FACTORS THAT INFLUENCE ALTERNATIVE EDUCATION
AT-RISK STUDENTS TO ENGAGE IN
LEARNING MATHEMATICS

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Presented
To the Faculty of
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in
Mathematics Education

by
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FACTORS THAT INFLUENCE ALTERNATIVE EDUCATION AT-RISK STUDENTS TO ENGAGE IN LEARNING MATHEMATICS

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by

Lisa Nussdorfer

Summer 2011

APPROVED BY THE DEAN OF GRADUATE STUDIES AND VICE PROVOST FOR RESEARCH:

___________________________________________
Eun K. Park, Ed.D.

APPROVED BY THE GRADUATE ADVISORY COMMITTEE:

Yuichi Handa, Ph.D.
Graduate Coordinator

LaDawn Haws, Ph.D., Chair

Nancy J. Carter, Ph.D.

Pamela Johansen, Ed.D.
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DEDICATION

This work is dedicated to my mother and father. Their constant encouragement of my work and their continued support throughout the years helped me complete the process of writing a thesis. In addition, I would like to thank my husband and children who supported my time away from home to work on my thesis.
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ABSTRACT

FACTORS THAT INFLUENCE ALTERNATIVE EDUCATION
AT-RISK STUDENTS TO ENGAGE IN
LEARNING MATHEMATICS

by

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Master of Science in Mathematics Education

California State University, Chico

Summer 2011

This investigation is a mixed methods study designed to ascertain which factors engage high-risk students, specifically community day school (CDS) students, in learning mathematics. Ten students who attended a CDS in Northern California were interviewed and data was collected about their experiences learning mathematics in traditional school versus a community school setting. Students from a different community school completed a second-phase survey. The survey questions were based on the data collected from the interviews. The survey focused on the experiences of students regarding the factors that affected their learning of mathematics while attending a traditional school and when they were attending a community school.

Students in the interviews often cited the teacher as a critical component to their ability to understand mathematics. Specifically, students felt that it was important to
be comfortable with their teacher so that they could ask questions in class. Students emphasized that they needed step-by-step instructions to engage in mathematics. Additionally, students overwhelmingly agreed that mathematics textbooks were not a useful resource. Future research into the aspects of external motivation and math curriculum is recommended.
CHAPTER I

INTRODUCTION TO THE STUDY

Background

A few years ago, the researcher began teaching in community day schools (CDS) operated by a county Office of Education. This type of school and its unique student population were unfamiliar to the researcher. The community student (CS) populations are usually in a state of flux because the students are frequently changing schools or transferring between the CDSs and juvenile court school. Many CSs whom the researcher taught were on home-monitoring systems or lived-in group homes. The CDSs had a population of approximately 50 students in grades 8 to 12 and the researcher was hired to teach mathematics intervention and, in addition, to support the Algebra I teachers. There were three teachers, a principal, three paraprofessional aides, and a school secretary at both CDS sites.

Previously, the researcher had taught mathematics at a traditional high school in southern California. There was not much in common between the traditional high school and the CDS except for the mathematics and the textbooks. The researcher was hired as a mathematics specialist to improve CDS student achievement in mathematics.

As the researcher began to teach mathematics at both of the CDSs, she noticed the students had very strong feelings and reactions about learning mathematics. Often students would be frustrated by their learning ability in mathematics, or they would be
frustrated by the teacher who was teaching mathematics. One CS, who will be referred to as Sheila, had a physical reaction to the mathematics lessons. Often Sheila would run out of the classroom when she became upset because she could not understand the mathematical concepts. The researcher was perplexed by the extreme behaviors of the CSs, but, at the same time, observed how the students’ reactions seemed to intensify around the subject of mathematics.

The researcher was fascinated to observe how CSs who had initially shunned learning mathematics began to understand concepts of Algebra I. The transformation of the attitudes of some of the students who mastered some concepts of Algebra I was inspiring and thought-provoking. With this background, the researcher wanted to investigate what caused CSs to engage in mathematics. In addition, the researcher wanted to know what earlier experiences the students had with mathematics since they had come to the CDS with such negative feelings about learning mathematics. The original motivation for the study was based on determining the factors that influenced CSs to start to engage in learning mathematics.

Statement of the Problem

As the researcher began to consider the CS population who had challenging behaviors and predominately had been expelled from other schools, she developed an interest to determine how the dislike for learning mathematics began. What made the students so fearful of learning mathematics? What experiences helped these students overcome that fear and become successful learning mathematics? The study was
designed to highlight the first-hand experiences of the CSs’ on their learning of mathematics.

Many studies researched for this thesis concerned the interviews of CDS students in the United States. Outside of California, many of the schools which were comparable to the CDSs were referred to as alternative schools (AS) for the high-risk student population. Most of the studies about the CS population focused on the students learning basic skills in mathematics, rather than project-based or grade-level mathematics (Mooney, Epstein, Reid, & Nelson, 2003; Pierce, Reid, & Epstein, as cited in Bottge, Rueda, & Skivington, 2006).

The main focus of the present investigation was to examine student perspectives in order to answer the following questions.

1. What factors influence alternative education middle and high school students to be engaged in learning mathematics?

2. What reflections do these students have on their mathematical learning while attending traditional and ASs?

Purpose of the Study

The present study will seek to achieve the following.

1. Review the research available in mathematics education regarding learning mathematics in CDS and ASs, at-risk students (ARS) learning mathematics in traditional schools, student perspectives on learning in traditional and ASs, and studies that describe success with at-risk students learning mathematics.
2. Design interview questions to determine how CSs developed their attitudes towards learning mathematics in schools, learning mathematics with teachers, what practices students found most helpful when learning mathematics, and how students compared learning mathematics to learning other subjects in school.

3. Interview students in a semi-structured manner individually from grades 8 to 12 in a small CDS in northern California.

4. Develop a second-phase survey to verify and expand the results of the initial interview. The survey was developed because the original two CDSs where the interviews were conducted were closed down. The survey will be designed to have students compare their experiences from the ASs and the traditional schools.

5. Conduct the survey at another CDS in northern California to gather data on CSs engaging in learning mathematics to further explore and confirm the results from the interviews.

Limitations of the Study

One of the limitations of the study was the small number of subjects who were interviewed and the small sample size of the survey. The students who completed the interview were not the same sample as the students who completed the survey because of a school closure.

In order to comply with the Human Subjects in Research Committee’s requirements, a release form had to be signed and returned from the parents. Since the CS population usually had parents who were disenfranchised from the school system, it was
difficult to get parents to sign the release form. The researcher collected 12 signed release forms from the CSs and completed ten interviews. Therefore, students who were more responsible with paperwork were the ones represented in the interviews. Some of the students who were most at-risk and distanced from the school system may not have been represented in the interviews.

Finally, the teacher of the students who completed the interviews was also the researcher. Since the researcher personally had worked with students from one to three years in the classroom, the students felt comfortable talking and sharing during the interview process. However, the researcher-student relationship could have affected some of the interview answers unintentionally since the students were familiar with the researcher. Additionally, the researcher may have made a few assumptions while interviewing students because of the familiarity with the student. At times, the researcher may not have asked for the appropriate amount of clarification during the interview process.

The researcher conducted the survey at a CDS after the interviews with a different student population. The researcher worked with teachers at this school where she conducted the survey, but did not know any of the students personally. CSs may not have been as motivated to complete a survey for a teacher that they did not know.

Definition of Terms

At-risk student – Student population who are enrolled in community and/or comparable type of school because they were expelled from a traditional school. For the
purposes of this paper, students at risk will be defined as being unlikely to graduate from a comprehensive high school and to be enrolled in an AS.

*Attendance area* – Geographical area drawn and defined by the public school district that determines where a student attends school.

*Neighborhood school* – Public school attended by a student.

*Traditional school* – The public school that is assigned to a student based on their attendance area. The traditional high school is also referred to as a “Comprehensive High School.”

*Home-monitoring system* – CSs on probation outfitted with a monitoring device. These students are often allowed to be at school or at home while they are wearing the device.

*Expulsion* – A student is expelled from a public school or district when the school administration determines that the student can no longer attend the traditional school without the student’s behavior adversely affecting the school’s learning environment. Usually a school will outline the terms of the student’s behavior and some students, upon completion of terms, can return to the traditional school.

*Alternative program* - An educational program that is designed for ARSs where students receive their educational program outside of the traditional school. In California, the CDS and juvenile schools are considered alternative educational programs.

*Alternative school* – A public or private school that is usually chosen by the parent or child who wishes to attend a school not defined by his or her attendance area. In this paper, ASs will refer to community day schools, county community schools or
continuation high schools. In states other than California, the term community day school is not used. The researcher used research from other states in the Midwest with ASs comparable to CDSs.

**Community day school:** CDSs are ASs operated by school districts and county offices of education. CDSs serve mandatory and other expelled students, students referred by a School Attendance Review Board, and other high-risk youths. The 360-minute minimum instructional day includes academic programs that provide challenging curriculum and individual attention to student learning modalities and abilities. CDS programs also focus on the development of pro-social skills and student self-esteem and resiliency. CDSs are intended to have low student-teacher ratios. Students benefit from learning support services that include school counselors and psychologists, academic and vocational counselors, and pupil discipline personnel. Students also receive collaborative services from county offices of education, law enforcement, probation, and human services agency personnel who work with at-risk youth (California Department of Education).

