THE IMPACT OF AN ATTITUDE TOWARD MATHEMATICS ON MATHEMATICS PERFORMANCE

A Thesis
Presented in Partial Fulfillment of the Requirements for
The Degree Master of Arts in Education at
Marietta College

By
Benjamin Schenkel

Marietta College
2009

Master's Examination Committee
Approved by
Dr. William Bauer

____________________________________
Adviser
Department of Education
ABSTRACT

Students have many different perceptions of mathematics. Most business and athletics leaders will talk about how the individual’s attitude directly affects their performance in the office or on the field. This study looked at how students and teachers attitudes impact the mathematics performance of the students in the classroom. One small private school in Southeastern Ohio was the focus of this study. Students and teachers both were surveyed by the researcher on their attitude towards mathematics education.
Dedicated to my children, my wife, my parents, and my in-laws who have always been there to support me in anything I do.
ACKNOWLEDGEMENTS

I wish to thank my adviser, Dr. William Bauer, for intellectual support, encouragement, and enthusiasm which made this thesis possible, and for his patience in correcting both my stylistic and scientific errors.

I thank my wife, Jennifer, for her continued support and the sacrifices she made while I worked on this thesis.

I would also like to thank my two daughters, Claire and Katelyn, for their understanding that daddy can’t always play because he has homework.

I would like to thank my fellow teachers at St. Mary’s School for their continued support, words of encouragement, and time in their classes to talk to their students about this project.

I would like to thank the students of St. Mary’s School for their help and their honesty in answering the questions on the survey.
VITA

September 16, 1975 .......................Born-Parkersburg, West Virginia

1998..........................................................B.S. Elementary Education, Marietta College

1999-present............................................Classroom Teacher, St. Mary’s Elementary School

FIELDS OF STUDY

Major Field: Elementary Education, AYA Mathematics
TABLE OF CONTENTS

Abstract ...............................................................................................................................2

Dedication ...........................................................................................................................3

Acknowledgements.............................................................................................................4

Vita......................................................................................................................................5

List of Tables ......................................................................................................................7

List of Figures .....................................................................................................................8

Chapters:

1. Introduction ..................................................................................................................10
   1.1 Purpose ..................................................................................................................11
   1.2 Research Questions ..............................................................................................11
   1.3 Limitations ............................................................................................................12
   1.4 Definition of Terms .............................................................................................13

2. Review of Literature ....................................................................................................14

3. Methods ........................................................................................................................18
   3.1 Research Site .......................................................................................................18
   3.2 Study Design .......................................................................................................18
   3.3 Participants ..........................................................................................................19
   3.4 Procedure ............................................................................................................19
   3.5 Potential Ethical Issues .......................................................................................19
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1 – Frequency of Respondents by Grade Level</td>
<td>21</td>
</tr>
<tr>
<td>Table 2 – Frequency of Respondents by Math Grade From Third Grading Period</td>
<td>22</td>
</tr>
<tr>
<td>Table 3 – Frequency of Attitude Level</td>
<td>24</td>
</tr>
<tr>
<td>Table 4 – Class Means and Correlation Coefficients</td>
<td>25</td>
</tr>
<tr>
<td>Table 5 - Teachers Attitude Toward Teaching Mathematics</td>
<td>26</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1 – Frequency of Respondents by Grade Level</td>
<td>22</td>
</tr>
<tr>
<td>Figure 2 – Frequency of Respondents by Math Grade From Third Grading Period</td>
<td>23</td>
</tr>
<tr>
<td>Figure 3 – Frequency of Attitude Level</td>
<td>24</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

A classic Roman poet by the name of Publius Vergilius Maro, more commonly known as Virgil, was once quoted in his poetry saying: "They can... because they think they can.” This idea is followed in athletics by coaches, players, and fans to an almost religious level. Coaches talk to their players about visualizing the catch, hit, basket, or shot. Fans spend all day checking message boards or blogs and talking about how their team will win no matter who they are playing. No one questions this outlook on athletics and the significance it plays in the success of individuals and team alike. As a culture, why do we not apply it to the classroom with the same vigor as the athletic field?

This researcher felt that this is a very important aspect of educational success. According to Ma and Kishor (1997), the variable ‘attitude’ is one of the most potent factors that relates to achievement.

This researcher has experienced many different outlooks on mathematics during teaching. Many times the researcher has heard, “I am not good at math,” or “I hate math.” Hannula (2002) wrote:

“The everyday notion of attitude refers to someone's basic liking or disliking of a familiar target. A general overview of the development of attitudes throughout school years is documented through surveys and meta-analyses. These studies have shown that, for example, girls tend to have more negative attitudes towards mathematics than boys (Frost et al., 1994; Leder, 1995), and
that attitudes tend to become more negative as pupils move from elementary to secondary school (McLeod, 1994).” Hannula (2002)

There are many different definitions of attitude out there in research. For this study, the researcher used the definition that Di Martino and Zan (2001) used: the degree of affect associated with mathematics; i.e. attitude is the emotional disposition toward mathematics. This researcher wanted to look at how the attitude of the students towards mathematics affects their performance in the class and if there is a correlation between the two. For this reason, the researcher developed a survey for students of mathematics. The researcher looked at students grades to assess their success. Anxious individuals may avoid mathematics classes, may be more likely to have negative attitudes toward mathematic related activities, or if they become elementary teachers, may not spend as much time teaching mathematics as their less anxious colleagues (Ho et al., 2000). The researcher also looked at the teachers’ attitude toward mathematics. These were used to see how perceptions match up with classroom performance.

