5-2008

Reducing Gender Stereotypes in Mathematics

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By

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May 2008

A thesis submitted to the

Department of Education and Human Development of the

State University of New York College at Brockport

in partial fulfillment of the requirements for the degree of

Master of Science in Education

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in Mathematics

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May 2008

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Chapter I

Introduction

Research over the last 20 years indicates many factors that have contributed to the trend that males outperform females in the area of mathematics. Researchers have suggested that family influences and the perception that mathematically related fields are masculine domains may be some of the causes. According to a 1999 report in the *Journal of Social Psychology*, family influences affect gender differences in math performance. Strong evidence was found that parents' perceptions about their child's ability in academic subjects are related to the child's attitude and academic performance. Parents develop impressions of their child's abilities and interests and then communicate their beliefs about math through their own practices (Hall, Davis, Bolen & Chia, 1999). The mere stereotype that "girls don't do well at math" may be enough to affect math performance. This may lead to anxiety and decreased performance for girls when put in a situation where the stereotype could be applied (Quinn, 2001). The perception that females are not equal to males in mathematics is one that needs to be addressed in our nation's schools immediately.

Whatever the causes may be, males are outperforming females in the area of mathematics. In 2000, the U.S. Department of Education released its results that examined the performance of boys and girls on achievement tests. It was found that in the stereotypically male subjects such as math and science, boys performed better, while in stereotypical female subjects, such reading and writing, the girls outperformed their counterparts (Kenney-Benson, 2006). Research indicates that similar gender differences

are apparent in international studies as well. In 1995, the Third International Mathematics and Science Study was conducted in 21 countries. In all but one country, the research revealed significant gender differences in math performance in favor of males (as found in Keller, 2002).

Problem Statement

Over the last seven years I have noticed an alarming trend in my elementary school. When it comes to classroom performance, males are outperforming females in the area of mathematics. Males tend to have a higher success rate while working on classroom investigation problems, teacher made tests and standardized tests. This year the gender difference is apparent again. When looking at the mathematics test results on the New York State Grade 5 Exam, males once again outperformed females for the 2006-2007 school year. There are 19 students currently in my class that took the grade 5 exam last year. Ten of the students are female and nine of the students are male. The males had an average scaled score of 655.3, out of 700, while the females had an average scaled score of 639.0. The males outperformed the females on average by 16.3 points. Perhaps a more descriptive way to assess the data would be to look at the students' raw scores, or number of questions that were answered correctly. On average the males answered 27.1 questions correctly while females answered on average 21.7. The males answered on average 5.4 more questions correctly than did the females.

Significance

It is important that female performance in math be equal to that of males. It can not be accepted by educators that girls typically score lower on math achievement tests just because the stereotype exists that math is a masculine area. Teachers need to be made aware that there is a gender difference in the performance of their students.

I do not believe it has ever been scientifically or medically proven that a genetic difference exists between males and females in the area of mathematical performance. Therefore there must be outside factors, such as family influences and stereotypes, which have contributed to this gender gap. As educators, we must look to create classrooms that are free of stereotypes and gender biases.

Rationale

Based upon previous research, I would tend to believe that most teachers are not aware of the gender differences that exist in their own classrooms. In a study by Tiedemann, math teachers were asked to consider the achievement of boys and girls in their classrooms. It was discovered that teachers thought their average achieving girls were less talented than their equally average achieving boys (2002). Furthermore, teachers may also not be aware of the subtle stereotypes they exhibit while teaching math everyday. Two types of sex bias have been consistently found in various studies. First, boys received more attention from teachers than girls. Second, boys were given more praise and critical feedback than girls (Tiedemann, 2002). Researchers believe that these stereotypes are one of the major contributing factors to why females are less likely to complete a major in mathematics in college or pursue a career in a math related field such as science or engineering.

In a recent study of undergraduate students, researchers discovered that women who possessed strong implicit gender stereotypes, such as males are better in math and science, were also least inclined to pursue a math-based career (Keifer and Sekaquaptewa, 2007). The main explanation for these results is that women did not want to lose their feminine identity. Women felt that by pursuing careers in math related fields, they would have to abandon some stereotypically female characteristics. This could create personal and professional conflicts for those women who did not want to abandon their feminine identity (Keifer and Sekaquaptewa, 2007). Some women felt they would be discriminated against or they would not be viewed as feminine if they pursued careers in professional fields that are historically male dominated.

These feelings and stereotypes are making it difficult for females to have the opportunities to pursue careers in their desired fields. Our nation's colleges, universities and workforce are losing competent and viable candidates based upon stereotypes that we as educators could help to fix. If we begin to change the perception in our schools that math is a feminine area, then we will begin to see the gender equality in schools that our students deserve in math related areas.

Method

I used a variety of strategies to ensure that female students in my classroom did not experience gender stereotypes and that they felt comfortable while working in math related subjects. Female students had the same opportunities as male students to participate in class and explore their interests without having to feel that they would be losing their feminine identity.

First, I looked at my own feelings about mathematics. I assumed personal responsibility for encouraging females in this area. Female students need to feel that they are just as capable as the male students and this is the sole responsibility of the teacher by creating a safe and supporting learning environment. I provided small, single sex group work opportunities so females had the opportunity to work separately from males. This gave them a chance to work in an environment where they felt more comfortable. I also provided situations, used language, problems, and activities that were more relevant to girls. For example, instead of creating word problems that involved stereotypical male interests, problems were generated to meet the interests of females. Rather than discussing football and racecars, the questions were about hopscotch and shopping which tend to be stereotypical female interests.

A final strategy I addressed was working with the parents of female students. I believe that if parents can change their perceptions about female performance, they will then pass their beliefs onto their children. I contacted all parents or guardians of my female students and helped them with strategies that would promote female achievement in math and math related fields from home. My goal was to determine if this approach would give female students a more positive outlook on math and allow then to come to school eager and ready to be successful in these related subject areas. The following chapter analyzes the current research on gender equity in the classroom. In the literature review I discuss the history of gender equity beginning with the inception on Title IX in 1972, ways to create gender equity in mathematics, and the effects of single sex classrooms on both male and female students.

Chapter II

Literature Review

History of Gender Equity

June 23, 2007 marked the 35th anniversary of the passage of Title IX. Often referred to as the gender equity act, this piece of legislation prohibits sex discrimination in any education program or activity within an institution receiving any type of federal financial assistance. The main objective of Title IX was to help guarantee equity for women in athletics. Before the gender equity act was passed in 1972, fewer than 30,000 college women participated in sports. Today, that number is more than 128,000 (Winchester, 2007). Since its passage, Title IX has been responsible for numerous changes in our nation's schools, which were designed to guarantee equal treatment and opportunities for females in educational settings. Even with these changes, there are still gaps in the achievement levels of males and females. Males are treated differently than females, especially in math and science, and experience higher rates of success in these subjects (Gavin and Reis, 2003).