**County community school** – For the purposes of this paper, CDS and county community schools will be used interchangeably and be referred to as CDSs. The difference in school population in the two schools is imperceptible; the main difference is how the state has determined guidelines that must be followed to operate the schools.

**Community student** – A student who attends a CDS or a county community school is referred to as a community student (CS) in this paper. All students who are enrolled in a CDS are at-risk. CSs and ARSs will be used interchangeably in this paper.
Juvenile court school – A court school in California is a public school that operates within the juvenile hall system. Often students who exit a court school are enrolled in CDSs.

Manipulatives – Items such as blocks or tiles are referred to manipulatives and are used often in mathematics education to represent a concept in mathematics. Teachers use manipulatives to teach or reinforce a particular concept with students. Manipulatives are predominately used in elementary school with mathematics.
CHAPTER II

REVIEW OF LITERATURE

Alternative education, an umbrella term for schools that operate as an “alternative” to the traditional school system, has been on the rise in recent years (Kleiner, Porch, & Farris, 2002). Typically, students attend their neighborhood school which is determined by individual districts. However, parents may choose not to enroll their children in their neighborhood school, but choose another traditional school or opt to enroll their child in an AS. The increase in the number of ASs is in response to the number of students who are not finding success or “fitting in” in a traditional school system (Foley & Pang, 2006). Some students, however, are required to enroll into ASs when they are no longer allowed to attend their neighborhood school.

There are many types of schools that are designated as ASs. This study examined students who were enrolled in California CDSs. Although there are charter schools, home schools, continuation schools, online schools, and other types of ASs, this study was concerned with the CDS population in California which will be referred to as an AS.

Educational Programs for At-risk Students

There exist educational programs, which also fit within the alternative education structure, created for a specific group of ARSs (J. Saunders & E. Saunders, 2001).

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The three specific educational programs refer to ASs that are offered in California to students: (a) continuation high schools, (b) CDSs (or county community schools), and (c) juvenile court schools (California Department of Education). Most students are referred to these schools either by the juvenile justice system or their current school. The district often expels certain students to ASs (Kershaw & Blank, 1993). As shown in Figure 1, most students attend a comprehensive high school and then are enrolled in one of the ASs.

Figure 1. Configuration of educational programs.
The main distinction of the three educational programs is the referral process; students are referred to different programs as the result of a student’s needs and behavior. According to Foley and Pang (2006), the criteria for placement in APs are social-emotional problems, truancy; expulsion and suspension (p. 15). Comprehensive high school administrators may send students to continuation schools when students are truant, failing classes or engaging in illegal activities. However, the student has the option to enroll in a continuation high school on his own initiative if the student feels he or she will be more successful in the continuation high school setting. A CDS is considered the next step for students who are not successful in continuation school, or if their probation officer requires that they attend the school. For example, when a student is released from the juvenile detention system, the student is usually enrolled into a CDS. Finally, if a student is sent to juvenile hall, he or she must attend the juvenile court school which is housed within the juvenile hall. For the purpose of this paper, the term APs will refer to the following ASs: continuation high school or CDS.

While APs for ARSs have many common characteristics, each school has a unique structure and mode of operation. According to Kershaw and Blank (1993), many ASs seek to individualize the learning experiences for their students. One common characteristic of ASs is that they are smaller than traditional schools, and the majority of the ASs offer additional social services for the students and families (Franklin, 1992).

Most ARSs who attend the APs have both serious behavioral and family issues (Streeter & Franklin, 1991). According to W. Kratzert and M. Kratzert (1991), many ARSs in ASs are impulsive and can become violent and destructive. Some ARSs
resist authoritarian structures, administration, and teachers in the traditional school. Anti-authoritarian behavior can lead to students being enrolled in ASs (Bottge et. al, 2006). Even with all of the challenges that ARSs face, their futures will be significantly improved if they graduate from high school.

According Kershaw and Blank (1993), students who attend ASs meet all of the criteria to be at-risk of educational failure. In a comprehensive high school there are a considerable number of students who are at-risk; however, all of the students enrolled in ASs are at-risk.

The following criteria may facilitate ARSs to be engaged in learning: (a) an accommodating school structure, (b) a positive student-teacher relationship, and (c) instructional practices that promote involvement (Finn & Voelkl, 1993; Slavit & Dunn, 1998; Turner et al., 1998). Learning is a complex action that involves both challenge and conflict. In order for ARSs to undertake the challenge in learning, they must be supported. According to one study, many students in alternative education feel like they are learning for the first time because they finally have the necessary prerequisites to become engaged in learning (Rutter & Margelofsky, 1997).

Attributes of Alternative Schools

School Size and Structure

There is a considerable amount of research about how alternative education students perceive their alternative education setting as compared to their former traditional school setting. Research on alternative education argues that ASs create a school
structure for ARSs to learn and coexist (Rutter & Margelofsky, 1997; J. Saunders & E. Saunders, 2001; Kershaw & Blank, 1993). “School Structure” refers to the specific organization and design of ASs; the attributes of the AS usually provide a low student-teacher ratio, smaller class sizes, paraprofessional aides for the classroom, counseling services, small staff, flexible rules and a small school (Foley & Pang, 2006; Kershaw & Blank, 1993; Mann & Gold, 1981; J. Saunders & E. Saunders, 2001). The school structure provides opportunities for ARSs to learn instructional material previously inaccessible to them because of disengagement, truancy, or disruptive classroom behaviors (Kershaw & Blank; 1993; Rutter & Margelosky, 1997). The traditional school structure can exacerbate the challenges to learn for many at-risk high school students. J. Saunders and E. Saunders (2001) have shown that small school size promotes academic achievement for at-risk youth. The school size and structure is a critical support for many students who cannot function in a traditional school setting (Finn & Voelkl, 1993). ARSs who are expelled from traditional schools often find that the smaller school setting is beneficial to them.

In order for a student to perform academically in a school, the sense of belonging to a school is foundational. When students feel alienated from any school setting, they may withdraw from school and may be more likely to be truant (Finn & Voelkl, 1993). LeCompte and Dworkin (1991) describe how traditional school is often “boring, humiliating, and unappealing to students” (p. 63). When ARSs withdraw from school, it is often a cumulative process that can start in elementary school. ARSs who are in an
accommodating school environment have a greater probability of staying in school (Miller, Leinhardt, & Zigmond, 1988).

One of the key aspects of an AS is the number of services that are available to the students and the families. These services are often referred to as wraparound services because the emotional, social, and behavioral needs are met within the AS. The wraparound services vary from school to school, but usually include probation officers, academic counselors, behavioral counselors and paraprofessional aides (Foley & Pang, 2006; Kershaw & Blank, 1993). Students in ASs are able to see their academic progress by having increased access to academic counselors. Kershaw and Blank (1993) noted that students in ASs reported that they were unable to get help from their academic counselors in their previous school. Because of the extensive wraparound services, school counselors were able to work with students and their families on academic and behavioral issues (Rutter & Margelofsky, 1997).

Student-Teacher Relationships

The small school setting facilitates a necessary ingredient for at-risk learners: a more effective student-teacher relationship (Foley & Pang, 2006). The relationship that a student is able to form with his or her teacher is central in order for a student to progress in any instructional material. Croninger and Lee (2001) found that a positive student-teacher relationship is helpful for all students, but the relationship with the teacher is more critical for the ARS who has not been successful learning in a traditional school. Many studies have shown that even the students who are most resistant are able to
engage in learning when they have developed a solid relationship with their teacher (Rutter & Margelofsky, 1997).

J. Saunders and E. Saunders (2001) noted that the teachers who are employed at ASs have a unique skill set. The flexibility of teachers who work in ASs promotes positive teacher-student relationships. AS teachers specialize in working with students with challenging behaviors. Kershaw and Blank (1993) found that in ASs, “teachers function in expanded roles” (p. 3). The roles of an alternative education teacher blur into counselor, behavior management specialist, and mentor, to name a few.

For students who are marginalized and distrustful, learning to belong to a school is a critical step. ARSs often have been expelled from schools because of their anti-social or anti-authoritarian behaviors. J. Saunders and E. Saunders found that 64% of students who left their comprehensive school felt that the teachers did not care about them as a student. Rutter and Margelofsky (1997) reported that a student at an AS changed his or her negative opinion of a teacher after having the same teacher in the AS setting. He or she was able to connect better with this teacher when the student and the teacher were in the AS setting. The attitudes of students may change as the structure of the school changes. For some ARSs who have become disengaged from school, ASs can provide the suitable learning environment for the students to reengage in learning.

The instructional activities and tasks that a teacher requires from the student may be easily executed when a student trusts and understands the teacher. According to Rutter and Margelofsky (1997), ARSs often feel that they cannot understand the teacher or express their misunderstanding when they are attending a traditional school. The rela-
tionship that an ARS has with his teacher is an important factor for students to feel comfortable asking questions in class and to engage in learning.

