006) who stated, “quantitative research usually involves few variables, and employs prescribed procedures to ensure validity and reliability” (p.3).

Another benefit of conducting quantitative studies is that it limits the amount of researcher bias. O’Neil (2006) suggested that bias is reduced when the researcher is unfamiliar with the participating students. To ensure this, identifying information and identities were kept anonymous, therefore limiting researcher bias throughout the study.

This study also utilized a qualitative methodology operationalized through interviewing participating teachers and analysis of video evidence collected. The researcher e-mailed each teacher after the implementation of all multiple intelligence based methods were utilized. The open-ended questions e-mailed to the teachers included: Which strategies did you believe had the highest positive effect? Why? How do you believe these strategies benefited the male student/students? Would you continue to use any of these strategies? Which ones and why? The
researcher analyzed responses to identify preferred strategies employed to address various behaviors. For example, which strategies did the teachers plan to continue using after the study and which proved to be the most effective?

Additional qualitative data was collected and analyzed through the recording of classroom videos. Each participating teacher recorded five videos that included the subjects involved in the study. The videos focused on the behaviors of the male students during the implementation of the approaches. These videos were analyzed phenomenologically among participants to obtain reliable information regarding the behavior of the male subjects in the classroom setting. The researcher was then able to provide insight into the specific actions and behaviors of the male subjects.

**Participants**

Third grade male students were selected for this study from two different public elementary schools. The first sample included one third grade male student who attended Leetonia Exempted Village Schools and his teacher. The second sample included 16 male third graders and their teacher who attended McKinley Elementary, part of the Lisbon Exempted Village School District. The methodology was identical for both participating elementary schools.

The direct, purposeful sample came from a small Appalachian elementary school in northeastern Ohio. At the time of this study, Leetonia Elementary had a total of 259 students. According to the Ohio Department of Education 2015-2016 State Report Card for this school, 97.7% of students were white, non-Hispanic. 22% of the students had a disability. Further, 50.9% of the student population at the school were economically disadvantaged (Ohio Department of Education 2015-2016 State Report Card). Based upon data collected from the
pre-survey, the participating female teacher at the first site was between the ages of 26-30 years old, has been teaching for 6-10 years, and held a Master's degree.

Table 1

<table>
<thead>
<tr>
<th>Demographics of Leetonia Elementary School</th>
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<tbody>
<tr>
<td>Student Population</td>
</tr>
<tr>
<td>259</td>
</tr>
</tbody>
</table>

The second site, McKinley Elementary, is a small Appalachian school in northeastern Ohio. At the time of this study, McKinley had a total of 421 students in grades Pre-Kindergarten through five. According to the Ohio Department of Education 2016-2017 State Report Card for this School, 97% of students were white, non-Hispanic. 18.4% of the students had a disability. Further, 58.9% of the student population at the school were economically disadvantaged (Ohio Department of Education 2016-2017 State Report Card). The data gathered in the teacher pre-survey indicated the participating teacher of the second site was between the ages of 46-50, has been teaching for 6-10 years, and held a Master's degree. The student sample for this study focused upon third grade male subjects. The 16 students who submitted the consent form comprised the participant group for this study.

Table 2

<table>
<thead>
<tr>
<th>Demographics of McKinley Elementary School</th>
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</thead>
<tbody>
<tr>
<td>Student Population</td>
</tr>
<tr>
<td>421</td>
</tr>
</tbody>
</table>

All information on student identity was kept confidential throughout the study.

Participation in this study was strictly voluntary. Participants were free to withdraw from the study at any time with no negative consequences. If a participant wished to withdraw, the data collected prior to his exit was kept confidential. The researcher followed the informed consent
procedures to protect all subjects. This study received IRB approval from the University of Findlay to ensure the rights and safety of all subjects involved in the research.

**Instrumentation & Data Sources**

The participating teachers completed a pre- and post-survey adapted from a study by Saban and Bal (2012) while researching teaching strategies employed in elementary mathematics using Multiple Intelligence Theory. The survey was an inventory of strategies in elementary math that focused upon eight of Gardner’s (1983, 1993) intelligences including: verbal-linguistic, mathematical-logical, musical-rhythmic, visual-spatial, bodily-kinesthetic, personal-intrapersonal, interpersonal-social, and naturalistic. The survey's purpose was to identify which of the intelligences teachers typically incorporate during their instruction in the third grade math classroom.

A preliminary group of four teachers completed the pilot survey and gave oral feedback on areas to make this survey more meaningful for the purposes of this study. The researcher met with her dissertation committee to discuss what should be included or adapted to best meet the needs of this study. For example, the original survey was broken into categories of never, once or twice a semester, once or twice a week, once or twice in fifteen days, or in every lesson. Based upon the feedback from the pilot group these opinions were changed to never, a few times a month, once or twice a week, or in every lesson. The questions of the teacher's age, gender, years of teaching third grade, and current level of education were added to the survey to collect the specifics of the participating teacher. The survey was then delivered through a Google Form with on-line access for the teachers. A sample of the final pre- and post-survey can be seen in Appendices A and B.
A tally sheet charting unwanted behaviors was developed in order for participating teachers to record the instances of unwanted behavior as demonstrated by male subjects. The tally sheet for this study was adapted from one created by Buschick, Shipton, Winner, and Wise (2007). Their instrument tracked the occurrences of unwanted student behaviors during silent reading time. The original survey included the following behaviors: flipping through pages, tapping pencil, staring into space, placing hands inside of desk, fidgeting, placing head on desk, saying "I'm bored," getting out of seat frequently, lack of interest, complaining, doodling, not paying attention, doing other work, wasting time, and being indecisive on book selection. After discussing this tally sheet with the dissertation committee, the survey was narrowed down to focus on clearly observable behaviors. Therefore, the following behaviors were included on the behavioral tally sheet for this study: placing head on desk, getting out of seat frequently, doodling/drawing, fidgeting, working on other school work, and talking.

Participating teachers from Leetonia Elementary and McKinley Elementary recorded a series of five videos of each of their classrooms that contained the male subjects. Each video was approximately 20 minutes in length. Each teacher demonstrated given multiple intelligence based methods provided by the researcher in the videos. Math content varied in each video and was specific to what each teacher was instructing in their classroom at the time of the study. The researcher then watched each video and took notes to have a better perspective of the male subjects and their behaviors in the classroom setting.

The teachers were asked to collect baseline data on the unwanted behavior incidences. The pre-data at Leetonia were collected for 18 consecutive school days in January 2016. Pre-data for McKinley Elementary students were gathered for 18 consecutive days in September 2016. The male subjects were observed for 10 minutes during independent work time during
math time. The post-data at Leetonia Elementary were collected in April 2016 after the implementation of the six Multiple Intelligence based pedagogical approaches, with post-data taking place in January 2017 at McKinley Elementary. These were collected for 18 days, during 10 minutes of independent work time.

Teachers were asked to answer a series of open ended questions at the conclusion of the study. The questions included: *Which strategies did you believe had the highest positive effect? Why? How do you believe these strategies benefited the male student/students?*, *Would you continue to use any of these strategies? Which ones and why?* The questions were e-mailed to each teacher by the researcher. The responses from each teacher were analyzed to determine if any common themes were specified.

**Data Collection Procedures**

The teacher pre-survey was completed at the beginning of the study by both teacher participants. The survey was completed via Google Forms. The link to the form was e-mailed from the researcher to the participating teachers. The teachers had one week to complete the form. Upon completion, the researcher accessed the results via Google Forms. The participating teachers completed the form at their convenience using a computer with Internet at a location of their choice. Both teachers completed the post-survey the last week of the study. The researcher e-mailed the participating teachers a new post-survey link. The teachers had one week to complete the post-survey. The researcher again accessed the results through Google Forms.

The unwanted behavior tally charts were printed and given to each participating teacher by the researcher. The charts were to be utilized during the first 18 days of the study to determine baseline data for the frequencies of unwanted behaviors. Once the baseline data were collected, the teachers began implementation of the six multiple intelligence based strategies
provided by the researcher. For the final month of the research, the teachers recorded incidents of unwanted behaviors on the tally sheet for participants while the new strategies were implemented. They then tracked the behaviors for 18 days during a 10-minute independent math work session. The teacher stored each observation sheet in a provided folder by the researcher until the 16-week study was complete. The data that were recorded from Leetonia Elementary was on the single male subject, while the data from McKinley Elementary reflected the whole group of 16 subjects. The researcher collected all folders from the participating teachers at the conclusion of the study. At the conclusion of the study both teachers were e-mailed and responded to the open-ended questions provided by the researcher to provide insight from their perspectives.

Each participating teacher recorded video of students in the classroom(s) that included the male subjects. The teacher at Leetonia Elementary recorded five video sessions through the course of the study. Each session showed the teacher implementing one or more of the provided multiple intelligence based methods provided by the researcher. The video series covered a variety of math concepts that the teacher was instructing during the time of the study. Each of the recordings was approximately 20 minutes in length. The teacher at McKinley Elementary recorded five video sessions that were also approximately 20 minutes in length. This teacher also followed the same guidelines in demonstrating the multiple intelligence based methods during a variety of math lessons at the time of the study. To conduct a qualitative analysis, the researcher took notes during each video session to have better insight into the behaviors of the male subjects. The researcher then analyzed video notes from Leetonia Elementary and McKinley Elementary to corroborate the evidence of the reduction of unwanted behaviors.
Data Analysis

Educators are faced with the common challenge of keeping male students engaged and reduce the frequency of unwanted behaviors in the classroom. To address this problem, educators need to incorporate multiple intelligence based methods to meet the needs of male students. The following research questions were used to gain knowledge of the most effective pedagogical approaches that incorporate multiple intelligences to meet the needs of third grade male students.

Research questions 1 and 2. To discern which teaching styles were used more commonly before and at the conclusion of the study, the researcher addressed which teaching styles aligned with one or more of the following multiple intelligences described by Howard Gardner (1983). Furthermore, which teachings styles do teachers typically demonstrate during math instruction before the study and was there a change in teaching styles after the study? In order to justify these questions, each teacher was asked to complete a pre- and post-survey via Google Docs. The data were primarily gathered through the use of Likert-based surveys for Research Question 1 which were then analyzed quantitatively by finding the percent of usage for each intelligence. To calculate the percent of the frequency of multiple intelligence based methods prior to the start of the study, the total number of questions for each intelligence was grouped into which specific intelligence the question focused on. There were four verbal/linguistic questions, 10 mathematical/logical questions, seven musical questions, eight visual/spatial questions, four intrapersonal questions, three kinesthetic questions, five interpersonal questions, and four naturalist questions. Based upon the data in each of the intelligence categories, each intelligence-grouped question was divided by the total number of
questions in each of the pre- and post-surveys to determine the percent of frequency of usage that the teachers implemented in the classroom.

**Research question 3.** To determine if the multiple intelligence based approaches were effective, the researcher addressed the questions: Was there a reduction of challenging behaviors based on change in instruction? The researcher analyzed data on the frequency of unwanted behaviors before and after the instructional multiple intelligence intervention. The dependent variable for this question was the number of challenging behaviors. The independent variable was the type of instruction the student was receiving. To determine if there was a change in unwanted behaviors, the baseline data was compared to the post data. Descriptive statistics were used to provide a summary of the frequencies of unwanted behaviors as demonstrated by the male subjects at Leetonia Elementary and McKinley Elementary. Each set of unwanted behavior tally forms was collected for 18 days before the multiple intelligence intervention and 18 days after the intervention to have similar time frames to compare the occurrences of the unwanted behaviors.