Purpose

The researcher felt that a student’s negative attitude toward mathematics as a subject has a damaging affect on their performance in the classroom. The researcher also felt that teachers who are more enthusiastic and have a more positive attitude about teaching mathematics have students whose attitude about the subject is more positive.

Research Questions

The researcher collected data from students and teachers by using both open ended questions and scaled answers on a Likert scale. The research asked the students questions to get a general idea of their attitude about mathematics. The teacher asked
about how they see attitude affecting student performance, if they are enthusiastic about math, if they enjoy teaching math.

Limitations

This study was limited by the size of the population in the school being used in the research. Another limitation is that attitude can be influenced on a daily basis and a bad experience on the day of the survey could skew the students’ response to the survey. Another limitation is that this study is only being done on one small private school in southeast Ohio. Although the focus of the study is on this school, it will limit the ability of the researcher to generalize the findings to a large population.
Definition of Terms

ATTITUDE - the degree of affect associated with mathematics; i.e. attitude is the emotional disposition toward mathematics.

COMPUTATION - the procedure of calculating; determining something by mathematical or logical methods.

PROBLEM SOLVING – mathematics problems that put mathematical concepts into real world situation for students to apply their understanding of the processes.

MEASUREMENT - the dimension, quantity, or capacity determined by measuring
CHAPTER 2
REVIEW OF LITERATURE

William James once said, “It is our attitude at the beginning of a difficult task which, more than anything else, will affect its successful outcome.” (Van Wagner, n.d.). This idea crosses many different aspects of everyday life. Businesses bring in motivational speakers to help inspire their employees to help them have a more positive attitude to help productivity. Businesses also do team building exercises to help employees have a better outlook on their jobs and the people they work with. Athletic coaches spend a significant amount of practice time talking to their players about “believing” and reminding players that any team can beat any other team on any given day. If a team does not have a positive outlook on an upcoming game, their chances of winning the game are significantly lowered. Many athletic teams use the phrase “believe and you can achieve” as their motto for a successful season. This idea is well known and accepted in today’s society.

This philosophy is no different in classrooms than it is anywhere else in society. McCleod (1992) said that attitude toward mathematics is related to mathematics success in the classroom. Conversely, student’s achievement can influence a student’s attitude as well. Thus, it is important for teachers to improve student work to make a positive change in their attitude toward mathematics (Ma & Xu, 2004). Hannula stated that attitudes can change in a short period of time, and sometimes dramatically (2002). Many students, especially those that are younger and less established students, their attitude toward a particular subject is proportional to their recent success in the class. A good day
can sway the attitude to the positive side and conversely a bad day can swing the attitude toward the negative side. Although, in Hannula’s research, he found that once established, an attitude is fairly stable and only minor changes occur based on successes and failures (2002). This is where teachers can have a great impact on the shaping of this attitude: “Teachers can reinforce the idea that mathematics is an interesting subject, used in other disciplines, and is an admission ticket for colleges and careers.” (Anderson, 2007 p. 12).

From Hammouri’s study of attitudinal and motivational variables and their relation to mathematics success he was able to draw conclusions similar to those of previous studies. He used the Third International Mathematics and Science Study (TIMSS) to look at 8th graders in Jordan. Jordanians have had shown poor performance in the area of mathematics. He states:

“Attitude itself can affect level of energy input, perseverance (Carroll, 1963), time on tasks (Love & McVevey, 2001), standard of achievement (Webster & Fisher, 2000) and engagement in an activity (Middleton & Toluk, 1999).” (Hammouri, 2004)

From this, one could say that the better a student’s attitude toward mathematics may be, the more successful and the higher the performance level will be for that student. From the study, Hammouri (2004) found significant positive affects of:

1. attitude towards math on math’s achievement and self-perception of math’s importance;
2. confidence in math’s ability on math’s achievement, attitude towards math, educational aspiration and self-perception of math’s importance;
Cheung (1998) wrote about the attitude toward mathematics and the ages of 11-13 year olds. He states that these ages are particularly important in the development of a mathematical attitude. This is the time when negative attitudes become most noticeable. Although he goes to say that the reason behind this is unclear. Possible reasons behind this are the greater prevalence of abstractions in mathematics material. In his research, using a Pearson correlation, he found a positive correlation between attitude and mathematics achievement. The correlation showed that the more positive the attitude, the higher the level of achievement was in the student.