According to Croninger and Lee (2001), if the student-teacher relationship is marginally existent or nonexistent, there can behave damaging consequences to students at-risk. Most students at-risk already face challenges in learning and they need special support in order to progress in their education. Learning can become impossible if ARSs do not trust or like their teachers. The teacher can provide the bridge to the curriculum by having a positive relationship with students, especially since most ARSs are disinterested in the curriculum.

**Academic Learning for At-risk Students**

When ARSs are asked how learning experiences differed in the ASs in comparison to their previous school, they often cite various issues with (a) understanding the teacher, (b) attendance, and (c) being able to complete the homework (Kershaw & Blank, 1993; Rutter & Margelosky, 1997). Many times, the mere fact that ARSs feel a sense of alienation at their school is enough for them to stop engaging in educational activities. However, ARSs may become discouraged over time when they feel like teachers are not communicating concepts in a way that makes sense to them. Kershaw and Blank (1993) found that ARSs often do not have the academic skills to complete their homework without support. In addition, most ARSs do not value homework (LeCompte & Dworkin, 1991). The fact that ARSs have poor attendance compounds the difficulty for these students to progress academically.
Some alternative education students report that they have much more academic success in alternative education school settings (Kershaw & Blank; Rutter & Margelosky, 1997). Since each AS varies, the curriculum for the schools is chosen at each site. Learning appropriate behaviors often can take precedence over learning academic subjects in ASs (Kershaw & Blank). When the conditions are right, students can engage in learning behaviors, regardless of their past educational failures (W. Kratzert & M. Kratzert, 1991). Dicintio and Gee (1999) found that ARSs are more motivated to learn in an AS because they feel like they have more control over their learning.

At-risk Students Engaging in Mathematics

Learning Mathematics in an Alternative School

Currently there is little research how ASs engage ARSs in learning mathematics. The studies of ARSs enrolled in alternative education learning mathematics focus on the learning of computational skills rather than grade-level mathematics (Bottge et al., 2006). The positive relationship between a teacher and the school structure seems to be a critical factor in the equation, regardless of the curriculum.

According to Rutter and Margelofsky (1997), many ARSs achieve academic success after they change their school setting. Students who have avoided and resisted learning may find themselves understanding and meeting their educational goals. Since most ASs use an individualized learning plan for their curriculum, the students earn credits based on work completed, not necessarily proficiency (W. Kratzert & M. Kratzert, 1991). Therefore, the ARSs’ feeling of academic success can be misleading. According
to Slavit and Dunn (1998), in the northwestern U.S. ASs they studied, students showed gains in their math confidence levels after receiving more “accessible” math instruction. However, the growth in the students’ confidence levels was not consistent with the students’ growth in their actual mathematics skills. Thus, the accommodation that schools use to engage ARSs in learning does not necessarily increase academic learning (Miller et al., 1988).

Hands-on learning and real-life mathematics problems can be motivating for students. In one study, for example, students in an AS were successful in completing hands-on and real-life mathematical tasks. However, as soon as the teacher began to introduce fractions in a whole-class lecture format, the students became disengaged and disinterested (Bottge et al., 2006). According to one study, ARSs want to learn on their own terms after being in classes where they were disengaged and discouraged (Dicintio & Gee, 2006).

Learning Mathematics in a Traditional School

Most ARSs enroll in an AS during junior high or high school. These students who have been progressively alienated from school are more likely to drop out of school (Miller, Leinhardt, & Zigmond, 1988). Some students at this juncture end up in an AS. Interestingly enough, their experience with learning mathematics is common with many students transitioning from elementary school to junior high school: they are struggling in their mathematics classes. According to Midgley (1988), the negative effect of bad experiences in mathematics classes in junior high is much more troubling for ARSs as com-
pared to the regular school population. In addition, “junior high students’ value percep-
tion and self-efficacy within the math domain decline during early adolescent years”

The transition to junior high school and high school for most students is an
unsettling change. These changes, however, are very difficult for ARSs who do not have
adequate tools to handle the transition from one school to the next. Learning mathematics
has the additional challenge of requiring students to have prerequisite knowledge. When
ARSs are taught concepts that are perceived too challenging for them, they disengage
(Dicinto & Gee, 1999). When ARSs begin to disengage from a class, they are disengag-
ing from the learning environment

Nature of School Mathematics

Borsai (1990) questions why the way mathematics is taught in school does not
describe the actual nature of mathematics itself. In fact, the way that mathematics is
taught in school can be an obstacle to students learning mathematics. Stododolsky (1998)
found that “traditional math instruction places all but the exceptional math student in
almost total dependence on the teacher for progress through a course” (p. 123). In con-
trast to other academic school subjects, the learning of mathematics in school may leave
students dependent on the teacher to explain or decode the mathematics textbook.

The act of teaching mathematics is based on each teacher’s philosophical
beliefs about teaching and mathematics. The teacher’s preconception of the nature of
mathematics itself has an effect on how they teach mathematics (Thompson, 1984). When a teacher believes that mathematics is static rather than dynamic, the teaching of
mathematics becomes a “transfer of knowledge” rather than an opportunity for students to grapple with and make conjectures about mathematics (Lampert, 1990; Stodolsky, 1998).

Many mathematics teachers believe that mathematics is only learned by demonstrating and modeling mathematical procedures. McKinney and Frazier (2008), in their study of junior highs, found that 73.4% of the mathematics teachers used demonstrations and modeling frequently and 70% of the teachers used independent work frequently. This method of teaching is found predominantly in junior high school where many students start having difficulty learning mathematics.

Lampert (as cited in Turner et al., 1998) described the typical traditional model of a mathematics lesson: (a) explain an example of a mathematics problem, (b) demonstrate an algorithm of a mathematics problem, and (c) expect students to practice mathematics examples. The traditional model of mathematics of instruction implies that the textbook and the teacher are the holders of the knowledge and the students are the receptors of this knowledge (Stodolosky, 1998; Turner et al., 1998; Thompson, 1984).

Borsai (1990) pointed out the various troubling aspects of learning mathematics in a traditional mathematics classroom:

Many students hold the belief that mathematics is a collection of disjoint, predetermined, and absolutely correct facts and procedures that are used to solve specific problems and that teachers are supposed to pass on such facts and procedures to students, who in turn memorize them for later recall and application for the solution of a given problem. (p. 181)

Unfortunately, any instructional practice that makes a mathematics teacher the “holder of the knowledge” may alienate ARSs. Most ARSs are very motivated to learn
when they have some control over what to learn in a classroom instead of the lesson being completely “teacher-centered” (Bottge et al., 2006; Dicintio & Gee, 2006). Steele (as cited in Holmes, 1985, p. 21) found that “students like mathematics more when they are not involved in teacher-centered instruction.” Teacher-centered instruction is a predominant teaching model in mathematics.

In addition, the pace of mathematics instruction can also be troubling for ARSs. Since the pace of instruction in traditional schools is not individualized, often ARSs cannot participate in class and get discouraged (Mann & Gold, 1981). When mathematics teachers explain a mathematics concept too quickly, some ARSs decide to become “hidden” in the classroom rather than ask a question. In addition, when an ARS asks a question in class, they can become easily disheartened when the teacher’s answer is incomprehensible to them (Rutter & Margelofsky, 1997).

**Teacher Practices That Promote Student Engagement in Learning Mathematics**

Learning mathematics is the interaction between student, curriculum, the presentation of the curriculum, and the relationship of the teacher to the individual student. The curriculum in mathematics classes in California is fixed; however, the presentation of the concepts can be accomplished in a variety of different ways. Steele (1993) found that students prefer to be engaged in the lesson by doing rather than just watching the teacher.

The instructional practices of teachers have an important impact on student achievement, especially for the ARS. ARSs often lose the opportunity to engage in a
classroom when the teacher demands no input from the student (Rutter & Margelofsky, 1997). When teachers can engage students in the classroom by creating a high involvement classroom, students become motivated to learn (Turner et al., 1998). This involvement allows students to become part of the process of “discovering mathematics” rather than collecting the mathematical procedures on the teacher’s word. Turner et al. (1998) observed in their study,

> When teachers did not explain why one would perform a [mathematical] operation, they were essentially retaining ownership of the mathematical knowledge and failing to support the mathematical autonomy of their students. (p. 743)

In order to provide students adequate cognitive support, teachers need to be perceptive of their students’ understanding of a lesson in the classroom (Thompson, 1984). Thompson (1984) found that teachers were meeting their students’ needs when they were able to “capitalize on the student’s unexpected remarks” (p. 121). Students’ errors and misconceptions can be worked into a lesson rather than ignored (Turner et al., 1998). When teachers are aware of the students’ needs and difficulties during a lesson, they can provide cognitive assistance to the student.

When teachers provide cognitive assistance to students, they are providing students with tools to access the grade level lesson; this is also referred to as “scaffolding.” This is an instructional strategy that can help all students engage in a lesson. The teacher recognizes the parts of the lesson that students need assistance with, and provides extra cognitive support, by offering either visual or oral aids to help students understand the concept. Additionally, Levpuscek and Zupancic (2009) have found that teachers who
articulate the effective learning processes increase academic success for their students (as cited in Urdan & Schoenfelder, 2006, p. 564).