Teachers recorded a series of five videos of their classroom during the study. Video recordings gave the researcher the opportunity to observe the behaviors of the male subjects in the classroom from both school districts. The information taken from each video was qualitative research as the researcher took notes based on observations of male subjects from video observations at Leetonia Elementary and male subjects at McKinley Elementary. The researcher then analyzed notes to identify evidence of reduction of unwanted behavior. The researcher observed the participating male subjects for demonstrations of unwanted behaviors that were listed on the unwanted behavior tally sheet in Appendix B.
To provide further evidence on how multiple intelligence based methods assisted in the reduction of unwanted behaviors in male students, both teachers responded to an e-mail that contained three open-ended questions provided by the researcher at the conclusion of the study. The prompts were: *Which strategies did you believe had the highest positive effect? Why? How do you believe these strategies benefited the male student/students? Would you continue to use any of these strategies? Which ones and why?* The researcher analyzed these questions to gain insight into which strategies were most effective based on the opinions of the participating teachers.

**Assumptions**

There were several assumptions made throughout the study. First, the assumption was made that the teachers were truthful in their responses. The second assumption was that the stakeholders related to this research could benefit from the data at the conclusion of the research. Also, the teachers had the opportunity to reflect on their own teaching methods and intelligences, and were provided with new multiple intelligence based methods to implement in their classroom. The researcher assumed that both teachers were thorough in their answering of pre- and post-surveys as well as their observations of male subjects. Finally, the assumption was made that the researcher would remain unbiased throughout data collection, analysis, and reporting of results.
Chapter IV. Results

The purpose of this study was to: 1) study which teaching strategies that are aligned with multiple intelligences were implemented prior to the study; 2) determine if there was a change in teaching styles after the study; and, 3) ascertain if there was a reduction in challenging behaviors after the implementation of the new strategies. The study was conducted from November 2015 through April 2016 at Leetonia Elementary and September 2016 through February 2017 at McKinley Elementary. During the first week of November 2015, the participating teacher at Leetonia completed a survey that focused on teaching strategies aligned with multiple intelligences that she implemented in her classroom. The teacher at McKinley Elementary completed the same survey during the first week of September 2016. The survey consisted of questions that detailed the frequencies of strategies that correlated to the different intelligences. Samples of these questions included: identifying key words about the topic, having students find solutions by working independently, associating lyrics to content, and explaining topics with pictures. The teacher was asked to answer each question by choosing from never, a few times a month, once or twice a week, or in every lesson. She also completed an observation tally sheet for 18 days before the study in January and 18 after the implementation of teaching strategies in April. The teacher at McKinley Elementary completed the unwanted behavior tally sheet for 18 days in September and again for 18 days in February. The observation tally sheet included the frequency of behaviors of placing head on desk, getting out of seat frequently, doodling/drawing, fidgeting, working on other school work, and talking. The teacher was asked to tally the observable behaviors for 10 minutes each day of the stated months during independent work time in the math classroom. Only one male student returned the permission slip from Leetonia Elementary and 17 students at McKinley Elementary.
Characteristics of the Sample

The first participating male subject attended school at Leetonia Elementary, a small Appalachian public elementary school in northeastern Ohio. At the time of the study, Leetonia Elementary had a total of 259 students. According to the Ohio Department of Education 2015-2016 State Report Card for this school, 97.7% of students were white, non-Hispanic. 22% of the students had a disability. Further, 50.9% of the student population at the school was economically disadvantaged (Ohio Department of Education 2015-2016 State Report Card). Based upon the completion of the pre-survey, the participating female teacher at the first site was between the ages of 26-30 years old, had been teaching for 6-10 years, and had a Master's degree. The focus for this study was a third grade classroom and the male student within that classroom.

Table 3

<table>
<thead>
<tr>
<th>Leetonia Elementary School Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Population</td>
</tr>
<tr>
<td>259</td>
</tr>
</tbody>
</table>

The second group of male subjects attended school at McKinley Elementary, also a small Appalachian public elementary school in Northeastern Ohio. McKinley Elementary had a total of 421 students in grades Pre-Kindergarten through five. According to the Ohio Department of Education's 2016-2017 State Report Card for this school, 97% of students were white, non-Hispanic. 18.4% of the student had a disability. Further, 58.9% of the student population at the school was economically disadvantaged (Ohio Department of Education 2016-2017 State Report Card). Based upon the completion of the pre-survey the participating female teacher at the
second site was between the ages of 46-50, had been teaching for 6-10 years, and held a Master's degree. The sample for this cohort consisted of 16 male third grade students.

Table 4

<table>
<thead>
<tr>
<th>McKinley Elementary Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Population</td>
</tr>
<tr>
<td>421</td>
</tr>
</tbody>
</table>

The participating teachers completed a pre- and post-survey that focused on teaching strategies aligned with multiple intelligences. The purpose of the pre-survey was to determine which strategies were used and the frequency of each, prior to being exposed to the new strategies. Both teachers completed this form a week prior to the start of the study. The teachers then completed the post-survey a week following the interventions. This was done using the same format of the pre-survey. The purpose of the post-survey was to determine if the teachers noted a change in their instruction after they were introduced to the new strategies.

Instrument Validity and Reliability

The teacher survey used for this research was based on a measure developed by Saban and Bal (2012) while researching teaching strategies employed in elementary mathematics using the Multiple Intelligence Theory. A pilot group of four teachers took this survey and provided feedback on possible changes to make in order for the survey to better collect the information needed for this study. The changes included adding sections that asked for the participating teacher's years of teaching third grade, her most recent level of education, gender, and her age. The survey was then adapted by the researcher and her dissertation committee. Once the survey was adapted it was formatted into a Google Form where the participating teachers were e-mailed the survey by the researcher to complete. This survey included distribution of strategies in
elementary math, which focused upon eight of Gardner's (1983, 1993) intelligences including: verbal-linguistic, mathematical-logical, musical-rhythmic, visual-spatial, bodily-kinesthetic, personal-intrapersonal, interpersonal-social, and naturalistic. The purpose of the survey was to identify which of the intelligences the participating teachers typically implemented during instruction in the third-grade classroom.

An unwanted behavior observational tally-chart was also used for this study. This form was also developed through a similar form created by Buschick, et al. (2007) to track the occurrence of unwanted behaviors during silent reading time. The original unwanted behavior tally sheet included observations of: flipping through pages, tapping pencil, staring into space, placing hands inside of desk, fidgeting, placing head on desk, saying "I'm bored," getting out of seat frequently, lack of interest, complaining, doodling, not paying attention, doing other work, wasting time, and being indecisive on book selection. Discussions between the researcher and the dissertation committee focused on what behaviors would be most beneficial to observe for the purposes of this specific study. The behaviors needed to be clear for the participating teacher to observe and measure of during the 10-minute duration. The following behaviors were decided upon for the observational tally chart for this study: placing head on desk, getting out of seat frequently, doodling/drawing, fidgeting, working on other school work, and talking. The original unwanted behavior tally sheet also required the teachers to observe during 15 minutes of silent reading time and the adapted survey for this survey asked the teachers to observe for 10 minutes during independent working time in the math classroom.

Teachers were e-mailed a series of open-ended questions after all six multiple intelligence-based methods were implemented in the classrooms. The open-ended questions sent to each teacher included: Which strategies did you believe had the highest positive effect? Why?
How do you believe these strategies benefited the male student/students? Would you continue to use any of these strategies? Which ones and why? These questions were used to provide the insights into the efficacy of the multiple intelligence-based methods from both participating teachers.

Lastly, the participating teachers video recorded five classroom lessons once the pedagogical approaches were being implemented in the classroom. The five videos demonstrated the teachers implementing the approaches while also showing the male subjects in the classroom. Each video was approximately 20 minutes long and was used to further support the findings from the surveys and observational tally sheets.

Research Question 1

Which teaching styles aligned with one or more of the following multiple intelligences described by Howard Gardner (1983) does the teacher typically demonstrate during math instruction before the study? The intelligences included in the survey included: interpersonal, intrapersonal, logical/mathematical, kinesthetic, musical, naturalist, visual/spatial, and verbal/linguistic. Some of the questions included in the survey that focused on multiple intelligence based strategies included: do I make the students teach the topic to each other, I use different activities based on group work, I want students to explain their feelings/opinions related to the topic, I use the drama method, I want students to tell explanations related with the topic by creating a rhythm, I make students solve problems by using various methods, and I make students prepare a written report. The teachers were asked to complete this survey one week prior to exposure to the new multiple intelligence based strategies provided by the researcher. The results indicated that the teacher from Leetonia Elementary was strong in using the strategies that included verbal-linguistic and interpersonal. The verbal-linguistic intelligence was used
equally between once and twice a week and in every lesson indicating that the teacher preferred the use of this intelligence. Interpersonal intelligence results in 40% for each area of once or twice a week and in every lesson with 20% in a few times a month being the second most frequently implemented intelligence. Results also showed that she was weaker in implementing strategies in the musical and naturalist intelligences. The frequency of musical intelligence was at 71.4% of never being implemented and 28.6% under a few times a month. The naturalist intelligence was the second lowest implemented intelligence that showed never being used 50% of the time with the remaining 50% being implemented a few times a month. To find the percentages of the occurrences of each multiple intelligence based strategy based upon the pre-survey data, the total number of questions for each intelligence was grouped. There were four verbal/linguistic questions, 10 mathematical/logical questions, seven musical questions, eight visual/spatial questions, four intrapersonal questions, three kinesthetic questions, five interpersonal questions, and four naturalist questions. Next, each group of questions was assessed individually to determine the percent of the frequency of the strategies that the teacher implemented in her classroom. The results from the Leetonia Elementary pre-survey are shown in Table 5.
The participating teacher from McKinley Elementary was also asked to complete the same pre-survey at least one week prior to the implementation of the multiple intelligence based strategies. The verbal-linguistic intelligence was used 50% in every lesson, 25% once or twice per week, and 25% never being used. The survey indicated that the McKinley Elementary teacher did not rely as heavily on verbal-linguistic methods that most teachers typically demonstrate. The McKinley Elementary teacher used the mathematical/logical methods most frequently. Results indicated that she used mathematical/logical methods 70% in every lesson and the remaining 30% once or twice a week. Results also showed that the McKinley Elementary teacher used musical methods significantly lower than all other intelligences. Intrapersonal methods were also not utilized frequently. The teacher answered that she never used musical based methods 57.1% of the time and implemented a few times a month 42.9% of the time. Data suggested that this teacher employed interpersonal methods much of the time in the math classroom. The McKinley Elementary teacher implemented intrapersonal intelligence
strategies at 60% at a rate of *a few times a month*. This teacher also demonstrated the use of intrapersonal strategies at a rate of 20% *once or twice per week*, and at a rate of 10% of the time *in every lesson*. Naturalist based methods were used significantly fewer times than all other intelligence based methods. Data indicated that these methods were *never* used 75% of the time.

The teacher implemented naturalist methods *a few times a week* at a rate of 25% of the time. Interpersonal methods were used 60% of the time *in every lesson*, 20% of the time *once or twice each week*, and 20% of the time *a few times a month* indicating that students participate in group work frequently. Another intelligence area that was used frequently was kinesthetic. Results showed these methods being used 66.6% of the time during *every lesson* and 33.3% of the time *a few times a month*. The final results from the pre-survey were calculated using the same methods as the Leetonia Elementary survey. The results from the McKinley Elementary survey are displayed in Table 6.