So the question remains, why do males outperform females in math and science? Gavin and Reis suggest that lower achievement levels of females in math and science is not attributed to ability or lack of effort. Rather, it is due to the fact that females are not expected to excel in this area by parents, teachers and peers. Mathematics is often thought of as a "male" field and our society holds this image of scientists and mathematicians being male. It is these stereotypes that influence the performance and contribute to girls' problems in math and related fields (2003).

In 2002, Congress passed The No Child Left Behind Act. Its main emphasis was the attainment of high achievement for all students. This legislation has played a major role in determining whether students are learning through the use of standardized assessments. Ryan and Ryan suggest that The No Child Left Behind Act is not meeting its desired goals. Studies found that while female grades were often higher in the classroom, their math test scores were lower than males in early adolescence. Many explanations have been offered for these findings (2005). Societal stereotypes, not mathematical abilities, may be the leading cause for the lower success rates of female students. These stereotypes create situational pressure that decreases their performance (Ryan and Ryan, 2005).

The most influential research on gender inequity in the classroom can be found in a report released by the American Association of University Women (AAUW). The report describes the American classroom as a "hellhole for girls, where female students were invisible, ignored, silenced, and broken by a loss of self-esteem" (Leo, 1999 p. 24). Although many people believed that the report was "false political propaganda", the media made America aware of a growing issue in our nation's classrooms. The AAUW report claimed that teachers call on male students more often and allow them to call out answers eight times more often than female students. These findings were seen everywhere including television talk shows, lecture halls and newspapers. The report went on to state that boys received up to eight times more attention than girls. Whether the attention was negative or positive, it was time taken away from female students who were acting appropriately (Leo, 1999).

The University of British Columbia in Vancouver, Canada conducted a survey concerning women's perceptions about their mathematic abilities. According to the 2007 article in the *Communications of ACM,* a group of women were told that men and women perform equally well in math. The second group of women were told that there is a genetic difference in math ability and males have an advantage. The two groups then took identical math tests. The first group of women who were told that men and women perform equally well in math scored higher than the group who was told there was a genetic difference. This is referred to as a stereotypical threat by psychologists. This means "That if a member of a group with a negative stenotype proceeds to test that stereotype, they will most likely fail due to the pressure." (p.10).

Kim Gandy, a math major, and teacher, states that one of the most enduring stereotypes about the sexes is that male's mental abilities are better suited than women's for science, technology, engineering and math which she refers to as STEM. She feels that it is statements and beliefs such as the ones made by then-president of Harvard University, Lawrence Summers, which are creating the biggest obstacles for women in STEM (Gandy, 2007). Summers suggested that women's "intrinsic aptitude" held them back in science and math. Gandy believes that if society can overcome these myths and stereotypes it can create an education system for females that was intended by the mandates of Title IX.

Recent studies indicate that as girls move from elementary, to middle and on to high school, they gradually lose interest in math and science. The National Science Foundation found that 66% of girls and 68% of boys reported liking science and math in fourth grade. By eighth grade, twice as many boys as girls expressed interest in these

same areas. The drop-off continues as females choose college majors and the reasons are more related to acceptance than aptitude (as found in Gandy, 2007). The National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine recently conducted a survey in which they found that "women are very likely to face discrimination in every field of science and engineering."(Gandy, 2007 p. 8a). Gandy strongly believes that the only way to break down the barriers girls continue to face in education is to make sure Title IX is fully enforced. The solution, Title IX, to end the gender inequity is already in place, society just needs the confidence to demand its application (Gandy, 2007).

Sanders and Peterson have similar views to Gandy as to why females lose interest in math and science as they progress through school. They use the image of a funnel to illustrate the relative access of women and men to math related fields. At the top of the funnel are all students with equal access to math education. As females move through middle and high school, the types of experiences they have are the critical factors that often lead to declining female enrollments and negative attitudes at the post-secondary level. Educational researchers have described female experiences as negative in middle and high school, thus leading to lower female interests in math and science (Sanders and Peterson, 1999).

Social interaction and social influences may be another reason why women shy away from technically oriented fields such as math and science. Some researchers speculate that females tend to value more group-oriented activities. Working in fields such as math and science does not allow females to pursue these interests according to Cavanag. (2005). Cavanag's research indicates that girls have less confidence in their

math and science abilities. Therefore, they prefer working in group situations where they can discuss the problem and fix any errors before sharing their answers with peers.

In 2006, a panel convened by the National Academies released a report that blamed bias for the gender gap in mathematics and science. The panel concluded that females are not innately less capable than men, but because of biases, discrimination, and outdated institutional structures, women are underrepresented in positions of math and science (Fogg, 2006). The report firmly rejected statements made by Summers stating that the gap may be attributed to innate differences in ability. The panel's findings concluded that they could not find "...any significant biological differences between men and women in performing science and mathematics that can account for the lower representation of women in these fields" (Fogg, 2006 p.95).

The panel blamed environments that favored men for the discrepancy in gender performance. They further stated the continuous questioning of women's abilities and commitment to an academic career further hinders their ability to pursue a career in math or science. Finally, the panel suggested that the academic system rewards traits such as assertiveness, that are socially less acceptable in women, instead of rewarding students based on merit (Fogg, 2006). Harter found that if teachers and parents serve as positive role models and foster equitable perceptions, students would have higher academic achievement and better self concepts. If students are treated in gender-biased ways, it could hinder their social and academic development (as found in Hong, 2005). Harter goes on to state that the ability of female and male students to voice their personal opinions is strongly influenced by support from parents and teachers. If students are not

supported in expressing their true feelings and opinions, then their sense of worth as a person would be compromised (as found in Hong, 2005).

Sax disputes the notion that there is no biological difference between men and women when it comes to performance in mathematics and science. He believes that there is a distinct genetic difference in the way male and female brains function. Sax states that by ignoring the fact that these genetic differences do exist, educators actually end up discouraging females in math and science courses (as found in Cavanag, 2005). In his book, *Why Gender Matters,* Sax describes how boys tend to benefit from a straightforward approach to teaching mathematics from the beginning of their schooling. On the other hand, girls use a different portion of their brains to perform those exercises. Females would benefit from an approach that is more connected to language and other functions because they use a different portion of their brains. When teaching females the focus should be on more of a "real world" explanation of the numbers (Cavanag, 2005).