Instructional strategies can provide academic success for all students in learning mathematics, but the emotional support a teacher can provide has the largest impact on student learning. Turner et al. (1998) found that teachers need to provide emotional support along with cognitive support. Murray (2009) found that a positive student-teacher relationship could compensate for a poor parent-child relationship and increase the student’s school competence.

There is considerable research that points to the value and importance of a positive student-teacher relationship in order for students to be motivated and perform well in school (Croniger & Lee, 2001; Murray, 2009; Patrick & Kaplan, 2007; Wentzel, 2007). ARSs are sensitive to “pedagogical caring,” and it can have a great effect on their learning.
CHAPTER III

METHODOLOGY

The purpose of this study was to determine how alternative education students enrolled in CDSs perceived how they engaged in learning mathematics in traditional versus ASs. In addition, the researcher wanted to find out which teacher practices were most effective for this particular population of students to learn mathematics. This study was motivated by the personal experience of the researcher who observed students that were completely disinterested in mathematics, learn mathematics and find aptitude in a subject that was previously inaccessible to them. The focus of this study was particularly about ARSs learning in the academic area of mathematics. The perspective of the ARS in regards to their learning of mathematics was critical to address the researcher’s questions:

1. What factors influence alternative education junior and high school students to be engaged in learning mathematics?

2. What reflections do these students have on their mathematical learning while attending traditional and ASs?

The goal of this research was to depict the student’s perspective on learning mathematics and how his or her perception of mathematics was shaped by his or her relationship to teachers, the school setting, and the teaching methods.
Participants and Setting

The study was conducted in two phases: interview and survey. The data was collected from ARSs at three schools who were enrolled in an AS, specifically, a CDS. The student population was similar in the three schools where the data was collected. The original plan was to use two schools for the entire study where the researcher had worked as a teacher; however, those schools were closed in 2008. Therefore, another CDS was added to the original two schools to conduct the survey.

Phase 1 Interview

This first phase of this study was qualitative. Students were interviewed at two CDSs in northern California in the same district. By definition, CDSs enroll students who are unable to attend a traditional school either because of expulsion from their school or because of conditions of their probation. Comparable to many ASs, the CDSs had a small student population and a small staff. By nature of the school, all students were considered ARSs and many students enrolled with insufficient credits, lack of attendance at their previous school, and behavioral issues. The student population was constantly changing as some students relocated to a different county, were incarcerated in juvenile hall, or transferred to a different school. The student grade levels ranged from 7th to 12th grade and there were approximately 15-25 students enrolled at the school at that time.

The policy of the district for the first two CDSs required all students to be placed in Algebra I, regardless of what mathematics class the student had previously been enrolled in. Some students had taken Algebra I multiple times, while other students operated at a third- to fourth-grade level in mathematics. The researcher taught in both of the
schools as a Title I mathematics intervention teacher and as a support teacher in the Algebra I class. On some days, the majority of class time was devoted to responding and correcting student behaviors, and since attendance was so unreliable, every day the classroom was populated by a different group of students. The researcher observed many students experiencing success learning mathematics. Students would make comments such as, “I finally get this” or “I have never got an A in mathematics before.” In addition, the researcher observed that students were proud of themselves when they were able to understand mathematics after many unsuccessful previous attempts.

The direct observation of the CDSs, compounded with the fact that there are not many studies about the “community” student population learning mathematics (Algebra I specifically), was the deciding factor to use this particular population in the research study. If students returned their parent permission forms, they were given appropriate rewards. The selection of the students to be interviewed was based on the students who returned their parent permission forms (Appendix A). There were ten students who turned in the permission forms and attended their interview appointment.

**Phase 2 Survey**

The second phase was to confirm the results from the interview data that was collected during phase 1. Since the initial two schools where interviews were conducted had closed down, another CDS in a different district in northern California was chosen to provide the sample to conduct a survey. The researcher had not taught at this particular school; however, she was familiar with some of the teachers at the school where the survey was conducted. The staff and the principal helped to distribute parent permission
forms (Appendix B) to the students. Originally, the research was only based on inter-
views with 9th- to 12th-grade students. However, the student enrollment at the new school
was small that, on the advice of my graduate advisor, Dr. Rapti DeSilva, the survey was
expanded to include 7th- and 8th-grade students. Twenty-eight students turned in the per-
mission forms and completed the survey.

Research Design and Instrumentation

There were two instruments designed for the study: an interview (Appendix C) and a survey (Appendix D). The data was collected in two phases. The survey was
based on the analysis of the interview results. Following is the description of the process
of developing the instrumentation for both the interview protocol and the survey.

Interview

Protocol

In order for students to reflect on their learning experiences, an open-ended
interview format was chosen to collect the information from the perspective of the stu-
have errors – they provide a valuable source of information about individuals who can
access their inner states” (p. 542). In addition, it was assumed that the ARSs would be
more motivated to answer questions completely and honestly with an interviewer with
whom they already were acquainted. Since the researcher had spent four years at the two
schools, she had developed a relationship with most of the students.
The foundation of the development of the interview protocol was based on the researcher’s observations of students learning mathematics at the CDS. The study was designed to learn about the perspective of the students on their own learning of mathematics, and the protocol was designed to solicit students’ opinions about their specific learning experiences. The interview protocol was designed to help students describe various experiences in the classroom and their thoughts about those experiences. The researcher would follow any themes that needed to be developed during the interview by asking more specific questions during the actual interview with the student.

Survey

The analysis of the interviews was used in conjunction with the literature review to develop the survey (Appendix D). The purpose of the survey was to further explore the findings from the interviews. The themes from the interview data provided the basis of the questions for the survey. Also, during the research process, the type of the school (alternative or traditional) emerged as a factor in how students learned. Questions regarding school structure became part of the survey, and there were two pages in the survey for students to compare their perceptions of the traditional and AS settings. The questions were developed and edited with the graduate advisor, Dr. Rapti De Silva.

The survey was four pages in length. The survey was written at a grade 6 reading level with the goal of making the survey comprehensible to the students at the school. The questions were designed to elicit positive and negative responses in order to keep the students’ attention while they were answering the questions. A Likert scale was
used, with values from 1 to 4, along with an option of not applicable. The options for the Likert scale were strongly agree (1), agree (2), disagree (3) and strongly disagree (4), and not applicable (N/A).

The N/A option was constructed to refer to the instance when a student had no experience with a particular question. The N/A option was not equivalent to the “no opinion” or neutral choice that is often found in Likert scales. The intention of removing a neutral option was to compel the students to determine whether they agreed or disagreed with the question. In addition, the assumption was that many ARSs would just answer “no opinion,” if it were available, because they were not motivated to complete the survey. The N/A option was included on the survey, however, the placement of the N/A option was intentionally put after the agree and disagree choices instead of in-between them. The researcher hoped that the placement of the N/A option at the end of the options would discourage students from using it excessively.

The first page of the survey contained ten questions and tested the themes from the interview data and the research from the literature review. The themes included how students perceived the importance of their teacher, how they were able to understand a mathematics textbook, and which environment the students thought was the best for them to learn mathematics. The second page of the survey was specifically about the student’s learning experience in the classroom in a traditional setting. The third page of the survey used the same questions as the second page of the survey, but this time with regard to their current AS. The second and third pages asked the student to compare their perceptions of the educational experiences at the traditional versus ASs.
The final page of the survey was an opportunity for students to identify qualities of teachers who helped (or did not help) them learn mathematics. For example, one of the qualities stated on the survey that described a teacher who was helpful was “interested in me.” Students selected from a list of 12 qualities that belonged to teachers who have helped them learn mathematics; they repeated the process for teachers who were not helpful. There was also a free-response blank where students could add comments after they had circled the qualities. Finally, the last question was a free response item about the importance of “being comfortable” with their teacher to learn mathematics.

Data Collection

Interview

Ten interviews were conducted with students at the CDSs. The interviews were conducted in the spring of 2008 within a two-month period. Since the schools were small, there were not many private rooms to conduct interviews. The principal’s office was used to conduct the interviews at both of the schools. The interviews were conducted before or after school. Additionally, an incentive (a burrito) was offered to students to attend the scheduled interview appointment.

The interview was conducted in a private room with a tape recorder and a note pad. The student had a copy of the questions, in case he or she wanted to reference the questions during the interview. The interviews were completed in 30 to 60 minutes, depending on how much the student had to say. Some interviews were conducted in two segments with a break in between.
At the beginning of the interviews, students were asked to describe their mathematical experiences in elementary and junior high schools. After the student established his or her mathematical history in the interview, the student was asked what effect that history had on the learning of mathematics in his or her current mathematics class. Students were asked if they noticed any connections between their mathematical history and how they respond to learning mathematics currently. Many students were uncertain how to answer the question. Because the students were not able to articulate the development of their learning experiences in mathematics, the interview was redirected to ask students to describe what practices or methods they found effective or ineffective in learning and engaging in mathematics currently versus the past.

The researcher made notes about the questions that students had trouble answering or when the students needed further clarification. This information was used to modify some of the questions in the interviews. Originally, the focus of this research was to compare students’ perceptions of their learning experiences of mathematics in elementary school to their current school. As the interview of students progressed, it became clear that students were able to describe specifically what teacher practices were helpful to them as individuals. The original research question was adapted to include the data that was collected about teacher practices.