Table 6

*Results from Teacher Pre-Survey: McKinley Elementary*

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>% Never</th>
<th>% Few Times a Month</th>
<th>%1-2 Times a Week</th>
<th>% Every Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal-Linguistic</td>
<td>25%</td>
<td>0%</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>Mathematical/Logical</td>
<td>0%</td>
<td>0%</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Musical</td>
<td>57.1%</td>
<td>42.9%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Spatial/Visual</td>
<td>25%</td>
<td>50%</td>
<td>0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>0%</td>
<td>20%</td>
<td>20%</td>
<td>60%</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>0%</td>
<td>33.3%</td>
<td>0%</td>
<td>66.6%</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>0%</td>
<td>60%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Naturalist</td>
<td>75%</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Research Question 2

Was there a change in teaching styles after the study? To determine if there was a change in teaching styles after the study, the teachers were given six different multiple intelligence based methods to implement throughout the duration of the study from February through March 2016 at Leetonia Elementary and January through February 2017 at McKinley Elementary. Each strategy was introduced to the teachers with support from the researcher that provided videos and materials needed to successfully use the strategy in the classroom. The strategies given to the teachers included the Super Improver Team (Biffle, 2013), Teach-Okay (Biffle, 2013), student self-assessment cards (Marzano), hands-on math manipulatives, Power Pix Cards (Biffle, 2013), and the on-line math web-site Zearn (2015). A new strategy was introduced every two weeks and the teachers continued the use of each throughout the length of the study.

After the completion of the study, the participating teachers were asked to complete the post-survey to determine if they continued the use of the strategies provided by the researcher. The post-survey consisted of the same questions from the pre-survey to determine if the percentages of the frequency of strategies changed after the implementation of the new methods. After comparing the pre- and post-survey data, there were 16 questions in which change was noted in the Leetonia Elementary teacher’s responses after the study. Of the 16 changes, 12 resulted in an increase of the specific intelligence based strategies. Pre-survey data showed four questions the teacher responded to using once or twice a week which then increased to the use of in every lesson based on post-survey responses. These questions included: I convey the learned information by using a mathematical formula, students work individually, I express similarities and differences to explain a topic, and students teach topics to each other. Data from the pre-survey also indicated five questions which suggested the teacher never used that method to an
increase of four questions where the teacher then implemented the methods to a few times a month. The final of the five never implemented questions resulted in the implementation to once or twice a week. Those questions included: I associate lyrics with topics I cover, I collect songs about a topic and use them to start a lesson, I change the lyrics to a song to relate to the topic at hand, and I use the drama method. Lastly, three questions from the survey which included: I use some rhythm patterns while teaching, I can explain the topic with pictures, and students prepare cards related to the topic, were implemented a few times a month according to pre-survey data and showed an increase of implementation based on post-data results to once or twice a week or in every lesson. The only decreases in use based on the comparison of pre- and post-survey data was giving homework and assigning observation tasks from a few times a month to never. This could be because homework was not in the focus of this study and other methods were provided that did not focus on observational tasks. These changes are illustrated in Table 7.

Table 7

Changes in Instruction after Addition of New Strategies: Leetonia Elementary

<table>
<thead>
<tr>
<th>Changes in Instruction</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>I convey the learned information by using a mathematical formula</td>
<td>1-2 times a week</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I express similarities and differences to explain a topic</td>
<td>1-2 times a week</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I use some rhythm patterns while teaching</td>
<td>A few times a month</td>
<td>1-2 times a week</td>
</tr>
<tr>
<td>I associate lyrics with topics I cover</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I collect songs about a topic and use them</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I start a lesson with music</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I change the lyrics to a song to relate to the topic at hand</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I draw tables/clusters/graphics/figures appropriate for the topic</td>
<td>In every lesson</td>
<td>1-2 times a week</td>
</tr>
<tr>
<td>I can explain the topic with pictures</td>
<td>A few times a month</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I use the drama method</td>
<td>Never</td>
<td>1-2 times a week</td>
</tr>
</tbody>
</table>
Students prepare cards related to topic: A few times a month 1-2 times a week
Students work individually: 1-2 times a week In every lesson
I use different activities based on group work: In every lesson 1-2 times a week
Students teach topics to each other: 1-2 times a week In every lesson
Give homework/projects to be done in groups: A few times a month Never
I assign some observation tasks about field calculations, geometric shapes, etc.

There was also a comparison of frequency of use of strategies based on the data from the pre- and post-teacher survey. The same method was used in the post-survey as the pre-survey to find the percentages of the frequency of each group of intelligence based questions. The questions on the post-survey were identical to the pre-survey and grouped by specific intelligence. Once the questions were grouped, there were four verbal/linguistic questions, 10 mathematical/logical questions, seven musical questions, eight visual/spatial questions, four intrapersonal questions, three kinesthetic questions, five interpersonal questions, and four naturalist questions. Based upon the teacher response on the frequency of the use of the strategy in the post-survey, her answers were then divided by the total number of questions in that intelligence area to find the total percentage.

The following percentages revealed the change of the frequency of teaching strategies once the new methods were put into place as demonstrated by the teacher at Leetonia Elementary. The pre- and post-data exhibited an increase in the percent of the use of strategies in every lesson for the mathematical/local intelligence group from 70% of the time to 90% of the time. There were also several changes in the frequency of the implementation of the musical intelligence. In the pre-survey, the teacher responded that 71.4% of the time she never utilized music in her lessons. After the implementation of the new methods, the never category
decreased to 14.3% which indicated a much higher rate in the use of musical based strategies. Furthermore, there was also a dramatic change with the kinesthetic intelligence in the never category from 33.3% in the pre-survey to 0% in the post-survey. This too showed a significant increase in the frequency of teacher implementation of kinesthetic methods in the classroom. When comparing the verbal-linguistic intelligence from the pre- and post-survey there was no change as the teacher's response indicated implementing verbal/linguistic strategies 50% of the time in the category of once or twice a week and 50% of the time in every lesson. Spatial/visual intelligence disclosed a change that included pre-survey data at 37.5% of the time to 50% of the time in the post-survey data in the category of using once or twice a week. Results in the data reporting use of interpersonal intelligence only showed a change in the never and a few times a month category. The teacher indicated in pre-survey data of never using interpersonal strategies at 0% of the time and a few times a month at 20% of the time. Post data showed 20% at never and 0% at a few times a month. The intrapersonal intelligence indicated no change in the never category of implementing intrapersonal based strategies 0% of the time and a few times a month at 25% of the time. There was a change from 25% to 0% of the time of the use of intrapersonal strategies in the once or twice a week section and an increase in frequency percentages from 50% to 75% of the time in every lesson category. Lastly, there were also changes in the naturalist intelligence. In the never category, the pre-survey presented strategies implemented at 50% of the time while the post-survey data increased to 75% of the time. There was also a change in the few times a month category starting at 50% and decreasing to 25% of the time. A summary of all intelligence areas is listed in Table 8.
Table 8

*Results from Teacher Post-Survey: Leetonia Elementary*

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>% Never</th>
<th>% Few Times a Month</th>
<th>% 1-2 Times a Week</th>
<th>% Every Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal-Linguistic</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Mathematical/Logical</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
<td>90%</td>
</tr>
<tr>
<td>Musical</td>
<td>14.3%</td>
<td>57.1%</td>
<td>28.6%</td>
<td>0%</td>
</tr>
<tr>
<td>Spatial/Visual</td>
<td>12.5%</td>
<td>0%</td>
<td>50%</td>
<td>37.5%</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>20%</td>
<td>0%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>0%</td>
<td>0%</td>
<td>33.3%</td>
<td>66.7%</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
<td>75%</td>
</tr>
<tr>
<td>Naturalist</td>
<td>75%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The teacher at McKinley Elementary was also asked to complete the post-survey to determine if she continued to use the strategies provided by the researcher. The post-survey consisted of the same questions from the pre-survey to determine if the percentages of the frequency of strategies changed after the implementation of the new methods. After comparing the pre- and post-survey data, there were 28 questions where change was noted in the McKinley Elementary teacher's responses after the study. Of the 28 changes, 26 resulted in an increase of the specific strategies. Pre-survey data indicated the teacher marking never 11 times, which then resulted in a higher rate of implementation after the approaches were in place. These questions included: *I make students prepare a written report, I associate some lyrics with the topics I cover, I collect the songs about the topic and use them, I start the lesson with music, I change the lyrics to songs to relate to the topic at hand, I make students prepare posters, notice boards, advertisements, or wall papers, I make students prepare models related to the topic, I make*
students prepare cards (games, puzzles, etc.) related to the topic which will be covered, I make use of nature to teach the concepts, I associate nature with mathematic topics, and I assign some observation tasks about field calculations, geometric shapes, etc.

Collected pre-survey data also revealed the teacher marking 11 instances of using other intelligence based methods a few times a month increasing to a higher rate of implementation. These questions included: I use some rhythm patterns while teaching some formulas and concepts, I draw tables/clusters/graphics/figures appropriate for the topic, I explain the topic with pictures, I use the board in my class, I use the drama method, I make students prepare materials related to the course, I want students to explain their feelings/opinions related to the topic, I create opportunities for the students to assess their own work, and I provide alternatives for the students while determining the annual assignment or project.

The McKinley Elementary teacher had marked once or twice a week four times on the pre-survey all four of which indicated an increase in use based on the results of post-survey data. These questions included: I associate some topics with the other courses, I develop a strategy game (building relationships) related to the topic, and I expose similarities and differences to explain the topic, I present different problem states, I make the students teach the topic to each other, I make the students form problems by utilizing their real life situations.

There were two questions that revealed a decrease in use when comparing pre- and post-survey data. The first question was I give homework/project assignments that need to be done in groups which was marked as using a few times a month then decreased to never in post-survey data. Based on the results of the post-survey the second question that showed a decrease in use was, I make students work individually in the class. Pre-survey data indicated this question was marked at using in every lesson followed by post-data indicating this question being marked at
once or twice a week. The lack of homework involvement used in this study may be an indicator for the decrease in assigning homework. The increase of the frequency of group work resulted a decrease in students working individually. The changes are shown below in Table 9.

Table 9

*Changes in Instruction after Addition of New Strategies: McKinley Elementary*

<table>
<thead>
<tr>
<th>Changes in Instruction</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>I make students prepare a written report</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I associate some topics with the other courses</td>
<td>Once or twice a week</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I develop a strategy game related to the topic</td>
<td>Once or twice a week</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I expose similarities and difference to explain the topics</td>
<td>Once or twice a week</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I present different problem states</td>
<td>Once or twice a week</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I use some rhythm patterns while teaching some formulas and concepts</td>
<td>A few times a month</td>
<td>Once or twice a week</td>
</tr>
<tr>
<td>I associate some lyrics with the topics I cover</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I collect the songs about the topic and use them</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I start the lesson with music</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I change the lyrics to sons to relate to the topic at hand</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I draw tables/clusters/graphics/figures appropriate to the topic</td>
<td>A few times a month</td>
<td>Once or twice a week</td>
</tr>
<tr>
<td>I explain the topic with pictures</td>
<td>A few times a month</td>
<td>Once or twice a week</td>
</tr>
<tr>
<td>I make students prepare posters, notice boards, advertisements or wall papers</td>
<td>Never</td>
<td>A few times a month</td>
</tr>
<tr>
<td>I use the board in my class</td>
<td>A few times a month</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I use the drama method</td>
<td>A few times a month</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I make students prepare materials related to the course</td>
<td>A few times a month</td>
<td>In every lesson</td>
</tr>
<tr>
<td>I make students prepare models related to the topic</td>
<td>A few times a month</td>
<td>In every lesson</td>
</tr>
</tbody>
</table>
I make students prepare cards related to the topic which
will be covered

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>I want students to explain their feelings/opinions related to the topic</td>
<td>Never, Once or twice a week</td>
</tr>
<tr>
<td>I create opportunities for the students to assess their own work</td>
<td>A few times a month, Once or twice a week</td>
</tr>
<tr>
<td>I provide alternatives for the student while determining the annual assignment or project</td>
<td>A few times a month, Once or twice a week</td>
</tr>
<tr>
<td>I make students work individually in the class</td>
<td>In every lesson, Once or twice a week</td>
</tr>
<tr>
<td>I make students teach the topic to each other</td>
<td>Once or twice a week, In every lesson</td>
</tr>
<tr>
<td>I give homework/project assignments that need to be done in groups</td>
<td>A few times a month, Never</td>
</tr>
<tr>
<td>I make use of nature to teach the concepts</td>
<td>Never, Once or twice a week</td>
</tr>
<tr>
<td>I associate nature with mathematic topics</td>
<td>Never, Once or twice a week</td>
</tr>
<tr>
<td>I assign some observation tasks about field calculations, geometric shapes, etc.</td>
<td>Never, A few times a month</td>
</tr>
<tr>
<td>I make the students form problems by utilizing their real life situations</td>
<td>Once or twice a week, In every lesson</td>
</tr>
</tbody>
</table>

The participating teacher at McKinley Elementary also completed the post-survey after the course of the study. Comparisons of the pre- and post-survey showed several changes in the frequency of use after the multiple intelligence based methods were provided to the teacher. Pre-survey data indicated that the teacher was using mathematical intelligence in every lesson 70% of the time. Once the new methods were in place, she then implemented mathematical methods 90% of the time in every lesson. The use of verbal-linguistic methods also increased from 50% in every lesson to 75%. The most significant change was the kinesthetic methods that began at 66.6% in every lesson to 100% in every lesson once the new strategies were implemented. The
multiple intelligences areas of spatial-visual, interpersonal, intrapersonal, and naturalist all raised the percent in the implementing *in every lesson* section of the survey.