Hannula (2002) looked at the attitude in cognitive-emotional terms. In his research, he states “While a student is engaged in a mathematical activity, there is a continuous unconscious evaluation of the situation with respect to personal goals.” When students are evaluated, there are four areas to examine. The first is simply situational and no prior experience of the entity being evaluated (Hannula, 2002). The second depends entirely on previous experience and is the kind that is typically seen on questionnaires. The third evaluation is when the situation is to a familiar to a degree, but the individual has no personal experience. The fourth is when an individual looks at ones whole life and the value of different goals in it. Hannula stated that “these four evaluations produce attitude” (2002).

Ma and Kishor (1997) looked at the relationship between attitude and performance as three separate components. The first component they looked at was the relationship between performance and self-concept. The second component is the
perception between family support and performance. The third component is the perception that mathematics is a male domain and how that affects performance.

Ma and Kishor (1997) determined that self-concept was one of the most critical factors in academic success. These researchers further discovered that the relationship between achievement and self-concept is also content specific. When students succeed in areas such as problem solving produces a stronger faith in one’s ability and leads to a more positive self-concept which in turn leads to higher levels of achievement.

Reynolds and Walberg (1992) looked at middle school students and how achievement and attitude are related and also what determines the student’s attitude. These researchers looked at the relationship as a sequence of effects. These effects begin with home environment, then student aptitude, and finally psychological and instructional environments. These environments include things such as peers, the classroom they were in, and how the material in covered in the classroom. Putting home environment first is founded on “consistent evidence that home environment influences the process of schooling well before the middle school years” Reynolds and Walberg (1992). In their study, they found that home environment plays a “pervasive role” in the learning for middle schoolers (Reynolds & Walberg, 1992). When it comes to mathematics attitude, they concluded that motivation is a bigger factor than the home environment. When they looked at instructional environment, the biggest factor affecting the students’ attitude toward mathematics was the teacher’s clarity of presenting the material. The students will have better attitude if they look at view the classroom and subject in a positive way.
CHAPTER 3

METHODS

Research Site

St. Mary’s Elementary School is the site of the study. It is parochial school that services students in pre-kindergarten through eighth grade and is financially supported by St. Mary’s Catholic Church in Marietta, Ohio. The school is accredited by both the State of Ohio and Diocese of Steubenville. The school’s programs serve three and four year-olds with a half-day Montessori preschool program, while an all day kindergarten is provided for five and six year-olds. The student body of approximately 200 is served by 23 licensed teachers. Class sizes range from eight to 25 students.

Study Design

This study of the impact of an attitude toward mathematics on mathematics will be done using the Quantitative - qualitative method. This was done by using a questionnaire where students, and teachers used a Likert Scale to gather the data for the quantitative aspect of the study. The information will be put into Microsoft Excel to be analyzed for a correlation between the variables in the study. There also have a space for the subject to give open ended responses. The results of the questionnaires were placed into themes for reporting. The researcher attempted to record students’, and teachers’, reactions to the impact of attitude on classroom performance.
Participants

The participants in this study were elementary students, and teachers of St. Mary’s Elementary School in Marietta, Ohio. The teachers in the survey are from grades one through eight grades. Students in first through eighth grade will be surveyed.

Procedure

Initially the researcher gained permission from the Marietta College Human Subjects Review Board. The principal of St. Mary’s School was be contacted to gain permission to use the school’s staff, students, as the research site. The researcher developed a Quantitative-qualitative questionnaire with questions that the subjects answered using a Likert Scale. In addition to the Likert Scale questions, the subjects were asked to qualify their answer with a brief explanation or comment. The students and teachers were notified of the study. Then the survey was sent out with a cover letter explaining the purpose of the research in more detail along with a permission form for the parents to allow their child to be part of the study. The participants did maintain complete anonymity in the study. The surveys were returned to the researcher through inter-office mail. The researcher collected all of the surveys and the data was placed into Microsoft Excel for the statistical analysis. The open-ended questions will be used to create themes for the study as well.

Potential Ethical Issues

Permission was obtained by the researcher from the principal at St. Mary’s School to distribute the survey packets. The participants will not be required to put there name on the survey to assure the anonymity of all participants. The data and surveys was stored in the home of the researcher.
RESULTS

Interpretation of Findings

The researcher used a fifteen question survey to measure a correlation between the attitude students have toward mathematics and their success in the classroom. The survey was administered by the homeroom teachers at St. Mary’s School in grades one through eight and collected by the researcher. The results were then tabulated by using Microsoft Excel and its statistical analysis tools.

The survey began with three questions gathering demographic data on the students being surveyed: grade level, gender, and letter grade during the third grading period. Questions four through eleven were in the five point Likert Scale format which was on an ordinal scale. This data was used to determine a correlation by implementing a quantitative research design.

One hundred and seventy-six (176) surveys were passed out to the students in grades one through eight at St. Mary’s Elementary School in Marietta, OH. After receiving one hundred-four informed consent forms from the parents of the students, only eighty-three (83) surveys were returned. Of those eighty-three, only seventy-nine (n=79) were counted due to four being incomplete. This resulted in a return rate of forty-five percent (45%).

