The Effects of Gender Based Classes on Eighth Grade Girl’s Math Achievement
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Introduction to the Study

Introduction
For the last three years our school has had gender based classes in our eighth grade. The first year it was strictly one male class and one female class. The next year we modified the format and had the two single gender classes and one co-ed advanced class. Then last year we went back to one boy class and one girl class. This year we have went back to the format of 3 classes. Our school board has supported us in this endeavor, but they want concrete data on the effectiveness of our program. At the end of the year we will have enough data to study the effects of gender based classes on girl’s mathematics achievement.

Statement of the Problem

Our school board would like data showing that gender based classes are effective for student achievement in the eighth grade math classroom. This is our fourth year of doing gender based classes and I want to compare the data to see if there is any significant difference in achievement between girls that are in the mixed class and girls that are in the single sex classroom. While we have anecdotal evidence that it helps academics as well as behavior, a more structured study is needed to see if there are differences that are significant.

Purpose of the Research

The purpose of the research is to determine the effectiveness of single sex classrooms on eighth grade girl’s mathematics achievement.

Research shows that girls tend to lose math ability around middle school. Why that occurs is unknown. Some theorize that boys are favored in math and the historical stereotype of girls cannot do math begins to take hold in middle school. Boys are often more vocal and overbearing in the classroom, thus there are less opportunities for girls to participate. Some also feel that girls believe that they should not show themselves as smart in math and they will not actively participate in class in order to not look smarter than a boy.

Whatever the reason for why girls opt out of math, many believe that if girls are specifically targeted and encouraged during this critical time, the loss of math ability can be halted. In this study, I want to see if placing eighth grade girls in a single sex classroom increases their math achievement.

Description of the Innovation
Approximately ¾ of the eighth grade girls were placed in an all girls classroom for their core classes. The other ¼ were in a mixed gender classroom for their core classes. The students were placed based on ability grouping with the top 25% being placed in the mixed gender class and the remaining being placed in a single gender classroom.

The mixed gender class was taught math in a traditional way with no changes in instruction by the teacher. The single gender class was taught the same curriculum, but with more focus on participation through discussion and cooperative learning. Less emphasis was placed on competition and each student was encouraged to participate through teacher questioning.

Goals of the Innovation

Female middle school students often lose confidence and ability to do math in the middle school years. Some research suggests that if girls are supported and encouraged in a girls only classroom, they will build the skills needed to excel at high school math more readily than if they were competing with boys in a traditional classroom. With this research study, I hope to determine which way my students learn best in order to suggest future classroom placements.

I expect to show growth in each student I teach, but I hope that the students in the all girls classroom will show growth beyond what is predicted by TVASS for their eighth grade TCAP scores.

Connections to Educational Standards

This study will encompass all of the eighth grade middle school math standards. Since the Eighth grade Grade Level Expectations for Standard One are about mathematical understanding and appreciation, I would hope that my students meet each of these on the path to meeting all of the other standards.

Grade Level Expectations:

GLE 0806.1.1 Use mathematical language, symbols, and definitions while developing mathematical reasoning.
GLE 0806.1.2 Apply and adapt a variety of appropriate strategies to problem solving, including estimation, and reasonableness of the solution.
GLE 0806.1.3 Develop independent reasoning to communicate mathematical ideas and derive algorithms and/or formulas.
GLE 0806.1.4 Move flexibly between concrete and abstract representations of mathematical ideas in order to solve problems, model mathematical ideas, and communicate solution strategies.
GLE 0806.1.5 Use mathematical ideas and processes in different settings to formulate patterns, analyze graphs, set up and solve problems and interpret solutions.
GLE 0806.1.6 Read and interpret the language of mathematics and use written/oral communication to express mathematical ideas precisely.
GLE 0806.1.7 Recognize the historical development of mathematics, mathematics in context, and the connections between mathematics and the real world.
GLE 0806.1.8 Use technologies/manipulatives appropriately to develop understanding of
mathematical algorithms, to facilitate problem solving, and to create accurate and reliable models of mathematical concepts.

