STUDENTS’ EXPERIENCES IN A MATHEMATICS INTERVENTION PROGRAM

A thesis presented
by

Renee Palazzo

To
The School of Education

In partial fulfillment of the requirements for the degree of
Doctor of Education

In the field of
Education

College of Professional Studies
Northeastern University
Boston, Massachusetts
December 2013
Abstract

Achievement in mathematics education continues to be a growing concern across the country. Presently, schools continue to struggle with the best methods and strategies to implement effective mathematics programs while working towards closing achievement gaps for those students who are not meeting the standards. The Rhode Island Department of Education has been working with local schools, mostly at the elementary level, to implement Response to Intervention programs. However, there is little information for the implementation of such a program at the secondary level, and more importantly, is a significant challenge at this level. Since secondary level mathematics classes tend to be homogeneously grouped, the chance for advancement of all students is lessened. In homogeneously grouped classrooms, content is presented at the perceived ability level of the students, preventing students from experiencing opportunities which higher achieving peers have access to.

The purpose of this study is to investigate and gain an understanding of the effectiveness of the numeracy support program through students’ experiences and perceptions. Therefore, a qualitative phenomenological approach is used. This support program is designed as blocks of instruction within smaller, personalized learning environments. The focus will be on students’ experiences and perceptions and will help in identifying the best way to improve mathematics in schools while providing equity among all learners.

Keywords: mathematics achievement; response to intervention; heterogeneous grouping; intervention in mathematics; intervention programs
Acknowledgments

As I come to the final stages of my doctoral work, I am forced to reflect on the journey I have taken which led me to this point. This journey consisted of many emotions, including happiness, pride, frustration, adversities, encouragement, perseverance, teamwork and finally, triumph. The word I included before triumph was teamwork. This endeavor was not one I accomplished alone, more importantly, without the love, support, guidance and encouragement of many people in my life, I would not have succeeded. Although this research has my name on it, the “team” deserves appropriate recognition for their part.

First I would like to begin by offering my lifelong thank you to my parents, Larry and Marlena Silvestri. Their unwavering support throughout my life has led me to be the person I am today. They have showed me that through my faith in God, anything is possible for our family. My parents are my biggest supporters and for that I am forever grateful. Their positive outlook on life throughout my childhood and into adulthood has molded my personality into one that has allowed me to truly believe that despite how challenging a situation may appear, we will come through it stronger, wiser, and better. I love them for who they are as parents, as a couple and as faithful believers in God.

Second I would like to thank my husband Joe. We have been together twenty years and have had our fair share of trials and tribulations. Although we do not have the life we planned, we have “our” life and for us, it works. I could not imagine any part of it being different. He is a person I admire and from him I have undoubtedly learned perseverance. There is not a “match” that we cannot win, as long as we do it together. Although we often find ourselves in difficult situations, it is because of his strength I find mine and for that, I know I am blessed.
Third, I would like to thank my professional community. I have been fortunate enough to have wonderfully supportive colleagues who I also consider friends. Daniel Kelley, for allowing me the autonomy to do what I believe in and the trust in knowing that I will be the best I can, I thank you. I appreciate how you have allowed me to grow professionally and am proud of the work we have accomplished together. Lora Calise, my friend, who sees the positive in me and allows me to speak openly and freely when I need to. I am grateful for our friendship and for your always available “open arms”. To Amanda Grundel who is one of my biggest supporters. I am thankful for your uplifting and positive words of encouragement at those times when I need it most. You are one who is always supportive of my work and encourages me to be the best I can. Andrea Pleau, I appreciate the professional conversations as well as your ability to challenge me to keep growing and moving forward. I offer a sincere and special thank you for agreeing to support my theses defense and being a part of this process.

Fourth, I would be remiss if I did not offer my sincerest gratitude to Dr. Jane Lohmann for continued support and encouragement. You agreed to advise me at a pivotal moment in my journey and you led me down the right path. However, I never felt like I traveled it alone and without you I would not have completed this project.

Lastly, I would like to dedicate my theses to my children Joseph and Isabella. You are my life, my heart, my soul and I only wish that you could understand how proud I am of both of you. I have learned so much from the two of you in different ways. Isabella, you have taught me to see and appreciate the small things in life and the importance of laughter. Joseph, you have taught me what is really means to have a kind heart, be a true believer in God and how to laugh. I love you both dearly and am so very happy to share this accomplishment with you. I hope you understand that there are no limits to who we can be and what can be accomplished. Please do
not ever stop trying, do not ever stop laughing and do not ever stop praying. For it is through Him that all things are possible.
# Table of Contents

Abstract of Theses .............................................................................................................. 2  
Acknowledgments ............................................................................................................... 3  
Table of Contents .................................................................................................................. 6  
List of Tables .......................................................................................................................... 8  
List of Figures ........................................................................................................................ 9  

**Chapter 1: Introduction** ................................................................................................. 10  
- Problem Statement ........................................................................................................... 11  
- Significance ....................................................................................................................... 12  
- Research Questions and Goals ....................................................................................... 13  
- Contents and Organization .............................................................................................. 14  
- Theoretical Framework ................................................................................................... 14  

**Chapter 2: Literature Review** ....................................................................................... 18  
- Mixed Ability Instruction ................................................................................................. 18  
- Instruction ....................................................................................................................... 21  
- Response to Intervention ............................................................................................... 22  
- Relationships .................................................................................................................. 25  

**Chapter 3: Research Design** ...................................................................................... 28  
- Research Questions ......................................................................................................... 28  
- Methodology ................................................................................................................... 29  
  - Site and Participants ...................................................................................................... 30  
  - Measuring Student Learning ......................................................................................... 31  
- Data Collection ............................................................................................................... 34  
- Data Analysis .................................................................................................................. 36  
- Reliability, Validity and Credibility ................................................................................. 38  
- Protection of Human Subjects ....................................................................................... 39  
- Summary ......................................................................................................................... 40  

**Chapter 4: Report of Research Findings** ................................................................... 41  
- Data Collection ............................................................................................................... 41  
- Participants ....................................................................................................................... 42  
- Data Analysis .................................................................................................................. 43  
- Results .............................................................................................................................. 46  
  - Learning Environment ................................................................................................ 47  
  - Student Teacher Relationships .................................................................................. 48  
  - Interactions with Peers ............................................................................................... 51  
  - Individualized Instruction ......................................................................................... 52  
- Attitude ............................................................................................................................. 53
Chapter 5: Discussion of Research Findings

Findings
- Finding #1: Fostering Self Efficacy
- Finding #2: Confidence in Performing in Mathematics
- Finding #3: Relationship Between Teacher and Student

Implications
Recommendations
Further Research

References

Appendix A: Parent/guardian Consent
Appendix B: Student Consent
Appendix C: Guide for Student Interview
List of Tables

Table 1.1: Six Principles of Effective Mathematical Interventions..........................16
Table 3.1: New England Common Assessment Program Proficiency Level Descriptions........32
Table 3.2: Student Achievement Levels on NECAP..................................................33
Table 4.1: Summary of Themes and Subthemes that Emerged From the Data....................47
Table 5.2: Summary of Recommendations.................................................................80
List of Figures

Figure 1.2: Intervention Pyramid ..............................................................................17
Figure 3.3: Data Analysis in Qualitative Research .....................................................37
Figure 5.1: Emergent Themes ....................................................................................65
Chapter One: Introduction

Mathematics achievement is often viewed as attainable only by those students who seem to really understand its concepts at an early age (Burris & Garrity, 2008). For that reason, early in students’ educational careers decisions about the path students will follow are made. According to Burris and Garrity (2008), those decisions include placing students in identified tracks, which could have negative effects on students’ identity, development and attainment, particularly for those students placed in lower tracks. Along with the track placement is also the expectation of achievement level since students are grouped according to their perceived level of ability. The difficulty appears to be in identifying the best way to improve mathematics instruction in schools while providing equity among all learners. The practice of tracking or leveling in mathematics may actually limit students’ access to rigorous courses that promote problem solving, analytical thinking and effective communication, increasing the gaps in students’ learning and achievement (Boaler & Staples, 2008). Tracking in mathematics tends to begin as students enter the middle grades, since elementary education is taught by one teacher teaching all content areas. As students progress to the sixth grade, a typical entry level for middle schools, they are then assigned different teachers for each content area. It is at this time that gaps in students’ prior learning are seen as obstacles to their present learning. Consequently, by the time they enter the ninth grade they have already had three years to fall behind and tracking then seems obligatory. (Burris & Garrity, 2008)

A heterogeneous classroom could have students who are at different grade level readiness with different learning styles forcing teachers to understand how to teach mathematics in a conceptual way while responding to all the learners’ needs in the classroom. The challenge for teachers then becomes how to effectively instruct and engage students with all levels of
readiness. This type of heterogeneous learning environment tends to be in contrast to what teachers practice, since researchers have found that teachers believe students can be taught more effectively when they are divided into groups of students whose math skills are similar (Gamoran, et al., Weinstein 1998).

**Problem Statement**

According to the New England Common Assessment Program (NECAP), the state assessment for all Rhode Island schools, current state assessment results, educators and policy makers in Rhode Island are struggling to produce students who are proficient in mathematics and are effective problem solvers (RIDE, 2008). Students participate in the NECAP in third through eighth and eleventh grades in the content areas of Reading, Writing, Mathematics and Science. It was reported that students around the state of RI scored an average of 22% proficient in mathematics for the 2008 and 2009 school years (RIDE, 2009).

This particular problem of practice exists in the proposed site for this investigation where approximately 840 students attend grades 9-12. The high school recently eliminated the lower tracked classes to create more heterogeneously grouped, equitable learning environments. Along with this change came the implementation of a numeracy course because the assessment data supported the need for additional mathematical support. Students who scored below proficiency on the state assessment for two or more years, did not receive a passing grade in their previous mathematics class, and/or had an identified disability in mathematics were selected for the program. It is in this program that they received additional, individualized instruction in their numeracy class.
I seek to understand how students perceive and experience the additional support of the numeracy program. This personalized learning environment includes a maximum student enrollment of ten students and the teachers will use an emerging curriculum.

**Significance**

The National Council of Teachers of Mathematics (NCTM, 2008), recognizes the need for equity in mathematics, specifically in the form of high expectations for all students, allowing for opportunities to learn mathematics with rigorous, meaningful and challenging experiences. Schoenfield (2004) holds that knowledge of any type, but specifically mathematical knowledge, is a powerful vehicle for social access and social mobility; therefore the lack of access to mathematics is a barrier that leaves people socially and economically disenfranchised.

In an effort to increase access and equity in mathematics instruction, The National Mathematics Advisory Panel Final Report (2008), recommends that schools work towards preparing all students for algebra in grade eight, requiring that students understand basic mathematical and problem solving skills prior to the start of eighth grade and ensuring that they have mastered algebraic concepts prior to beginning high school. If students have not mastered algebra by the beginning of high school, interventions must be put in place to work towards ensuring success in the upcoming years (Fuchs & Fuchs, 2008). According to The Panel, teachers and educational leaders must use research-based interventions to help students. These interventions should be support-focused and help with improving student progress towards identified goals. Therefore, schools have an obligation to provide students with the best curriculum and hold high standards for all. This is true for an “all kids agenda”, which includes believing all kids can learn and grow from where they are currently. However, since not all
grow at the same rate, same pace and with the same information, there is a need to individualize and personalize. (Brown-Chidsey & Steege, 2010; Fuchs & Fuchs, 2008)

**Research Questions and Goals**

Since this project is focused on students’ perspectives and experiences in the numeracy program in a school that had just recently eliminated the lowest track, the following question is critical to the nature of this project:

1. How do students describe their experience in the mathematical intervention support program?
   
   Sub questions:
   - What success do students describe with the numeracy support program?
   - What barriers and challenges do students describe with the numeracy support program?

Maxwell (2005) argues “a particularly important advantage of basing your research topic on your own experience is motivation” and as a former mathematics teacher, I have a personal connection to this project (p. 16). According to Maxwell (2005), practical goals seek to accomplish something while intellectual goals seek to understand something, gain insight into what is going on, or answer questions that previous research has not addressed adequately. Intervention programs, or mathematics support at the secondary level, have shown to be an area of concern with little to no clear definition of successful programs.

Intellectual and practical goals are used to understand the meaning for the participants of the study, which includes, how the participants make sense of the events and behaviors and how their understanding influences their behaviors (Maxwell, 2005). I seek to understand how students’ experiences in this support classroom help or hinder their success in the regular mathematics classroom, and I hope to use what I learn to improve the intervention program.
Organization of this Document

This chapter includes a framework for this study, the literature review and methodology. The framework provided a lens for this study and focuses on effective mathematical interventions for students who are struggling mathematics learners. In the section that follows, I review the four strands of literature which were used to base my study: mixed ability classrooms, instruction, Response to Intervention and teacher-student and peer relationships.

I chose to investigate mixed ability classrooms since students in the numeracy support program were placed in heterogeneously grouped classes when they entered into the 9th grade. The second strand of literature pertains to the individualized instruction students should receive in order to be successful. Since the numeracy support program was created for students who struggled with mathematics achievement, the emphasis of this strand was on instruction at the secondary level. The third strand is Response to Intervention which supports and outlines components of successful programs for students who are not performing at grade level. The final strand of literature is relationships since students are placed in smaller, more personalized learning environments. Subsequent to the literature review, I developed a proposal for a research design and methodology following a qualitative approach. Since this study is dependent on students’ experiences in the numeracy program, I chose a phenomenological study. The methodology section includes my data collection and data analysis protocols. This section concludes with my explanation of validity and reliability of my study followed by the protection of the rights of the participants.