Of the respondents, thirty-two (40.5%) were male and forty-seven (59.5%) of the respondents were female. A breakdown of the respondents by grade level and grade
received during the third nine weeks is shown in the tables on the next page (Table 1 & Table 2).

Eight variables were measured on the five-point Likert Scale that were related to the students attitude toward mathematics. The variables were:

- I see a purpose in my life for learning mathematics.
- The prospect of having to learn new mathematics makes me nervous.
- I can get good results in mathematics.
- I am more worried about mathematics than any other subject.
- Having to learn difficult topics in mathematics does not worry me.
- No matter how much I study, mathematics is always difficult for me.
- I am naturally good at mathematics.
- I have a lot of confidence when it comes to mathematics.

Table 1

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency (Number of Respondents)</th>
<th>Percent (%)</th>
<th>Cumulative Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>10.1%</td>
<td>10.1%</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>10.1%</td>
<td>20.3%</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>11.4%</td>
<td>31.6%</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>21.5%</td>
<td>53.2%</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td>19.0%</td>
<td>72.2%</td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>13.9%</td>
<td>86.1%</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>10.1%</td>
<td>96.2%</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>3.8%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1

![Frequency of Respondents by Grade Level](image)

Table 1 and Figure 1 show number of students responding to the survey and are broken down by grade level. More than half the respondents were from grades four, five, and six. A very small percentage of the respondents came from the upper two grades.

Table 2

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency (Number of Respondents)</th>
<th>Percent (%)</th>
<th>Cumulative Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>40</td>
<td>50.6%</td>
<td>50.6%</td>
</tr>
<tr>
<td>B</td>
<td>24</td>
<td>30.4%</td>
<td>81.0%</td>
</tr>
<tr>
<td>C</td>
<td>11</td>
<td>13.9%</td>
<td>94.9%</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>5.1%</td>
<td>100.0%</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2 and Figure 2 look at the letter grades, or success, of the respondents. From the seventy-nine (79) respondents, sixty-four (64), or eighty-one percent (81%) received a grade of A or B during the grading period selected. Close to ninety-five percent (94.9%) received a grade of C or above. Four respondents received a letter grade of a D. The respondents were heavily weighed toward the average to above-average levels on their grades.

Defining Attitude

For this study, attitude was defined as the emotional disposition toward mathematics. The scores of the respondents were broken into three levels of attitude that are defined below.

A positive attitude is defined as having a response range from 37-55.

A moderate attitude was defined as having a response range from 18-36.

A negative attitude was defined as having a response range from 0-17.
The students’ responses were calculated to fit one of the three classifications above and the results are shown in Table 3 below.

**Table 3**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Positive</th>
<th>Moderate</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Percentage</td>
<td>60.8%</td>
<td>39.2%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

**Figure 3**

![Frequency of Attitude Level](image-url)
Table 3 and Figure 3 show the number of students in each grade level that fall in each of the three categorized attitude levels defined above. A large majority (60.8%) of the respondents are classified as having a “Positive Attitude” toward mathematics, the rest of the respondents fell into the “Moderate Attitude” category, while no student at St. Mary’s was surveyed as having a “Negative Attitude” toward mathematics.

Correlations were tabulated for each grade to check the correlation between the class’s attitude and the class’s success in the classroom as measured through their letter grade during the third grading period. Table 4 shows the mean scores for the classes’ letter grade and the mean score for determining their attitude level. All grades showed a positive correlation except the eighth grade which showed a very strong negative correlation.

Table 4

<table>
<thead>
<tr>
<th>Class</th>
<th>Class Mean Grade</th>
<th>Class Mean Attitude</th>
<th>Grade's Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>3.500</td>
<td>36.625</td>
<td>0.296</td>
</tr>
<tr>
<td>Grade 2</td>
<td>3.750</td>
<td>36.750</td>
<td>0.579</td>
</tr>
<tr>
<td>Grade 3</td>
<td>3.556</td>
<td>38.444</td>
<td>0.633</td>
</tr>
<tr>
<td>Grade 4</td>
<td>3.059</td>
<td>37.176</td>
<td>0.341</td>
</tr>
<tr>
<td>Grade 5</td>
<td>2.733</td>
<td>36.867</td>
<td>0.370</td>
</tr>
<tr>
<td>Grade 6</td>
<td>3.636</td>
<td>36.909</td>
<td>0.682</td>
</tr>
<tr>
<td>Grade 7</td>
<td>3.500</td>
<td>36.625</td>
<td>0.296</td>
</tr>
<tr>
<td>Grade 8</td>
<td>2.333</td>
<td>34.333</td>
<td>-0.963</td>
</tr>
</tbody>
</table>

Total Correlation 0.540

The negative correlation coefficient for grade eight had minimal affect on the overall correlation coefficient due to the low number (3) of respondents.
The researcher also surveyed the teachers in grade one through six. The first five questions were on a five-point Likert Scale. They were to determine the teachers’ attitude toward teaching math. The results are shown in table 5.