Adding to this controversy, new research with monkeys seems to suggest that males have an advantage in math. The findings also show that female monkeys can easily catch up with extra training which indicates that curricula could be designed to help both males and females reach their full potential (Beckman, 2005). The curriculum could allow for females to have extra time and information presented more than once so they do not fall behind males early on in education. These findings were discovered when a team of researchers tested 90 young, middle aged and old monkeys of both sexes in a game of spatial ability. The research was conducted at Emory University in Atlanta, Georgia. The object of the game was to remember where treats were hidden under a disc on a board with 18 possible spots. On average the males retrieved 2.6 treats versus the 2.2 that were

discovered by the females. This data seems to suggests better innate spatial memory in the males (Beckman, 2005).

Contradicting this belief, Elizabeth S. Spelke, a Harvard University psychology professor, believes there is little evidence that suggests differences exist in the structure of the male and female brains and how they affect the way in which the two sexes learn math and science. Based on her 2004 findings, Spelke states that "We don't have a male or a female brain: we have a human brain, with a whole lot of commonality," (as found in Cavanag, 2005 p. 27).

Creating Gender Equity in Mathematics

Many theories and practices have been discussed over the years on how male and female students learn best. Perhaps the most widely debated practice is the idea of single-sex classes. Educating students separately, especially in math and science, may give teachers and female students the opportunity needed to create gender equity in the classroom.

As many as a dozen states across the country have experimented with the idea of creating single-sex classrooms. The most common reasons that districts are willing to try such measures are to boost girls' math and science scores, eliminate distractions and tighten up on discipline problems (Hancock and Kalb, 1996). Hancock and Kalb state that research shows single-sex classrooms produce girls with more confidence and higher grades. At a high school in Presque Isle, Maine an all girl algebra class is offered for female students. It was found that girls who took the algebra class were twice as likely as their coed counterparts to go on and enroll in advanced classes in high school and college

(Hancock and Kalb, 1996). For many teachers and students involved in single-sex education there is no debate whether or not they are effective. At Marsteller Middle School in Virginia, science teacher Sheryl Quinlan states "Single-sex classes let her kids think with something besides their hormones" (1996 p. 76). If you take away pressure from peers, Quinlan believes miracles can happen. Eight grade girls at the same high school say they prefer doing science experiments without boys around to hog the equipment. As for the boys, they state that they would rather recite Shakespeare without girls around to make them feel like "geeks". At Marsteller Middle School, school officials believe single-sex classes benefit all who are involved, teachers, female and male students (Hancock and Kalb, 1996).

Evans believes that single-sex classes are the starting point in creating gender equity in the classroom. Evans states that it has been proven that boys and girls learn differently. It is now the responsibility of educators to teach students based upon their strengths and weaknesses. Separating students in elementary school would provide them with a stronger sense of self and prepare them to succeed in higher education (Evans, 2007).

South Carolina has served as a training ground for single-sex education and programs have been in place there since 2004. David Chadwell, Director of Single-Gender Initiatives for the South Carolina Education Department, believes that based on "...cutting-edge scientific research and our early experiences, ... single-gender classes can offer teachers unique opportunities to support and challenge students" (Chadwell, 2007 p. 10a).

In classrooms that are involved in single-sex programs in South Carolina, boys and girls learn by using the same state academic standards. Students are held to the same high expectations the only difference being the instruction practices delivered by teachers. Single-gender programs do not have smaller class sizes or more resources, just different models of instruction to meet the unique learning styles of boys and girls. Some of these models include presenting information that relates to the interests of female students and using a multi-sensory approach based upon how each student learns best (Chadwell, 2007).

If teaching in a single-sex classroom is not an option, female students should still be given the opportunity to work in small single-sex groups within a heterogeneous class. Some current research indicates that girls tend to thrive in small group work, especially all female groups. Boys tend to dominate coed groups and monopolize the discussions while girls observe more and become the recorders (Gavin, Katherine, Reis and Sally, 2003). Math clubs, computer camps and summer math programs designed specifically for girls are other ways for females to experience math in non-threatening learning environments. It is important to remember though, that single-sex classes and learning opportunities are only successful when the teacher creates a safe and nurturing learning environment for all students (Gavin, et al. 2003).

In 2005, Johns, Schmader and Martens tested whether informing women about stereotypes in mathematics was a useful intervention to improve their performance in testing situations. Men and women were given math problems to complete that were described as being difficult. In the second condition, in which the teaching-intervention was used, the test was also described as being difficult, but participants were informed

that stereotype threat could interfere with women's math performance. The results from the first study group in which the stereotype was not discussed showed that women performed worse than men. In the second condition, in which they learned about the stereotype, there was no measurable difference in performance. These results suggest that teaching about stereotype threat might offer a way to reduce test anxiety and raise female performance in mathematics (Johns, et al. 2005).

In Dallas, Texas, gender –equity workshops have been established to help inform teachers of classroom practices that promote gender equity. Teachers attend workshops where they learn specific strategies that promote gender equity in the classroom. They learn ways to make each female student feel competent, important and talented in mathematics by developing curriculum and class discussions that are specific to female needs and interests (Sanders and Nelson, 2004). Taking a similar approach is Rossi Becker, who is a professor of mathematics at San Jose State in California. She arranges workshops that encourage females to stay interested in math and science. She also advises teachers to offer students a mix of male and female role models who have succeeded in those fields. Finally, Becker offers suggestions on how to make sure girls remain an active part of math and science class, even though boys tend to be more assertive in such settings. A simple approach such as alternating back and forth between male and female students during class discussions could help maintain female students as active members of class (Cavanag, 2005).

Sanders and Peterson also believe that staff development is the best way to promote gender equity. Principals would be better advised to provide high quality staff development in gender equity rather than resort to single-sex math classes. Research over

the last few decades has greatly increased our understanding of the relationship between gender and math achievement. Educators have learned that achievement differences are not biological, but rather the product of social and cultural factors. Therefore the most effective way to create a gender equitable classroom is not by segregation but rather by using various strategies that help ensure girls continue to participate and achieve in both math and math related careers (Sanders and Peterson, 1999).

Sax believes that a few changes in the classroom can make a big difference for female students. Sax, asserts that "Everything needs to be different, if you want to make math, physics and computer science girl-friendly" (2007 p. 24). He suggests that teachers need to use gender specific strategies while teaching certain subjects such as math and science. A simple approach, such as looking female students in the eye during a lesson, could help build their confidence. Female students tend to benefit from this tactic, while this gesture can be seen as threatening to boys (Cavanag, 2005).