Section Two: Theoretical Framework

In most high schools across the United States, classrooms are teacher driven environments where students are passive, unengaged learners (SurveyWorks, 2010). Theories
and research support the idea that this is not an effective way to teach children (Boaler, 2008; Burris, 2006; Gamoran & Weinstein 1998). I will use the research on effective mathematical interventions at the secondary level to frame this study. This framework assumes that students are best served by individualized situations that foster understanding based on the foundation they already possess. Some of the key assumptions of this framework focus on the need to identify students as individuals and support students to progress at their own rate. The belief is that personalization, individualization, and meaningful learning are at the forefront of successful education for students.

Secondary students entering high school with learning disabilities in mathematics or extensive gaps in their knowledge benefit from direct instruction rather than discovery based learning environments (Fuchs & Fuchs, 2008). A very individualized approach is necessary, which is focused on problem-based situations along with basic skill and remedial work. This will provide learners the opportunities to develop their learning based on their current understanding.

According to Carter and Dean (2006), activating prior knowledge is especially important in mathematics, since it helps students understand relationships between what they have previously learned and what they are currently learning. Since the intervention should be learner centered and individualized, teachers’ main roles are to be diagnosticians, providers of a diverse instructional environment, and facilitators of growth (Schiro, 2008). The barrier for learning mathematics may lie in the lack of the ability to build on assumed prior knowledge that the students do not have (Schoenfeld, 2004). Therefore, gaps in existing knowledge obstruct new knowledge from being attained (Carter & Dean, 2006). Instructors need to assess what students
know in order to effectively build upon their knowledge base and allow them to progress. Mathematical interventions should create this type of opportunity for both teacher and student. According to Fuchs & Fuchs, (2008), effective mathematical interventions encompass six instructional principles: (1) instructional explicitness; (2) instructional design that eases the learning challenge; (3) strong conceptual basis for procedures that are taught; (4) emphasis on drill and practice; (5) cumulative review as part of drill and practice; and (6) motivators to help students regulate their attention, behavior and effort to work hard.

Table 1.1 Fuchs & Fuchs (2008) Six Principles of Effective Mathematical Interventions

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional explicitness</td>
<td>The teacher directly shares the information the student is learning with very little discovery based methods</td>
</tr>
<tr>
<td>Instructional design</td>
<td>The teacher anticipates and eliminates misunderstandings and carefully design instruction to minimize the gap in knowledge</td>
</tr>
<tr>
<td>Conceptual basis</td>
<td>The teacher uses manipulatives or other resources and designs instruction that allows students to show conceptual transfer of knowledge within the same type of problems</td>
</tr>
<tr>
<td>Emphasis on drill and practice</td>
<td>The teacher provides instruction that allows students intensive drill and practice of basic math skills that are separated and mixed with other skills</td>
</tr>
<tr>
<td>Cumulative review</td>
<td>The teacher creates reviews throughout the learning that are composed of many topics/skills taught so students have the opportunity to continue to practice what they have learned</td>
</tr>
<tr>
<td>Motivators</td>
<td>The intensive intervention must contain motivators since many students have experienced repeated failure with math and now require tangible reinforcements</td>
</tr>
</tbody>
</table>

The Rhode Island Department of Education (RIDE) lists important components for instruction in intervention programs. These components include: (1) curriculum and instruction which are built upon a guaranteed and viable core aligned to district, state, and national
standards; (2) instruction that is universally designed to address student learning strengths and needs; (3) instruction that is informed by student data across all content areas and is differentiated to meet the needs of all students; and (4) teachers and administrators who have developed the skills and tools needed to analyze and interpret data to make instructional decisions (RIDE, 2011).

According to RIDE, interventions should occur daily in the regular classroom as part of the core instruction and should be appropriate for approximately 80% - 90% of the students. More intensive interventions should be in place for about 5% - 10% of the students. Individualized interventions must be designed for students with significant gaps in knowledge and these should be designed for about 1% - 5% of the students. This third level of students, no more than 5% of the students, must receive individualized instruction that is separate from special education services.

Figure 1.2: Intervention Pyramid- Rhode Island Department of Education (2010)

Mathematical interventions at the secondary level must be tiered programs based on individual students’ level of knowledge. These programs should be daily and ongoing and need to incorporate individualized instruction. (RIDE, 2009).
Chapter Two: Literature Review

The intervention framework used for this study led me to review the literature encompassing research that focused on the grouping of students in the classroom, instruction in the classroom and components of intervention programs. Based on the literature, this review will be separated into four areas: (1) mixed ability mathematics classrooms, (2) mathematical instruction, (3) Response to Intervention and (4) teacher-student and peer relationships.

Mixed Ability Instruction

The focus of this review is the achievement of all students in mixed ability mathematics classrooms and the relationship between mixed ability classrooms and student achievement. The National Council of Teachers of Mathematics (NCTM, 2008) argues that equitable practices encourage both teachers and students to see the importance of and respect the work of all members of the classroom. They assert that all students can make important contributions. Equitable learning environments are created when teachers encourage students to share their thinking, listen to others, and develop different solutions, interpretations, and approaches which are mathematically sound, and students and teachers share responsibility to engage with and support one another throughout the learning experience (NCTM, 2008). Furthermore, NCTM posits that schools in which teachers and students are a part of equitable learning environments have greater opportunities for engagement in significant mathematical ideas.

In order to achieve equity and work towards closing the existing achievement gap, researchers have investigated what equitable classrooms look like, and most have found that mixed ability classrooms offer the opportunity for all to learn and achieve (Boaler & Staples, 2008; Burris & Garrity, 2008; Linchevski & Kutscher, 1998; Oakes, 2008). The intent of mixed ability classrooms is to provide all students the same access and opportunity to the content at the
same level of rigor (Boaler & Staples, 2008; Burris & Garrity, 2008; Linchevski & Kutscher, 1998). One goal is to maximize each student’s growth and individual success by meeting individual students where they are and then assist them accordingly in the learning process. As noted by Strickland & Tomlinson (2005), it is clear that teachers in differentiated classrooms begin with a clear sense of what constitutes powerful curriculum and engaging instruction. Classroom instructional strategies should be research based and content appropriate and teachers should know when to use them and with whom (Strickland & Tomlinson, 2005). The focus on equitable classrooms is on the individual student where interventions are in place to support the success of those students who may need them.

According to a study conducted by Boaler (2008), the students who were placed in mixed ability classes enjoyed mathematics more than those students who were taught in traditional classrooms. Students’ experiences increased interest in mathematics and showed an increase in achievement. In terms of courses for the future, all of the students interviewed planned on pursuing more mathematics courses, compared with 67% of students from the traditional classes. In addition, 39% of mixed ability grouped students planned a future in mathematics compared with 5% of students from traditional classes.

Although equity was achieved by creating mixed-ability classrooms, other variables that led to the increase in student achievement in such a short period. This was beyond simply changing the structure; rather, it included changing teaching styles, perceptions, expectations, curricula and supports for struggling students all occurring simultaneously.

Burris (2006), conducted a longitudinal quantitative study with a primary goal focused on student achievement in mixed ability classrooms. Assessment of the students’ understanding of math content was performed in a variety of methods, including content-aligned tests and open-
ended project assessments, state assessments, and mathematics courses. The findings of the study showed that high quality instruction is possible in heterogeneous mathematics classrooms; therefore, there is no need to “water down” the curriculum for student success. When challenged and given the opportunity to succeed, students believed in themselves and showed progress. Burris (2006) also found that the performance of high achievers did not differ statistically in heterogeneous classes and the percentage of students taking advanced math courses did increase.

A qualitative study performed by Gamoran and Weinstein (1998) consisted of a one-year examination of twenty-four highly restructured schools as part of the Center on the Organization and Restructuring of Schools (CORS). The researchers interviewed teachers representing different grade levels, administrators, district personnel, parents and representatives from community organizations that influenced the school. Their findings showed that although mixed ability classes require extra effort in order to prepare to work with students individually, students performed better than those who were in same ability classrooms.

Most of the studies reviewed were quantitative in design. Linchevski and Kutscher (1998) studied twelve junior high schools and assigned students to either heterogeneous or homogeneous classes. In this study, it was necessary to separate the effects that may influence final achievement; e.g. effect of grouping at different levels and initial differences between students in these groups. The findings showed that within class ability grouping may be offset to some degree by losses in instructional effectiveness due to the difficulty in managing multiple ability groups.

The research indicates that heterogeneously grouped mathematics classes are beneficial to both high and low achieving students. Detracking decreases the achievement gap, “…the average and weaker students’ achievement showed significant gains, whereas the loss in
achievements of the stronger students was negligible.” (Linchevski et. al, p.550). Although
detracking does decrease the achievement gap, it only does so if proper supports for both
students and teachers are implemented. A heterogeneously grouped class requires individual
instruction for students, and educators require supports in teaching students of different ability
levels in the same classroom. Although the research does not specify one particular way of
supporting students, Burris (2008) found that providing opportunities outside the regular
mathematics classroom for both enrichment and remediation is necessary for the success of
heterogeneously grouped classes, while still maintaining a rich, rigorous curriculum for all
students. The findings are directly related to the need for mathematical interventions.

**Instruction**

The newest *Standards* document (NCTM, 2000) gives greater importance to equity
defining it as “equity does not mean that every student should receive identical instruction;
instead, it demands that reasonable and appropriate accommodations be made as needed to
promote access and attainment for all students” (p. 12). The literature is clear that all students
need to be held to high expectations and educators must provide additional support for struggling
learners in order for true equity to occur (Fuchs & Fuchs, 2001; NCTM, 2008; Slavin &
Karweit, 1985). The support is then left open for interpretation and individual design and should
include effective instructional strategies that are organized and guided by theories of learning.
According to a study conducted by Arra and Bahr (2005), there is a need for more research in
mathematical interventions focusing on cognitive, behavioral, or traditional methods. This
appears to be where the challenge lies at the secondary level. Although teaching strategies based
on best instructional practices are expected in all classrooms, there seems to be little research
based on best interventions at the secondary level. According to Danielson (2009), there is much
to be learned about implementing interventions at the secondary level since the schedule and design of high schools pose many challenges. The experts are clear that support for struggling learners and intervention opportunities are necessary. It is not clear how that should be created for a current high school mathematics setting.

In a recent educational survey conducted by the state of Rhode Island, approximately 18,000 students in grades 9-12 were surveyed, and the results showed that student engagement in learning is low. Although the results were not specific to mathematics, they were reflective of what students across the state are experiencing on a daily basis. Approximately 94% disagree with the statement that teachers keep them engaged and interested in the content and approximately 40% of students admit to skipping class with 73% citing the reason as boredom (SurveyWorks, 2010). Schools need to incorporate meaningful and relevant instructional strategies and learning opportunities for students that are based on their individual levels of readiness. Students develop when they are able to “test drive” the learning that happens in classrooms by applying those ideas in the real world (Boston, 2005).

**Response to Intervention**

The Response to Intervention (RTI) process is a multi-step approach to providing services and interventions to students who struggle with learning at increasing levels of intensity (Ehren, 2008). Since the RTI model is a relatively newly defined model adopted by the state of Rhode Island, it is difficult to identify the best design for interventions at the high school level; however, there are some recommendations for necessary components of any program. RTI is a model of a process that allows educators to determine the necessary supports or interventions (Brown-Chidsey & Steege, 2010). These supports and interventions must be used to supplement the core curriculum, not replace it (Fuchs, 2008). Response to Intervention should be part of the
bigger picture of allowing all students the same educational access and opportunities (Brown-Chidsey & Steege, 2010). According to Fuchs & Fuchs (2001), all learners will have access and opportunity to a rigorous and challenging curriculum; however, with RTI, interventions are implemented to meet the needs of all learners. According to Danielson (2009), a key component to the success of any intervention is matching the student with the appropriate supports. According to Duffy and Scala (2012), “Response to intervention is a framework used to ensure that students receive the supports they require for success, and, when implemented throughout an educational system, it also can inform the kinds of supports that might benefit adults in the system.” (p.18)

When the RTI process is implemented successfully, there are many advantages: (a) assessment data reflects student performance over time rather than a snapshot; (b) early intervention leads to fewer special education referrals; (c) student performance data guides instructional decisions and (d) immediate intervention (Wiley, et. al. 2008). It is then expected that the design for the delivery of instruction and assessment is based on progress monitoring data with an overall goal of improving student achievement (RIDE, 2006). According to Brown-Chidsey & Steege (2010), “there is no one right way to set up RTI practices. Every school needs to plan, set up, and evaluate its own RTI plan.” (p. 2).

Since the process of RTI is grounded on supports for students based on individual needs, the RTI process includes the recommendations of tiered interventions to address skill deficiencies that may prevent students from achieving the core content. The RTI process includes three tiers of interventions. According to the National Center on Response to Intervention, Center on Instruction and the National High School Center (2011), the three tiers are described as: (1) Tier I is high quality core instruction where all students receive research
based instruction that meets the needs of approximately 80% of the students; (2) Tier II is evidence based interventions that are used in addition to the core, is mostly teacher led small groups and utilizes ongoing progress monitoring for approximately 15% of the students; (3) Tier III is individual interventions with one-on-one instruction for students who showed minimal response to the primary interventions. Tier III includes increased time and increased feedback and is designed for approximately 5% of the students. This level of intervention, tier III or tertiary intervention, is the basis for the numeracy support program. Fuchs & Fuchs (2001) defined tertiary prevention as a method of intervention focused on the individual student as the center of instruction. “Interventions should have three components: (1) focus on the individual student as the unit for instructional decision making, (2) intensive instructional delivery and (3) explicit contextualization of skills-based instruction” (p.91). In order for this type of learning intervention to occur, teachers must create individual, personal, and meaningful learning environments.