Table 5 (Note: Teacher number does not reflect the grade level taught)

<table>
<thead>
<tr>
<th>Teachers' Attitude Toward Teaching Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher (Not Grade)</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

**Correlation Coefficient = 0.254**

In the table, the attitude total is based on a possible total of 25. Most of the teachers have number that indicates having an above average attitude when it comes to teaching mathematics. Question 2 on the survey asked the teachers to respond 1-strongly disagree, 2 disagree, 3-neutral, 4 agree, 5 strongly agree; “I am enthusiastic when teaching mathematics”. The mean score of 4.00 indicates that the children are in a room where the teacher tries to keep class upbeat and are enthusiastic about the material.

**Themes**

Students felt it is important that teachers **make math fun, they are involved in the lesson** and the teachers **help them at their ability level**.

**Student should be taught at their level and pace (ability grouping):**

When responding to “I would like mathematics more if…”

“I had reviewing exercises and we did not move quite so fast.”

“I could understand it and keep up.”
“The teacher would explain everything more.”

“We could slow down a little.”

“We worked on more challenging things.”

“We took more time going over each section.”

“We were challenged more.”

“If we slowed down and took things a step at a time.”

“We had more individual attention.”

“…more one-on-one attention.”

“Our teacher didn’t re-explain things well when we need it to be redone.”

**Math should be fun and interactive:**

When responding to “I would like mathematics more if…”

“We would be able to come up to the board more and practice.”

“We did more visual projects like with fractions, we could use objects to show fractions to help us understand better.”

“We did more hands-on learning.”

“We did more math games.”

“There was more hand-on learning.”

“If we had math games, it would be the best school day.”

“We had more fun projects.”

“We played games with it and had fun.”

“We could be more motivated with the lessons.”

“We did more visual stuff with the Mimio boards.”

“We had fun math teachers.”
“We did more fun activities.”

“We did fun activities like science experiments.”

“My teacher was more enthusiastic.”

“My teacher could make it fun.”

“They used the Mimio more.”

Teachers agreed with the students and felt that hands-on real, life situations was a way to help them be enthusiastic about their teaching.

**Manipulative and other materials are essential:**

They responded to “I like teaching math when…”

“I have the appropriate materials.”

“I have … new materials to try.”

“I can use manipulatives… so that the students are more engaged.”

“I can use manipulatives.”

“The students can use manipulatives.”

**Real life connections engage students:**

“…relate the concepts to real life experiences.”

“When the students see how they can use the topics in real-life.”

“…more hands-on activities to help students see real-world applications.”

Teachers felt reaching all learners would help them enjoy teaching math more.

They responded to “I would like teaching math more if…”

**Teaching multiple levels is difficult to manage:**

“I could do grouping for abilities and actually have the time to work with the remediation and challenge groups for more than a few minutes a day”
“I felt more confident diversing to suit the different abilities in the class.”

“I would also like additions resources to help the kids that ‘just a’int getting it’ or struggle in math.”

“I could make ability grouping work more efficiently in the classroom.”
CHAPTER 5

DISCUSSION

Summary

The purpose of this study was to determine if there is a correlation between a student’s attitude toward mathematics and their performance in the classroom.

A five-point Likert Scale survey was used to assess the attitude toward mathematics of seventy-nine (79) students in grades one through eight. The first three questions in the survey were to gather some general demographic information about the students. They asked for the student’s grade, gender, and letter grade received during the third grading period. The following eight questions were to assess the attitude of students toward mathematics where they selected a response on a five-point scale.

The data from the seventy-nine, first through eighth grade students, was entered into Microsoft Excel. After the data analysis was complete from all of the surveys, this researcher believes that having a positive attitude about mathematics does have a positive impact on a student’s classroom performance of students at St. Mary’s School.

The students’ scores on the eight attitude assessment questions were scored to give the student an attitude classification. The students could have been placed into one of the three following categories: A positive attitude was defined as having a response range from 37-55, a moderate attitude was defined as having a response range from 18-36, and a negative attitude was defined as having a response range from 0-17. After calculating all of the scores for the students at St. Mary’s, none were categorized as
having a negative attitude, while the majority of the respondents had what the researcher
categorized as a positive attitude. Of the 48 students who had a positive attitude, all were
in the lower half of the scale. Therefore, all of the 48 positive attitudes would not be
considered a strong positive attitude. Of the 31 moderate attitudes, 30 were within two
standard deviations of the positive/moderate split.

When looking at the letter grades for the third grading period, the vast majority
(81%) received either an A or B in mathematics. While only four respondents earned a D
and no respondents got an F for the grading period. When looking at the mean letter
grade for each grade level, all but two had a mean of a B+ equivalent or higher for the
respondents. Grades five and eight had the lowest mean letter grade, both having an
equivalent in the B- to C+ range. This is an area of concern for the researcher that will be
looked into more in the discussion section of this chapter.