Aikman feels that the way to achieve gender equality is through curriculum and pedagogy change. She believes that not only is gender inequality a social condition in which females live, but often pervades their educational experience. Curricula needs to be developed that promotes gender equality and gender-equitable pedagogical practices must be in place (Aikman, 2005). Aikman states that a broad range of views of women from different social groups are included in curriculum development and review processes. The presence of women in decision making bodies can have an extremely beneficial effect on shaping a curriculum that is responsive to diverse needs (Aikman, 2005).

Since teachers are central to the delivery of the curriculum, classroom practices must promote boys and girls participating in learning as equals. In a 2004 study, Arnott found that teachers have lower expectations of the intellectual abilities of girls, and girls have correspondingly low expectations of themselves (as found in Aikman, 2005). The study also showed that these low expectations are reinforced by textbooks, curriculum and examination materials. A pedagogy change would increase the consciousness among students of misconceptions, prejudices, and stereotypes. One change could be classroom organization that would allow for increased participation of female students.

Also, placing a greater value on students' experience and knowledge, and closer involvement of students in planning and evaluating their educational work could reduce gender inequality (as found in Aikman, 2005). According to Aikman, teachers must first become aware that curricula and pedagogy changes need to take place and it is the job of the government to make them aware. Trainings need to be developed that help teachers understand gender-equity issues and how to overcome them in the classroom. Teachers need on-going support by creating networks of teachers who can work together on new pedagogies through school clusters and school centers (Aikman, 2005).

Gender stereotyping and gender inequity are issues in other nations as well. Many researchers believe it is more prevalent in Asia than the United States where the culture and society have been influenced by centuries of male dominated lifestyles (Hong, 2005). In 1997, the Ministry of Education in Taiwan enacted a provision for "gender equity education". It is similar to the U.S. Department of Education's Title IX Amendments. The goal of the ministry was to give students the opportunity to learn about gender equity, to moderate and ultimately eliminate gender stereotyping. In response to the new

legislation, a study was conducted to investigate the perceptions of Taiwanese students and teachers concerning topics and teaching strategies related to gender issues. Based upon the results of the study, the goal was to develop curricula that was gender equitable and meaningful. The results of the study revealed that there was a discrepancy between students and teachers in what they perceived to be important gender-education topics (Hong, 2005). When given thirty topics to choose from, only two topics were among the top ten most important for both students and teachers. Students believed that strategies on how to interact with the opposite gender and gender-equity perception were the most important while teachers chose understanding personality and marriage management. In response to these results new curricula was developed in regards to gender education in Taiwan. Topics that elementary teachers now cover include family sex education, prevention of sexual harassment and how to understand the meaning of gender equity (Hong, 2005).

Effects of Single-Sex Classrooms

When discussing any change in education, there are always advantages and disadvantages that need to be considered. This is certainly the case when examining the question of whether or not students learn better in single-sex classrooms. Early research shows that girls gain the most benefits from homogeneous gender classrooms for math and science (Kirschenbaum and Boyd, 2007). They tend to feel more comfortable about their abilities and are not worried about how they appear to boys. Furthermore, they have more opportunities to answer questions and participate in classroom discussions which tend to be dominated by males in a heterogeneous classroom. Research also indicates that

teachers tend to call on boys more often then girls during math and science class, therefore single-gender classes would alleviate such teacher tendencies (Kirschenbaum and Boyd, 2007). Current research also indicates that boys benefit from single-sex classes as well. Teachers can adapt their teaching strategies to meet the unique learning styles of male students. Boys tend to be more direct and confrontational, therefore classroom learning activities can be structured in ways that allow male students to use these qualities (Kirschenbaum and Boyd, 2007).

Other research indicates that there is a qualitative difference in the single-sex class environment that makes females prefer it to a coed classroom (Gavin, Katherine, Reis and Sally, 2003). In studies of middle school girls, it was found that girls were more likely to answer questions in math single-sex classrooms. Female students appeared more confident with their abilities and were not overwhelmed due to the fact that their male counterparts were not present (Gavin, et al. 2003).

Even though the opposite gender may be a distraction for some students, Boyd feels a true element of education is lost when students are grouped by gender. If our education system moves towards single-sex classrooms, the diversity of questions would be lost, along with the interests and perspectives of the opposite sex which adds to the learning of students. Boyd states that in order to prepare students for future families, homes and workplaces we need to promote appropriate social interaction with the opposite sex. Educators need to teach respect and appreciation for gender differences and a school classroom allows the opportunity to do so. Boyd also feels that the efforts of educators should not be focused on how they can separate students, but rather how students can be brought together. He states that it is his experience that "Students tend to

learn better when teachers learn to teach better, regardless of the gender of the students" (Kirschenbaum and Boyd, 2007 p. 41).

Sanders and Peterson also believe that single-sex classrooms are not the answer to creating gender equity in the classroom. They feel that research does not provide a strong foundation for single-sex classrooms. Although it has been documented that females prefer single-sex math and science classrooms, there are no accompanying achievement gains to support the belief that these classrooms are successful (Sanders and Peterson, 1999). They believe that teachers need to learn how to recognize and counteract gender bias in the coed classroom. When this happens, girls will perceive the classroom environment as positively as a single-sex environment.

Coed schools with single-sex classrooms may also be problematic due to legal constraints. Under Title IX, all public and private schools receiving federal funds are prohibited from reserving any school offering or program, such as a classroom or club, exclusively to one sex. There are some exceptions such as contact sports, chorus vocal requirements, and courses on human sexuality. At this time though, single-sex math and science classrooms are not considered to be an exception under the laws of Title IX (Sanders and Peterson, 1999).

Chapter 3

Applications and Evaluations

Introduction

The purpose of this study was to determine the effects of gender stereotypes as they relate to male and female students' academic achievement levels in mathematics and science. There were two objectives of this study. The first and main objective was to determine how gender biases and stereotypes affect female performance in the classroom and on standardized testing. The second goal of the research study was to implement strategies that would increase female achievement in stereotypically male subject areas. Furthermore, this study helped determined why gender stereotypes exist in schools and what we as educators can do to eliminate them.