This type of instruction requires a paradigm shift for many educators (Ravitz, 2000). Past practices have consisted of teaching all students the same content, with the same delivery and evaluation procedures. Twenty-first century learning must move towards creating critical thinkers, who are highly engaged and responsible for their own learning, which must be based on their current knowledge base. This type of learning requires data support systems to identify such a knowledge base and to monitor subsequent progress (Duffy & Cunningham, 1996). According to field studies performed by Hughes & Dexter (2012) on RTI “… it appears that more studies that include a focus on the middle and high school levels are needed to establish the breadth of impact for RTI programs.” (p.5). This limitation of RTI research has been noted by
others in the field such as, Division for Learning Disabilities (2007), Fuchs & Deshler (2007), and National Joint Committee on Learning Disabilities (2005).

The area to focus on would then be the purpose and design of the model using RTI components. However, according to Buffum, Matto, & Weber (2010), RTI should not be a program developed to simply raise student test scores, but rather a process used to help students realize their hopes and dreams and prevent any discouragement due to the belief that it cannot be achieved. Once educators understand the urgency of their work and embrace it based on a fundamental purpose, then it seems improbable that any student could fail (Buffum, Matto, & Weber, 2010). Truly individualized instruction is created when time is the variable and learning is the constant, not vice versa. Omitting time as a constant, allowing variation based on student need, is a core essential to any intervention intended to promote student learning. The formula for learning looks like this: Targeted Instruction + Time = Learning (Buffum, Matto & Weber, 2010). The success of this learning formula includes the relationship between the teacher and student.

**Relationships**

Personalization, individualization, and high expectations are some of the components of the review of the literature that has been presented thus far. The last element of this review focuses on the impact relationships have on students’ successes, especially those students who are in need of remediation or enrichment.

According to Bernstein-Yamashiro & Noam (2013), the importance of the relationships between teacher and student has been overlooked as an integral component of student success. They noted that there is a body of research “… that has begun to find interesting connections
between teacher-student relationships and a host of outcomes including dropout, test scores, grades and behavior” (p.15).

This is also supported by a study conducted by De La Ossa (2005), which focused on eight public alternative high schools. The students who were involved in this high school redesign program noted that their school was like a family and the relationships formed between teacher and student is not one that is characterized by “friend” or “foe” but rather one that encompassed encouragement, trust and in some regards teamwork. According to students the smaller, personalized learning environments helped them in many ways including: “being able to academically concentrate and learn, feeling supported and comfortable, and forming valuable community relationship skills” (p.33). In addition, many students contributed their success and achievement to the caring relationships they had with their teachers. The findings revealed that relationships between teacher and student affected students both academically and socially, thus having a positive effect on the whole educational experience (De La Ossa, 2005). This is in agreement with the findings of Pianta (1999), where he noted the relationships between teacher and student are an essential part of the classroom experience and important in the acquisition of knowledge and academic competencies.

Having a relationship alone will not increase student achievement or increase student motivation to want to learn. Rather the type of relationship is what is important. According to Klem & Connell (2004) “students need to feel teachers are involved with them – that adults in the school know and care about them” (p. 262). Additionally, students who feel teachers care about them and create such environments are more likely to be engaged in school (Bernstein-Yamashiro & Noam, 2013; Darling-Hammond, Ancess, & Ort, 2002; Klem & Connell, 2004).
The success of education seems to hinge on a redesign, or at least in part, a shift in the interactions between and among teachers and students. Darling-Hammond, Ancess & Ort (2002) summarized the Coalition Campus Schools Project (CCSP) which occurred in New York City. The project sought to remove larger institutions with smaller more personalized learning environments. The CCSP replaced two neighborhood high schools with eleven smaller learning communities. Part of the outcome of the project was improved attendance rate and a larger graduating class. Among those outcomes was the increased personalization which allowed students to feel more connected to their schools and compared their schools to a family environment. They associated their personal academic success to the relationships with their teachers (Darling-Hammond, Ancess & Ort 2002). One student noted, “School should not be mass production. It needs to be loving and close. That is what kids need. You need love to learn.” (p. 654).

The literature supports high standards and rigorous curriculum for all students. It also provides foundations for implementing additional supports or interventions for students with gaps in their knowledge, illustrating the importance of individual and personalized learning environments focused on student needs. Response to Intervention is a process grounded in the belief that all students can learn if provided the correct interventions at the correct time. However, there is a dearth of literature providing specific methods and models of implementation, especially at the high school level. Practitioners seeking information on the implementation of interventions at the secondary level will be searching for guidance and recommendations. The exploration of issues surrounding the “numeracy course” discussed in this project will contribute to the literature in this field.
Chapter Three: Research Design

Research Questions

The success of students in heterogeneous classes embraces many components, including, instruction based on students’ differing abilities, commitment to the implementation of high standards, and additional support for students (Burris, 2006). In order to have a better understanding of these components, this project will focus on the third component, additional support for students. Specifically, this will include students who would have been placed in an applied, remedial math course when those courses existed at the high school; however, due to the elimination of the lowest track, they are placed in a heterogeneously grouped, college preparatory algebra 1 course that is aligned to Rhode Island State Standards and an additional numeracy intervention support class.

According to Moustakas (1994), research questions should be developed on certain characteristics of human science which include seeking to reveal meanings of the experiences and uncover the qualitative instead of quantitative components. To that end, research questions should “illuminate through careful, comprehensive descriptions, vivid and accurate renderings of the experience, rather than measurements, ratings, or scores” (p.105). Therefore, the following questions are critical to the nature of this qualitative research project:

1. How do students describe their experience in the mathematical intervention support program?
   Sub questions:
   • What success do students describe with the numeracy support program?
   • What barriers and challenges do students describe with the numeracy support program?
Methodology

The method of research chosen for this project is a qualitative approach focused on the experiences and perceptions of students involved in the numeracy program. According to Chesebro & Borisoff (2007), qualitative research includes investigation and data collection in the natural setting and “the specific results obtained have immediate utility and/or produce direct and instant insight into ongoing social processes and outcomes; the research analysis resolves an existing social problem.” (p. 9). According to Merriam (1998), qualitative research is a method in which the researcher is searching for meaning and understanding and is the primary instrument for data collection and analysis. As noted by Maxwell (2005), qualitative researchers “tend to ask how x plays a role in causing y, what the process is that connects x and y.” (p.23).

I seek to understand the students’ experiences in the numeracy support program as an intervention. According to Creswell (2003), qualitative studies are typically grounded in constructivist perspectives, using open-ended questioning with data emerging throughout the study.

Method

The design of this research will be based on an empirical, phenomenological research approach. Moustakas (1994) explains that an empirical phenomenological approach “involves a return to experiences in order to obtain comprehensive descriptions that provide the basis for a reflective structural analysis that portrays the essences of the experiences.” (p. 13). According to Giorgi (1995), there are two descriptive levels of empirical phenomenological research: level 1) original data compiled through open ended interviews; and 2) the researcher describes the experiences based on reflective analysis and interpretations. Moustakas (1994) also explains that a phenomenological study should be focused on the descriptions of what happened during the
experience and not on explanation of why or how it happened. “Evidence from phenomenological research is derived from the first person reports of life experiences.” (p. 84).

In order to obtain first person descriptions of students’ experiences, I will interview four students. These interviews will last for approximately one hour. They will be semi-structured interviews, composed of open ended questions which will allow the students to detail their experiences and perceptions of learning mathematics in both the numeracy support program and the heterogeneously grouped mathematics classrooms. The interviews will help me capture the feelings and experiences of the students and use the information to develop and improve the support program.

**Site and Participants**

Saraville High School is set in a suburban, relatively affluent community and serves approximately 820 students. The student population is 97% white, 1% African American, 1% Hispanic and 1% Asian. Approximately 9% are eligible for subsidized breakfast/lunch programs. Eight percent of the student body is identified as special education students in general education programs with supports and 1% of the population are in self-contained settings (RIDE, 2009). Currently there are ten mathematics teachers and three special educators, each of whom team teach two classes. Saraville High School’s NECAP scores in mathematics showed the proficiency levels from the 2007 – 2009 school years were 31%, 30% and 35% respectively.

Over the past five years in the state of Rhode Island there has been an increasing concern with achievement in mathematics, particularly with the students in applied level course. In this suburban high school, the site of the study, the applied level courses have been taught with less rigor, depth and coverage of essential content. In school years prior to 2009, students who were perceived to be at a lower ability were placed in an algebra 1 course which was separated into
two years; Interactive Math Year 1A, freshman year and Interactive Math Year 1B, sophomore year. The students were taught the same content but over a two year period. Based on their placement in this track, they would never have the opportunity of competing with others, since they were placed on an uneven playing field.

By following this sequence, a special third year class was created for this group. This type of program only increased the gaps in their knowledge and did not allow access or opportunity to the same content as their peers. It was a “watered down”, much less rigorous geometry course. Many math teachers felt this was appropriate and the idea of teaching heterogeneously classes was one that created apprehension. This apprehension supports the literature from researchers who have found that teachers believe students can be taught more effectively when they are divided into groups of students whose math skills are similar (Gamoran, et al., Weinstein 1998). However, researchers have also found that students in mixed-ability settings scored at higher levels than those in same-ability classes (Boaler, 2008).

The 2009-2010 school year, the Rhode Island Department of Education (RIDE) partnered with the Charles A. Dana Center to help improve math scores in the state of RI. In conjunction with this work, and based on the research provided prior to beginning this partnership, this school worked towards increasing the rigor of math classes by eliminating the applied level and creating heterogeneously grouped college prep courses. In making this decision, the administrative team worked closely with the mathematics and special education department.

**Measuring Student Learning**

The New England Common Assessment Program (NECAP) is a state assessment which is aligned to the Grade Level Expectations (GLE) for K-8 and Grade Span Expectations (GSE) for 9-12. The NECAP is administered in the fall following the teaching year of the GLEs or
GSEs. Therefore students are tested in October of their 8\textsuperscript{th} grade year on 7\textsuperscript{th} grade GLEs. The results are released in February of the same school year. The students are not tested on the 8\textsuperscript{th} grade GLEs. The district has data on these students for the past five consecutive years which include a scaled score, ranging from 0 to 60, and a proficiency level, ranging from 1 to 4.

Table 3.1 *New England Common Assessment Program Proficiency Level Descriptions.*

<table>
<thead>
<tr>
<th>Scaled Score</th>
<th>Proficiency Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–29</td>
<td>1</td>
<td>Substantially Below Proficiency</td>
</tr>
<tr>
<td>30–39</td>
<td>2</td>
<td>Partially Proficient</td>
</tr>
<tr>
<td>40–49</td>
<td>3</td>
<td>Proficient</td>
</tr>
<tr>
<td>50–60</td>
<td>4</td>
<td>Proficient With Distinction</td>
</tr>
</tbody>
</table>

According to the Rhode Island Department of Education, students must receive a score of a 3 or 4 to be considered at or above proficiency.

The students chosen for the study are all 11\textsuperscript{th} grade students for whom there is state assessment data from 2005 – 2010, which illustrates and confirms the need for additional mathematics support. Transfer students were excluded from the data. The students have scored below proficiency, a 1 or 2, in two or more of the four testing years and more specifically, scored below proficiency in the 8\textsuperscript{th} grade. All of those students were placed in a numeracy course to ensure they would receive the additional support they needed. In addition to the state assessment results over the past four years, the data for the 8\textsuperscript{th} grade math test which was administered in March of 2009, and the data for the current school year. The mathematics test is a test that was created by teachers who teach grades 8-12 and scored on a range from 0 to 30 points. This test is aligned to the GLEs and was designed to give additional data for those who were not proficient on the NECAP in October. The achievement levels for the students are represented in Table 3.2.
Table 3.2 Student Achievement Levels on NECAP for grades 5 through 8

<table>
<thead>
<tr>
<th>Student</th>
<th>Grade 5</th>
<th>Grade 6</th>
<th>Grade 7</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proficiency Level</td>
<td>Scaled Score</td>
<td>Proficiency Level</td>
<td>Scaled Score</td>
</tr>
<tr>
<td>1</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>30</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>28</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>24</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

These 11th grade students are currently in heterogeneously grouped, year 3 mathematics classes and a numeracy course, which allow them to receive additional, individualized support in mathematics. Many have Individualized Education Plan (IEP) and some have Personalized Literacy Plans (PLP) for intensive intervention, which means, they scored two or more grade levels below expectations in reading and writing on district assessments. The students participating in the interview were purposefully selected based on their participation in the numeracy course and willingness to participate in the research study.

Currently there are 13 students who have been in the numeracy support classroom for three years. Although informal interviews have been a part of the program design for the past two years, this interview is different and will be recorded; therefore, a consent form will be given for students to have signed before participating. I plan to interview between four and six students. The goal of the interview is to gain an understanding of the students’ experiences in the support program and analyze their responses using coding strategies in order to have a better understanding of how to improve the program. According to Moustakas (1994), the aim of a phenomenological design is to understand what the experience means to those who have actually experienced it through a comprehensive description of it. To that end, the interview questions
will help me gather a detailed description of what students have experienced in the past three years.

**Data Collection**

The purpose of this study is to gain an understanding of the numeracy course as an intervention, through students’ experiences and perceptions. Interviews will be the primary source of data collection in order to capture the essence of the phenomenon through the students’ experiences. Moustakas (1994) explains “the phenomenological interview involves an informal, interactive process and utilizes open-ended comments and questions” (p.114).

The student interviews will follow an interview protocol and include a checklist that will allow me to take notes and keep focused on essential components during the interview (Appendix C). The components of the checklist will include reminders to: explain the purpose of the study, explain the assurance of confidentiality, initiate conversation in order to increase the participants’ comfort levels and explain their rights to discontinue the interview at any time or refuse to answer certain questions if so desired, along with the date and time of the interview. The interviews will occur either before school or after school and will in no way interfere with instructional time. However, if for unanticipated reasons, a student cannot participate outside school hours, accommodations may be made to conduct the interview during numeracy class based on the student’s needs and availability.