Limitations

The researcher feels that based on the data that was collected, several limitations
could have influenced the data. Based on the data collected and tabulated, the research
does show that there is a positive correlation ($r = 0.540$) between a student’s overall
attitude toward mathematics and their success in the classroom. One of the concerns with
this is the level of the respondent’s grades that were received during the third grading
period. With such a large majority of students responding having a high level of success,
this could have influenced the overall mean of attitude assessment. Generally with
children, they tend to like the things they do well, thus influencing their responses on the
attitude survey. All but one class did show a positive correlation between the two
variables, although grades one ($r = 0.296$), grade four ($r = 0.341$), grade five ($r = 0.370$),
and grade seven \((r = 0.296)\) have a correlation that would be considered a weak positive. Grades two, three, and six \((r = 0.579, r = 0.633, \text{and } r = 0.682 \text{ respectively})\) showed a mildly strong correlation.

The sample size \((n = 79)\), and the fact that all of the participants are from the same school limits the ability of this study to be generalized to a larger, more diverse population.

**Application**

The significance of this study could be used by both teachers and parents of students. Since the study does show a positive correlation, teachers might try and find ways to help students develop a positive attitude and thus improving their overall performance in the classroom. Parents could use this study in a similar fashion to help their children’s success with mathematics.

**Future Implications**

If the researcher were to complete this study again, there would be a few additions made to the process. The researcher would begin by gaining school wide permission from the principal to survey all of the students in the school. This would increase the sample size, making the results more valid. It would also insure that more students who do not have a high level of success in the classroom are part of the data as well. The researcher would also include a parental component to the study looking to see what the overall attitude at home is toward math and how it is perceived.
REFERENCES


McLeod, D. B. “Research on Affect in Mathematics Education: A Reconceptualization.”


http://psychology.about.com/od/profilesformajorthinkers/a/jamesquotes.htm

Appendix A

Marietta College
Human Subjects Committee

LONG REVIEW FORM

Send the completed, typed proposal to the Human Subjects Committee. Electronic submission of proposal materials (via e-mail attachment) is preferred (human.subjects@marietta.edu). Hard copies can be sent to Gloria Stewart, HSC Chair. Proposals from student investigators must be accompanied by an e-mail from a faculty or staff member stating that he or she has read and approved the HSC proposal. Each student investigator must have "Human Participant Protections Education for Research Teams" certification on file with the HSC (see faculty.marietta.edu/humansubjects/ for all details of submission procedures).

Project Title: THE IMPACT OF AN ATTITUDE TOWARD MATHEMATICS ON MATHEMATICS PERFORMANCE

Date Submitted (MM/DD/YY): 3/17/09  HSC # (to be assigned):

Contact Information

Principal Investigator(s): Benjamin D Schenkel
Phone Number(s): (740) 373-7018  E-mail(s): bds002@marietta.edu

Project Status

This research is for (check one):

☐ Faculty Project  ☐ Undergraduate Student Project  ☑ Graduate Student Project
☐ Class Project  ☐ Other (specify):

If Student Project, name of faculty supervisor(s): Dr. William Bauer

If Class Project, course name, number, and instructor: Masters in Education
Thesis Project

This research proposal is (check one):

☑ New  ☐ Renewal  ☐ Re-evaluation
[If Renewal or Re-evaluation, describe the changes in #15]

Proposed start date (MM/DD/YY) (or, if renewal, original start date): 3/31/09
1. Describe your project, including objectives, design, and what will be required of subjects (including a time frame). Include details regarding the types of procedures and tests to be used in the investigation, and the method(s) of data collection.

St. Mary’s Elementary School in Marietta, Ohio is the site of the study. It is a parochial school that services students in pre-kindergarten through eighth grade and is financially supported by St. Mary’s Catholic Church in Marietta, Ohio. The school is accredited by both the State of Ohio and Diocese of Steubenville. The school’s programs serve three and four year-olds with a half-day Montessori preschool program, while an all day kindergarten is provided for five and six year-olds. The student body of approximately 200 is served by 23 licensed teachers. Class sizes range from eight to twenty-five students.

This study of the impact of an attitude toward mathematics on mathematics will be done using the Quantitative - qualitative method. This will be done by using a questionnaire where students, teachers, and parents will be using a Likert Scale to gather the data for the quantitative aspect of the study. The information will be put into SPSS to be analyzed for a correlation between the variables in the study. Each question will also have a space for the subject to explain their response. The results of the questionnaires will be placed into themes for reporting. The researcher will attempt to record students’, teachers’, and parents’ reactions to the impact of attitude on classroom performance.

The participants in this study will be elementary students, teachers, and parents of St. Mary’s Elementary School in Marietta, Ohio. The teachers in the survey are from grades kindergarten through eighth grades. Students in kindergarten through eighth grade will be surveyed as well as the parents of these students.