Survey

The survey was conducted to explore and verify the themes in the interview data. After meeting with the staff of the school, the author and staff decided it would be best to conduct the survey during a particular school day when all of the students could
complete the survey at once. On the day of the data collection in the fall of 2009, the researcher conducted the survey, assisted by a teacher employed at the school. We collected surveys in a large room at the school during a one-hour session. The researcher roamed the room to answer any questions that students might have and to check on their participation in the survey. Twenty-eight students completed the survey.

Data Analysis

Interview

All of the interviews were transcribed so that the interviews could be read easily. The researcher met with a professor at California State University, Chico (CSUC) who detailed the process of analyzing qualitative data. Each of the interviews was read individually and themes were identified. The themes that were repeated by students were rated. The data was entered in a matrix and sorted. After the data was sorted, the researcher identified the themes that emerged multiple times and the themes that showed up only once.

Survey

The survey analysis was completed by using student responses from the survey. To analyze the data, each question on the survey was identified as a positively or negatively stated question. The frequency of responses was categorized as strongly agree, agree, disagree or strongly disagree. Each student’s response was given a value of 1, 2, 3, 4, or null (no value). Student response differences between the second and third pages of the survey were calculated. The researcher noted whether she expected a positive or a
negative difference when the calculating the difference. In the part of the survey where students identified attributes of good teachers, the responses were tallied for each quality. Finally, all of the free response items were typed in the same document to compare the responses.

Nancy Carter, CSU, Chico statistics professor, helped the researcher use statistical software to analyze the data to calculate percentages, the mean, and a stem and leaf plot for the data from the first page of the survey.

On pages 2 and 3 of the survey, the researcher wanted to compare the results of students’ perception in their traditional schools versus their current AS. The questions on the two pages were identical but the school setting was different. In order to derive results from this data, the differences of the student responses from the two pages were calculated. For example, if a student chose strongly agree for both questions on the survey, the resulting difference would be zero. The score of zero would indicate the student perceived no difference between the two schools. The expected values from the differences could be negative or positive.
CHAPTER IV

RESULTS AND DISCUSSION

Review of Context and Participants

The data collection was completed in northern California in three small ASs. These ASs were specifically referred to as CDSs. The students, by nature of the schools they attended, were labeled at-risk of dropping out of school or at-risk of becoming a juvenile delinquent. These students, for the most part, had been failures at their traditional schools either because of attendance and/or behavioral problems. When the students were expelled from their traditional school, under certain conditions, students were mandated to enroll in CDSs.

All three of the ASs were small and offered other services such as counseling and access to probation officers. The school population ranged from 30 to 60 students. In addition to the schools being small, the class sizes ranged from 3 to 15 students. It was necessary that the class sizes be small because of the behaviors and needs of the students. Most students were enrolled in Algebra I to satisfy their mathematics graduation requirement; however, they were not performing at that level. They were enrolled in the Algebra I class regardless of their mathematics level or previous course work. The following results from the data detail the students’ perspective on learning mathematics and how their teachers helped them in the traditional and AS settings.
Student Interview Results

The first phase of the research process was to conduct qualitative research by interviewing students to determine the students’ perspective on their learning of mathematics. The goal was to answer two research questions:

1. What factors influence alternative education junior and high school students to be engaged in learning mathematics?

2. What reflections do these students have on their mathematical learning while attending traditional and ASs?

The results were categorized into the following sections: (a) elementary school experiences, (b) traditional junior high or high school experiences, (c) current alternative school experiences, and (d) experiences when learning mathematics. During the interview data analysis, the data was categorized into the above categories. These categories were also used to develop the survey. All of the students’ or teachers’ names are pseudonyms.
Elementary School Experiences

There were a few questions about the students’ experience learning mathematics at their elementary school. Overall, the students were very positive about their elementary experience. Many students referred to their teachers as helpful and kind. They also stated that during elementary school the teachers would use manipulatives and visual aids to help them learn.

Traditional Junior High or High School Experiences

Some of the interviewed students had transferred to the CDS in junior high, while other had transferred during high school. The students described their experiences in the schools they attended before they enrolled in the CDS. Many students said that the mathematics in junior high and junior high itself was a lot harder than elementary school. Ismelda said, “When I started doing math I was really good at it, until about the seventh grade.”

All of the students were able to recall specific experiences of their junior high math classes. Most of the students felt that the pace of the mathematics classes was too fast; they did not feel comfortable asking questions since they felt like they were the only ones in the class who were not able to keep up with the concepts taught in the mathematics classes. Georgia shared how she felt in her mathematics class in junior high:

In junior high, I would just not even do (the math) – I would feel so weird I would distract kids and stuff. Because if I didn’t get it I didn’t want them to get it, so I would distract them a lot or I wouldn’t pay attention . . . I pretty much felt like I was slower than the rest of the people.
Pace of Classes

The pace of mathematics classes in junior high was difficult for many of the students. Enrique said, “But [the math teachers] were moving fast, so it got hard and then I kind of gave up.” Ismelda shared how her 7th-grade mathematics teacher would go over problems: “She’d go over two or three problems really fast, and I needed to go through step by step.” Even though many students recognized that the class was going too fast for them and they were getting lost, they just gave up. In fact, Ismelda decided to stop attending her mathematics class regularly at junior high because she felt it was useless for her to attend.

In addition to the fast pace of the mathematics classes, many students mentioned how teachers would “rush” through the explanation of individual mathematics problems without explaining each step in detail. Ken said, “[The teacher] just tells it you one time and expects you to get it like that . . . instead of showing you how to do each individual part.” And Ismelda added, “Some teachers just skip this stuff in their head because they’re smart.”

Asking Questions in Class

The students were often frustrated when trying to get help with their questions. Some students thought that the teachers were too busy to help them, some students couldn’t understand the teacher’s explanation, or some students remarked that the classes were too big for them to feel comfortable asking questions. Ken was frustrated that one of his teachers could not use an alternate explanation for a concept he could not understand: “You’ll ask her how it’s done and she will tell you the same thing . . . you told me before
and I still don’t get it.” Dave’s teacher would do a problem on the board and expect the students to do it for themselves. Dave felt that the teacher was not available to help him:

“You had to ask (the teacher) like 50 times before he’d come help.” Ismelda summed up how she felt about asking her math teacher questions:

I would ask [the teacher] probably once every month or two months. I wouldn’t ask her every single time because it wasn’t like- you couldn’t really do that every single time, just ask for help. Usually most of the time she’ll be really busy, and it just seemed like you couldn’t just go and ask her any time you wanted to.

Relationship Between Teachers and Students in Tradition Schools

A few students had positive remarks about individual relationships they had with teachers in junior high. The positive remarks referred to times when students met with teachers one-on-one, often outside of class. After school, Gary met with a teacher who helped him individually: “So [the teacher] would help and I wouldn’t feel dumb – she would explain it, she wouldn’t just do it.” When Enrique asked a math teacher for help after class, the teacher responded, “Come back at the end of the day, if you really want help.”

Perceptions of Current Alternative Schools

All of the students that were interviewed were enrolled in one of the two CDSs where the researcher had taught. During the interview, students shared their experience with learning mathematics in their AS. Most of the students were very positive about learning mathematics in their current school setting. Students described the teacher
practices that helped them learn mathematics and the relationships that they had with their individual teachers.

Teacher Practices

The students remarked that at the AS they had better math teachers. In the ASs, the students referred to their teachers by first names. Ken remarked, “Larry goes into a lot more detail than most teachers do. If other teachers would do the same thing, then they could be just as effective.” Most students really felt they could learn mathematics in the alternative setting because teachers would go through the problems step-by-step.

The fact that students felt they were able to receive detailed instructions about problems emerged from the interviews as a strong theme. The students described the experience of sitting in mathematics classes where they could not grasp what the teacher was explaining. In contrast, students felt that, in the AS, the teachers taught much “slower” and in detail. Georgia explained how she could understand the mathematics more in her current school:

I kind of get it more than I used to get it in junior high yeah I do get it more. The teachers are more like . . . I don’t know it’s kind of hard because if you don’t get it they will do it over and over as many times as they have to so you can it get, it kinds of bugs you, but OK you might as well get it and they will stop, so you try to get it.

Relationship Between Teachers and Students in Alternative Schools

Many of the students were able to learn in the alternative setting because they had a positive teacher-student relationship. Since students felt comfortable in their
mathematics classes, they could ask questions more freely. Andrew said that in the AS, “I
wasn’t scared to ask, because I thought it would make me look like I am a stupid kid in
the class if I ask for help.” Benny remarked on the persistence of his teacher in offering
help: “I was ready to give up, but my teacher (at the CDS) was like, no, I’m going to help
you with it.”

**Experiences When Learning Mathematics**

There was some overlap between the students’ experiences, specifically
within traditional and alternative settings, and students’ general experiences about learn-
ing mathematics. Students explained what factors made it possible for them to be suc-
cessful in mathematics and compared their experiences with other academic subjects,
such as English and history.