The interview questions were developed to obtain detailed information about: (a) their interactions with their peers in the two different classes; (b) their interaction with the teacher in the numeracy class; (c) their feelings about how they best learn mathematics; (d) their experiences in being a part of a support program; (e) how they describe their learning of mathematics; (f) what they believe is working for them in this class; (g) what they believe are
barriers to their learning; (h) what learning mathematics was like without participation in this program and (i) rich and vital descriptions of their experience in the support class including how the class looks and how it feels to be there (Moustakas, 1994).

According to Moustakas (1994), by the nature of the design of a phenomenological study, interview questions will be open-ended, followed by prompts intended to allow the students ample opportunity to tell of their experience. “Although the primary researcher may in advance develop a series of questions aimed at evoking a comprehensive account of the person’s experiences of the phenomenon, these are varied, altered, or not used at all when the co-researcher shares the full story of his or her experience of the bracketed question.” (Moustakas, 1994, p. 114).

The interviews are designed to take approximately one hour; however the time may vary based on probing or clarifying questions asked by the researcher. The interview will be a reflective process for the participant, meaning that he/she will have the opportunity to remember and detail his/her experiences. According to Moustakas (1994), “the phenomenal experience becomes increasingly clarified and expanded in meaning as the phenomenon is considered and reconsidered in a reflective process.” (p. 50). Therefore the questions asked will spiral, allowing the student to reconsider his experiences while answering the questions (Moustakas, 1994).

At the beginning of the interview, I will work towards creating a relaxing and trusting environment by engaging the students in social conversation from the onset. According to Moustakas (1994), it is the researcher’s responsibility to create an environment where the participant feels comfortable to respond to the questions honestly.

The interviews will be audio-taped allowing me to listen to the interviews again for data analysis, as well as allow me to support and check the ethical and correct collection of data.
Data Analysis

According to Creswell (2009), “the process of data analysis involves making sense of text and image data” (p. 183). Coding is an important strategy in qualitative research data analysis. As noted by Yin, (2009), the purpose of coding is to rearrange data into categories so as to identify themes, make comparisons and develop theoretical concepts. In addition to coding are connecting strategies that allow the researcher to attempt to understand the data in context, looking for relationships that connect statements and events within a context (Maxwell, 2005). Following qualitative data analysis procedures, the data will be transcribed, organized and coded to look for themes that emerge from the interviews. The process will begin with transcribing and organizing the transcripts into hard copies and backed up with a password-protected file. According to Creswell (2009) describing, classifying and interpreting are at the heart of qualitative analysis.

The data analysis component of the study will follow organizing, coding, and interpreting data following Creswell’s (2009) Data Analysis Flowchart. This is a multi-step, comprehensive process that takes the researcher from the completion of the interview process through the interpretation of what the collected data means.
Using the above method, I will follow the subsequent steps for each individual interview so I can dissect it for emergent expressions:

**Step 1**: Transcribe the interviews verbatim.

**Step 2**: Read through all the data multiple times. This step will allow me to get a general sense of the information and ideas of what the participants are saying.

**Step 3**: Coding the data. According to Creswell (2009), coding is not a step but a complex process that allows the researcher to chunk information before trying to derive meaning from it. This is a very detailed and important element in the data analysis procedure. I will begin with preliminary coding by identifying words / phrases that the interview has and look for emerging themes. I will then make a list of topics and cluster together similar topics.
**Step 4:** After the coding process I will use it to get a description for analysis. I will generate a small number of themes or categories. This means that during this time I will be listing statements with respect to the participants’ experience. The themes will be identified in an outline form with Roman Numerals identifying the theme and small letters representing statements.

**Step 5:** Interconnecting themes. During this step I will look at how the descriptions and themes will be represented. In other words I will be looking at how I will communicate the findings of the analysis.

**Step 6:** Interpreting the data. During this stage I will make meaning of the data with respect to the literature reviewed and theoretical framework that was used as a lens for the study. After this is completed for each individual interview, I will use textural and structural descriptions. According to Moustakas (1994), the textural descriptions will be used as the basis for the *what* was experienced and the structural descriptions will be used for the *when* and *how* certain experiences occurred.

**Reliability, Validity and Credibility**

Validity in qualitative research refers to the accuracy, credibility, and trustworthiness of the study, the descriptions and the conclusions. The researcher is an assistant principal and former mathematics teacher at the high school chosen for the study. Therefore, the researcher must be cognizant of any biases when collecting and analyzing data. As noted by Maxwell (2005), if data collection and analysis are based on personal desires *without* careful assessment of the implications, the researcher is in danger of a flawed and biased study or invalid conclusions. According to Creswell (2009), “qualitative validity means that the researcher checks for accuracy of the findings by employing certain procedures” (p. 190). The validity of
the study and data collection has and will continue to be maintained from the development of the research questions through the synthesis of data. According to Moustakas (1994) “…scientific investigation is valid when the knowledge sought is arrived at through descriptions that make possible an understanding of the meanings and essences of experiences.” (p. 84). This researcher has developed research and interview questions that will obtain rich, thick, detailed descriptions about the participants’ experiences (Creswell, 2009), which will allow the researcher to build an understanding of what it is like for students to participate in the numeracy support program.

One area of concern for this researcher is reactivity. According to Maxwell (2005), reactivity is defined as “the influence of the researcher on the setting or individuals studied” and is an area of concern for validity (p. 108). However, according to Moustakas (1994), if the researcher is personally connected to the phenomena and has a special interest in what she is seeking to know, the goal is not to eliminate the influence the researcher has on the study but rather to understand it and use it productively. I will follow reliability procedures as outlined by Creswell (2009). I will reread and check transcripts to ensure there are not any obvious mistakes. I will also continuously compare data with the codes throughout the coding process to ensure I remain true to the initial definition of codes. I would also like to use member checking to ensure the accuracy of the findings or specific emerging themes.

**Protection of Human Subjects**

The researcher completed the online course titled "Protecting Human Research Participants” through Northeastern University in the spring of 2009. Therefore, ethical considerations have been at the forefront since the beginning of the design. The design of the project does not pose any threats to students participating in this study. Throughout this project,
the researcher will remain respectful of the rights and privacy of all participants. High school aged students are often very concerned with the perception of peers, so the researcher will make every effort to avoid bringing attention to the study participants.

There is an ethical obligation this researcher has in protecting those who have agreed to participate in the study. To begin the process, a student will only be allowed to participate in the study if parental consent has been signed. Included in the consent agreement is the information that the participation is voluntary and students may withdraw at any time during the interview. In addition, the student’s response to the interview questions will be kept confidential throughout the entire process. Furthermore, it is explained that no compensation would be given to members of the study to ensure that participation was completely voluntary. All procedures put in place for this study, which include informed consent, voluntary participation, confidentiality and approval through Institutional Review Board (IRB), were designed to protect participants for harm.

In addition, all printed or digitally collected information will be stored in a locked cabinet in the researcher’s office and any online information will be password protected. The researcher will agree to destroy any hard copy or digital information for this study within three years of the completion of the doctoral project.

**Summary**

This study presents a phenomenological research approach to understanding students’ experiences in a mathematics support and intervention program. The purpose of the project is to examine and capture the meaning that the students make of the intervention based on their experiences in the numeracy support program. With the above identified research questions at the heart of the study, the researcher feels that the results from this study could be used to better
define the characteristics of an effective intervention program in the content area of mathematics, not only for this school, but also as a prototype for other schools struggling with proficiency in mathematics.

Chapter 4: Report of Research Findings

This qualitative study was conducted to gain an understanding of the numeracy course as an intervention through students’ experiences and perceptions. The one overarching research question at the heart of this study is: *How do students describe their experience in the mathematical intervention support program?* The primary source of evidence for data collection and analysis was student interviews. In addition to the interviews were field notes taken during the interviews which were used as a source of data to support the interpretation of the data gathered during the individual interviews.

Data Collection

The four participants were all eleventh grade students who had been scheduled in the numeracy support program since their freshman year, giving them three years of experiences with the program from which to draw. Following the program’s design, all participants had the numeracy course for a full year both their freshman and sophomore years and half a year in their junior year. The individual interviews occurred during the school day in the last weeks of their junior year during a modified exam schedule. Due to the limited schedule, participants were interviewed on different days at different times of day. The interviews occurred in the conference room in the main office where the participants arrived during their scheduled time. An interview protocol, (Appendix C), a form designed with guiding questions, helped me stay focused, with follow up and additional probing questions when needed. The specific details of the data collection process are provided in Chapter 3. In the following sections, I will introduce
the individual participants and the four themes that emerged from the interview data collection: learning environment, student attitude, support for learning, and grades.

participants

The participants for this study included two males and two females who have been given pseudonyms: Robert, Jill, Todd and Stacey. The students were not in numeracy class together during their junior year, but some had been in the past. However, there was not a time when all four students were scheduled together during any of the past three years.

Robert. Robert was the first to be interviewed and is a quiet, mild mannered student. He has an Individual Education Plan (IEP) and has been identified as a fifth year student. He is a student receiving special education services who required an additional year to complete his coursework. This means that after his senior year, he will return to Saraville High School for an additional year with a modified schedule. During this fifth year, Robert will have the opportunity to meet the grade span expectations (GSEs) required for graduation, while he transitions to a post graduation program. As a student with an IEP, he is scheduled in a special education class for overall academic support and organization, a literacy class and the numeracy support course.

Robert entered the room with a great smile, which he always displays when walking around school on a typical day. However, when we began the interview his smile disappeared and he was all business. He sat down, commented that we were sitting on “comfy” chairs as he pulled up closer to the table and folded his hands ready to begin when I was. Robert was very serious in the way he answered questions especially when he spoke about his class this current year. He considered it the best year because his numeracy class was scheduled right before his algebra II class; he said “It fell perfectly in my schedule… so I kept all the memory I had from
numeracy.” Robert was especially happy at this point as he truly felt that having the two classes back to back allowed him to be better prepared for what he was about to learn in math class when he entered after leaving numeracy. He said, “I was able to stay focused in my next math class.”

Robert said what he would like to change about the numeracy course is to have it every day, as he struggles with mathematics. He stated, “I would like to have it every day so I can keep up on my math.” As the interview ended I thanked him and he appeared almost disappointed that the interview was over; he seemed to enjoy talking about his experiences.

Jill. Jill was the second to be interviewed. She came a bit late, approximately ten minutes after her scheduled time. She entered with three bags: a purse, a backpack and her “everything else” bag. I say this because when she entered the room she commented on the size and was pleased that she had enough room for all of her “stuff”. Jill is a very outgoing young woman. She is not shy or soft-spoken and was not particularly happy about being in numeracy in the beginning. However, through the years and with the realization of how it had helped her, she did not mind it so much. Jill admits that when she did not have numeracy she did not give it her all in her math classes, mostly because she did not understand the content. She stated, “I’ve slacked off with homework”, but with numeracy she was able to “get her grades up and stuff.”

While three of the four participants had the numeracy support courses, Jill did not, and this was the only class where she was with other struggling learners. She did not view herself as a student who really needed help, and she believes that if she had applied herself she would probably not have needed the course. Jill also included that she did not like the Study Island online program very much because it was “kind of like general math but for those actually needed it it was good.”
Todd. Todd was a vocal student who had strong opinions about the field of education. He entered the room, carefully put his books on the floor, and said good morning. Like Robert, Todd has an Individual Education Plan; therefore, he is also scheduled in a literacy support course and a special education course. Right from the beginning of our interview, Todd expressed that he felt that numeracy did not really teach him but gave him the extra support that he needed. He stated, “I just needed that extra little oomph.” He continued, “…numeracy was like a refresher. I couldn’t say ooh I learned this in numeracy class it was more like a review in numeracy.” Although Todd admitted that the support class did help him, he had many concerns about the Department of Education and how the standards are too high for students who are struggling learners, stating, “their expectations are so high for kids that have learning disabilities.” While making this point, he did change his posture and tone of voice. It was evident that Todd struggled and felt that although he worked hard, the expectations were very high, almost too high to be achieved. “It’s like they don’t know who we students are as people and they don’t care. It’s hard.” However, he did perk up again and find his way back to feeling valued when he spoke about the success he is finding in Algebra II. He mentioned that although he does not especially like numeracy in his schedule because it prevents him from taking “fun courses,” he does view it as a necessary component in his success with mathematics. He stated, “it is a win win in a way because of the grades on my tests and quizzes.”

Stacey. The final student to be interviewed was Stacey. She entered the room with little affect; however that could have been because she was not happy with her performance on her exam that she had just taken prior to meeting with me. While Jill did not like Study Island, Stacey did like it and identified it as the best component of numeracy, although she did not see the connection to the regular math class. She stated: “I liked finishing levels on Study Island but..."
that had nothing to do with like algebra or geometry.” This is interesting because the online program is remediation practice for algebra and geometry. The program contains problems that are more skills-based and out of context. Stacey liked the online programs because of the embedded games. She continued, “…if you get the correct answer you get to play the game. So it’s kinda like boring and fun at the same time.” Stacey also had mixed feeling about the class saying that she liked the class depending on the students in it. She described her freshman year numeracy saying, “It was noisy because of all the kids we had in there.” However, that was her freshman year, and since that time she has had different classes and felt that smaller classes were better. Stacey stated, “I liked it last year when there were maybe four or five kids in there.”

The interviews each lasted for approximately an hour, and the field notes were invaluable to the experience and data collection as well. The field notes allowed me to capture key moments and integrate them when replaying the recorded interviews. In the next section, I will discuss the data analysis and provide a more complete representation of the data collected from the interview process.