Initially, the researcher will gain permission from the Marietta College Human Subjects Review Board. The principal of St. Mary’s School will be contacted to gain permission to use the school’s staff, students, and parents as the research site. The researcher will develop a Quantitative-qualitative questionnaire with questions that the subjects will answer using a Likert Scale. In addition to the Likert Scale questions, the subjects will be asked to qualify their answer with a brief explanation or comment. The students, teachers, and parents will also be notified of the study. Then the survey will be sent out with a cover letter explaining the purpose of the research in more detail along with a permission form for the parents to allow their child to be part of the study. The participants will have complete anonymity in the study. The surveys will be returned to the teacher through inter-office mail. The researcher will collect all of the surveys and the data will be placed into SPSS for the statistical analysis. The open-ended questions will be used to create themes for the study as well.
2. Who will be your subjects and how many do you plan to include in your study? Are there any inclusion or exclusion criteria?

The subjects of the study will be the teachers, students, and parents of St. Mary’s Elementary School in Marietta, OH. Approximately 35 teachers, 200 students. All students and teachers will be included.

3. How will your subjects be recruited? Specify whether recruitment and data collection will take place on or off the Marietta College campus. Include any specific requirements of the subjects, and criteria used for inclusion or exclusion of subjects.

All teachers, students, and parents will be included in the study. The data collection will take place at St. Mary’s Elementary School in Marietta, OH.

4. Describe how informed consent will be obtained or justify why it will not be obtained.

Consent will be obtained from the principal of the school to conduct the study and also from the parents for the individual students who will be participating.

5. Have previous research or pilot studies indicated any significant dangers or risks in the procedure being used? 

☐YES ☑NO

If you answered ‘YES’ to the above question, identify and describe the potential dangers or risks (physical, psychological, ethical, social, economic, legal, etc.) of this type of study you have found in previous research. Cite sources in APA, AMA, or MLA style.

6. Regardless of your answer to Question 5, assess and describe the potential dangers or risks (physical, psychological, ethical, social, economic, legal, etc.) involved with your study. Estimate their likelihood and seriousness.

I do not feel that there are any dangers or risks to the students. They are not being asked to do any physical activity, no deep psychological reflection, and will not be publically identified in any of the results. The survey does not ask for their name and any identifying information. There classroom teachers will not know individual results either.

7. Describe any procedures that will be employed to minimize potential hazards and give an assessment of their potential effectiveness.

I will conduct the survey in each classroom. I will pass out the paper and collect. Upon collecting all of the surveys for each room, they will be sealed in an envelope until they
will be open at my home to collect the data. The envelopes will be stored in a locked filing cabinet in my classroom and will go home with me the same day they filled out by the students. Once at my house, they will be kept in a fire safe until destroyed upon completion of the thesis.

8. Does your study involve any deception (i.e. misleading or false information) of subjects?

☐ YES  ☒ NO

If you answered 'YES' to the above question, respond to the three statements below.

A. Explain the nature of the deception, and the rationale for including this deception in your study.

B. Describe the expected reaction or consequences (immediate or long-term) that the deception may have on subjects. Include potential negative reactions.

C. Explain how and when the subjects will be informed of the deception, typically via a debriefing procedure.

9. If you answered ‘NO’ to Question 8, indicate how and when subjects will be informed of the purpose of the research, and how this feedback will be provided.

The subjects will be given a cover letter explaining the purpose of the study before they are given the actual survey to fill out. Before they fill out the survey, I will talk to the students about the purpose of the study as well.

10. Describe the methods by which you will maintain the confidentiality of information collected in the context of your study (e.g., store all documents with identifying information in a locked cabinet; destroy all documents with identifying information within a year of the study’s completion; allow access to identifying information only to members of the research team; report the study’s results in aggregate form, with no individuals identified; identify participants with a number). Be sure to specifically address the following three questions in your response.

A. Who will have access to confidential information?

Only I will access to actual completed surveys. I will pass them out and collect in each of the individual classrooms and I will remain present in the room at all times while
students have the surveys.

B. How will confidential information be stored and protected?

The surveys will be collected in the individual rooms, sealed in a large envelop and then taken to my classroom where they will be locked in a filing cabinet until the end of the day when they will go to my house. The information will be stored in a fire safe in my home.

C. What will happen to confidential information after the study?

The confidential information will be destroyed after the study.

11. For each of the following general requirements of Human Subjects research, place a check mark in the column for “YES,” “NO,” or, if the description is not applicable to your project, “N/A.”

<table>
<thead>
<tr>
<th>Requirement</th>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Subjects will participate voluntarily.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Subjects will have the freedom to withdraw from the study at any time,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and without consequence.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The data collected will not be used for any non-approved purpose.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Subjects will be guaranteed confidentiality.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Subjects will be informed about the nature of their participation in the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>study before they begin the study.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. All reasonable attempts will be made to minimize physical and/or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>psychological harm to subjects.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Individual performances will not be disclosed to anyone other than the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>investigator(s).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Subjects are given the opportunity to ask questions, and all questions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>will be answered to the satisfaction of the subjects.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. All subjects will provide consent with their signature on a consent form.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Appropriate debriefing procedures will explain the purpose(s) of the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>study following the subject’s participation in the research.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Explain any ‘NO’ answers below:

12. Describe the extent of your training on ethical guidelines for treating human subjects within this field or discipline. Cite, in APA, MLA, or AMA style, at least two sources you have consulted for research ethics guidelines in your field.