Participants

The members of the target group for this one-month study were sixth grade students in an elementary school in the Rochester City School District. This year, over 90% of students from this school received free or reduced lunch and breakfast. This elementary building houses about 1,000 students from Pre-K through sixth grade. My classroom is comprised of twenty three students which was the target group for this research study. There were twelve boys and eleven girls. Of the twelve boys three of them were Hispanic and eight were African American. Of the eleven girls six of them were Hispanic and five were African American. This classroom was an inclusion classroom with a full time special education teacher in the classroom at all times. Of the twenty three students, eleven had individualized educational plans at the time the study

was conducted. Nine students were classified as having a learning disability, one student was classified as emotionally disturbed and one student as having a speech impairment. All inclusion students participated in the study and received testing modifications when necessary.

Procedures

In response to research over the last twenty years that indicates males out perform females in mathematics, I decided to analyze the mathematical achievement levels of the males and females in my classroom for the 2007-2008 school year. First, parents and students were given consent forms (see Appendix A) that were required to be signed before they could participate in the study. I then took a look at the student's fifth grade New York State Mathematics Exam results for the 2006-2007 school year to determine if a gender achievement gap existed for this target group. Nineteen of the twenty three students for the target group took the exam and on average the males scored 16.3 points higher than the females. The other four students came from out of state and test results were not available at the time of the study. All twenty three students were then given a pre assessment. It was a fifth grade New York State practice exam that consisted of 26 multiple choice questions. None of the questions covered sixth grade curriculum. That way, my teaching would not influence the results of the exam. All information on the exam should have been covered during the students' fifth year experience.

Students and parents/guardians were then given a survey to complete. The student survey (see Appendix B) was used to determine the confidence levels and stereotypes students may have when participating in math and reading. The parent survey (see Appendix C) was used to determine how successful parents feel their children are in math

and reading. Also, the parent survey was used to determine if there was any relationship between parental stereotypes and the achievement levels of their children.

Students participated in mathematics instruction for one hour and fifteen minutes everyday. It was my goal during this time to change student perception that math is a masculine subject. Females need to feel more comfortable and confident that they can achieve the same or higher levels of success than males in math. To ensure that female students develop more confidence in math, I took a look at my own feelings and assumed personal responsibility to encourage female achievement. I consciously called on female students who I knew had the correct answers. I used this approach instead of randomly calling on students or only calling on the student who raised their hand first. If a female student did not have the correct answer I would not just give it to her. I would give her hints and not the solutions this way building her self confidence. I wanted female students to realize that if they were persistent they could seek their own solutions and did not need someone to give them the answer.

During class instruction and work time, students worked in single-sex learning groups. This allowed for the female students to work in a setting that was quieter and less competitive. Female students felt more comfortable working with the same sex and were more likely to answer and ask questions without fear of being embarrassed in front of their male counterparts. While working in single-sex groups, female students were given mathematical questions that were specific to their interests. At the beginning of the study students were given an informal survey to determine their interests and leisure activities. Questions were developed based on the responses of the female students. Some typical

female interests included shopping or jumping rope compared to the male responses that involved sports or playing video games.

During English Language Arts, female students were given the opportunity to read about and research influential women in math and science. They visited websites such as www.iwaswondering.org that featured the accomplishments of women in mathematic and scientific fields. Students were then required to write a brief essay on one woman that they learned something new about. This allowed young girls to realize that males such as Einstein and Newton were not the only famous mathematicians and scientists.

After one month of implementing the various strategies discussed to improve female achievement in math, students were given a post assessment . The post assessment was used to determine if the change in teaching strategies improved female achievement in mathematics. The students were also given the same survey they took at the beginning of the research study (see Appendix C). The survey was given again to determine if there was any change in confidence levels or stereotypes for students as they relate to math and reading. The results were analyzed to determine if student perception and stereotypes changed as they related to their feelings about math. The results and data to the pre-assessment, post-assessment, student, and parent surveys can all be found in the next chapter.

Chapter 4- Results

Pre-Survey Responses

The pre-survey was intended to identify pre-existing stereotypes or beliefs that students had as they related to math and reading. The survey examined not only what subject they preferred but also what subjects they perceived their classmates preferred. Lastly, students were asked questions about how they thought their parents felt about them as students. Twenty-one sixth grade students completed the pre-survey: 10 male and 11 female students.

Table 1 represents all twenty-one student responses to each of the twelve survey questions. The survey questions are listed on the left, while the answers from the males and females are listed in the following columns. The student responses are listed as a percentage of how students answered each question. Students could answer reading or math and yes or no. Results of the pre-survey can be found on the following page.

Table 1: Student Pre-Survey Responses

Question	Males	Females
Which subject are you better in?	Math: 80% Reading: 20%	Math: 55% Reading: 45%
Which subject do you like better?	Math: 50% Reading 50%	Math: 45% Reading: 55%
Do you think you will pass this year's NYS Math Exam?	Yes: 90% No: 10%	Yes: 64% No: 36%
Do you think you will pass this year's NYS ELA Exam	Yes: 100% No: 0%	Yes: 91% No: 9%
Do you read at home?	Yes: 30% No:70%	Yes: 55% No: 45%
Do you practice your math skills at home?	Yes:40% No:60%	Yes: 36% No 64%
Do your parents encourage you to read at home?	Yes: 80% No: 20%	Yes: 82% No: 18%
Do your parents encourage you to practice math at home?	Yes: 50% No: 50%	Yes: 45% No: 55%
Do your parents think you are good at math?	Yes: 100% No: 0%	Yes: 100% No: 0%
Do your parents think you are a good reader?	Yes: 90% No: 10%	Yes: 91% No: 9%
What subject do you think females like better?	Math: 20% Reading 80%	Math: 9% Reading 91%
What subject do you think males like better?	Math:60% Reading 40%	Math: 82% Reading 18%

According to Table 1 above, both male and female students believed that they perform better in math than reading. Although both genders shared this feeling, a larger number of males (80%), than females (55%), believed this to be true. Both genders also believed that they would pass the NYS Math Exam. Again, a larger number of males (90%) compared to females (64%) felt that they would pass the exam. Student responses to questions that related to parental feelings gave no indication that stereotypes existed in these areas. The data was consistent in both male and female responses for questions that

related to parental feelings. Both genders believed that females prefer reading over math. Eighty percent of males felt this way and 91% of females. Both genders also believed that males prefer math over reading. Sixty percent of males and 82% of females believed this to be true.

Post-Survey Responses

The questions on the post survey were the same as the ones found on the pre-survey and were given one month after the strategies that were discussed in Chapter 3, Applications and Evaluations, had been implemented. The post-survey was intended to determine if student perception and stereotypes changed as they related to their feelings about math and reading. Eighteen sixth grade students completed the post-survey: nine male and nine female studetns. Due to classroom restructuring of students and movement, fewer students participated in the post survey.