Data Analysis

The data analysis for this phenomenological study followed a process outlined by Creswell (2007) and Moustakas (1994) and was described in detail in Chapter 3. I began by using the transcripts and making a list of significant statements of a student’s experience with relation to the numeracy course as an intervention. The statements helped to identify expressions or feelings and each was equally weighted in importance and did not overlap other statements. I identified emergent expressions from each transcript and supported each one with evidence from the transcript. If the expression could not be supported it was eliminated. I then continued with
the expressions and grouped them into emergent themes. This was done for all four interviews separately and consistently.

After the individual analysis was done, themes were created from the commonalities among the individuals’ experiences. The themes that emerged throughout the data were tracked using a coding system. The coded statements and themes were used as the textural descriptions of what students experienced (Moustakas, 1994). After the textural descriptions, the interpretative, structural descriptions of the how and when of the experiences was written (Moustakas, 1994). Finally, the essence of the phenomenological study was written through a descriptive, culminating representation of what the students experienced and how they experienced it.

Results

This phenomenological research study explored four students’ experiences in a mathematics support and intervention program. The purpose of this study was to examine and capture the meaning that the students make of the intervention based on their experiences in the numeracy support program. In doing so, I sought to answer the research question: How do students describe their experience in the mathematical intervention support program? Data were collected and through the analysis process four primary themes emerged: learning environment, attitude, support for learning, and grades. Within each theme a set of subthemes also emerged, as depicted in Table 4.1
Table 4.1 *Summary of themes and subthemes that emerged from the data*

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Learning environment</td>
<td>A. The teacher</td>
</tr>
<tr>
<td></td>
<td>B. Peer support</td>
</tr>
<tr>
<td></td>
<td>C. Individualized instruction</td>
</tr>
<tr>
<td>2. Attitude</td>
<td>A. Confidence</td>
</tr>
<tr>
<td></td>
<td>B. Effort</td>
</tr>
<tr>
<td>3. Support for learning</td>
<td>A. Extra help</td>
</tr>
<tr>
<td>4. Grades</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Each of these subthemes helped to define the individual emergent themes*

**Learning environment.** The theme of the learning environment was perhaps one of the most important and prevalent themes that emerged from each of the interviews. When asked to describe a typical day in the numeracy class, three of the four participants referenced the classroom environment, the teacher, and the other students in the class. The data showed that students were more likely to be successful with mathematics if they were in a learning environment that felt comfortable. The supportive environment included comfort with the teacher and other students in the class. For example Stacey said, “I really liked it last year because I had Mrs. Gifford.” She felt welcomed when she entered the room because the teacher was always pleasant and greeted her at the door. This was important to Stacey because she struggled with school in general and appreciated the teacher’s positive attitude.

Jill felt the teacher was important but really emphasized the difference between the regular math class and the numeracy support program. To her, this class was much more relaxed with less pressure. Jill said, “It’s different because we can have our own conversations about math and if we don’t get it it’s ok. She [the teacher] will come back and forth and work with
us.” She continued by saying, “we were able to talk about math class and what was difficult. Since we were all in the same class we mostly all had the same questions.” Jill felt the classroom environment made it “easy” to be herself when it came to what she understood about mathematics.

When describing their experiences in the numeracy program, both Robert and Todd reflected on all three years. They both emphasized to me that the years they enjoyed and appreciated being in numeracy, were the years that they had the same teacher for both regular math and numeracy classes or were with students who were “nice”. They also described the other students in the class and worked harder when there were students who were in their other mathematics class. Robert stated “I liked it when I could ask other kids and didn’t always have to ask the teacher even though she would help me if I needed it.” Todd acknowledged the “comfort” he felt in the numeracy class because there were fewer students than his regular math class. He said, “I could be myself sometimes and it was ok if I didn’t get it. No one else got it so it was good.” Based on these students’ descriptions of the learning environment, it was evident that were three important components of this environment and these components had positive or negative effects on the students’ experiences in the program. The three subthemes that emerged from the learning environment include: relationships with the teacher, interactions with peers and individualized instruction. The following sections further developed the subthemes based on the data collected.

**Student teacher relationships.** During the interviews, all four of the students spoke of the importance of the relationship with the teacher. They also indicated that it was their relationship and comfort levels with the teacher that helped them feel confident. When Jill was talking about the numeracy support program she declared, “I feel comfortable asking her any questions as
needed.” Jill did not feel judged; rather she felt that the teacher encouraged her to ask questions and encouraged her to make mistakes, which was not the norm in her other math classes. Due to this, Jill often did not ask the questions to which she really needed answers during her regular math class. She waited and asked her numeracy teacher. This was especially important since she was a student who initially felt that she did not need the support program. However, realizing that as the years progressed, the content became more difficult; Jill appreciated the opportunity to have the support.

Robert described something similar but with a different teacher. He felt it to be especially important that the teacher cared enough to stay with him until he was successful with what he was doing. He stated, “the teacher assisted me, helped me with each problem, making sure I get them and I do the problems all correctly.” He continued, “she stays with me until I get it. She takes her time and makes sure I understand what I am doing.” This was particularly significant to Robert since he also mentioned that she would take her time with all the students in the class. He noticed that although he was not the only one who needed her help, she always had time for him. Robert said, “I don’t know how she helps all of us but she does and she’s nice when she does it.” Todd concurs with Robert and Jill’s feelings. When talking about the environment he described the teacher as someone who assisted him with his success in mathematics. According to Todd, the teacher “…helped in a way because he taught the material that I was learning so he could help me better myself in math.” He added, “he cares about me and gets excited when I get good grades in my regular math class.”

In addition to the responses given by the students during the interviews were the observation notes. These notes consisted primarily of student body language, voice inflection and other noticeable or subtle gestures. Some of the notes included feelings of excitement,
sadness, confusion, or apathy. These notes were used to help me understand the students’ feelings while the interview protocol questions focused more on the experiences. Additionally, at the beginning of the interview an icebreaker question was provided. Students were asked to complete the following statement: “If I could create my ideal classroom to learn math in, it would include____________.” Students felt that their ideal classroom was not created by the environment but rather the teacher. Three out of the four students identified that an ideal classroom is created based on the teacher.

According to Robert he believed his ideal classroom must have, “a good teacher to learn from.” Although he did not specifically define what a good teacher was, he gave a teacher’s name after his statement. I could describe that teacher as someone who cares very deeply for the students he teaches and has a very positive and encouraging way about him. Jill also felt the teacher was a vital component to the ideal classroom, but did not use the word “good” as Robert, rather described the energy level. She felt that the classroom she could create must have an “energized teacher.” Jill believed an energized teacher would keep her motivated and on track to do her work. She also felt that if someone is energized about math that in itself is motivating. She stated, “if I go into class and this person is happy about what we are doing then I guess I can at least try but if you go into a class and the teacher is like yeah whatever then I’m going to be like that too.”

Although Todd also recognized the teacher as the factor for an ideal classroom, he did not describe the qualities of the teacher. Rather, he felt there needed to be more than one. Todd believed that an ideal classroom must have enough support to help all those students and he did not feel this was achieved in his regular math class. He commented, “more than one teacher so if the teacher is busy I can ask the other one.” However, while discussing the time spent with the
teacher, he also discussed the other students in the class and how their behavior affected his time with the teacher. He felt that certain behaviors affected some of his teacher’s interactions with students. Todd commented, “If you have misbehavioral students they affect the teacher’s mood and emotions.” Todd’s comment also reinforces and supports the second subtheme of interaction with peers.

**Interaction with peers.** As high school adolescents, interactions with their peers are important; however, those interactions can either support or interfere with academic success. The participants identified interactions with the other students in the class as an essential component to the atmosphere of the learning environment. Overall, the interactions among the students appeared to support their learning and improve their comfort level. According to the participants, the interactions among the students in this support class allowed them to receive help from one another and encouraged them to discuss and talk about struggles with mathematics. Robert felt that the numeracy class was a place where students assisted one another to work through problems by stating, “In numeracy we help each other out a lot and we attend we assist each other. We help each other out and make sure we keep up to date on our homework.” Jill stated, “we are able to talk about math class kind of talk about what was difficult and what we could do to help each other.” While Todd acknowledged, “in math class you just do math you don’t have to chit chat with your friends, and in numeracy you really open up yourself a little bit so you can actually talk to people.”

This was particularly important to Stacey who did not have any of her friends in numeracy during the last three years. Yet, she mentioned there was one student who she did not know before being scheduled together in this class and felt that the student was an important contributing factor to her comfort level. Stacey acknowledged that having someone in her class
that she could talk with was one of the reasons she could “put up with numeracy.” She stated, “well I had Angela and we talked and stuff and she helped me with math and I helped her. It’s like a lot easier it’s like you have only a couple other people in there and you could ask them if the teacher’s busy with somebody else.” As Stacey mentioned, she would often work with her peers if the teacher was assisting or working individually with other students. This leads into the third subtheme of individualized instruction.

**Individualized instruction.** Individualized instruction is achieved when a teacher instructs using content and pace of learning that is based on levels of readiness of each individual learner. It is a chief component for struggling learners whose levels of readiness and pace of learning may differ compared to their peers. It can be challenging at times for teachers to implement truly individualized instruction in larger classes, yet it is a critically important and an effective method of instruction for students who have gaps in their knowledge. When asked how they learn mathematics best, the participants of the study mentioned working with the teacher on material they were ready to work on, which helped them feel successful. Robert stated that he learned best when working individually with the teacher. “One on one with my teacher and I feel like if I work one on one I can have all the math stored in my head very fast and complete.” He continued by saying, “I like one on one better I like to learn that way.” He added to that, “She starts me with the things that I don’t even know I know but she knows I know. It makes it easier.”

This subtheme was prevalent when asking specifically about how students learn. All participants felt that having the individualized one on one attention was what worked best for them. Jill described the numeracy class as a place where students are viewed as individuals and all the learning is done separately unless they need to work on one common topic. She stated,
“the class is kind of like individual rather than like a whole classroom if you needed help.” She continued by identifying the teacher’s role as one where, “she would kind of individually help.” The dynamics of the classroom were characterized by the teacher’s ability to concentrate on each student as an individual mathematics learner. As noted by Todd, this type of instruction is what helps him learn. When describing the numeracy environment he stated, “you get divided attention I guess in a way individual attention with your math needs and everything like that.”

Stacey was very direct and unequivocally stated, “I learn best with one on one attention.” This was declared in a firm, confident voice. Stacey felt the lack of individualized attention in her classes is what forces her to need numeracy support.

**Attitude.** Although encouragement by the teacher relates to the theme of learning environment, it seemed evident that once students had confidence, they put forth more effort, thus supporting the importance of the theme of students’ attitudes towards mathematics. Since attitude can described as a way of thinking or feeling that is typically reflected in a person’s behaviors, the expressions the student relayed to me were ones focused on confidence and effort, and are subthemes of attitude.

When asking students about their experiences and feelings in the support course, most referenced an increase in their confidence in performing in their regular mathematics class, thus increasing their success. Students felt that when they had confidence in what they were doing, they put more effort into it and performed better. As they recalled their experiences, it seemed that regardless of their ability in mathematics, encouragement towards completion of their work increased their desire to complete the work. For example, Robert stated, “when I am home I don’t even want to do my homework, really at all, because it just looks hard and I know I will get it wrong.” He continued by explaining, “sometimes I can just do it because [my teacher] is in the
room and she tells me I can.” Jill mentioned, “I didn’t used to do my homework when I was in middle school because I didn’t like it and really didn’t get it”. She continued by explaining that once the teacher in numeracy showed her how to start problems she felt that she could do more on her own. Initially Jill believed that she did not need numeracy, however, once she had the extra support she began doing more homework and performing better in class. She also commented, “I didn’t really used to do actual math alone. I used to try to get it from someone else but [my teacher] showed me how to start using this tricky thing and now when I use that I can do more on my homework.”

**Confidence.** When interviewing the students, three of the four felt that when they understood the information prior to entering the regular mathematics class, they would have a better class that day. Students seemed to make a connection between being prepared and feeling self-assured. Robert explained, “I felt organized and I feel like I could be very skilled at it and I have confidence when going into my regular math class.” Robert really valued the review he was able to receive in numeracy. If he did not fully understand the content in math class, he knew he had the opportunity to receive more instruction in numeracy. “You get to review more in numeracy and it preps you for your class,” Robert commented. He continued, “I kept all the memory I had from numeracy that I had stored in my mind literally like five minutes later; it’s like prepping myself for my next math class so it would help me stay focused.”

Jill’s portrayal of numeracy was simple; she felt it just helped her understand the content she was expected to learn in her regular mathematics class. She stated, “having the class kind of helps you understand it more so it gives you a better look on the actual [math] class.” It seemed that she, along with Robert, appreciated the extra time and support that she was given. An important component of Jill’s experience was having the teachers teach the same way in both
classes. “I like hear the exact same words from my numeracy teacher so I feel confident going into my math class.” Robert expressed that he has always struggled in math but definitely feels that now he tries examples and problems on his own compared to years before numeracy. He stated, “I feel like I need a lot of help. I struggle sometimes but will try it because I know if I keep trying I will get it.”

Todd had a slightly different perspective from Robert and Jill. He did not directly say that he felt more confident in his math ability but he did believe he improved in math due to the numeracy support. Todd described numeracy as a refresher in what was learned in math class. He did not feel that he learned anything new in numeracy class but did receive extra help, thus allowing him to improve his math skills. Todd stated, “it’s built my education skills I guess in math and stuff like that.” He went on to explain, “numeracy was like a refresher. I couldn’t say oooh I learned this in numeracy class it was more like a review in numeracy.”