Data revealed a significant decrease in the *never* implemented section of the survey. Naturalist based methods decreased from 75% *never* in use to 0%. Spatial-visual, musical, and verbal-linguistic methods also all resulted in a decrease in the *never* section. While some intelligences decreased in the *never uses* section, others remained the same including; mathematical at 0%, kinesthetic at 0%, and intrapersonal also at 0%.

Teacher implementation of methods a *few times a week* also proved to show changes in percentages. For example, verbal-linguistic increased from 0% to 25%, musical increased from 42.9% to 85.7%, while naturalist methods also increased from 0% to 25%. There were also intelligence areas that decreased in implementation from a *few times a month* which included: intrapersonal methods from 60% to 0%, kinesthetic methods from 33.3% to 0%, and spatial-visual methods from 50% to 12.5%.

Lastly, in the implementation use of *once or twice per week*, data displayed several differences. The increased use of the intelligence areas included; musical methods from 0% to 14.3%, spatial-visual from 0% to 25%, intrapersonal from 20% to 80% and naturalist methods from 25% to 50%. A decrease in the use of *once or twice a week* included the intelligences of; verbal-linguistic from 25% to 0%, mathematical from 0% to 10%, and interpersonal methods from 20% to 0%. The only intelligence area that remained the same in the *once or twice per week* section was kinesthetic which remained at 0% for the pre-and post-survey. The results from the teacher post-survey from McKinley Elementary are displayed in Table 10 below.
Table 10

Results from Teacher Post-Survey: McKinley Elementary

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>% Never</th>
<th>% Few Times a Month</th>
<th>% 1-2 Times a Week</th>
<th>% Every Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal-Linguistic</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
<td>75%</td>
</tr>
<tr>
<td>Mathematical/Logical</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
<td>90%</td>
</tr>
<tr>
<td>Musical</td>
<td>0%</td>
<td>85.7%</td>
<td>14.3%</td>
<td>0%</td>
</tr>
<tr>
<td>Spatial/Visual</td>
<td>0%</td>
<td>12.5%</td>
<td>25%</td>
<td>62.5%</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>20%</td>
<td>0%</td>
<td>0%</td>
<td>80%</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>0%</td>
<td>0%</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Naturalist</td>
<td>0%</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Each of the three open-ended questions was analyzed to determine which methods were most effective based on the opinions of both participating teachers. When asked which strategies did you believe had the highest positive effect? Why? teachers responded that Power Pix (Biffle, 2013), hands-on math manipulatives, Zearn (2015), and Teach-Okay (Biffle, 2013) showed the highest positive effect. These methods gave the students the opportunity to move and talk while learning. The second question how do you believe these strategies benefited the male student? teachers stated that the Teach-Okay (Biffle, 2013) method gave the teacher the chance to listen to students while teaching to their partner to check for understanding or redirect if necessary. The third question would you continue to use any of these strategies? Which ones and why? teachers indicated they would continue the use of Power Pix (Biffle, 2013), Super Improver (Biffle, 2013), Zearn (2015), Teach-Okay (Biffle, 2003), and hands-on math manipulatives. The use of Power Pix (Biffle, 2013) kept students engaged and gave students a visual of the math concept.
along with physical gestures. Super Improver Team (Biffle, 2013) provided a visual of student successes in the classroom and motivated the students to continue to work towards their specific goals.

**Research Questions 3**

Was there a reduction of challenging behaviors based on the change in instruction? With the intent of decreasing occurrences of challenging behaviors, the researcher provided the participating teachers with six multiple intelligence based strategies to incorporate in their classrooms. Each strategy was used for two weeks at a time while building upon one another to the point where the teachers were using all six strategies by the end of the study. Approach one, which was provided to the Leetonia Elementary teacher on January 4, 2016, and on September 5, 2016, for the teacher McKinley Elementary, was the Super Improver Team (SIT) (Biffle, 2013). This is a Whole Brain Teaching strategy that sets personal goals for each individual student focusing on the intrapersonal intelligence. SIT also focuses on the visual-spatial intelligence as students can visualize their successes on the board.

The second approach in the research that was presented to the Leetonia Elementary teacher on January 18, 2016, and on September 19, 2016, for the McKinley Elementary teacher was the Teach-Okay technique (Biffle, 2013). This is another Whole Brain Teaching method where the teacher taught students a small chunk of information which they then turned and taught one another. This method focused on the interpersonal method where students worked in pairs to discuss and teach class content. After the implementation of Teach-Okay (Biffle, 2013) the teacher at McKinley Elementary stated, "the targeted students seem to quickly regroup when I would use the Teach-Okay. This strategy would bring the students back to either redirect or clarify which kept them more on-track". 
The third approach presented at Leetonia Elementary on February 1, 2016, and on October 3, 2016, at McKinley Elementary was the use of student self-assessment task cards (Marzano). This method consisted of four cards that stated, "I can’t do it by myself”, “sometimes I need help”, “I can do it by myself”, and “I can do it without mistakes”. Task cards focused upon the visual-spatial, intrapersonal, and interpersonal intelligences. Using these cards allowed male students to formatively self-assess when independently working while also allowing the teacher to know how they were thinking of their progress during the task at hand. If a male student felt like he was done, instead of sitting and perhaps demonstrating an unwanted behavior, the teacher could check his work and allow him to move on and help another student in need.

The fourth approach presented at Leetonia Elementary on February 17, 2016, and at McKinley Elementary on October 17, 2016, consisted of providing hands-on manipulatives for the students to using during their independent work time during the math lesson. This approach addressed the kinesthetic and visual-spatial intelligence which encourages the male student to physically hold and manipulate objects to solve problems. After a discussion with the participating teachers, the researcher was informed of the materials that both teachers had in their classrooms and advised that students have full access to these during the independent work time.

The fifth approach presented at Leetonia Elementary on February 29, 2016, and at McKinley Elementary on October 31, 2016, was the use of Power Pix (Biffle, 2013). Power Pix (Biffle, 2003) was a set of cards that had illustrations and definitions of Common Core math terms. This is another Whole Brain Teaching method that focused on the interpersonal, bodily-kinesthetic, musical, and visual-spatial intelligence.
To incorporate these in the classroom, the teacher would introduce the term and the phrase on the card. The students would then use the Teach-Okay (Biffle, 2003) method and teach the concept to each other while incorporating the gesture (kinesthetic) that tied into the definition of the term. Often times, the term on the card was a rhyming verse (musical) to assist in student recall. Once the term was taught in the classroom, the students would teach the term to each other (interpersonal) while showing the gestures and reciting the verse (musical and kinesthetic). The card would then be displayed on a board for daily review (visual). After implementing Power Pix (Biffle, 2003), the participating teacher stated, "I believe using the Power Pix was the most effective strategy that I used with my students because not only were they taught through movements and sayings but the cards were also available to them while completing the task." She further shared, "I will continue to use the Power Pix. I really enjoy the engagement and presentation of the Power Pix." The teacher at McKinley Elementary made a similar statement, "the Power-Pix also gave the students a physical gesture that seemed to help improve their focus and attention."

The last method presented at Leetonia Elementary on March 14, 2016, and at McKinley Elementary on November 14, 2016, was a web-based program called Zearn (2015). This is a program that has a positive correlation to Common Core math and is designed to work by grade level. Zearn (2015) is an on-line tutor for students where there are a variety of people and engaging activities that teach third-grade math concepts. The participating teachers were asked to create Zearn (2015) accounts for their students and allow them access to Zearn (2015) once they completed their independent work. Having male subjects work with Zearn (2015) provided them with learning opportunities that included the intelligences of intrapersonal, mathematical/logical, musical, and visual. For example, there was a tutor that discussed each
step of the lesson that allowed the male student to work independently which related to the intrapersonal intelligence. Zearn (2015) also used a variety of charts and visuals that are strategies aligned with the visual and mathematical intelligence. Lastly, the tutor provided songs and chants in several lessons that engaged the student in musical events and activities. Overall, this provided the student with skills to apply several multiple intelligence areas while working on-line.

Before the implementation of the new strategies, the teachers were asked to track the occurrences of unwanted behaviors of the male subjects by completing an unwanted behavior tally chart. The unwanted behavior tally chart was adapted from a similar chart of Buschick, Shipton, Winner, and Wise (2007) where they recorded the number of unwanted behaviors during silent reading time. After discussions with the researcher and her dissertation committee, the form was adapted to best fit the needs of this study. The teachers were asked to track unwanted behaviors for the first 18 days prior to the implementation of the new multiple intelligence-based strategies provided by the researcher. This observation took place for 10 minutes during math class when the students were working independently. After the course of the study when the new strategies were in place, the teacher did not record unwanted behaviors, but rather focused on implementing the strategies on a daily basis. At the conclusion of the study, the participating teachers again recorded unwanted behaviors during math class for a 10-minute duration when the student was working independently.

After the 12-week study, data identified a reduction in unwanted behavior demonstrated by the male subject. For the first seven days of the study, unwanted behavior tally charts pre-assessment showed a higher total of unwanted behaviors compared to the following days which included: placing head on desk, getting out of seat frequently, doodling/drawing, fidgeting,
working on other school work, and talking for the first seven days of the study. Following the seven days, there was a decrease in unwanted behavior occurrences compared to the first seven days that then averaged approximately eight recorded daily occurrences. In addition, after the implementation of the new strategies, there was an overall decline in the occurrence of unwanted behaviors. The average occurrences after the implemented strategies dropped to approximately five observed daily occurrences.

The unwanted behavior tally-charts pre- and post-assessment were also compared to determine possible increases or decreases in each of the unwanted behaviors listed. Of the six listed behaviors, each one showed a decrease in occurrences once the multiple intelligence approaches were implemented in the classroom. The largest decrease was seen in the unwanted behavior of talking from 89 times from the total 18 days of observations found in the baseline data to 24 total times from the total 18 days of observations found in post data. There was also a significant decrease in the frequency of out of seat behavior section from 40 occurrences from the total 18 days found in baseline data down to zero from the total 18 days in the post data. The participating student demonstrated a decrease in the occurrences of fidgeting. The first set of unwanted behavior tally charts indicated the student fidgeting a total of 45 times was significantly lowered to a total of 18 times. In addition, the student decreased the occurrences of placing his head on a desk from a total of 24 times to a total of 14 times after the implementation of the multiple intelligence based strategies. He also lowered the occurrences of working on other school work from a total of nine before the implementation of methods to zero after the implementation of methods. The smallest decrease in unwanted behaviors was drawing/doodling which began with a total of 28 occurrences and decreased to a total of 27
occurrences. The results of the observational tally sheet are shown below in Table 11 and Figure 1.