Most students agreed that learning mathematics requires patience and
concentration, especially because many mathematics problems are multi-step. Some stu-
dents did not like the multi-step problems because they wanted to do the mathematics
problems in their head, rather than on paper. Bill remarked, “I feel uncomfortable when I
can’t do a problem in my head. It is just out of my comfort zone.”

**Future Value of Mathematics**

All of the students planned to continue their study of mathematics and, even if
they did not like learning mathematics, they believed it would be useful to them. The stu-
dents agreed that there was value in learning mathematics after they turned 18 years old,
and most of them planned to go to college. Benny said, “‘Cause I learned that everywhere
you go you are going to have to use [mathematics]. No matter where you are at, no matter what job you do. You are still going to have to use it.”

Many students also described the ups and downs of learning mathematics. Gary described it this way: “I guess for some people it’s like a little roller coaster, you are up when you get stuff and you’re happy but when you can’t get it you are down low.”

When students felt like they knew how to do the mathematics they were learning in class, they felt like they had accomplished something. Students felt especially good when they could solve problems independently. Andrew said, “I felt really confident and I could actually do (solve the problem). I did the problem without asking for help and I got it right.”

Learning Mathematics versus
English or History

When students were asked to describe the difference between learning mathematics compared to English or history, the topic of the mathematics textbooks emerged from the discussion. Students commented that they could not learn directly from the mathematics textbooks because they were often incomprehensible. Georgia explained, “In history . . . the answers are in the book; in math the answers are not in the book, you have to work it out yourself.”

Students described how in English or history classes the answers for the questions were often easy to locate within the textbook. Gary compared using a history textbook versus a mathematics textbook:

It’s like math equations are (in the mathematics textbook) but you have to do the work and that’s more equations and you have to find the answer. . . . So,
you pretty much either have to know how to do it or you’re not getting the answer. Whereas in history . . . all you have to do is read. You could just read the whole chapter and you will eventually get the answer that you need. . . . With math if you just open the book up you have no idea what you are doing.

In addition, other academic subjects were not dependent on previous learning. Ismelda commented, “If you skip something in history, it’s not the end of the world. In math, if you miss something, it’s like the end of the world.”

Factors That Help Students Learn

The students commented on the factors that helped them learn mathematics well: (a) step-by-step instructions, (b) one-on-one instruction/tutoring, and (3) the “easy way” to do mathematics. Many students felt like the individual attention from the mathematics instructor was critical for them to learn mathematics. There were also many comments about whether students could learn easily from the mathematics instructor when they taught from the board in comparison to the teacher working with the student at their desk. Most students felt more comfortable when the teacher was next to them, rather than up at the board. Georgia describing a teacher said, “he did (the lesson) on the board instead of going side by side with the student which actually helps more than just on the board.”

Students knew that to be successful in mathematics that they would need step-by-step instructions at a pace that worked for them. The concept of step-by-step instructions is related to the pace of the instruction and how well teachers articulated each step they were explaining. Ken described learning step-by-step from one of his teachers:

[The teacher] will move slowly through the problems. He’ll probably take twice as long as you would normally take if you are doing a problem. . . .
When he goes through each step, he’ll ask you a question. Suppose you are supposed to multiply this by this, which would be one step of the problem. He’ll ask you what it is, just to force you to work along with him.

The “Easy Way”

Finally, most students were convinced that the good teachers would explain how to complete a mathematics problem “the easy way.” Somehow when teachers were able to explain a problem “the easy way,” they felt that they could understand the problem without difficulty. Bill said about one of his mathematics teachers, “[The teacher] just put it in the right things I could understand.” Andrew commented, “There ended up being another way you could do it and get the right answer a faster way.”

Phase 2 Survey Results

The following section reports the results of the survey (Appendix D). The results are divided into four sections: (a) general questions (p. 1 of the survey), (b) comparison of school settings (pp. 2 and 3), (c) qualities of teachers (p. 4), and (d) free response comments (p.4).

The students responded to the ten questions on page 1 of the survey with either strongly agree, agree, disagree, strongly disagree, or N/A. These were general questions based on the results of the interview data; they were questions regarding how they like to learn mathematics, how well they understand math textbooks, and which teacher practices helped them learn.
The results for page 1 of the survey are found in Table 1. The percentages of the students’ response for each question were recorded. Eighty-nine percent of the students definitely felt a good math teacher could help them learn mathematics.

Table 1

*Student Perceptions on Learning Mathematics Survey Results by Percent*

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If I have a good math teacher, I definitely can do math better.</td>
<td>31</td>
<td>58</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>2. I need one-and-one help when I work on mathematics</td>
<td>22</td>
<td>44</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>3. I can understand mathematics better when I have step by step instructions</td>
<td>36</td>
<td>54</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>4. Reading the math textbooks helps me understand mathematics</td>
<td>0</td>
<td>22</td>
<td>56</td>
<td>22</td>
</tr>
<tr>
<td>5. I don’t like showing my work when I do math problems.</td>
<td>26</td>
<td>44</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>6. When I am stuck on a math problem, I keep trying until I can figure it out.</td>
<td>8</td>
<td>46</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td>7. Math is pointless.</td>
<td>15</td>
<td>8</td>
<td>50</td>
<td>27</td>
</tr>
<tr>
<td>8. I feel pretty great when I can solve a math problem by myself.</td>
<td>27</td>
<td>42</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>9. I can understand the mathematics better when students explain their thinking.</td>
<td>8</td>
<td>46</td>
<td>31</td>
<td>15</td>
</tr>
<tr>
<td>10. When teachers explain a math lesson to the whole class, I usually understand what they are saying.</td>
<td>15</td>
<td>54</td>
<td>12</td>
<td>19</td>
</tr>
</tbody>
</table>
When students commented on how they learned mathematics, 66% of the students said that they needed one-on-one help with mathematics. In addition, 90% of the students agreed that they could learn mathematics better when they had step-by-step instructions. Sixty-nine percent of the students said they felt great when they solved a math problem by themselves.

Fifty-four percent of the students did not have a strong opinion about how well they learn when other students explain their thinking. Many students (69%) felt that they could understand when a teacher explained the lesson in front of the class. In addition, 54% of the students said that they keep trying to work out a math problem until they figure it out.

Most students (78%) disagreed that reading their mathematics textbook helped them to understand mathematics. Seventy percent of the students didn’t like showing work when they worked out mathematics problems. Seventy-seven percent of the students disagreed with the statement “Math is pointless.”

**Perceptions of School Settings**

For the analysis of pages 2 and 3, the student responses from page 2 and 3 were compared to determine their perception of how the school setting affected their learning of mathematics. The questions on pages 2 and 3 were identical. The questions on page 2 referenced the school they attended prior to the school they were currently attending. The questions on page 3 referenced their current school, which was an alternative CDS. Some students answered N/A to questions on page 2. The data from the questions where students picked N/A were pulled out of the analysis of the comparison of
the students’ experiences. The data was calculated using the difference between the scores. The questions are listed with “previous/current” to indicate that on page 2 the question read “previous” and on question 3 the question read “current.”

The data was analyzed and separated into four categories. The description of how the students’ answers fit into the categories is found in Table 2.

Table 2

*Comparison of Students’ Perceptions Between Traditional and Alternative Settings*

<table>
<thead>
<tr>
<th>Student response type</th>
<th>Explanation</th>
<th>Possible student responses from Previous school to Current school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree/ agree neutral</td>
<td>Students answered Agree or Strongly Agree to both questions on pages two and three. Students agreed with the question at both schools they attended.</td>
<td>SA to A</td>
</tr>
<tr>
<td>Disagree to agree</td>
<td>Students disagreed with the question in their previous school, but agreed with the question in their current school.</td>
<td>SD to SA</td>
</tr>
<tr>
<td>Disagree/ disagree neutral</td>
<td>Students answered Disagree or Strongly Disagree to both questions on page two and three. Students disagreed with the question at both schools they attended.</td>
<td>SD to D</td>
</tr>
<tr>
<td>Agree to disagree</td>
<td>Students agreed with the question in their previous school, but disagreed with the question in their current school.</td>
<td>SA to D</td>
</tr>
</tbody>
</table>

*SA=strongly agree; A=agree; D=disagree; SD=strongly disagree.*
The survey statements on pages 2 and 3 were designed to test the theme from the interviews that the students had a better learning experience at the AS. Students were expected to have a positive change on the statements that were stated positively. On the other hand, the negatively stated questions would produce a negative effect. In Table 3, the negatively stated statements are indicated by an asterisk.