Description of the School Setting

Dorothy and Noble Harrelson School is a PreK-8 small rural school located in northwest Tennessee. The school has only been open 6 years and is the result of the consolidation of two smaller Prek-8 schools. The enrollment of the school is approximately 500 with a principal, assistant principal and about 40 faculty members. About 60 students are in the eighth grade. The school is a Title I school with a free and reduced lunch percentage approaching 70% and the student population is 96% Caucasian, 3% African American and 1% of other races. Approximately 24% of the local community does not have a high school degree and about 15% fall under the official government poverty line, though half of the households earn less than $35,000 a year.

Review of the Literature

Educational Significance of the Innovation

In her meta-analysis of d studies regarding the supposed differences between males and females, Janet Hyde points out that from ages 5-10 there are no differences in the mathematical complex problem solving of boys and girls, but from ages 10-14 girls pull ahead slightly. However, after age 15 boys start to pull ahead in problem solving ability (Hyde, 2005). Why is this occurring? This study I am proposing will seek to find out how we can stop the loss of mathematical ability in girls by supporting them through the middle school years.

The facts reported by Hyde are also evident in SAT scores. For the past thirty years, boys have scored 30-35 points higher than girls on the mathematics part of the exam (Angier & Chang, 2005). Why this occurs is up for debate. Some argue that boys and girls have different brains and must be taught differently. Research has shown that there is a slight difference in the ability to mental rotation and mathematical reasoning with boys having the advantage (Willingham, 2006). Girls, however, have a slight memory advantage and seem to do better with mathematical calculations. Recent trends in mathematics instruction focus on the use of manipulatives which seems to serve boy’s learning styles better. Is this hurting our girl’s learning?

Research also shows that girl’s brains develop the language area faster than the logical reasoning area (Rycik, 2008). This reinforces the theory that girls are just as capable at doing math as boys, but their abilities may develop later. If a single sex classroom can foster the mathematical develop of the girls in a safe, non-threatening environment, they may not get overwhelmed with math and give up before their brain fully matures (Stabiner, 2002).

One warning that I came across stated that studies that only focus on grades and test scores will not detect a discernable difference (NASSPE, 2008). Rather, they state that focus should be placed on breadth of educational opportunity. This describes what the students are doing in single sex education that they might not be doing were they in co-ed groups. I
personally feel that this is a valid point, but it is not hard evidence such as that required by NCLB and high stakes testing. Thus, I am hoping to find differences in test scores.

Definition of the Variables

In this study, achievement will be measured based on the student’s mathematics scale score on the TCAP assessment. Students scale scores from the previous year will be compared to scores from the current year in order to determine gain.

Achievement will also be measured using the TVASS feature that predicts what percentile a student will place in on a future assessment. I will look at the TVASS prediction for each student and compare it with her actual percentile on the eighth grade TCAP.

Research Questions

1. Do female students experience more growth in scale score on the TCAP achievement test when placed in single sex classrooms?

Did the students in the all girl class have significantly different gains in scale score than those in the co-ed group?

2. Do female students score in a higher percentile than predicted by TVASS on TCAP when placed in a single sex classroom?

Where did TVASS predict that each student’s percentile score would be? What were her actual scores and what was the difference? Was there a gain by those students in the single sex class that is significantly different than those in the co-ed class?

3. Do students who perceive a benefit from single sex classrooms do better than those who do not perceive a benefit?

Summary of the Plan of Action

Materials Needed

- Paper and pencils for students
- Survey
- TCAP results

Overview of Project

Evaluation Plan
Students will be assigned by convenience sampling to either a single sex classroom or a co-ed classroom. Both classes will be taught the same standards with the same methods. The co-ed class may advance at a faster pace than the single sex classroom, but since we are measuring growth there should not have to be statistical adjustments.

Data Collection

Instruments / Measures

I will use the following tools to collect data on my research project. These tools will be used to measure and document the findings of my research.

*Student survey.* I will survey students for their thoughts and opinions on their classroom assignment. The first survey will be given within the first four weeks of the start of school and then again two weeks after TCAP. Students will be questioned using a Lickert style survey to ascertain attitudes toward single sex classroom and what they expect to accomplish this year.

*TCAP testing.* I will use the data provided from TCAP testing to determine gains. Students scale scores from the previous year will be compared to results from the current year to determine gains made, either positive or negative.