Table 11

*Pre and Post Observational Tally Charts: Leetonia Elementary*

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placing head on desk</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Getting out of seat frequently</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Doodling/drawing</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>Fidgeting</td>
<td>45</td>
<td>18</td>
</tr>
<tr>
<td>Working on other school</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Talking</td>
<td>89</td>
<td>24</td>
</tr>
</tbody>
</table>
To provide further evidence of the male subject’s behavior, the five videos were also analyzed from Leetonia Elementary. Video one displayed evidence of the teacher using approaches such as Teach-Okay (Biffle, 2003), Power Pix (Biffle, 2003), and the use of manipulatives by students solving problems on white boards with markers. The lesson focused on the discussion of numerators, denominators, and fraction bars. The teacher demonstrated the gestures and the chant that was given on the Power Pix (Biffle, 2003) card. The male subject participated fully during this time as he mirrored his teacher while she demonstrated the Power Pix (Biffle, 2003) card. He did not demonstrate any of the behaviors on the tally-chart during this time. When asked to do the Teach-Okay (Biffle, 2003) with a partner, the male subject was fully engaged while teaching his partner using gestures of a numerator, denominator, and
The teacher provided many opportunities for students to turn and teach to their partner which gave students the opportunity to move and talk rather than simply listening to the teacher lecture. The male subject demonstrated active learning and engagement during the time of this video.

The second video showed a lesson on 2-D and 3-D shapes. The classroom was decorated with several Power Pix (Biffle, 2003) cards to provide a visual for the students of topics they had previously covered. The teacher taught the lesson using the Power Pix (Biffle, 2003) cards that required her to use gestures and chants to coincide to the topic on the card. The male subject was actively engaged during the lesson by demonstrating the gesture and chant to cubes, cones, pyramids and cylinders. Again, the teacher provided several opportunities for the students to move and talk during Teach-Okays (Biffle, 2003) which assisted in keeping the male subject engaged throughout the lesson. Lastly, the lesson concluded with the use of iPads to solve math problems where the students had to prove their answers using pictures, words, and/or equations. From the angle of the camera, one could see that the student was not placing his head on his desk as he was actively participating, but it cannot be determined if he was doodling on his iPad because he was seated too far from the camera. The male subject appeared to be excited to use the iPad to work on each problem set and was eager to share his answer to the classroom using the Teach-Okay (Biffle, 2013) approach.

The third lesson that was recorded focused on a review of a previously taken quiz of portioning fractions. The teacher used several fraction gestures that the male subject mirrored successfully throughout the lesson. When the quiz was passed back to students, the male subject quickly gathered his materials and began working on his quiz. He appeared to stay focused for the remainder of the video and demonstrated no inappropriate behaviors as he worked on his
quiz. As mentioned, due to the camera angle it appeared as though he was writing what he was instructed to do, but he could have been drawing or doodling judging from the higher occurrences of this behavior as seen in the findings of the behavioral tally sheets.

Video four recorded a lesson on mass and volume. The teacher used Power-Pix (Biffle, 2003) to teach mass, volume, cups, pints, quarts, and gallons. The teacher demonstrated the gesture with the chant while the students mirrored for each card, followed by the students teaching each card to their partners. The male subject appeared to enjoy the gesturing and was enthusiastic while teaching his partner. This kept the male subject engaged while also giving him the opportunity to talk and move out of his seat, as he was permitted to do by the teaching approaches demonstrated in the lesson. To finish the lesson, the students solved math problems on white boards. During this time the male subject demonstrated no signs of unwanted behaviors and worked on the given task as directed by the teacher.

The fifth and final video focused on analyzing numbers using addition, subtraction, multiplication, and division. While the teacher discussed the upcoming quiz, the male subject sat at his desk and listened attentively. The teacher then incorporated Mirror Words with students to review terms that would be on the test. Once the test and privacy folders were passed out, the male subject quickly began writing and remained focused while he worked on his test.

The teacher at McKinley Elementary experienced the same process as the teacher at Leetonia Elementary for this study. Each of the six strategies was given in the same order, and each were used for the same length of time. The main difference when reviewing data of the unwanted behavior tally sheet from Leetonia Elementary with McKinley Elementary is the number of subjects that demonstrated the behaviors. Leetonia Elementary had one male participant while McKinley Elementary had 16 participants. To track the behaviors of the 16
students at McKinley Elementary, the teacher assigned a number to each male participant. During the 10-minute observation, the teacher would cycle through the numbers in order to observe the behaviors of each student. This eliminated the potential for the teacher to focus more on one student compared to others.

When analyzing data from before and after implementation of multiple intelligence based methods at McKinley Elementary, of the six observable behaviors, there was a decrease of four behaviors. Results indicated that working on other school work and doodling/drawing behaviors remained the same. Before the implementation of the new methods, students were observed placing their head on desk nine times which then decreased to three times after the strategies were in place. Students also got out of their seat less frequently by doing so a total of three times before the methods to one time total after the methods were implemented. Baseline data indicated the occurrences of students talking at a total of 41 times decreasing to 18 total times. The most significant decrease of student behaviors reported was fidgeting. Before the implementation of the new strategies, all students participating demonstrated fidgeting a total of 150 times. After the implementation of the strategies the occurrences as shown by all participating students decreased to a total of 19 times. Working on other school work and drawing/doodling were the two behaviors that remained constant based on the data before and after the new strategies. Pre and post data reporting one occurrences of drawing/doodling revealed no change. Male students were not observed working on other school work before and after the new methods. The results from the unwanted behavior tally sheet appear below in Table 12 and Figure 2.
Table 12

*Pre- and Post-Unwanted Behavior Tally Charts: McKinley Elementary*

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placing head on desk</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Getting out of seat frequently</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Doodling/drawing</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Fidgeting</td>
<td>150</td>
<td>19</td>
</tr>
<tr>
<td>Working on other school work</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Talking</td>
<td>41</td>
<td>18</td>
</tr>
</tbody>
</table>

To provide further analysis of the demonstrated behaviors, the teacher at McKinley Elementary also recorded five videos of the three classrooms which had the male participants in
the classroom. The 16 male students were not in the same classroom at the time of the study. These participants were in three different third grade classes. Their classroom placement did not compromise the data collection of this study. The researcher is employed at McKinley Elementary, so she was aware of which students were participating in the study. Therefore, the participating teacher did not have to inform the researcher of which students to observe during the video segments because the researcher knew each of the students.

Video one consisted of a lesson discussing multiplication and division with the Class One group, containing six of the 16 total male subjects at this site. The classroom Super Improver Board (Biffle, 2003) was in sight with all 16 subjects' names being displayed on the board along with their classmate's names. Students were seated in their desks for the duration of the video. The participating subjects were engaged in the lesson and did not demonstrate any of the unwanted behaviors other than fidgeting. Three of the male subjects were playing with pencils during teacher-led discussion time.

The second video consisted of a lesson discussing fractions and how to place fractions on a number line with the Class Two group, containing five of the 16 total male subjects at this site. Students were given several opportunities to use the Teach-Okay (Biffle, 2003) method to talk with a partner about strategies and ideas of solving each given math problem. The teacher also called on individual students to answer questions. Of the five students, all but one demonstrated zero unwanted behaviors. The one male student was seen talking when not permitted as well as fidgeting with his papers while the class was demonstrating plots on a number line.

Video three consisted of a lesson that was also on fractions and placing fractions on a number line. This video was recorded with the Class Three group, containing five of the 16 total male subjects at this site. During the video there was use of the student self-assessment
cards (Marzano) where students would display the task card, "I can’t do it by myself;”
“sometimes I need help,” “I can do it by myself,” and “I can do it without mistakes” based on
their self-assessment of each problem. The teacher would observe the cards and provide further
demonstration if students believed they were confused. When this was noted, the teacher had the
students use the Teach-Okay (Biffle, 2003) method frequently to allow students to talk out
possible issues rather than sitting quietly in order to do so. The teacher also had students moving
around the classroom in a variety of fraction centers to keep students active. Every participating
student was fully engaged during the duration of this video.

Video four consisted of a lesson that exhibited students using Chrome books to complete
assigned lessons in Zearn (2015) with the Class Two group again. Students were working on a
combination of skills that included multiplication, division, and equivalent fractions. Students
also had white boards and markers to work out problems when needed during the on-line lesson.
During the on-line lesson, Zearn (2015) had a math teacher talk students through a lesson by
singing songs and displaying a variety of visuals. Students then had work sessions to ensure they
comprehended the provided lesson. During this video all participating students were fully
engaged and did not display any of the unwanted behaviors.

The last video captured students using Power Pix (Biffle, 2013) cards during the Class
One group. The teacher prompted students to look at specific cards and define the card by
stating the definition and showing the gesture to a partner. The students did this repeatedly for
approximately 30 seconds while the teacher walked around the classroom to monitor. The
students appeared to enjoy this as they were smiling and actively moving to act out the gesture
on each card. Two students appeared to be talking once the teacher called them back after the 30
second partner teach time of the Power Pix (Biffle, 2013) card but not to the point where the teacher had to redirect their attention.

**Summary**

**Research Question 1).** Which teaching strategies that are aligned with multiple intelligences were implemented prior to the study? The results indicated that the teacher at Leetonia Elementary was strong in using the strategies that included verbal-linguistic and interpersonal prior to the implementation of the new multiple intelligence based strategies. Data revealed that this teacher was weaker in incorporating strategies in the musical and naturalist intelligence. Results showed that the teacher at McKinley Elementary was strong in the implementation of mathematical, kinesthetic, and interpersonal intelligence based strategies. She appeared to be weaker in the use of musical and verbal-linguistic based strategies.

**Research Question 2).** Was there a change in teaching styles after the study? Once the new strategies were in place followed by comparing the pre- and post-survey data, there were 16 questions that indicated a change in the frequency after the study based on the results of the teacher at Leetonia Elementary. Of the 16 frequency changes, 12 resulted in an increase of the use of the specific strategy. Based upon the pre-data of a low percentage of the frequency of musical methods there were changes when looking at the post-data. The teacher never used musical methods 71.4% based on pre-survey data. After the implementation of the new approaches, the teacher significantly lowered the percent to 14.3% of never using musical methods. This indicated a 57.1% increase in the use of musical based strategies. There was also an increase in the category of implementing the musical intelligence once or twice a month from 0% from the pre-survey to 28% from the post survey. Also, there was a change in the most frequently used methods from verbal-linguistic and interpersonal found to be the most frequently
used based upon the pre-data to mathematical/logical and intrapersonal being the most frequently used based upon post-data.

The teacher at McKinley Elementary presented a more significant change in instruction after the study. Data indicated that there were 28 changes in the frequencies of intelligence based methods after the new methods were implemented in the classroom. Of these 28 changes, there were 26 specific areas that increased in the occurrences of how frequent the methods were being used. There was a higher rate of implementation among the all eight intelligence areas. Naturalist based methods decreased from 75% never in use to 0%. Spatial-visual, musical, and verbal-linguistic methods also all results in a decrease in the never section. Verbal-linguistic based methods increased from 0% to 25%, musical increased from 42.9% to 85.7%, while naturalist methods also increased from 0% to 25%.

Both participating teachers found the Power Pix (Biffle, 2003) to be the most effective approach implemented in the classroom. The teachers reflected that by using this method provided a visual for students, a physical gesture and phrase to incorporate with the mathematical term. Along with Power Pix (Biffle, 2003) the use of Teach-Okay (Biffle, 2003) was also found to be effective. This gave the teachers the opportunity to monitor student comprehension of the skill as well as the time to redirect and clarify students if needed. Both of these methods are similar in giving students the time to talk and move while learning content within the math classroom. The teacher at McKinley added to the efficacy of the implementation of Zearn (2015) and hands-on math manipulatives. Using these methods gave students a learning experience using interactive materials and web-sites while working in the classroom.