One of the questions asked during the interview was an inquiry for a description of how it felt to walk into numeracy. Jill used the words, “confident, comfortable, relaxed” while Todd’s account was “better prepared for math class.” Robert believed he was more organized and described his feelings as “confident” and “skilled.” Stacy used the words “confused, messy and mad.” However she used these words to describe how she felt walking into class. Stacy felt that she struggled in the regular math class so would enter numeracy with emotions that were created from her experiences in math class. Yet, after being in the support class, she felt “better, less confused and not as mad.” These are important words and depictions of experiences with mathematics, especially when used by struggling learners.
Effort. It is virtually impossible to discuss success without using the word effort. Effort can be viewed as the pathway we use to get where we want to be. More effort is required for some than others; however, inevitably, effort is essential for success to be achieved, especially with struggling learners. The subtheme of effort appeared to be prevalent when students described themselves as learners in both the numeracy and regular math classes. Since the support course does not offer a numerical grade, it is truly left to the students to maximize their time without the penalty or reward of a grade in that class. Therefore, the effort and work that is done in this class is done for their own personal benefit.

Robert explained that in his regular math class he tries to take notes but does not always understand what he is writing down. Therefore, he finds his time in numeracy especially important if he chooses to use it appropriately. He felt that, “taking advantage of the time in numeracy like study more and to get help with my homework like if I was stuck on my homework made me want to do better.” Robert went on to describe, “we basically take advantage of the whole time the whole period, take advantage of as many worksheets as I can, as many problems.” Since he is “taking advantage” of this support time, he is putting the extra effort into his math work to ensure he can be successful in his regular math class. He expressed that he would not have tried as hard in math class if he did not have this class. Robert stated, “I don’t think I could do it in math class without what we do in numeracy. I know I couldn’t. So I know I wouldn’t try but because I can ask [my teacher] when I get to class I pay attention and try more.”

Jill’s statements were similar to Robert’s in that she felt using the opportunities that were offered in numeracy enabled her to try harder. She stated, “I use the time wisely and actually do math, which I didn’t do really before numeracy, like when I was in middle school.” Jill
continued to express that not only did she try harder in numeracy but this carries over into her regular math as well. She proudly stated, “I really do pay attention in class and try.” Adding to that statement, again with a proud, upright demeanor, “I always did my homework in that class like all the time.” Jill appeared to be secure and grounded in her statements when discussing what she had done to help herself be successful in math class. She included that she does not do this well in her other classes but certainly puts more effort into math because of the extra time she has in numeracy. Jill stated, “it’s like I get a second chance to do it, learn it, if I don’t get it the first time in math class so why wouldn’t I try hard?”

Todd’s sentiments mirrored both Robert’s and Jill’s. He certainly felt that numeracy helped him but also felt that overall he wanted to do well in school. He commented, “sometimes I don’t understand it which is a big issue to me because I feel like I want to do good in school.” Todd believed he tried hard in all his classes; however, he did not try as hard in math class during his years before numeracy. Based on his past experiences with mathematics, Todd believed he did not really have to try because he was not participating in grade level math and when he did try, he would not meet the expectations. He seems to have felt defeated. However, now that he has had the numeracy support, he admitted to still struggling, but was working harder because he was now in a grade level class. He proudly stated, “I’m in college prep.” According to Todd, the struggles he had in college preparatory classes were struggles he almost expected. Since he received support and was doing fairly well, he tried harder to continue to achieve a passing grade.

Todd, along with Stacey, cited specific content that he worked especially hard with mastering. Todd remembers struggling with linear systems. He recalled, “if I was not in numeracy for those whole two and three equations things, I would have never made it out alive.
I would not have known where or how and wouldn’t have even tried. But [my teacher] helped me and I did it on my own because I kept trying.” Stacey spoke about proportions and ratios. She recalled when first introduced to the topic in middle school she never understood it and did not want to repeat that in high school. Stacey explained that numeracy helped her, “solve equations and fractions and the whole proportions thing because you set them, cross multiply and you have to take the sides and cross multiply.” She continued, “I was not even going to try those things again. No way. But because I had to numeracy I finally figured it out and then did them on my own because I kept trying to do them.”

The theme of attitude emerged with two subthemes of confidence and effort. However, the next theme, support for learning, is almost assumed in this situation in order for student attitude towards mathematics to improve. The theme of support for learning was one that was identified through students’ expressions from the help they received. It then follows that the help they received increased their belief that they could achieve, thus improving their attitudes towards mathematics.

**Support for learning.** Many students felt that the numeracy course played an integral role with their success in their regular mathematics classroom. This theme seems especially important as it is the foundation and basis for the numeracy support program. It is important that students receive what they need from the course and that their experiences and perceptions are that of the intended goal of the course. This was recognized specifically through a subtheme of extra help which really can be categorized as offering more than what is expected in the regular mathematics classroom. For all four participants, the extra support was viewed as a key factor in their success in the regular math class.
**Extra help.** It was evident the participants viewed distinct differences between the numeracy and their regular math classes. The primary difference appeared to be the amount of help and assistance they received. When asked about a typical day in the numeracy class, some of the responses included, “to help you with problems that you’re working on in class to help you get better,” and “I was in a place I was very helpful and knowing I had assistance to get my work done.” When asked how numeracy class was different from the regular math class, some responses included, “getting more help in numeracy,” and “in numeracy we always get help and in math class we just do it on our own.” According to the participants, help was an important component to this class and the extra help they received was invaluable. When discussing the numeracy course, Robert stated, “it helps me in every way with everything I do.” He continued, “in numeracy class we get to talk about math like how we like feel ya know? It’s not just right or wrong but we all get to tell what we got right or wrong if we want to and why we thought it was the right answer.” To him, numeracy was not only a place that his questions would be answered, but rather a place that he felt valued and supported as a learner of mathematics.

According to Jill, she felt that numeracy was the means in which she received what she needed outside of the math classroom. She stated, “it helps you understand it more because I got the extra help.” Jill also gave advice to anyone who is scheduled in numeracy and may not want to be there. Her advice was to stay because, “it does help it really does and sometimes you don’t even know how much.” Jill’s comments were focused on providing all students with the opportunity to be in numeracy so they could see how much easier math could be. She felt that math was another language and that numeracy helped her, “…understand that crazy language you people speak.” Jill emphasized that for her, some of the words she struggled with just needed to be defined, which was not always done in math class. She expressed concern that
some teachers assume the students in front of them, “…speak math outside of school and we don’t.” Jill’s concerns were not based on understanding the content in math but rather understanding what was being asked. She continued to explain, “if those words were simpler like when [my teacher] explains them, I could probably do it on my own. But most of the time I don’t even know what the heck it’s asking me to do and if I didn’t have help with that then I would just fail.”

Todd’s perspective of the numeracy course was quite simple. He felt that he received the help he needed. As identified earlier, he did not believe he learned anything new, but rather received extra practice, support, or time reviewing what he needed. Todd stated, “I say it helped in a way as in I got extra help in math.” He continued by elaborating on that and identifying that he specifically received what he needed from numeracy. Todd explained, “I got all the help that I needed in numeracy, but not too much.”

Both Robert and Stacey felt the help they received was not only from the teacher but also from their peers. Robert’s perspective was that he learned from his peers in the class when he was explaining something to them. According to Robert, “I like it when I explain something to my friends in numeracy because then I can say it and I know I know it. That kinda helps me a lot.” Stacey agreed with Robert’s statements in that she believed when she worked with another student she was able to remove any misunderstandings or misconceptions. She stated, “when Angela and me work together I feel like we help each other and then [my teacher] will come by and only help if we did something wrong. Sometimes it’s better to work with someone else because as kids we understand each other and math.” This was an interesting comment when looking at it through the extra help subtheme as well as other themes. This statement speaks to the environment, interaction with peers and support for learning. Stacey continued to explain
this statement, “sometimes math teachers do things good and don’t always get what we don’t get because they understand it way way way up there.” As our conversation continued, Stacey was mirroring what Jill had stated when she spoke about the work that she and Angela did in numeracy and how the teacher really allowed them to learn from one another while supporting them where and how they needed it. She felt successful with her ability to work with Angela and also liked the fact that she could do it on her own. Stacey, and the other participants identified the success of the numeracy program by the grades they received in their math classes.

**Grades.** Scores and grades are common markers of academic success and for students in the support program. The success of the program was based on the grades they received in their math classes. According to Robert, participation in the numeracy program was a contributing factor to the achievement he experienced in his regular math class. He felt, “it definitely paid off on my quizzes and tests and my midterm and final exam because I passed them and got to study in numeracy and review, review, review.” Robert felt that although the numeracy course helped him with his day-to-day homework, it was especially beneficial when he was preparing for an assessment. He continued by adding, “I was set to go on my quizzes and tests.” In his mind, he was able to achieve good grades on his assessments because of what he did in the numeracy class. To Robert, he would not have been able to achieve the grades he needed if he did not have the time in numeracy.

Stacey perceived grades as being synonymous with how smart someone is. It was especially important to her not to be identified as the “dumb kid” any longer, and she did not want to continue to “fail every single quiz and test that I take.” In Stacey’s mind, she wanted to achieve but knew she struggled with math; therefore, she stated adamantly, “I want to do good in math and get good grades.” This was especially important to her and she felt that it was
happening with the additional support provided by the numeracy class. As with Stacey and Robert, Todd and Jill both felt the course certainly allowed them to achieve better grades in their regular math classes. According to Jill, the numeracy course was the reason she continued passing math, especially during her junior year. “This past year math was really, really hard and I didn’t like it at all but because I had the numeracy class it helped me keep my grade up.” She continued to note, “It really helped a lot because I passed [math].” Based on Todd’s comments it was evident that to him grades were an essential part of identifying success. He believed, “if I don’t get good grades then I don’t get math. How else does a teacher know if I know it unless I get good grades?”

Todd also agreed with Robert’s feelings about the assessment. Both Todd and Robert believed that part of the help they received was in preparation for assessments in which they would receive a grade. Todd stated, “if we had a test or a quiz coming up I was prepared and could pass.” He added, “it was midterms and we worked together on it and I passed that.”

**Structural Descriptions**

According to Moustakas (1994), the structural descriptions of the phenomenon capture the *how* of the experience, which are the factors that influenced the experience. When asked to think back to a time that they did not have the numeracy program as a support and to compare how they think about or view math now that have had the program, most students’ responses included words such as “confident” or “prepared”. Since these are important words for struggling learners of mathematics, the participants were asked follow up questions. Their responses showed that they were now included with their peers and believed they could do the same math that other students were doing. When I followed up with probing questions, I
learned that most were not in regular mathematics classes prior to beginning their high school careers, so the numeracy program allowed them to feel that they were learning the same content as other students in their grade. This increased their confidence and comfort with mathematics.

The descriptions from each student focused around the pleasure they felt that they were performing in college level courses rather than focusing on the numeracy class. Although indirectly included in the response, the numeracy class was a necessary support for them to continue to feel secure and be successful in their “other” mathematics class. Robert affirmed, “I felt like in middle school I wasn’t prepared and couldn’t do what everyone else was doing.” He viewed himself as having a lesser ability for mathematics and fewer opportunities to conquer the content. He did not believe he was capable of achieving the same level as his peers. Todd commented, “Before I had numeracy I was in pull out math and did different math from other kids.” Stacey stated, “Now I am in Algebra I and geometry like other kids and before numeracy I wasn’t.” When probing further to try to understand some of the responses, Todd added, “it’s very agitating at times” because of the State’s high expectations for students who have learning disabilities. It’s tougher for students who are struggling in mathematics.” As I reflect on my notes during the interview (body language, gestures), this was one question in which he became a bit more slouched with his shoulders and his voice softened. This question and his response in particular gave me great insight into the phenomenon of this study. It was evident that he seemed to be uncomfortable, almost with a sense of vulnerability when answering this question. Both his response and body language led me to believe that his experiences throughout his academic career have been difficult and challenging.

In summary, although the students described a different what in the numeracy class, they all described their relationship with the mathematics teacher as having a significant impact on the
how they learned math in the numeracy class. This phenomenological study allowed students to share their experiences and perspectives about the numeracy program. In turn, the results from this study will be used to help increase knowledge of the mathematics instructors on ways of further developing this intervention program. Based on the students’ participation, not only have they had the opportunity to reflect and articulate their perceptions, they will also benefit from the intervention development. Reflecting on the students’ responses, their experiences mirror the foundational component of the Response to Intervention model, which was included as a framework for this study. Additionally, their perceptions echo the literature surrounding mixed ability classrooms. For most participants, their high school career was the first time they were presented with the same access and opportunities as their peers.

Chapter 5: Discussion of Research Findings

The purpose of this phenomenological study was to learn about the students’ experiences in the numeracy support program. Participants included four eleventh grade students who were enrolled in the numeracy program for three full years while they were also scheduled in college preparatory mathematics classes. They were included in the support program because they had been identified as having a weakness in mathematics. The goal of the study was to gain an understanding of how students perceive and experience the additional support of the numeracy program. This could help lead to an understanding of how best to support mathematics instruction from a struggling learner’s perspective.

Findings

This doctoral study focuses on gaining an understanding of students’ experiences in the support program. A critical component of this study is the students’ perceptions. Given that, this phenomenological research study used student interviews to answer the research question:
How do students describe their experience in the mathematical intervention support program?

I formulated the structural descriptions of the phenomenological study to reach conclusions. Then used the findings discussed in chapter 4 to capture the essence of the phenomenon through composite descriptions.

According to Moustakas (1994), “the final step in a phenomenological research process is the intuitive integration of the fundamental textural and structural descriptions into a unified statement of the essences of the phenomenon as a whole” (p. 100). The culmination of the data led to the textural and structural descriptions. With all the pieces put together, a complete description of the essence of the phenomenon is captured.