*TVASS projections.* I will use the TVASS projection to see what percentile TVASS predicts the student to be in and then compare it to the student’s actual percentile.

Methods

*Student survey.* Students will be surveyed at the beginning of school to assess their thoughts and attitudes toward single gender classrooms and how they think it will affect their achievement. Students will be resurveyed two weeks after TCAP to see if their views have changed since the original survey.

*TCAP testing.* As soon as TCAP results are released, the students’ scale scores will be compared to prior testing scores.

*TVASS projections.* As soon as TCAP results are released, the students’ percentiles on the 2010 test will be compared to the projections made by TVASS.

Ethical Considerations
Before conducting the survey, I would request permission from the principal of my school to conduct this research. Upon receiving her permission, I would notify the Director of Schools and the School Board of plans. Each student would be given a parental permission to allow them to participate in the study. The students would be guaranteed confidentiality. No names would be attached to test scores, rather students would be numbered and only those numbers would be used in published or discussed findings. The results of the study would be shared with the school faculty and administration and the school board.

Data Analysis

Student gains will be measured by looking at the TCAP scale scores. Analysis of variance will be used to look for the differences between the all girl class and the co-ed class. A significant difference in achievement between the girls in the same sex classroom and girls in a co-ed classroom will help answer the research questions posed by the study.

Pearson Correlation tests will be conducted to see if there is any relationship between math achievement and attitudes towards single sex classrooms.

Use of Findings

The findings of this study will be used to decide whether or not to implement single sex classrooms in the future not only in our school, but in other county middle schools. The board has allowed us to use gender based classes in our school the last few years, but they would like something more than anecdotal evidence for us to continue with the program. The other middle schools are also watching our results and are considering implementing this at their schools. The findings of this study will be critical to these decisions.

Beyond that, the findings will be used to assist teachers in planning their instruction and in student placement. If the study shows a positive correlation between attitude toward single sex classroom and achievement, this can be taken into consideration when placing students into their classroom assignments.
References


Appendix A

Dear Parents/Guardians,

During this school year I will be conducting a research study on the effects of eighth grade girl’s mathematics placement on math achievement. The achievement of the students in the all girls classroom will be compared to the achievement of the girls in the co-ed classroom to see if there are any significant differences in the gains made by each group. I would like to ask your permission to use your student’s TCAP results in this study.

I am conducting this study to assist in planning future classroom structures and student placement in both Harrelson and other Henry county middle schools. I will be sharing my findings with the teachers in our county and our school board to help in the decision making process.

If you choose to allow your student to participate, I will guarantee confidentiality of your student’s scores. Each student will be assigned a number and that number will be associated with test scores, not your student’s name. Students will also be asked to complete a survey on their opinions of single sex classrooms and their thoughts on their own mathematical abilities. Student names will be removed from the surveys before any information from these surveys is shared.

I can also guarantee that all students will be taught the same mathematical standards and that each student in the study will receive equal educational opportunities. Also, any student electing not to participate in the study will receive no negative consequences and will suffer no missed educational opportunities.

The rights below are the rights of every person who is asked to be in a research study. As a research subject, your child has the following rights:

1) To be told what area, subject, or issue is being studied.

2) To be told what will happen to you and what the procedures are.

3) To be told about the potential risks or discomforts, if any, of the research.

4) To be told if you can expect any benefit from participating and, if so, what the benefit might be.

5) To be allowed to ask any questions concerning the study, both before agreeing to be involved and during the course of the study.

6) To be told what medical treatment is available if any complications or injuries arise as a result of the research study.

7) To refuse to participate in the study or to stop participating after the study starts.
8) To receive your signed and dated copy of this Bill of Rights and the consent form.

9) To be free of pressure when considering whether you wish to be in the study.

If you have other questions, please contact me or Mrs. Fridy, principal of Harrelson School. I appreciate your consideration of this opportunity.

Angela McCord
Harrelson 7/8 mathematics teacher

I, ____________________________, parent/guardian of _______________________________,

(parent/guardian name printed) (student name printed)
give permission for _______________________ to participate in Mrs. McCord’s research study.

(student name printed)

________________________________________
Parent/guardian signature