Table 2 represents all eighteen students who completed the survey. The questions are listed in the left hand column with the student responses in the following two columns. The student responses are listed as a percentage of how students answered each question. Students could answer reading or math and yes or no. The results of the post-survey can be found on the following page.

Table 2: Student Post-Survey Responses

Question	Males	Females
Which subject are you better in?	Math: 78% Reading: 22%	Math: 78% Reading: 22%
Which subject do you like better?	Math: 78% Reading 22%	Math: 22% Reading: 78%
Do you think you will pass this year's NYS Math Exam?	Yes: 89% No: 11%	Yes: 89% No: 11%
Do you think you will pass this year's NYS ELA Exam	Yes: 100% No: 0%	Yes: 89% No:11%
Do you read at home?	Yes: 56% No:44%	Yes: 44% No: 56%
Do you practice your math skills at home?	Yes:78% No:22%	Yes: 44% No 56%
Do your parents encourage you to read at home?	Yes: 89% No: 11%	Yes: 78% No: 22%
Do your parents encourage you to practice math at home?	Yes: 78% No: 22%	Yes: 78% No: 22%
Do your parents think you are good at math?	Yes: 100% No: 0%	Yes: 100% No: 0%
Do your parents think you are a good reader?	Yes: 89% No: 11%	Yes: 67% No:33%
What subject do you think females like better?	Math: 33% Reading: 67%	Math: 44% Reading: 56%
What subject do you think males like better?	Math:56% Reading: 44%	Math: 56% Reading:44%

According to Table 2 above, after one month of implementing various strategies to promote gender equity in the classroom, 78% of males and females felt that they were better in math than reading. Although females stated they were better in math, 78% preferred reading over math compared to 22% of males who preferred reading. Male students (67%) and female students (56%) believed that females preferred reading over math. Both male and female students also believed that males preferred math over reading (56% for both genders). More males than females stated that they read at home,

56% compared to 44% and also more males practiced math skills while at home, 78% compared to 44%.

Table 3 represents all ten male students who took the pre-survey and all nine male students who took the post survey. The survey questions are listed on the left, while the answers to the pre and post surveys are listed in the following columns. The last column will show the change in beliefs that males experienced in the time between the pre and post assessments. The results can be found on the table below.

Table 3: Male Pre and Post Survey Responses

Question	Male Pre-Survey	Male Post-Survey	Change in Male Perception
Which subject are you better in?	Math: 80% Reading: 20%	Math: 78% Reading: 22%	Math: -2% Reading: +2%
Which subject do you like better?	Math: 50% Reading 50%	Math: 78% Reading: 22%	Math: +28% Reading: -28%
Do you think you will pass this year's NYS Math Exam?	Yes: 90% No: 10%	Yes: 89% No: 11%	Yes: -1% No:+1%
Do you think you will pass this year's NYS ELA Exam	Yes: 100% No: 0%	Yes: 100% No: 0%	Yes: No change No: No Change
Do you read at home?	Yes: 30% No:70%	Yes: 56% No: 44%	Yes: +23% No: -23%
Do you practice your math skills at home?	Yes:40% No:60%	Yes: 78% No 22%	Yes:+38% No: -38%
Do your parents encourage you to read at home?	Yes: 80% No: 20%	Yes: 89% No: 11%	Yes: +9% No: -9%
Do your parents encourage you to practice math at home?	Yes: 50% No: 50%	Yes: 78% No: 22%	Yes: +28% No:-28%
Do your parents think you are good at math?	Yes: 100% No: 0%	Yes: 100% No: 0%	Yes: No change No: No change
Do your parents think you are a good reader?	Yes: 90% No: 10%	Yes:89% No: 11%	Yes: -1% No: +1%
What subject do you think females like better?	Math: 20% Reading 80%	Math: 33% Reading: 67%	Math: +13% Reading :-13%
What subject do you think males like better?	Math:60% Reading: 40%	Math:56% Reading: 44%	Math: -4% Reading:+4%

According to Table 3 on the previous page, the various strategies that were implemented affected male perception as it relates to academic performance in the classroom. After the post-survey, 78% of males stated that they preferred math over reading compared to 50% who held this belief on the pre-survey. That is an increase of 28%. Also, 78% of males stated on the post-survey that they now practice math skills at home. This is an increase of 38% from the pre-survey. Finally, male perceptions about female interests also changed. On the pre-survey, 20% of males stated that females preferred math over reading. On the post-survey that number rose to 33%, a 13% increase.

Table 4 represents all 11 female students who took the pre-survey and all nine female students who took the post survey. The survey questions are listed on the left, while the answers to the pre and post surveys are listed in the following columns. The last column will show the change in beliefs that females experienced in the time between the pre and post surveys. The results can be found on the following page.

Table 4: Female Pre and Post Survey Responses

Question	Female Pre-Survey	Female Post-Survey	Change in Female Perception
Which subject are you better in?	Math: 55% Reading: 45%	Math: 78% Reading: 22%	Math: +23% Reading: -23%
Which subject do you like better?	Math: 45% Reading 55%	Math: 22% Reading: 78%	Math: -23% Reading: +23%
Do you think you will pass this year's NYS Math Exam?	Yes: 64% No: 36%	Yes: 89% No: 11%	Yes: +25% No:-25%
Do you think you will pass this year's NYS ELA Exam	Yes: 91% No: 9%	Yes: 89% No:11%	Yes: -2% No: +2%
Do you read at home?	Yes: 55% No:45%	Yes: 44% No: 56%	Yes: -11% No: +11%
Do you practice your math skills at home?	Yes:36% No:64%	Yes: 44% No 56%	Yes:+8% No: -8%
Do your parents encourage you to read at home?	Yes: 82% No: 18%	Yes: 78% No: 22%	Yes: -4% No: +4%
Do your parents encourage you to practice math at home?	Yes: 45% No: 55%	Yes: 78% No: 22%	Yes: +33% No:-33%
Do your parents think you are good at math?	Yes: 100% No: 0%	Yes: 100% No: 0%	Yes: No change No: No change
Do your parents think you are a good reader?	Yes: 91% No: 9%	Yes: 67% No: 33%	Yes: -24% No: +24%
What subject do you think females like better?	Math: 9% Reading: 91%	Math: 44% Reading: 56%	Math: +35% Reading : -35%
What subject do you think males like better?	Math: 82% Reading: 18%	Math:56% Reading: 44%	Math: -26% Reading:+26%

According to Table 4 above, the various strategies that were implemented affected female perception as it relates to academic performance in the classroom. After the post-survey, 78% of females felt that they were better in math than reading, a 23% increase from the pre-survey. Although the majority of females felt they performed better in math, only 22% stated that they preferred math over reading, a decrease of 23% from the pre-survey. Female confidence also grew as it related to the NYS Math Exam. On the post-survey, 89% of females felt that they would pass the exam. This was an increase of 25% from the number of females who felt this way on the pre-survey. Female students also

noticed a change in parental behavior at home. On the post-survey, 78% of students stated that their parents encouraged them to practice math skills while at home, compared to 45% on the pre-survey. This is an increase of 33%.