In class lecture, EDUC-640, Dr. Bill Bauer.

13. Additional comments:

14. The following documents are appended to the end of this form (if applicable):

- [✓] Informed consent form
- [ ] Letters of permission
- [✓] Tests/surveys/questionnaires
- [ ] Recruiting ads
- [✓] Human Subjects Training certificate(s)
- [ ] Additional items (specify)

15. If this proposal is a “Renewal” or “Re-Evaluation” (see cover sheet), please specify the changes from the original submitted proposal. If not, leave this section blank.
Appendix B

Ms. Rita Angel

I am writing this letter to ask for your permission to perform a study here at St. Mary Elementary School. The study is regarding the affects of a student’s perception of, and attitude toward mathematics on the student’s classroom success. The study will attempt to find out if a good attitude toward mathematics correlates into classroom success.

Attached you will find a copy of the informed consent for that I will be sending out to the parents of students in grades 1-8 here at St. Mary. I will be getting with each of the homeroom teachers and finding a time, at their convenience, that I can come in and administer the survey to the class. No student identification information will be asked of the student. The only personal information on the survey is grade and gender. The survey is both a Likert scale questionnaire and a few open ended questions that the students will be asked to respond to.

Please look over the informed consent form and the student survey. If there are concerns, please notify me and I will address them to the best of my ability. If everything looks to be in order, and I have your permission to perform this study at St. Mary, please sign below so that I have your written permission to proceed.

Thank you in advance for your cooperation in my master’s thesis process.

Sincerely,

[Signature]

Benjamin Schenkel

Signing below state that I am granting Benjamin Schenkel permission to conduct a study titles: “THE AFFECTS OF A POSITIVE OUTLOOK TOWARD MATHEMATICS ON MATHEMATICS CLASSROOM PERFORMANCE.”

__________________________________________
Print Name Here

__________________________________________
Sign Name Here

__________________________________________
Date
Appendix C

To: Parent of St. Mary’s Students
From: Mr. Benjamin Schenkel, 5th Grade Teacher
Re: Student Survey on Attitude toward Mathematics for Masters Degree Thesis

INFORMED CONSENT FORM

You are invited to participate in a study of how a student’s attitude or outlook on mathematics impacts their overall classroom performance. I hope to learn that if we as a staff at St. Mary’s School can help students to learn to enjoy math and have a positive outlook toward, the students will begin to show greater improvement in the class work. You were selected as a possible participant in this study because you are a student at St. Mary’s Elementary School, the site of the study.

If you decide to participate, I will send you a survey that you will fill out that contains both Likert Scale questionnaire as well as open ended questions. The survey should not take you more than 15-20 minutes to complete.

Any information that is obtained in connection with this study will remain confidential. No identifying information is on the survey and your child’s responses are completely confidential. All information gained in this study will be submitted to Marietta College Education Department personnel, and it will also be made available to all students, parents, and staff of St. Mary’s School. Individuals’ confidentiality will remain intact when anyone is looking at the results.

Your decision whether or not to participate will not prejudice your future relation with Benjamin Schenkel and/or the faculty and staff of St. Mary’s School. If you decide to participate, you are free to discontinue participation at any time without prejudice.

If you have any questions, please do not hesitate to contact me. If you have any additional questions later, please contact Ben Schenkel at 740.373.7018 and I will be happy to answer them.

You will be offered a copy of this form to keep if requested.

_____________________________________  _____________________________________
Printed Student Name     Student Signature

_____________________________________ _____________________________________
Printed Name Parent/Legal Guardian  Signature of Parent/Legal Guardian (If necessary)

Signature of Investigator
Appendix D

**Mathematics Survey for Mr. Schenkel’s Masters Thesis**

### Demographic Information

1. Grade  1  2  3  4  5  6  7  8
2. Gender (Circle One)  Male  Female
3. Grade in Math (3rd grading Period)  A  B  C  D  F

### How You Feel About Math

HE = Hardly Ever, O = Occasionally, HT = About Half the Time, U = Usually, NA = Nearly Always

<table>
<thead>
<tr>
<th></th>
<th>HE</th>
<th>O</th>
<th>HT</th>
<th>U</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. I see a purpose in my life for learning mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. The prospect of having to learn new mathematics makes me nervous</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. I can get good results in mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. I am more worried about mathematics than any other subject</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Having to learn difficult topics in mathematics does not worry me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. No matter how much I study, mathematics is always difficult for me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. I am naturally good at mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. I have a lot of confidence when it comes to mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Complete the following sentences:**

I would like school more if...

I would like school less if...

I would like mathematics less if...

I would like mathematics more if...
Appendix E

Mathematics Teaching Survey

How You Feel About Teaching Math

SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

<table>
<thead>
<tr>
<th>Q.</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Math is my favorite subject to teach during the day</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I am enthusiastic when teaching math</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I make a conscience effort to make math fun for my students</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. I am confident in my understanding of the material I teach to my class</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. I feel math is the most important subject I teach</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

I like teaching math when...

I would like teaching math more if...