**Research Question 3).** Was there a reduction in challenging behaviors after the implementation of the new strategies? When looking at the data to determine if there was a
reduction in unwanted behavior after the implementation, the data revealed that there was a
decrease in the occurrences of unwanted behaviors at both Leetonia and McKinley Elementary.
Not only was there a decrease in the occurrences of unwanted behaviors, but there also appeared
to be more of a steady trend line of lower occurrences of unwanted behaviors compared to the
unsteady rate of unwanted behavior occurrences in the baseline trend line.

Analysis of the video recordings indicated students responding positively to the given
multiple intelligence-based methods. Students appeared to be engaged in the lesson and stayed
on task when asked to use methods such as Teach-Okay (Biffle, 2003) and Power Pix (Biffle,
2003). There were minimal occurrences of unwanted behaviors as demonstrated by the male
subjects during the video recordings. It was observed that the teachers demonstrated proper use
of the methods provided by the researcher. Teachers had their classrooms set-up for the
implementation of methods such as the Super Improver Team (Biffle, 2003) and Power Pix
(Biffle, 2003) wall. Video analysis provided the researcher with insights pertaining to student
behaviors, teacher implementation, and classroom set-up based on the use of the multiple
intelligence-based methods.
Chapter V: Conclusions and Recommendations

Research indicates that if educators place an emphasis on incorporating multiple intelligence based instruction in the classroom, students may greatly benefit (Rettig, 2005). A study by Highland, McNalb, and Peart (1999) found that when teachers implemented multiple intelligence based strategies, students exhibited a 77% improvement of behaviors such as: talking out, being off-task, not cooperating, and not keeping hands to themselves. Given the connection between students being more successful in the classroom and multiple intelligence based methods, the researcher determined there was value to explore a variety of these methods and the impact they had on student performance.

Research by Worden, Hinton, and Fischer (2011) discussed the different aspects of the brain, and how using information on how the brain receives content is important to learning. A specific point was how researchers, neuroscientists, and educators do not typically work together to find the most effective approaches in education driven by brain-based research. Due to this issue, the main focus on education research was not where the focal point should be in brain-based education. Worden, Hinton, and Fischer (2011) stated:

education research often studies the "what," focusing on the outcomes of learning. By using different methods, including those from cognitive psychology and neuroscience, we can study the "why" and the "how" of learning. While brain research alone can't tell us how to teach children, understanding the brain leads to uncovering underlying learning mechanisms. (p.10)

With the focus of the “how” and “why” of learning, this study was directed in finding how and why the most effective approaches were implemented, and what contributed to the outcomes.
Review of the Study

The main purpose of this study was to determine the frequency of pedagogical approaches that incorporated multiple intelligence based methods the teacher used before the study and the frequency of pedagogical approaches incorporating multiple intelligence based methods used after the study once the new approaches were implemented. This study also sought to determine if incorporating pedagogical approaches correlating with multiple intelligences assisted in keeping participating third grade male subjects engaged and demonstrating less unwanted behaviors during independent work time in the math classroom. This study was conducted at two public elementary schools in Northeastern, Ohio. The two elementary schools consisted of Leetonia Elementary and McKinley Elementary.

At the time of the study, Leetonia Elementary had a total of 259 students and McKinley Elementary had 421 students. This study was directed at third grade male students only. Leetonia Elementary had one male subject and McKinley Elementary had 16 male subjects with valid consent forms submitted. The participating teachers were asked to respond to a pre- and post-survey that was adapted from a measure developed by Saban and Bal (2012). Components were added to the survey to determine each participating teacher’s years of teaching experience, as well as her current level of education, age, and gender. The pre-and post-surveys both contained the same questions. The pre-survey was completed by the participating teacher from Leetonia Elementary in January 2016 and by the McKinley Elementary teacher in September 2016. The post-survey was then completed by the Leetonia Elementary teacher in May 2016, while the teacher at McKinley Elementary completed hers in January 2017.

The questions on the survey were grouped based upon the intelligences of verbal/linguistic, mathematical/logical, musical, visual/spatial, intrapersonal, bodily/kinesthetic,
interpersonal, and naturalist. Examples of the questions included: I use thinking aloud problem-solving method, the students generally work in small groups in my class, and I make students work individually in my class. Each question was followed by the choices of: never, a few times a month, once or twice a week, and in every lesson. The teachers were asked to select one answer per question for the pre- and post-surveys.

The teachers were asked to complete an observation tally chart of unwanted behaviors as demonstrated by the participating male subjects. The tally chart was adapted from a questionnaire created by Buschick, Shipton, Winner, and Wise (2007). Their study researched how to increase reading motivation with middle school students using Gardner's Multiple Intelligence Theory. The original tally chart included the behaviors of: flipping through pages, tapping pencil, staring into space, placing hands inside of desk, fidgeting, placing head on desk, saying "I'm bored," getting out of seat frequently, lack of interest, complaining, doodling, not paying attention, doing other work, wasting time, and being indecisive on book selection. Reflection, inquiry, and professional interactions led the research to refine the instrument to better address this study’s requirements. The outcomes of the refinements included a means to insure that behaviors could be clearly observed and were manageable for the participating teachers to tally in the classroom. The adapted unwanted behavior chart for this study included the behaviors of: placing head on desk, getting out of seat frequently, doodling/drawing, fidgeting, working on other school work, and talking. The participating teachers were asked to complete this chart for 18 consecutive school days. The teacher at Leetonia Elementary completed her first observations during the month of January 2016. She collected baseline data of the number of occurrences of unwanted behaviors the male subject demonstrated. The teacher at McKinley Elementary followed the same procedure during September 2016. The teacher at
Leetonia Elementary observed the single male subject for 10 minutes per session. Due to the higher sample at McKinley Elementary, the teacher assigned a number to each subject and cycled through the numbers to ensure she did not observe one subject longer than others. She too did this for 10 minutes during each observation date.

Once the 18-day baseline data were collected, the researcher provided the participating teachers with six multiple intelligence based pedagogical approaches to implement in the classroom. Each method was used for two weeks at a time, while building upon one another to the point where the teachers were implementing all six strategies by the end of the study. These approaches included: Super Improver Team (Biffle, 2013), Teach-Okay (Biffle, 2013), self-assessing task cards, the use of hands-on math manipulatives, Power Pix (Biffle, 2013) cards, and the on-line math program Zearn (2015).

After all six approaches were implemented, the teachers were asked to use the same unwanted behavior chart to again observe the male subjects. The observations took place for 18 consecutive school days, 10 minutes each day, during independent working time in the math classroom. This was the same length of time as in the baseline data collection process.

Each participating teacher was e-mailed a series of open ended questions to complete at the conclusion of the study. The questions included: which strategies did you believe had the highest positive effect? Why? How do you believe these strategies benefited the male student? and would you continue to use any of these strategies? Which ones and why? The researcher analyzed the responses to each question to determine if there were any similar trends based on the opinions of each teacher.

A series of five video recordings from Leetonia Elementary and McKinley Elementary were conducted to provide the researcher with an insight of the male subjects in each classroom.
Each video was approximately 20 minutes and showed a variety of math lessons based on what each teacher was implementing at the time of the study. The researcher analyzed these videos to obtain reliable information based on the behaviors of the male subjects. The researcher determined if there were similar trends in behaviors of the male subjects in response to the multiple intelligence based methods incorporated in the videos.

Discussion

Research Question 1

In analysis of the first question, the researcher addressed which teaching styles aligned with one or more of the following multiple intelligences described by Howard Gardner (1983). Specifically, what strategies did the teachers typically demonstrate during math instruction before the study? Based on the results of the pre-survey, of the eight intelligences of spatial, musical, naturalist, interpersonal, intrapersonal, verbal/linguistic, mathematical/logical, and kinesthetic, the participating teacher at Leetonia Elementary typically used strategies that aligned with the intelligences of verbal/linguistic, mathematical/logical, kinesthetic, and intrapersonal. The teacher had indicated in the pre-survey that she used the identified intelligences in every lesson at least 50% of the time compared to the other intelligences and the frequency of the use in her classroom. The teacher at McKinley Elementary did not rely as heavily on verbal-linguistic methods, as most teachers typically demonstrate. This teacher implemented mathematical-logical approaches most frequently at 70% of use in every lesson. Data indicated that the McKinley Elementary teacher implemented kinesthetic approaches 66.6% during every day lessons. By implementing movement in the classroom during this study through incorporating the kinesthetic intelligence, data indicated an alignment to research by Taylor (2004) suggesting that teachers should include movement and hands-on approaches to address
male preferences in the classroom. In addition, Gunzelmann and Connell (2006) stated that more hands-on lessons, as well as incorporating movement in lessons, allows students to release energy (Gunzelmann & Connell, 2006; Taylor 2004).

Furthermore, pre-survey data indicated that the Leetonia Elementary teacher and the McKinley Elementary teacher used musical and naturalist intelligence only minimally. The lack of the use of strategies that included music and lyrics could have been the part of the reason for the display of unwanted behavior as seen by the male subjects. This supports research findings from by Katz, Miranda, and Auerbach (2002) who found that students appeared to be more frequently engaged in a multiple intelligence based classroom that incorporated music, dance, and movement in daily lessons compared to that of a traditional classroom. Using methods such as music and dance provided students with the opportunity to use their musical and kinesthetic intelligence while learning. Students demonstrated a higher rate of social interaction than that of the children in the control group (Katz, Mirenda, & Auerbach, 2002). To find the percentages of the occurrences of each multiple intelligence based strategy using the pre-survey data, the total number of questions were aligned to intelligences, and the totals were calculated. There were four verbal/linguistic questions, 10 mathematical/logical questions, seven musical questions, eight visual/spatial questions, four intrapersonal questions, three kinesthetic questions, five interpersonal questions, and four naturalist questions. Based upon the teachers’ responses of the frequency of the use of the strategy in the pre-survey, their answers were then divided by the total number of questions in that intelligence area to find the total percentage.

To answer research question one, which teaching styles aligned with one or more of the following multiple intelligences described by Howard Gardner (1983) does the teacher typically demonstrate during math instruction before the study? the data from the pre-survey were
analyzed to determine the frequency of usage of each intelligence. Based upon data from the teacher pre-survey, the Leetonia Elementary teacher typically demonstrated teaching styles aligned with the intelligences of verbal/linguistic, kinesthetic, and interpersonal. The teacher at McKinley Elementary typically demonstrated teaching styles aligned with the intelligences of mathematical and kinesthetic. These two pieces of data were critical for establishing baseline data required to address research question number two.

**Research Question 2**

In analysis of the second question, the researcher investigated if there was a change in teaching styles after the implementation of the new teaching approaches. The six new approaches that were implemented included: Super Improver Team (SIT) (Biffle, 2013), Teach-Okay (Biffle, 2013), self-assessing task cards, hands-on math manipulatives, Power Pix (Biffle, 2013), and Zearn. After the implementation of these approaches, data indicated that there was a change in the frequency of use of multiple intelligence based methods. Once all strategies were utilized, both teachers were asked to complete the teacher post-survey. The teacher at Leetonia Elementary completed the form in May 2016, and the teacher from McKinley Elementary in January 2017. The post-survey was identical to the pre-survey that was taken before the implementation of the multiple intelligence approaches.

After comparing the pre-and post-surveys, data indicated that the Leetonia Elementary teacher’s results showed a change in the use of multiple intelligence methods in 16 of the questions taken from the survey. Of the 16 changes, 12 changes resulted in an increase in the frequency of use of the specific strategy. The intelligences that showed an increase in frequency included mathematical/logical from 70% to 90% being used *in every lesson*. Musical based methods expanded from 28.6% to 57.1% *a few times a month* and 0% to 28.6% for *once or twice*
each week. Spatial/visual methods rose from 37.5% once or twice a week to 50% once or twice a week. Kinesthetic methods grew from 0% once or twice a week to 33.3% once or twice a week. Lastly, intrapersonal methods increased from 50% in every lesson to 75% in every lesson.