As human beings, our attitudes, beliefs, goals, and perceptions are formed by our experiences. Students were asked to recall past experiences in the numeracy support program. Based on their recollection of the experiences, four themes emerged and are depicted in figure 5.1.

Figure 5.1. Emergent Themes
Each of the themes from the data collected helped shape and capture the experiences of the students in the numeracy program and helped outline the findings of this study, which can be organized according to either strategies or environment. The themes encompass the students’ experiences of the following: increased self efficacy in mathematics, confidence in performing in mathematics along with their peers, and relationships with both teacher and fellow students. Every one of these components impacted students’ experiences; however, the learning environment seemed to have the most marked effect. Furthermore, the interactions and the relationship with the mathematics teacher had a great influence on the students’ experiences. Understanding the essence of this phenomenon will help with practical applications, which will be discussed further in this chapter.

These findings are related to the framework of mathematical interventions at the secondary level. According to Fuchs & Fuchs, (2008) students with gaps in their knowledge benefit from a learning environment with a very individualized approach. In addition, the Response to Intervention process emphasizes that students who fall into the tier III category should receive intensive, individual support (Fuchs & Fuchs, 2008). The individualization in the design of the program was based on data to support individualized instruction and levels of readiness. Based on the literature review and framework, it is evident that the design of the numeracy program supported the effective components of an intervention program (Buffum, Mateo & Weber, 2010; Fuchs & Fuchs, 2008; RIDE, 2009). However, although these components are integral, the students’ experiences encompassed more than just an individualized learning approach with intensive support. The students explained that if the environment was not only supportive and individualized but also caring, positive and unlike their other classes, then they felt more success. While the structural components, like individualized instruction,
supported the students’ success, their experiences were really formed by the tone and environment of the classroom itself. It is that environment which affected students’ perceptions of their ability to be successful in mathematics and helped generate the self efficacy finding.

**Finding 1: Importance of fostering self efficacy.**

Self efficacy refers to a person’s belief that he can be successful, or confidence in his ability, and includes how a person thinks, behaves and feels (Bandura, 1997). According to Buffum, Matto, & Weber (2010), interventions should be a process used to help students realize their hopes and dreams and prevent any discouragement due to the belief that it cannot be achieved. Supporting this literature, the study exposed the importance of encouraging student confidence in preventing discouragement and supporting success.

One of the structures that helped support student confidence was the alignment between the numeracy support course and the mainstream math classes. The importance of this alignment should be natural in the creation of heterogeneously grouped classes and the RTI process (Boaler, 2008; Brown-Chidsey & Steege, 2010; Fuchs & Fuchs, 2008). Providing opportunities for teacher collaboration in order to appropriately plan with consistency between both classes, is an essential element in individualized instruction for struggling learners. In order for students to truly benefit from the support course and increase confidence in their ability, teachers of both courses must communicate and collaborate to ensure repetition, reinforcement or extension when necessary (Fuchs & Fuchs, 2001; National Center on Response to Intervention, 2011).

Alignment and continuity between the two courses allowed students in this study to continue working in the support course where they ended in the regular math course. Through teacher communication and collaboration, struggling learners are allowed a sense of stability if
they can enter the support course ready to begin where they left off in the regular math class. More importantly, for students in this study, an increase in confidence was established if they entered the support course with remediation or reinforcement material ready for difficult concepts. This could only be produced if the teachers of the two courses had the opportunity to discuss and plan for the needs of the learners.

The students in this study entered high school believing that they were not going to do well in mathematics. This belief was based on their past years of experiences, which contributed to their placement in remedial courses and their continuous low levels of performance. The participants had not previously experienced success in mathematics; therefore, they did not have confidence they could be successful. The participants in this study expressed that since beginning their high school careers they were finally placed in challenging courses; however, without the support and extra help they received in the numeracy program, they may not have succeeded in these challenging mathematic classes. Since this extra support was a part of their daily schedules, participants felt more confident and exhibited more effort, minimizing discouragement.

Through the numeracy course, they were placed in situations where they could easily ask questions, receive individual attention or work with peers who struggled with the same concept. This environment allowed them to take risks that they may not have taken in a larger setting or without the support of a teacher encouraging them to do so. This smaller learning environment, that at times presented the same content as their larger math class, provided them the familiarity and courage to move forward with questions and responses (Ehren, 2008; Duffy & Scala, 2012). Therefore, they began believing in their ability to perform in mathematics simply by experiencing small, daily successes.
During my Master’s Degree program, I researched students’ attitudes towards mathematics and more specifically, anxiety towards mathematics. It was through that research that I discovered the impact efficacy has on students’ attitudes towards mathematics, ultimately affecting their performance regardless of their ability. Through that study I found that students who were in honors level courses did not necessarily perform as well as they expected because they doubted their ability to do so (Palazzo, 2006). The research project illustrated higher ability students underperforming on important assessments due to their own beliefs, or disbeliefs, in their ability. Although there were not any identifiable barriers that the students could overcome to perform at the expected level, the unidentifiable challenges were the ones that prevented them from displaying their true understanding and ability levels. The study helped me see the impact mathematical anxiety had on some of the stronger math students.

Therefore, as I approached this research project with students who already struggled in mathematics, I did not anticipate that students’ attitudes towards mathematics would improve so greatly. However, much of the students’ growth and development came in the form of believing in their ability to be successful in something that had always been a challenge. Since self efficacy is the belief in one’s ability to be successful, this increased belief expressed by the participants is the heart of self efficacy. During my two research projects, a common theme for me seems to be that the student’s own belief in his ability helped mold his actual achievement. Through this research process, it is now evident to me that once the students in this study felt comfortable, they took more risks, asked more questions and gained a deeper understanding of who they were as math learners and how they could capitalize on their strengths while knowing their weaknesses, thus increasing their self efficacy.
Although the expectation and desired outcome of the numeracy program can be simplified into students having positive experiences and performing better in mathematics, the unintended outcome was increased belief in their capacity in mathematics. This unintended outcome of increased effort and overall change in attitude was not one that I had projected or predicted based on the literature reviewed or the theoretical framework. Yet is it a delightful finding and encapsulates the theory of self efficacy with respect to academic achievement. According to Bandura (1997), the core belief of self efficacy is the foundation of human motivation, performance accomplishments, and emotional well-being.

**Finding 2: Confidence in performing in mathematics along with their peers.**

My second finding focuses on the different environments where students learn mathematics. Students were placed in two very distinct mathematics classes, numeracy and college preparatory, which were both created with intentional designs. Although the two classes similarly offered content, support, and interaction with peers, the numeracy class was a smaller, homogeneously grouped setting, while the regular mathematics class was a larger, heterogeneously grouped setting. The different combinations of students for each class is important because the ability grouping serves its purpose at times but must be appropriately created to maximize the learning environment; therefore, the larger math classes were intentionally heterogeneously grouped, with the teachers having flexibility for homogeneously grouping students when necessary. Fuchs & Fuchs (2001, 2008) as well as National Center on Response to Intervention (2011) advocate that heterogeneously grouped settings are important components to the learning environment, provided that homogenously grouped settings also exist. The essential element here, which was supported by the students’ experiences, is that
success can be achieved in a larger math classes with peers of mixed abilities provided that individual support in a smaller numeracy class with peers of the same ability was included.

The literature is clear on the purpose, impact and benefits of students being grouped with their peers with differing ability levels (Boaler, 2008; Strickland & Tomlinson, 2005). However, it is also clear that struggling learners must receive the necessary, additional supports to be successful. The intent of mixed ability classrooms is to provide all students the same access and opportunity to the content at the same level of rigor (Boaler & Staples, 2008; Burris & Garrity, 2008; Linchevski & Kutscher, 1998). Participants in this study found that they were pleased to finally be learning the same content as their peers and in college preparatory classes. This type of environment allowed students to feel that they could be successful given the opportunity. Yet, homogeneously grouped classes did have a purpose in the academic experiences of these struggling learners. Since the numeracy class was a smaller, same ability grouped setting, students felt they could ask questions, work at a pace they were comfortable with, and get a little more information on material when they needed it. However, this homogeneous class was purely a support to the grade level, college preparatory, heterogeneously grouped classes.

Through this support course, students were afforded the opportunity to have exposure to the material prior to seeing it in their mathematics class. While the creation of the numeracy program was to support struggling learners, it was solely up to the teacher to design the grouping of students to maximize the learning environment. This allowed them to take risks and ask questions in numeracy, while building confidence in their regular mathematics class. The students in this research project felt they were finally allowed the opportunity to work with their peers, and on the same content as their peers.
Participants became active members of group work, participants in class discussions, volunteers for class work, and had equal opportunities as their peers to engage. The participants of the study found that the teacher’s individual work either one on one or with small groups of students, helped them to be better prepared for their larger math class. Since they had individualized work presented at their level of readiness, and in a small, safe setting, they increased their understanding, progressed quickly and found success. This success, increased their comfort and confidence in participation in the regular math class.

According to NCTM (2008), equitable learning environments are created when teachers encourage students to share their thinking, listen to others, and develop different solutions, interpretations, and approaches which are mathematically sound, and students and teachers share responsibility to engage with and support one another throughout the learning experience. Therefore, the inclusion in a larger, mixed ability, college level course, along with a smaller, individualized course allowed students to feel they had confidence in performing with their peers and began building relationships. This is something they had not had the opportunity to experience prior to their high school careers.

**Finding 3: Relationships between teacher and students**

My third finding and perhaps the one with the most striking effect is based on relationships with teacher and student. Through this progression, I was able to understand that although a research-based program with identified components for success was developed and implemented, it seemed to be the environmental more than the structural elements that influenced the students’ perceptions and ultimate success. The structural components were easier to identify and coordinate with the literature review and framework for a successful intervention program. Some of those components include: smaller, homogenously grouped
settings, individualized instruction, opportunities for remediation, and collaboration between the support teacher and regular mathematics teacher. However, the environmental components are those that were not integrated in the lens of framework for this study and include: a caring teacher who encouraged students to believe in themselves and approach tasks and challenges with a positive attitude. In the support program, the learning environment appeared to mirror the teacher’s beliefs, thus in turn informing the students’ beliefs.

This type of learning environment moved far beyond the teacher just knowing the content to be taught and understanding how the data reveals students’ ability levels as recommended by Carter & Dean (2006) and Fuchs & Fuchs (2008). In fact, it incorporated thoughtful and considerate behaviors with a true and genuine desire for students to improve (Klem & Connell, 2004). When students were greeted at the door with a smile, they felt cared for and valued. The evidence helps find that when students worked with an adult who they trusted, who worked with them knowing their ability level, and who allowed them to experience success, they strived to improve and work harder (Darling-Hammond, Ancess, & Ort, 2002). Students also increased their belief in themselves when they knew the teacher they were working with undoubtedly wanted them to be successful. The participants in this study expressed that they tried harder on some assignments because they knew their numeracy teacher worked hard with them and wanted them to thrive. This is not to say they would perform for the teacher, but it does seem that if they knew they had someone who was waiting to share their achievement, they desired those achievements and worked harder for them.

This finding encourages the need for the appropriate type of person to be working in a support program; that is, a person who honestly believes in students despite their past
experiences and known failures, and through that belief, helps students believe in themselves and change their attitudes towards learning mathematics (Fuchs & Fuchs 2001).

Along with the student-teacher relationship is the student-student relationship. As stated earlier, the inclusion with their college preparatory peers contributed to increased confidence and attitudes towards mathematics, yet their interactions with the students in the support program appeared to have a great impact as well. The relationships the students established with other struggling learners allowed them to identify with similar students and feel included as opposed to isolated, which is what they experienced in the past. It seemed that the inclusion in the regular mathematics class allowed students to interact with their peers in ways they may not have had any other opportunities to do so. These interactions were important as it helped the students feel included and knowledgeable. Yet, the interactions with their peers in the numeracy course were just as important but in a different way. Both environments and interactions permitted the participants opportunities to experience mathematics in both challenging and supporting environments. This seemed critical to their success and growth as learners of mathematics.

The literature and theory that I incorporated into this study emphasized the importance of smaller environments and the roles that teachers play in the instruction. According to Schiro (2008), teachers are to be diagnosticians and facilitators of growth and Carter and Dean (2006) note that instructors need to assess what students know in order to build upon that knowledge. This essential component for intervention programs was implemented successfully and is supported through the literature and framework; however, the lens that was used to frame this study did not include a focus on fostering relationships between teachers and peers in the homogeneously grouped support course. This analysis helped shift my thinking and
understanding, and illuminated the need for students to develop sound, authentic relationships with both the adult and peers that they are working with daily.

As an administrator in a public school setting, I am always seeking ways to increase student achievement and successes. One of the reasons for the development of the numeracy support program was just that: to create a program that will help struggling mathematics learners improve their performance. Before implementing the program, certain processes were employed to ensure the program would meet the academic needs of the students and that the participants identified for the program truly needed to be there. We valued the importance of developing a program that would help struggling learners of mathematics; however, in creating and implementing the program, although the procedures and structural components were important, I now see that we did not focus enough attention on the types of environments that support belonging and fosters relationships, or on the factors that increase students’ comfort levels.

Encouraging teachers to be diagnosticians of students’ learning is a structural component that we had in place and is supported through the literature and framework (Fuchs & Fuchs, 2008; Schiro, 2008). Yet, having that same teacher truly care about that students’ learning and create an environment that fosters confidence, efficacy, and belonging, is a component that was not apparent to me in the design of the program. Since the participants of the study experienced both types of teachers, those who simply had a role of educator and those who had the ability to connect with students as individuals, the students were able to identify the impact the latter had on their success.