Table 3

*Student Perceptions of Previous to Current School by Percent*

<table>
<thead>
<tr>
<th>Statements</th>
<th>From previous to current school</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agree/neutral</td>
</tr>
<tr>
<td>1. In my (previous/current) schools, my math teachers were good at explaining mathematics to me.</td>
<td>44</td>
</tr>
<tr>
<td>2.* In my (previous/current) schools, I was bored in math classes.</td>
<td>38</td>
</tr>
<tr>
<td>3.* In my (previous/current) schools, the number of kids in the class didn’t affect how I learned mathematics.</td>
<td>81</td>
</tr>
<tr>
<td>4.* In my (previous/current) schools, the mathematics classes went too fast for me.</td>
<td>0</td>
</tr>
<tr>
<td>5. In my (previous/current) schools, I felt comfortable asking the teacher questions in math class.</td>
<td>44</td>
</tr>
<tr>
<td>6. In my (previous/current) school, when I asked a question in my math class, I knew the teacher could understand what my question was about.</td>
<td>44</td>
</tr>
</tbody>
</table>

continued
<table>
<thead>
<tr>
<th>Statements</th>
<th>From previous to current school</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agree/agree neutral</td>
</tr>
<tr>
<td>7.* In my (previous/current) schools, I was the only person who didn’t know what was going on in math class.</td>
<td>12</td>
</tr>
<tr>
<td>8.* In my (previous/current) schools, I needed extra help before or after school to pass my math class.</td>
<td>4</td>
</tr>
<tr>
<td>9.* In my (previous/current) schools, the math classes were much harder than when I learned math in elementary school.</td>
<td>32</td>
</tr>
<tr>
<td>10. In my (previous/current) schools, I tried to do my best in my math class.</td>
<td>59</td>
</tr>
</tbody>
</table>

*Negative statements.

Twenty-eight percent of the students felt that the teachers at the AS explained mathematics better than they did at their previous school and 44% of the students agreed that their teachers were good at explaining mathematics at both schools. Students were split on whether or not they were bored in mathematics classes: 23% felt that they were bored in their traditional math classes versus the alternative education class.

Overwhelmingly, students agreed that the number of students did not affect how they learned mathematics (81%). Thirty-eight percent of students felt that the pace of the traditional schools was faster than the pace of the AS. Many students (44%) felt comfortable asking questions in their math classes in either school. Thirty-seven percent felt more comfortable asking questions at the traditional school rather than at the AS. Forty-four percent of the students felt that their teacher could understand their question when
they asked it. Forty-eight percent of the students felt that the alternative education
teachers could understand their question better than the traditional teachers. None of the
students felt that the traditional teachers could understand their questions better than the
alternative education teachers.

Most students (64%) disagreed that they were the only one in the math class
that did not know what was going on in the math class, while 24% of the students agreed
that they knew what was going on in the math class better in the AS rather than the traditional school. Sixty-three percent of the students disagreed that they needed extra help after or before school to pass their math classes.

When students compared their elementary school experiences with their current school, 36% of the students felt that their previous school was harder than the AS. Thirty-two percent of the students felt that the AS was harder than elementary school as compared to their previous school. Many students (59%) agreed with the statement that they tried to do best in their math class. The remainder of the students (41%) felt that they tried to do best in their math class in the alternative education as opposed to traditional school.

Teacher Qualities

Page 4 of the survey asked students to circle the attributes of teachers who helped them learn mathematics, based on all of the mathematics teachers from whom they had taken classes. In Table 4, the percentages of the attributes that students felt were
Table 4

Percent of Students Agreeing Teacher Attributes Helped Them

Understand Mathematics

<table>
<thead>
<tr>
<th>Teacher attributes helping students understand mathematics</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Easy to understand</td>
<td>86</td>
</tr>
<tr>
<td>2. Explained step-by-step</td>
<td>82</td>
</tr>
<tr>
<td>3. Helped me one-on-one</td>
<td>79</td>
</tr>
<tr>
<td>4. Explained an “easy way” to do math</td>
<td>75</td>
</tr>
<tr>
<td>5. Understood my mistakes</td>
<td>71</td>
</tr>
<tr>
<td>6. Good at mathematics</td>
<td>68</td>
</tr>
<tr>
<td>7. Could explain math in many different ways</td>
<td>64</td>
</tr>
<tr>
<td>8. Used games</td>
<td>54</td>
</tr>
<tr>
<td>9. Interested in me</td>
<td>32</td>
</tr>
<tr>
<td>10. Encouraged students to explain their thinking</td>
<td>32</td>
</tr>
<tr>
<td>11. I felt smart in class</td>
<td>32</td>
</tr>
<tr>
<td>12. Didn’t talk too much</td>
<td>25</td>
</tr>
</tbody>
</table>

Eighty-six percent of the students thought that the teachers who helped them were easy to understand. Eighty-two percent felt that receiving step-by-step instructions was helpful to them. Seventy-nine percent of students felt that receiving one-on-one help
Table 5

Percent of Students Agreeing Teacher Attributes Did Not Help Them

Understand Mathematics

<table>
<thead>
<tr>
<th>Teachers attributes not helping students understand mathematics</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Expected me to learn it by myself</td>
<td>71</td>
</tr>
<tr>
<td>2. Went too fast</td>
<td>71</td>
</tr>
<tr>
<td>3. Took shortcuts that I didn’t understand</td>
<td>71</td>
</tr>
<tr>
<td>4. I felt uncomfortable in class</td>
<td>54</td>
</tr>
<tr>
<td>5. Hard to understand</td>
<td>50</td>
</tr>
<tr>
<td>6. Sat behind the desk</td>
<td>50</td>
</tr>
<tr>
<td>7. When he or she explained the math the second time, I still couldn’t understand</td>
<td>50</td>
</tr>
<tr>
<td>8. Did all the problems on the board</td>
<td>46</td>
</tr>
<tr>
<td>9. Didn’t understand my questions</td>
<td>25</td>
</tr>
</tbody>
</table>

was useful to them. Seventy-one percent of the students felt that teachers who understood their mistakes were helpful to them.

Table 5 refers to the results of the attributes of teachers who did not help students understand mathematics. Seventy-one percent of the students were in agreement that when teachers took shortcuts that they did not understand, it did not help them learn mathematics. Seventy-one percent of students felt that when the pace of the class went too fast, it was not helpful for them to learn mathematics, and 71% of the students
reported that when teachers expected students to learn mathematics by themselves, it did not help the students learn mathematics.

**Student-Teacher Relationship**

The final question on the survey was, “Do you think you can learn mathematics better when you feel comfortable with your teacher? Why or Why not?” All the students responded to the question except for one. All of the responses were positive and many students mentioned that when they trust their teacher, they are more likely to learn. One student summed it well when she wrote, “Yes, because they understand the person you are and they know how to talk to you so that you can understand the math.”

**Discussion of Survey and Interview Results**

The survey for many questions confirmed the findings from the interviews. Overwhelmingly, students felt that a good math teacher was critical for them to learn mathematics. Eighty-nine percent of students who completed the survey agreed with the statement, “If I have a good math teacher, I definitely can do math better.” This supports research that the teacher is often the most influential factor for students to achieve in learning mathematics (Levpuscek & Zupancic, 2009).

**Mathematics Teachers**

The students who completed the surveys and the interviews described the qualities of math teachers that helped them to be successful in mathematics as helpful and available. In addition, students were sensitive to the teachers that would be able to explain mathematical concepts multiple times and in different ways. Sixty-six percent of
the students agreed that they need one-on-one help in mathematics, which would require a teacher to work with students individually rather than exclusively use the lecture format in a mathematics class. Students also wanted teachers who were available to help them one-on-one. Many students in the interviews described teachers in the classroom that were not available to help them with their mathematics because teachers were at their desk after they gave the instruction.

A few students in the interviews mentioned that they thought that a good mathematics teacher had to be good at mathematics. A student was able to determine that one of his teachers was not good at mathematics because the teacher could only explain the problem one way. On the survey, 68% of the students felt that teachers who were good at mathematics helped them to learn mathematics. In addition, 64% of the students felt that good teachers could explain a mathematics problem in many different ways.

**Step-by-Step Instruction**

In addition to the attributes of the teachers who helped students learn mathematics, students listed the various strategies that were helpful to them in learning mathematics. The most frequently occurring factor that helped students learn was when teachers gave step-by-step instructions. In the interviews, the students would explain how helpful it was when teachers would slow down and explain each step of the problem.

Eighty-six percent of the students surveyed felt that teachers were helpful when they were “easy to understand.” This attribute should be paired with the step-by-step instructions since the instructions would need to be easy to understand in order for
students to follow along. Similarly, 71% of the students felt that it was hard to follow instruction when teachers took shortcuts that they didn’t understand.

The complement to step-by-step instruction was when the explanation was at a reasonable pace for the student. Seventy-one percent of the students felt that teachers that weren’t helpful to them “went too fast.” However, when asked directly whether math classes went too fast for them, 52% of the students disagreed with the statement. The distinction between the results is that most students felt that the individual instruction about a math problem went too fast, but the pace at which the teacher introduced new concepts was not too fast for them.

**Asking Questions in Mathematics Classes**

Students also felt they could ask questions in their math classes, but the survey confirmed that many students did not think the teacher understood the questions they asked. In the interviews, many students surmised that the teacher would try to answer the question, but would misunderstand the question or not use an alternative strategy to explain the mathematics concept to the student. Even though 44% of students on the survey agreed they felt comfortable asking a question, 48% of the students felt that the AS teacher could understand what their question was about as opposed to the teacher in the traditional setting.