Parent Survey Responses

The parent survey was intended to identity any stereotypes that parents might have had about math and reading as they relate to their child's abilities in those subjects. The survey examined which subjects they believed their child performs better in, math or reading, and which subjects they prefer. Lastly, parents were asked which subjects their child was encouraged to practice while at home. Twenty-one parents responded to the survey. Eleven of the parents had male students in the classroom and ten parents had female students in the classroom.

Table 5 represents all twenty-one parents who responded to each of the twelve survey questions. The survey questions are listed on the left, while the answers to the questions are listed in the following two columns. The parent responses are listed as a percentage of how parents answered each question. Parents could answer reading or math and yes or no. Results of the parent survey can be found on the following page.

Table 5: Parent Survey Results

Question	Male Child	Female Child
Which subject do you think your child performs better in?	Math: 74% Reading 36%	Math: 60% Reading: 40%
Which subject do you think your child likes better?	Math: 73% Reading: 27%	Math: 50% Reading: 50%
Do you think your child will pass this year's NYS Math Exam?	Yes: 100% No: 0%	Yes: 90% No: 10%
Do you think your child will pass this year's NYS ELA Exam?	Yes: 91% No: 9%	Yes: 90% No: 10%
At home, do you encourage your child to read?	Yes: 100% No: 0%	Yes: 90% No: 10%
At home, do you encourage your child to practice math skills?	Yes: 91% No: 9%	Yes: 90% No: 10%
Which do you encourage your child to practice more?	Math:18% Reading: 82%	Math: 50% Reading: 50%
Would you encourage your child to take a job where they had to work with mostly men?	Yes: 18% No:82%	Yes: 20% No: 80%

According to Table 5 above, parents of both male and female students believed that their child prefers math over reading. Although both groups of parents felt this way, a larger number of parents who have male children (74%) compared to parents who have female students (60%) held this belief. When asked which subject was preferred by their child, 73% of parents with male children chose math compared to 50% of parents with female children. The data collected showed no significant difference in parents of male or female students in questions that pertained to passing NYS Exams and encouraging their children to practice reading and math while at home. Although, 82% of parents with male students encouraged their child to read more than practice math compared to 50% of parents with female students. When asked if they would encourage their child to take a job where they had to work mostly with men, both groups of parents responded no, 82% of parents with male students and 80% of parents with female students.

Pre-Assessment and Post-Assessment

The pre-assessment was a New York State 5th grade practice exam. It consisted of 26 multiple choice questions. The students were given the assessment under the same circumstances as the actual New York State Math Exam. They had 45 minutes to complete the questions and students with an Individualized Education Plan were given all testing modifications.

Table 6 represents all twenty students who took the pre-assessment. Ten male and ten female students participated in the assessment. The data under the male and female columns shows the number of questions each gender answered correctly on average out of twenty six questions. The percent correct is then listed below. Results of the pre-assessment and the post assessment can be found below.

Table 6: Pre-Assessment and Post-Assessment

	Male	**Female**
Pre-Assessment	14 correct 56%	11.4 correct 45.6%
Post-Assessment	15 correct 60%	13.4 correct 53.6%

According to Table 6 above, males, on average, answered more questions correctly than the females on both the pre and post-assessment. On the pre-assessment, the males answered 14 questions correctly compared to the 11.4 by the females. The males, on average answered 2.4 more questions correctly than the females. On the post assessment, the males answered on average 15 questions correctly while the females answered 13.4. The males, on average, answered 1.6 more questions correctly than the females.

Chapter 5 - Conclusions and Recommendations

The purpose of this thesis was to determine whether outside influences affect female performance in stereotypical male subject areas, such as math and science. I wanted to look at why, historically, males tend to experience greater success rates than females in math and science. I implemented various strategies over a one month period to ensure that female students in my classroom did not experience gender stereotypes in math related subjects. After implementing these strategies, I analyzed the results of student surveys, parent surveys, student assessments, interviews and anecdotal notes and have drawn several conclusions about why males tend to outperform females in math and how gender equality can be achieved in the classroom.

After analyzing the data that was collected, it was clear that teachers can make a difference in promoting gender equity in the classroom. This was evident by the increased number of female students who believed that they were better in math than reading and also felt that they were going to pass the NYS Math Exam. Based on the pre and post surveys, female students had a lower self-esteem about their abilities in math before classroom strategies were implemented to promote gender equity. These results suggested that the gender equity program that was established in my classroom was effective.

The student pre-surveys supported the stereotype that males prefer math and females prefer reading. The question that needed to be answered though, was why do students at such a young age hold such strong beliefs? One of the main contributing factors for this belief may be parental influence. According to the survey results, female

students were encouraged less than male students to practice math at home, while a higher percentage of female students were encouraged to read at home than their male counterparts. Both sets of students shared the belief that their parents thought they were successful at math and reading, so that data in this circumstance does not support the before mentioned stereotype. The results of the parent survey, also support the stereotype. The parents of male students believed that their children preferred math over reading and performed better in math, at a much higher percentage, than the parents of female students.

When analyzing the data collected from the student's pre and post assessments, it suggested that the strategies that were implemented were successful. Although males still outperformed females on average, the gap closed from a 10.4% advantage on the pre-assessment to a 6.4% advantage on the post-assessment. I strongly believe that if the strategies were to be implemented over the course of an entire school year that the gap would diminish even more, or perhaps not exist at all.

When discussing the strategies with the students, both the males and females indicated that they preferred working in single-sex groups. Female students stated that they felt more comfortable not having males around because they are too bossy and always have to have the right answers. Female students went on to say that they would be even more comfortable if the males were not in the room at all during math, but stated it did not bother them to work with males as much during reading. The information gathered from male students was also very interesting, as it supported the stereotype that some people have on female achievement in math. Although most males simply stated that "girls are annoying to work with", some students went as far as to say that "girls are

not as smart as boys in math, that's why we don't like working with them". Comments such as these are very telling that male students have developed the stereotype that they are superior to females in mathematics.