Upon completion of this study, it is perceptible to me that although the design was directed towards keeping the environment small and having consistency among teachers, the importance or necessity of creating an academic and social environment that facilitated
relationships, belonging among peers, and used strategies to help students move to the next place in their learning, were overlooked (Carter & Dean, 2006; Klem & Connell, 2004). Therefore, I see that I approached this study from a limited perspective that focused primarily on logistical or structural design, which are important, but only part of the contributors necessary for success. As I progress through this process and review the findings, it is now apparent that the lens I chose to frame this project should have incorporated an environmental component which includes fostering relationships. An interesting facet of this lies in the fact that although there was an absence in the inclusion of these components in the design of the program, the environmental aspects came out in the study because they are such an integral component in the success of struggling learners.

This research project focused on students’ perspectives and experiences in the numeracy program, with the following question critical to the nature of this project: *How do students describe their experience in the mathematical intervention support program?* The question was answered through the student interviews, in which structural and composite descriptions helped provide a true viewpoint. The participants in this study illustrated their successes in the program in the form of increased self efficacy in mathematics, confidence in performing in mathematics along with their peers, and positive relationships with both teacher and fellow students. The findings also showed that the learning environment had the most discernible effect on the students’ experiences and efficacy. Their experiences were expressed with a strong commitment when certain environmental elements existed. Their descriptions of the experiences were saturated with a focus on student and teacher relationships as well as appropriate academic support in order for academic, mathematical achievement to be a reality. Therefore, in order to be successful in area that had been a great challenge in the past, students described their
experiences in this program as one where they received what was needed, when it was needed and more importantly how it was needed.

I approached this project with a design that was based on effective mathematical strategies as part of an intervention program. I completed this study knowing how to support struggling learners of any content area and that is invaluable to me. This study allowed more to be gained than expected and helped shift thinking and vision development. The next steps would be now working towards identifying effective programs and supports for all students, across all content areas which may not have been seen without the outcome of this study. Based on this research study, there are certain implications and recommendations that are suggested in order to maximize the possibility of struggling learners to experience success in their academic setting.

**Implications**

The implications for practice from this study come in two forms: structural and environmental. The structural ones relate to class size and the importance of limiting the number of students in the support program since the students felt that some of their success was due to the smaller, same ability grouped classroom. Although this poses challenges in financially strained times, the smaller class size was a critical element of students’ feeling comfortable and supported the teacher’s ability to know the students on individual levels. Although the structural design helps support the environmental ones, it cannot stand alone. Students’ success came when all components existed together. The goal is to extend these findings to a broader range of students, specifically the entire incoming ninth grade class. The creation of a freshman team is being discussed which is framed around the findings of this study. Since this study exposed the importance of personalization, individualization, support and relationships as components for success, the administration team is working towards expanding these opportunities to entire
grade levels and creating a team of teachers who will work solely with all ninth grade students and enjoy doing so.

**Recommendations**

The results of this qualitative phenomenological study could not only serve to better define the characteristics of an effective intervention program in the content area of mathematics but also to frame effective programs for struggling learners in any academic setting and be applied to other schools with similar characteristics. The overall recommendation is to continue to support the numeracy program at Saraville High School. The data collected provides information and conclusive findings that the program has produced positive experiences for participants. However, as with any program, there are areas that require attention to improve.

A second recommendation is to begin a ninth grade team with the primary focus on creating learning environments which are supported through this study. The results of the study identified learning environments in which struggling students can be successful. Therefore, in an effort to capitalize on opportunities for all learners, it is recommended that a team of teachers work together focused solely on ninth grade students. This team would take the results of this study and the extended literature identified, and work towards creating opportunities that maximize students’ chances for success. This study provided a wealth of information and should be taken seriously when considering the impact on student success in mathematics and in the school setting. The recommendations are separated by roles and responsibilities.

District leadership, including Superintendent, Assistant Superintendent and Special Education Directors, must understand the importance of supporting a program with such a limited number of students it services. The class size was limited to ten students, and ideally, fewer were better. Although I understand it may be difficult to support a teaching position for so
few students, the impact on the success was almost immeasurable as their attitudes and efficacy had the greatest increase. I recommend continuing to provide appropriate personnel to ensure the program is sustained without exceeding the maximum student requirement. In addition, provide financial support for the development of the program so the resources, such as Study Island are accessible. It is also important that teachers receive professional development opportunities to collaborate and develop effective instructional strategies that allow carry over from the regular math class into the numeracy class while district leadership share information with school committee on the success or challenges of the program.

School leadership, including the principal, assistant principals and mathematics department chair, must work towards creating opportunities for teachers to collaborate and work together. This is especially important if students do not have the same teacher for numeracy and regular mathematics. The integration and consistency of presentation of content, assessments and instructional design are essential. It is also recommended that members of school leadership work with guidance to ensure appropriate scheduling for heterogeneous grouping, in that, the regular mathematics class is truly grouped with mixed ability students. In addition, classroom size must be adhered to in order to maximize the individualization and personalization that these students found necessary to their success. Although the next recommendation is not necessarily one that may be simple since some staffing decisions are based on seniority, it is recommended that those faculty who teach numeracy enjoy the work of helping struggling learners and able to connect with students in a caring, motivating way.

Since the teacher was identified as a critical component of the students’ experiences in the numeracy support course, these recommendations are both structural and environmental. The recommendation begins with using data to understand where students are in relation to the
content, standard or topic being taught. Since students felt they were successful because the content was at a level they were ready to work on, it is vital that a teacher begin where the student is while also knowing where the student needs to be. In addition, numeracy teachers must work with the regular mathematics teachers to share and collaborate in order to better prepare for work with students.

The final, perhaps most critical recommendation for a teacher of numeracy is to have a positive attitude with a sincere and genuine disposition. The students in the study believed that they could be successful because their numeracy teachers encouraged them and believed in them. Although this is not a structural element, it is an invaluable, environmental element. Table 5.2 identifies the recommendations separated by stakeholders.

*Table 5.2 Recommendations*

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Leadership</td>
<td>Continue to support high school personnel in the development of the numeracy program.</td>
</tr>
<tr>
<td></td>
<td>Provide the school committee information on the success of the program</td>
</tr>
<tr>
<td></td>
<td>Provide financial support for program development</td>
</tr>
<tr>
<td></td>
<td>Provide professional development funding for teachers to collaborate and enhance instructional strategies</td>
</tr>
<tr>
<td>School Leadership</td>
<td>Continue to support school personnel in the development of the program</td>
</tr>
<tr>
<td></td>
<td>Adhere to schedule constraints for class size and heterogeneous grouping</td>
</tr>
<tr>
<td></td>
<td>Provide numeracy teachers common time to plan lessons and design</td>
</tr>
<tr>
<td></td>
<td>Carefully select those chosen to teach the numeracy course</td>
</tr>
<tr>
<td>Teachers</td>
<td>Use data to individualize instruction</td>
</tr>
<tr>
<td></td>
<td>Collaborate with members of the department who share similar students</td>
</tr>
<tr>
<td></td>
<td>Keep a positive attitude and encourage students</td>
</tr>
</tbody>
</table>
Further Research

Since the program is a truly individualized program meant to help students progress from their present level of readiness, it creates a situation where a goal is essential. However, the goals should not in the form of a curriculum map but rather through the attainment of general attitudes and skills. Future research may include an embedded research process that involves interviewing students about what they hope to gain from the program and develop a program purpose that is purely based on students’ goals. This will ensure individualization, progress monitoring and development of a path that students must take to accomplish the targets they have set for themselves. The goals will be realistic and attainable and different for each student. Since the goals are generated with both student and teacher input, there may be an increased likelihood that students will work harder to achieve, due to the fact the student had input into the creation. Moreover, these data over time may show patterns within the goals that students share and can be used to improve the overall program.

Success for the program was initially measured by increased grades. While I am not minimizing that achievement, I do believe success actually moved beyond just improved grades. At the conclusion of this research project, the students’ experiences and perceptions of this support program led me to identify success as increased self efficacy towards mathematics. With improved attitudes and belief in ability, their experiences in this support program unleashed an underlying foundation of a caring, supportive learning environment that changed attitudes in relation to a sensitive topic.
References


http://www.rtinetwork.org/learn/what


http://nces.ed.gov/timss/results07.asp


National Council of Teachers of Mathematics (2008) *Closing the achievement gap* and *Equity in Education*. Retrieved February 12, 2010 from

http://www.nctm.org/about/content.aspx?id=13490


Appendix A

Parent/Guardian Consent

Dear Parent/Guardian,

As part of our continued efforts to improve teaching and learning in mathematics at Smithfield High School, I am conducting a study of the effectiveness of the numeracy program for my Doctoral Research Project. The study is focused on the students’ experiences in the numeracy support program and the goal is to improve the support program.

Your child has been invited to participate in the study by participating in an interview on a voluntary basis. The interview questions are listed on the attached page for you to preview and the interview will take place only once this current school year and will last for approximately 30 minutes.

The questions will be asked by me personally, and the responses will be kept confidential in a locked file cabinet or password protected file, and in no way will be associated with assessment or evaluation. The researchers for this project are the only individuals who will have access to the data from this project.

Although your child may not benefit directly from participating in this study this year, your child may assist the researcher in making a contribution to the design of the program and the implementation of support interventions to benefit students.

There are no risks or discomforts from participating in this research project.

If you have questions or comments about this project you may contact Renee Palazzo, rpalazzo@smithfield-ps.org, 401-949-2050.

If you have any questions about your rights in this research, you may contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: irb@neu.edu. You may call anonymously if you wish.

You will not receive any compensation for participating in this research project.

I agree to have my child take part in this research project

_________________________________________  ____________
Signature of person agreeing to take part    Date

_________________________________________
Printed name of person above

_________________________________________  ____________
Signature of parent/guardian giving consent    Date

_________________________________________
Printed name of person above
Appendix B

Student Consent

Dear Student,

As part of our continued efforts to improve teaching and learning in mathematics at Smithfield High School, I am conducting a study of the effectiveness of the numeracy program for my Doctoral Research Project. The study is focused on your experiences in the numeracy support program and the goal is to improve the support program.

I would like to invite you to participate in the study by participating in an interview on a voluntary basis. The interview questions are listed on the attached page for you to preview and the interview will take place only once this current school year and will last for approximately 60 minutes. During the interview, if at any time you wish to discontinue the interview you have the right to do so.

The questions will be asked by me personally, and the responses will be kept confidential in a locked file cabinet or password protected file, and in no way will be associated with assessment or evaluation. The researchers for this project are the only individuals who will have access to the data from this project.

Although you may not benefit directly from participating in this study this year, you may assist the researcher in making a contribution to the design of the program and the implementation of support interventions to benefit students.

There are no risks or discomforts from participating in this research project.

If you have questions or comments about this project you may contact Renee Palazzo, rpalazzo@smithfield-ps.org, 401-949-2050. If you have any questions about your rights in this research, you may contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: irb@neu.edu. You may call anonymously if you wish. You will not receive any compensation for participating in this research project.

I agree to take part in this research project.

___________________________________________
Signature of person agreeing to take part

____________________________________________
Printed name of person above

Date
Appendix C

Guide for Student Interview

I. Introduction – this will be read verbatim to ensure consistency:

Good morning/afternoon. I would like to thank you for agreeing to participate in this research project and especially the interview process. As you know, I am seeking to gain information about students’ experiences in the numeracy class, and with the information I collect, I hope it will help me make changes to or continue to support the numeracy program so that it is really a beneficial experience for students. Anything that is discussed in this interview will not be discussed or shared outside this room. I will mostly ask you questions that I have already prepared so I will be reading from this paper at times. There might also be things that you’ve noticed or thought about the program that I didn’t think, so please share anything that comes to mind. There are no “right answers” just honest ones.

I am asking that you share your opinions and past experiences as they relate to the questions. I will be recording this interview so I can be sure I do not miss any information. My role today is as a student, like you. This paper that I will be writing will help me finish the program I am in. Therefore, I only care about what you feel and have experienced, and how we can make the numeracy program better. Your perspective is important since you participated in the program.

Again, there aren’t any right answers, just honest ones. Nothing that you say will be used to evaluate you, and your honest opinions, positive and negative, are what I hope to learn. I also want to remind you that I will not share your name with anyone. The only time I have to tell someone is if I learn about something that could hurt you or
someone else. Do you understand and agree to what I’ve explained to you? [end of introduction]

II. **Ice breaker** - As an opener before beginning the questions, I will ask students to take a moment and think about how they may complete the following sentence. “If I could create my ideal classroom to learn math in, it would include________________.”

III. **Guiding interview questions**

a. Describe a typical day in the numeracy class
   
i. How is it different from your regular math class?
   
ii. How is it the same as your regular math class?

b. Tell me about a time you felt the numeracy class helped you in your regular mathematics class.

c. Give me 3 words that describe what it feels like when you walk into numeracy class.

d. Describe what works well for you in the numeracy class.

e. Describe a time in numeracy when you really felt like it helped you understand mathematics. Please include the following
   
i. What was the environment like?
   
ii. What activities were taking place?
   
iii. What was the teacher’s role

f. Describe the interactions between you and other students in the numeracy class
   
i. How is it different from your regular math class?
   
ii. How is it the same as your regular math class?

g. Describe your interactions with your numeracy teacher.
   
i. If you have the same teacher for both math classes explain to me if his/her role is the same or different in the two classes.

h. I’d like to think back to when you did not have the numeracy support class. Can you describe for me how you think/view math now compared to when you did not have the class?
   
i. Describe what you would like to change about the numeracy class if you could.
j. Describe how you believe you learn mathematics best.
   
i. Tell me how you think the numeracy class supports your learning.

k. What advice would you offer students who are entering the numeracy program?