The teacher from McKinley Elementary exhibited a change in the use of the approaches. Data indicated a change in frequency in 28 of the questions from the survey. Of the 28 questions, 26 resulted in an increase of the specific strategies. Some of these changes included mathematical-logical intelligence approaches shifted from implementing 70% to 90% in every lesson. Kinesthetic approaches from 66.6% to 100% in every lesson. Intrapersonal approaches from 20% once or twice a week to 80% once or twice a week. Lastly, spatial-visual from 12.5% in every lesson to 62.5% in every lesson. The percentages for the post-survey were calculated in the same manner as the pre-survey by having the questions grouped and dividing each given response by the total number of questions in each specific intelligence.

Previous studies have documented the benefits of implementing methods that integrate opportunities for movement and music. For example, research by Schirduan and Case (2004) found that students with ADHD showed preference for activities that involved the spatial intelligence. When these types of activities were implemented, the students felt more positive about the academic task at hand. Katz, Mirenda, and Auerbach (2002) found that special education students appeared to be more frequently engaged in a classroom that demonstrated methods incorporating multiple intelligences within the teaching methods and classroom activities.

To answer research question two, was there a change in teaching styles after the study? post-survey responses were analyzed to determine the frequency of teachers employing strategies addressing multiple intelligences. Data indicated the teacher from Leetonia Elementary
increased the use of approaches aligned with the intelligences of mathematical-logical, musical, spatial/visual, kinesthetic, and intrapersonal. The teacher at McKinley Elementary increased the usage aligned with the intelligences of mathematical-logical, kinesthetic, intrapersonal, and spatial-visual. Based upon the responses to the open-ended questions, participating teachers planned to continue the use of approaches such as Power Pix (Biffle, 2013), Teach-Okay (Biffle, 2013), and Zearn (2015) that they did not use prior to this study. These data confirm that there was a change in teaching styles using multiple intelligence-based approaches.

Research Question 3

In analysis of the third research question, the researcher explored if there was a reduction of challenging behaviors based on change in instruction. In attempts to lessen the occurrences of unwanted behaviors, and to keep the male subjects more engaged during independent work time, the researcher provided the participating teacher with six multiple intelligence based approaches to implement in the classroom. The teachers collected the baseline data for 18 consecutive school days using the unwanted behavior chart. Teachers then began the implementation of the approaches; one approach was given at a time, each lasted for two weeks before the implementation of the next approach. After all six approaches were implemented, the teachers observed the male subjects and gathered more data using unwanted behavior tally charts identical to those used prior to the implementation of the approaches.

The six behaviors that were listed on the unwanted behavior tally chart included: placing head on desk, getting out of seat frequently, doodling/drawing, fidgeting, working on other school work, and talking. After comparing pre- and post-unwanted behavior tally charts, there was a decrease in unwanted behaviors as seen by the male subjects at both Leetonia Elementary
and McKinley Elementary. There were no areas indicating an increase in unwanted behaviors after the implementation of the new multiple intelligence based methods.

The single male subject at Leetonia Elementary displayed a decrease in all six unwanted behaviors when comparing data prior to the implementation of the new approaches to that collected after the implementation. The most significant decrease was the category of occurrences of *getting out of seat* from 40 total times to zero. *Talking* showed a significant decrease in occurrences from 89 total times to 24 total times after the implementation of the approaches. The other decreases included: *placing head on desk* from 24 total times to 14, *doodling/drawing* from 28 total times to 27, *fidgeting* from 45 total times to 18 and *working on other school work* from nine total times to zero.

After analyzing the data from unwanted behavior charts and watching the video recordings from the teacher, the researcher noted that using approaches that allowed students to talk and move freely kept the male subject engaged in the lesson. As a result of the teacher keeping the male student actively engaged, the teacher observed him demonstrating fewer unwanted behaviors. He appeared to enjoy the Teach-Okays (Biffle, 2013) that gave him the opportunity to turn and talk to his partner followed by directing his attention back to his teacher when asked to do so. The male subject participated actively in the use of Power Pix (Biffle, 2013). He demonstrated the gestures several times associated to the math term on the card.

The 16 male subjects displayed decreases in four of the six unwanted behaviors while the other two questions remained the same after the implementation of the new approaches. The six behaviors that decreased after the implementation of the multiple intelligence based approaches included: *placing head on desk* from nine total times to three, *getting out of seat frequently* from three total times to one, *fidgeting* from 150 total times to 19, and *talking* from 41 total times to
18. The two questions that remained the same included *drawing/doodling* at one total time and *working on other school work* at zero.

Based on video recordings from McKinley Elementary, students were actively engaged during Teach-Okays (Biffle, 2013) and Power Pix (Biffle, 2013). They, too, were up and moving around their area to teach partners the content provided from their teacher. Several times the teacher would have them talk in voices such as robots or squeaky mice which brought more enjoyment to the students. Subjects remained engaged during the use of Zearn (2015) on the class set of Chromebooks. During this time students did not ask to get out of their seats and did not talk to their neighbors. Students had whiteboards and markers as well as other hands-on manipulatives that they used during their Zearn (2015) session when needed. Students were able to freely access these materials and use them as they felt necessary.

The researcher hypothesized that incorporating multiple intelligence based methods would reduce the occurrences of unwanted behaviors as demonstrated by the male subjects. After the videos were analyzed, this hypothesis was supported. In videos from Leetonia Elementary and McKinley Elementary, male subjects responded well to the use of Teach-Okay (Biffle, 2013) and the use of Power Pix (Biffle, 2013). Students appeared to enjoy moving and talking during class time when directed to by the teacher which resulted in a decrease in the occurrences of unwanted talking. Students from both school districts remained engaged in the lesson when they were out of their seats moving while teaching their partner a particular Power Pix (Biffle, 2013) card. When students at both locations were asked to work independently on seat work they remained focused on the task rather than fidgeting with other materials or demonstrating other unwanted behaviors.
To discover more about the impact of the new strategies, the researcher e-mailed the participating teachers to ask what they thought to be the best methods, why they thought that way, and if they planned to continue the use of the methods. The Leetonia Elementary teacher responded, “I believe using the Power Pix was the most effective strategy that I used with my students because not only were they taught through movements and sayings, but they were available to them while completing a task.” She continued, “I believe the strategies benefited my male student by allowing him to move and talk while learning because that is what he would do during most math lessons.” When asked if she would continue the use of the strategies, she replied, “I will continue to use the Power Pix and Super Improver Team. I really enjoy the engagement and presentation of the Power Pix and, the Super Improver board is a great way to motivate the students and provide them a visual of their success.”

The McKinley Elementary teacher responded by stating:

I believe the use of hands-on manipulatives and Zearn along with the Teach-Okay strategy has had the highest impact on the students. They seem more engaged in learning, and the negative classroom behaviors have lessened. The Power Pix gave the students a physical gesture that seemed to help improve their focus and attention. The targeted students seem to quickly regroup when I would use the Teach-Okay. This strategy would bring the students back to either redirect or clarify which kept them more on-track.

She concluded by explaining, "I will continue to use Zearn, Teach-Okay and the math manipulatives each day. I will also continue using the Power Pix as the students like to have the physical gesture to help understand math concepts." Incorporating regular movement into classroom routines and transitions could provide a better classroom management style and allow
students to see that movement is part of their daily classroom routine (Gibson & Govendo, 1999; McFarlane, 2011). Based on the statements of both teachers, each teacher acknowledged in the success of the multiple intelligence based approaches in the context of keeping male subjects on task. One of the main points from the teacher at Leetonia Elementary was how the movement strategies kept the student motivated. This statement supports research by Buschick, Shipton, Winner, and Wise (2007) on how to motivate their middle school students to read during silent reading time. They decided to incorporate multiple intelligence based strategies during their reading class to try to motivate students and keep them on task. After the implementation of their methods, the results indicated that students demonstrated fewer unwanted behaviors, performed better on projects, and had a higher rate of reading motivation (Buschick, et al., 2007).

To answer the question, was there a reduction of challenging behaviors based on change in the instruction? he unwanted behavior tally charts were compared using the baseline and post data. Data indicated that the male subject from Leetonia Elementary displayed a decrease in all six of the unwanted behaviors as seen in the unwanted behavior tally chart. The 16 male subjects from McKinley Elementary displayed a decrease in four of the six unwanted behaviors including: placing head on desk, getting out of seat frequently, fidgeting, and talking. The remaining two behaviors of drawing/doodling and working on other school work stayed at zero in the baseline and post data. Video recordings corroborated this, as students were actively engaged during math lessons and demonstrating minimal unwanted behaviors. Students reacted positively to the new approaches. Based upon the teachers’ responses to the open-ended questions after the implementation of the multiple intelligence based methods gave students the opportunity to talk and move while learning which resulted in fewer occurrences of unwanted behaviors.
Recommendations

These findings suggested that the use of multiple intelligence based strategies lessened the occurrences of unwanted male students’ behavior while also keeping them engaged. For example, this study used Power Pix (Biffle, 2013), which allowed male subjects to learn math content by looking at a visual, saying a lyrical chant related to the key term, and giving a physical gesture that correlated to the term. One specific Power Pix (Biffle, 2013) card displayed a fraction for students to learn which number represents the numerator and denominator. The lyrical chant the student said was a syllabic breakdown of each word while the gesture included making two fists, one on top of the other, and shaking the top fist while singing “nu-me-ra-tor” and shaking the bottom fist while singing “de-nom-in-ator.”

Both teachers agreed that the approaches allowed the male subjects the opportunity to move while learning math content of the lesson. This not only gave students time to move to release energy, but also allowed them to talk to peers about classroom content rather than talking off topic. The use of the Power Pix (Biffle, 2013) and Teach-Okay (Biffle, 2013) appeared to be the most successful due to the times where students could move, chant lyrics, and discuss content with peers and truly show a joy for what they were learning in the classroom.

The implementation of Zearn (2015) also had positive results from the McKinley Elementary teacher. This site could be used with several grade levels in the mathematic classroom. Zearn (2015) employs a variety of demonstrations including visual models, rhymes, and virtual tutors to explain math content appropriate to specific grade levels. This program can be used regardless of the math curriculum as an extension to provide students with individualized experiences while exploring math subject areas.
The six multiple intelligence based approaches that were used in the math classroom for this study could also be implemented in other content areas as well. Teachers could adapt the methods to best fit the needs of their students and content area. As a result of the success documented by this study in the third grade, teachers should be willing to embrace these innovative approaches in order to increase the success in their classrooms as well.

Overall, the multiple intelligence based pedagogical approaches provided students the opportunity to encounter several areas of multiple intelligences. Some students may prefer working in groups, while others may prefer working alone. One student may like to talk and move while learning, and the other may like moving and manipulating objects to figure out a problem. Finding which multiple intelligence based method to implement is key and would benefit all learners in the classroom.

Future Research Opportunities

Researchers can take the findings from this study and apply these findings to more grade levels to increase the generalizability of the results. Expanding the study to include more schools, more male participants, and more learning approaches would provide additional data on this topic. Accordingly, the researcher has identified an agenda for future research. The researcher could conduct action research in her own classroom using identical approaches from this study, or expanding on other multiple intelligence based approaches as well. This study could gain more insight into the most effective approaches for male students by implementing the methods in urban or suburban school districts. With this study only including female teachers, a future study would be compelling to include male teachers as well. Collecting as much data on the effects of multiple intelligence based approaches will only strengthen the education field regarding the most effective methods to implement in elementary classrooms.
Another consideration that could be beneficial to future researchers would be to increase the length of the study. With this study’s time duration running from November through April at Leetonia Elementary and September through February at McKinley Elementary, there were a variety of factors that could have influenced the male subjects’ behaviors. For example, during this study the students had Halloween parties, Winter Break, Valentine’s Day, Spring Break, and third grade state assessments. Though this may sound irrelevant, these holidays and events are typically important to young students and may alter their regular behavior in the classroom. For those conducting similar future studies, the research design may benefit from starting at the beginning of the school year to the end for the most accurate findings. Based on the limitations such as population and time duration, these adaptations could be applied in future studies to increase the body of literature on the most effective approaches to implement in the classroom.