During further informal interviews with female students, they stated that they enjoyed working on math problems that used vocabulary which was specific to their interests. Many female students informed me that it is much "easier" to answer a question that is about something they like, than to answer a question about "football or something else that boys do". When male students were asked the same question, they replied that it did not matter to them what the question was about because it did not help them answer the question. I believe that responses such as these are directly related to confidence levels that males and females have about their abilities in math. Due to the fact that males in the study group have a higher confidence level in math, it did not matter to them what the questions were about, instead only focusing on answering the question.

If I were to conduct this study again, there are few ways I believe I could improve the thesis. First, I would explore in greater depth the concept of single-sex classrooms. It appeared to be the most beneficial strategy that led to the increased performance and higher self-confidence of female students. I would explore the idea of teaming with another teacher during math. One teacher could give instruction to male students, while the other teacher instructs the female students. I would also extend the length of time that the study was conducted. I believe that all strategies would have been more effective if they would have been in action for a longer period of time.

I believe that research needs to continue in the area of promoting gender equity in the classroom. It is much too important of an issue to just accept the stereotype that males

are superior to females in the areas of math and science. Research has proven that these stereotypes exist, so it now becomes the responsibility of educators to change these perceptions. Just simply acknowledging the fact that stereotypes exist is not good enough. It appears that much research has been done to prove that a gender gap does exist and not enough research or action towards minimizing the gap.

I believe that the only way to create a gender equitable classroom is to make administrators, teachers, parents and students aware that a problem does exist. Teaching colleges and school districts need to educate their teachers on how to create gender equity in the classroom through course study, workshops, and professional development. Time must be set aside for teachers to be trained on how to redevelop lesson plans and how to work more closely with students to meet the specific learning needs of female students.

It is also extremely important that adults outside of the classroom are part of the process to establish a gender equitable classroom. School counselors and support staff need to work with and encourage females to continue to study and pursue careers in math and science related fields. Parents need to be educated on how to encourage their daughters to explore their potential in math and science. Parents need to teach their children to dismiss the belief that males outperform females in those areas. Parents are usually the strongest role models a child will interact with and it is therefore imperative that they are sending the right message to their children.

Based upon the continuing research on the issue of gender equity in the classroom, it would appear that this will be a discussion that will continue for many years to come. Researchers and educators need to continue their work in this field so the gender gap can be eliminated in schools today. As long as awareness continues to be brought to

the problem, work can be done to find a solution that would allow females to achieve the same successes as males in all math related fields.

Overall, I believe that the thesis study was successful. It brought greater awareness to an issue that exists in our schools today, that often times is not addressed. I have made changes in my classroom that have improved my instruction, as well as the achievement and confidence levels of all students. Furthermore, and perhaps most importantly, I have made others aware that gender inequality may exist in their classrooms. The sooner educators are aware that a gender gap exists, the sooner all schools can achieve the goal of gender equitable classrooms.

Appendix A

Statement of Informed Consent for Minors

This form describes a research study being conducted with students to better understand male and female performance in various school subjects. The purpose of this study is to compare the academic achievements of males and females and try to create a learning environment that is equal towards both sexes. The person conducting the research is a student at SUNY College at Brockport. If you agree to participate in this study, you will be asked to complete a questionnaire about your feelings about school subjects.

The possible benefits from this study could be information that would be used to ensure males and females have the same opportunities achieve success in school. Your participation in this study is completely voluntary. Being in it or refusing to be in it will not affect your grades or class standing. You are free to change your mind or stop being in the study at any time.

I understand that:

1. My participation is voluntary and I have the right to refuse to answer any questions. I will have a chance to discuss any questions I have about the study with Mr. Frenzel after completing the questionnaire.

2. My confidentiality is guaranteed. My name will not be written on the survey. There will be no way to connect me to the written survey. If any publication results from this research, I would not be identified by name. Results will be given anonymously and in group form only, so that neither the participants nor their school can be identified.

3. There will be no anticipated personal risks or benefits because of participation in this project.

4. My participation involves reading a survey of 10 questions and answering those questions in writing. It is estimated that it will takes 15 minutes to complete the survey.

5. Approximately 25 people will take part in this study. The results will be used for the completion of a research project by the primary researcher.

6. Data and consent forms will be kept separately in a locked filing cabinet by the investigator and will be destroyed by shredding when the research has been completed.

You are being asked whether or not you want to participate in this study. If you wish to participate, and you agree with the statement below, please sign in the space provided. Remember, you may change your mind at any point and withdraw from the study. You can refuse to participate even if your parent/guardian has given permission for you to participate.

If you have any questions please see me or my faculty advisor

Primary researcher	Faculty Advisor
Mr. Mark Frenzel	Dr. Thomas Allen
[redacted]	[redacted]

I understand the information in this form and agree to participate in this project.

_____ _____

Signature of participant Date

_____

Birth date of participant

_____ _____

Signature of a witness 18 years of age or older Date

Appendix B

Student Survey

For questions 1-11, please circle the answer that most accurately describes your feelings or opinions about the subject.

Male **Female**

1. Which subject are you better in?
   Reading Math

2. Which subject do you like better?
   Reading Math

3. Do you think you will pass this year's NYS Math Exam?
   Yes No

4. Do you think you will pass this year's NYS ELA Exam?
   Yes No

5. Do you read at home?
   Yes No

6. Do you practice your math skills at home?
   Yes No

7. Do your parents encourage you to read at home?
   Yes No

8. Do your parents encourage you to practice math at home?
   Yes No

9. Do your parents think you are good at math?
   Yes No

10. Do your parents think you are a good reader?
    Yes No

11. What do you think females likes better?
    Reading Math

12. What do you think males likes better?
    Reading Math

Appendix C

Parent Survey

For questions 1-10, please circle the answer that most accurately describes your feelings or opinions about the question.

My child is: Male Female

1. Which subject do you think your child performs better in?
   Reading Math

2. Which subject do you think your child likes better?
   Reading Math

3. Do you think your child will receive a passing score on this year's NYS Math Exam?
   Yes No

4. Do you think your child will receive a passing score on this year's NYS ELA Exam?
   Yes No

5. At home, do you encourage your child to read?
   Yes No

6. At home, do you encourage your child to practice math skills?
   Yes No

7. Which do you encourage your child to do more of at home, read or practice math?
   Read Math

8. Would you encourage your child to take a job where he/she had to work with mostly men?
   Yes No

9. Which subject did you perform better in when you were in school?
   Reading Math

10. Which subject did you enjoy more when you were in school?
    Reading Math

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