The research from this study is beneficial when researching multiple intelligence based methods to incorporate in the classroom while focusing on keeping male students engaged and reducing the incidences of unwanted behaviors. This study has found that the six approaches were well received by the participating teacher and the male subjects, particularly the use of Power Pix (Biffle, 2013) and Teach-Okays (Biffle, 2013). Future investigations of the efficacy of Whole Brain Teaching approaches aligned with multiple intelligences will be done in the researchers own classroom. Discovering how students receive and react to these methods will enhance the understandings of education researchers and educators by providing insight into the "why" and "how" of multiple intelligence based approaches benefit every learner in the classroom.
References


Biffle, C. (2013). Whole brain teaching for challenging kids (and the rest of your class, too!). Yucaipa, CA: Whole Brain Teaching LLC.


Appendix A: IRB Approval

Institutional Review Board

Date: November 2, 2015
To: Dr. Mary Cameron
Cc: Lindsey Roush
RE: Examining the Most Effective Pedagogical Approaches to Implement in the Elementary Math Classroom to Benefit Male Students

Project Expiration date: November 2, 2016

The University of Findlay Institutional Review Board (IRB) has completed its review of your project utilizing human subjects and has granted authorization. This study has been approved for a period of one year only. The project has been assigned the number 950.

In order to comply with UF policy and federal regulations, human subject research must be reviewed by the IRB on at least a yearly basis. If you have not completed your research within the year, it is the investigator’s responsibility to ensure that the Progress Report is completed and sent to the IRB in a timely fashion. The IRB needs to process the re-approval before the expiration date, which is printed above.

Understand that any proposed changes may not be implemented before IRB approval, in which case you must complete an Amendment/Modification Report.

Following the completion of the use of human subjects, the primary investigator must complete a Certificate of Compliance form indicating when and how many subjects were recruited for the study.

Please refer to the IRB guidelines for additional information. This packet can be obtained within blackboard under community section. Please note that if any changes are made to the present study, you must notify the IRB immediately. Please include that number on any other documentation or correspondence regarding the study.

Thank you very much for your cooperation. If you have any questions, please feel free to contact IRB at (419) 434-4640 or email irb@findlay.edu.

Sincerely,
Jennifer Fennema-Bloom, Ed.D.
Chair, Institutional Review Board

Cc: IRB Office
Appendix B: Invitation to participate in the study

Dear …

You are invited to participate in a study of examining the **Most Effective Pedagogical Approaches to Implement in the Elementary Math Classroom to Benefit Male Students**. I hope to learn the most effective pedagogical approaches to keep students engaged and to keep unwanted behavior minimal. You were selected to participate because you teach third grade math in a school district in Columbiana County. If you decide to participate, I would like to meet with all participants to discuss this study in more depth, as well as to provide you with research based strategies to implement in your classroom as the study progresses. As a participant, you will be required to complete a pre and post survey to determine which intelligence you typically use most frequently, and an observation form of unwanted behaviors of male students. You will also be required to complete a form for five days a week during the month of October. During this time, you will observe for 10 minutes during student work time in the lesson. A post observation form will also be completed during the month of February following the same guidelines as above. The researcher will also conduct interviews with you and the participating male students throughout the duration of the study. The principal will also record videos in your classroom of the male students during independent working time for observation purposes. On completion of this study the benefits to you include an increased awareness, and the acquisition of strategies to implement within your classroom. Any discomfort or inconvenience to you derives only from the amount of time taken to complete the survey and observation sheet.

Any information that is obtained in connection with this study that can be identified with you and your students will remain confidential and will not be disclosed. Your decision whether or not to participate will not prejudice any further relationships with The University of Findlay. If you decide to participate, you are free to discontinue the participation at any time without prejudice. If you have any questions, please ask Lindsey Roush at 330-277-6163 or by email at roushl1@findlay.edu. If you have any additional questions later, please contact Dr. Mary Cameron, 419-434-6626 or by email at cameron@findlay.edu or the IRB Chair at irb@findlay.edu

Thank you for your time.

Sincerely,

Lindsey Roush
Doctoral Student at The University of Findlay
330-277-6163
roushl1@findlay.edu
Appendix C- Teacher Pre- & Post-Survey

After the completion of the pilot group of teachers that took the original survey followed by meeting with the researcher and her dissertation committee, the survey was adapted to best meet the needs of this study. This survey was adapted from a survey created by Saban and Bal (2012) when researching math methods used in the classroom. The questions of years teaching, gender, age, and current level of education were added to the survey. A Google form was created for the survey administration in order to offer respondents easy access and ensure data integrity. The pre-survey was completed in January 2016 for Leetonia Elementary and September 2016 for McKinley Elementary. The pre-survey was completed before the start of the multiple intelligence based interventions. The post-survey which was identical to the pre-survey, was completed in May 2016 for Leetonia Elementary and January 2017 for McKinley Elementary. The post-survey was completed after the start of the multiple intelligence based interventions. The teachers responded to the following surveys as the pre- and post-survey. The teacher pre- and post-survey appear below.

Teacher Survey

Please answer the following questions honestly. To remain anonymous, please do no place your name on this survey. Also, please do not identify your students by name. Information in this survey will be reviewed only by the researcher and her advisory committee at the University of Findlay.

How many years have you been teaching third grade?
- □ 1-5 years
- □ 6-10 years
- □ 11-15 years
- □ 16-20 years
- □ 21-25 years
- □ Greater than 25 years

What is the level of education you have completed?
- □ Undergraduate degree
MULTIPLE INTELLIGENCE-BASED PEDAGOGICAL APPROACHES

- Undergraduate degree plus graduate level credits
- Master's Degree
- Master's Degree plus graduate level credits
- Terminal Degree (Ph.D., Ed.D., etc.)
- Other

What is your gender?
- Male
- Female

How old are you?
- 22-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51 or over

I utilize verbal expressions for making students remember the topic more easily.
Please answer how often you use the following in your classroom that utilizes the verbal linguistic intelligence

- Never
- A few times a month
- Once or twice a week
- In every lesson

I make students prepare a written report

- Never
- A few times a month
- Once or twice a week
- In every lesson

I identify some key words about the topic.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I associate some topics with the other courses.

- Never
- A few times a month
Once or twice a week

I convey the learned information by a mathematical formula.

Please answer how often you use the following in your classroom that utilizes the mathematical-logical intelligence.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I develop a strategy game (building relationship) related to the topic.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I expose similarities and differences to explain the topic.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I present different problem states.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I ask questions intended for using thinking skills.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I make students solve problems by using various methods

- Never
- A few times a month
- Once or twice a week
- In every lesson

I solve problems which make students explore mathematical rules and basic concepts.

- Never
- A few times a month
Once or twice a week

In every lesson

I ask problems that could be solved by using more than one strategy.

Never

A few times a month

Once or twice a week

In every lesson

I make students find the solutions by themselves.

Never

A few times a month

Once or twice week

In every lesson

I use different ways to solve a problem

Never

A few times a month

Once or twice a week

In every lesson

I find tongue twisters related with the topic and use them in class.

Please answer how often you use the following in your classroom that utilizes the musical intelligence

Never

A few times a month

Once or twice a week

In every lesson

I use some rhythm patterns while teaching some formulas and concepts.

Never

A few times a month

Once or twice a week

In every lesson

I associate some lyrics with the topics I cover

Never

A few times a month

Once or twice a week

In every lesson

I collect the songs about the topic and use them.

Never

A few times a month
I start the lesson with music

- Never
- A few times a month
- Once or twice a week
- In every lesson

I want students to tell explanations related with the topic by creating a rhythm

- Never
- A few times a month
- Once or twice a week
- In every lesson

I change the lyrics to song to relate to the topic at hand

- Never
- A few times a month
- Once or twice a week
- In every lesson

I draw tables/clusters/graphics/figures appropriate for the topic.
Please answer how often you use the following in your classroom that utilizes the visual-spatial intelligence

- Never
- A few times a month
- Once or twice a week
- In every lesson

I explain the topic with pictures.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I present the topic using one of the projector/Smartboard/video instruments/etc.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I make students prepare posters, notice boards, advertisements, or wall papers

- Never
- A few times a month
Once or twice a week
- In every lesson

**I use the board in my class**

- Never
- A few times a month
- Once or twice a week
- In every lesson

**I use the drama method**
Please answer how often you use the following in your classroom that utilizes the bodily-kinesthetic intelligence

- Never
- A few times a month
- Once or twice a week
- In every lesson

**I make students prepare materials related to the course**

- Never
- A few times a month
- Once or twice a week
- In every lesson

**I make students prepare models related to the topic.**

- Never
- A few times a month
- Once or twice a week
- In every lesson

**I make students prepare cards (games, puzzles, etc.) related to the topic which will be covered**

- Never
- A few times a month
- Once or twice a week
- In every lesson

**I assign homework that the students need to do on their own.**
Please answer how often you use the following in your classroom that utilizes the intrapersonal intelligence

- Never
- Once or twice a week
- In every lesson
- A few times a month

**I want students to explain their feelings/opinions related to the topic**

- Never
I create opportunities for the students to assess their own works.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I provide alternatives for the students while determining the annual assignment or project topics.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I make students work individually in the class.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I encourage the students about different thinking styles.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I create a supportive educational environment for the students who offer different ways to solve the problems.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I use different activities which are based on group work in my classes.

Please answer how often you use the following in your classroom that utilizes the interpersonal intelligence

- Never
- A few times a month
- Once or twice a week
- In every lesson

The students generally work in small groups in my class.

- Never
I use the thinking aloud problem solving method.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I make the students teach the topic to each other.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I give homework/project assignments that need to be done in groups.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I make use of nature to teach the concepts.

Please answer how often you use the following in your classroom that utilizes the naturalistic intelligence.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I associate nature with mathematics topics.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I assign some observation tasks about field calculations, geometric shapes, etc.

- Never
- A few times a month
- Once or twice a week
- In every lesson

I make the students form problems by utilizing their real life situations.

- Never
A few times a month
Once or twice a week
In every lesson
Appendix D: Unwanted Behavior Tally Chart

The following unwanted behavior tally sheet was adapted from an original behavioral tally chart created by Buschick, Shipton, Winner, and Wise (2007) while researching the frequency of unwanted behaviors during silent reading time. The participating teachers completed the chart for 18 days at the beginning of the study to collect baseline data. This was done for 10 minutes of independent work time in the math classroom. Only the male subjects that returned the needed consent form were observed. An identical unwanted behavior tally sheet was used to collect data by the participating teachers for 18 days after all multiple intelligence based strategies were implemented. This was done for 10 minutes of independent work time in the math classroom. An example of the unwanted behavior tally chart is shown below.

Observation Tally Chart- Before Multiple Intelligence Based Strategies
Please complete the following unwanted behavior tally chart for 18 days. This should be done during 10 minutes while students are working at center, activities, etc… Please make sure to move through the numerical roster during the observation.

<table>
<thead>
<tr>
<th>Date: ______________</th>
<th>Frequency of Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavior</strong></td>
<td></td>
</tr>
<tr>
<td>Placing head on desk</td>
<td></td>
</tr>
<tr>
<td>Getting out of seat frequently</td>
<td></td>
</tr>
<tr>
<td>Doodling/drawing</td>
<td></td>
</tr>
<tr>
<td>Fidgeting</td>
<td></td>
</tr>
<tr>
<td>Working on other school work</td>
<td></td>
</tr>
<tr>
<td>Talking</td>
<td></td>
</tr>
</tbody>
</table>

Total # of tally marks: ______