**Mathematics Textbooks**

The students in both the interviews and the surveys felt mathematics textbooks were not helpful for them to learn mathematics. In the interviews, students felt that it was too difficult to read math textbooks to try to “get answers.” On the survey, 78% of
the students disagreed with the statement that reading math textbooks helps them understand mathematics. Although the mathematics textbook does not relate directly to the teachers, it does confirm that good teachers are vital in mathematics education because most ARSs cannot rely on their textbook as a useful resource.

**Showing Work**

In the survey, 70% of the students said they did not like showing their work in mathematics problems. The dislike of showing work was consistent with the data from the interviews. Some students felt the teachers were insistent that students show their work, even if they felt like they could do it in their head. It is interesting, however, that students want step-by-step-instructions, but they don’t want to show their work step-by-step. It is ironic that students want to get detailed instructions from teachers, but do not agree that it is reasonable for them to show the step-by-step work on their paper. Gary commented on showing work in his math classes, “I can do problems in my head . . . It bugs math teachers; usually they are like, ‘I want to see work’.”

**Value of Mathematics**

All of the students in the interview agreed that learning mathematics was useful and that they would have to continue their mathematics instruction after they turned 18. This fact seemed inconsistent with their behavior. Many of these students were not on track to graduate from high school, yet they realized mathematics was needed for their future career goals. On the survey, 77% of the students disagreed with the statement “Math is pointless.” In addition, 59% of students agreed with the statement that they tried
to do best in their math class, with the remaining 41% saying they felt that they would try to do their best in their math class in the AS.

The students agreed that they liked the feeling of being successful in learning mathematics. Some of the students in the interviews compared learning mathematics to a roller coaster, and were happy when they were able to complete a problem by themselves. They wanted to feel independent from the teacher to be able to solve a problem by themselves. Sixty-nine percent of students agreed with the statement that they felt pretty good when they solved a math problem by themselves.

Class Size

The interview data showed a discrepancy with the survey data on class size. Many students in the interviews, when reflecting on their experience in the traditional setting, felt that a large class size accounted for teachers not answering questions or being able to answer all of the students’ questions. Ismelda compared her junior high teacher to her current teacher in the AS and came to the conclusion that the number of kids in the class affected how much help she received.

But if we do get something wrong on a regular assignment, (the teachers here) are gonna ask us, “I remember you got this wrong, let me show you how to do it.” (the junior high teacher) would never do that. . . Probably because I needed more help – that was probably the problem, there was too many kids.

In contrast, 81% of the students surveyed agreed that the number of students did not affect the way they learned mathematics. Even though the data was not consistent between the survey and interview data, the importance of small class size was implied in both the interviews and surveys. Students remarked that step-by-step instruction and
individualized instruction was critical for them to learn mathematics which is much more feasible in small classes.

**Student Perceptions of Alternative School Compared to Traditional School**

Students in the interviews felt that the alternative setting helped them learn mathematics better because of more individualized instruction and smaller class sizes. A few students also mentioned that they had outside motivation to stay in the AS and achieve in their classes because of the terms of their expulsion or the requirements of their probation officer. In the survey, the students felt like they tried harder in the AS and that the teachers in the AS understood their questions better than in the traditional school.

In the survey, 48% percent of students felt that when they asked a question, it was understood in the alternative setting as compared to the traditional setting. The survey data confirmed that students felt more comfortable asking questions in their mathematics classes in their current school. The fact that students felt more comfortable asking questions was described more in the interviews than in the survey. Many students who were interviewed felt that the teacher had time to answer questions.

Forty-one percent of the students who were surveyed commented that they tried their best in the AS as opposed to the traditional school. The survey data was consistent with the interview data. Students in the interviews often reported giving up in mathematics classes because they could not keep up. A few students in the interviews reported that they did better in the AS because of conditions that were placed upon them by their probation officers. Students in the interviews also reported that they found the
conditions in the AS more conducive for learning mathematics. Georgia explained in the interview how much easier it was for her to keep up in the AS:

It’s much easier the way [Lucy] teach[es]. It’s probably different, and plus I was in big classes in [traditional] school and here they are small and there aren’t a lot of kids, and I can actually get it because [the teachers in the alternative school] spend a lot of time with the students and the other schools wouldn’t.

Student Perception of Learning Mathematics

When there were inconsistencies between the interview and survey data, it could be presumed that students were not able to answer a survey question as well as they could when they were being interviewed individually. Specifically, students in the interviews commented they learned better at the AS because of the individualized instruction and small class sizes. When the students responded on the survey, they did not believe class size affected the way they learned. Either the students did not equate class size with a large group of students or they did not connect that individualized instruction happens more often in smaller classes.

However, students were able to identify qualities of teachers that helped them with mathematics. This research was consistent with the interview data. During the research process, students could not necessarily articulate what would make them learn better, but they could identify which teacher practices helped them progress in their learning.
CHAPTER V

SUMMARY, CONCLUSIONS,
AND RECOMMENDATIONS

Summary

When ARSs do not successfully complete mathematics courses in junior high and high school, their future job-earning power is reduced. It is critical that the ARSs who are dropping out of high school have the opportunity to learn mathematics so that they can be successful contributors to our society.

The intent of the research was to study the perspective of ARSs on their mathematics learning. Nearly all of the students had attended both a traditional school and an AS, and the study found that students agreed which teacher practices were helpful for them to learn mathematics.

Conclusions

The participants in this study provided detailed information and insights about their perceptions and attitudes towards the learning of mathematics in alternative and traditional school settings. The following conclusions were found for the ARSs in this sample.

1. Students learn best when they have a positive relationship and “feel comfortable” with their mathematics teacher, regardless of the school setting.
2. Students learn best when teachers are able to explain mathematics concepts in multiple ways.


4. Students learn best when the pace of the instruction matches their rate of understanding the concepts in the mathematics class.

5. Students do not find the mathematics textbook a useful resource for their learning.

6. Students desire to be independent learners of mathematics and find a sense of achievement when they are able to complete problems independently.

The study confirmed the theory when a student has a positive relationship with their teacher, their learning is affected positively. The underlying theme for many of the conclusions of the study is the fact that a student has a positive relationship with their teacher. For example, when students have a positive relationship with their teacher, they can ask the teacher (a) questions during the instruction, (b) for help before or after school, (c) to slow down the instruction, and (d) to explain the concept in a different way.

Implications for Further Research

This study focused on the ARSs’ evaluation of their experience learning mathematics in a traditional and AS setting. The students identified teacher practices and methods they found helpful. The study was conducted using an interview and a survey. Since the sample sizes on both the interviews and surveys were small, further research
could be done with a larger sample on the learning of mathematics by students who are at-risk and attend ASs.

**Expanding the Sample Size**

When the surveys were analyzed, it became apparent data from the surveys was not as consistent as the data collected when students were interviewed individually. Many ARSs, in general, are not motivated to complete surveys carefully, or are not fully able to comprehend the questions because of the possibility of low reading ability. If the survey were used with a larger sample size of ARSs in an alternative setting, it is recommended that the data from the survey be collected in small groups of three or four. The researcher would then record the verbal responses from the students. In addition, before the data collection, the researcher would explain critical vocabulary terms to ensure better data collection.

A recommendation to expand the qualitative study would be to include data from classroom observations during the mathematics class as part of the study. In addition, it would be useful if students could be interviewed more than once. The challenge in researching students in alternative educational settings is the students switch schools repeatedly. However, if this study were replicated, it would be recommended to conduct it in a more populous area to make it possible to have a larger sample; the larger sample would increase the chance to interview students more than once.

**Further Study on Curriculum**

This study focused primarily on how students perceived their learning experiences from the lens of the different schools. However, it is difficult to study the
difference in mathematics learning in the schools when the curriculum varies from school to school. Further study to extend the conclusions of this research could identify and compare the effectiveness of different mathematics curriculum at multiple ASs.

External Motivation

During the interviews, some of the students at the ASs mentioned that they were “required” to attend school. The requirements to attend school could have been from a probation officer or the welfare office. The factor of external motivation was not included as a part of this study. Since some students had an external source requiring them to go to school, what effect did this have on their learning? Further study could investigate what effect the external motivation had on their classroom learning.

Step-by-Step Instruction

The data from the interviews suggested that ARSs learn best when teachers teach a mathematical concept step-by-step. This teacher practice of teaching mathematics step-by-step was a critical factor for most of the population in the study. It is recommended that a study could focus on this particular teaching practice and develop the concept. Further research on this teacher practice could also determine if students’ academic achievement and resiliency are affected when students receive step-by-step instruction in mathematics. Research could be conducted to determine if ARSs are more affected positively by the step-by-step instruction as compared to the regular school population.
Conclusions and Recommendations for Classroom Practice

In the literature review, several studies reported that the AS setting was ideal for students at-risk because of the flexible curriculum, small school size, and extra academic and behavioral services (Franklin, 1992; Kershaw & Blank, 1993). Many of the practices that the students in the study identified as helpful to them can exist in either school setting.

Teacher Practices

The teacher’s role is critical for ARSs to learn mathematics. In this study, the data suggest this is true and indicate many important teacher practices to help ARs learn mathematics. Mathematics teachers are encouraged to teach ARSs step-by-step and not take shortcuts in their thinking when explaining mathematics. Teachers need to be available to answer questions and help students with their questions. In addition, ARSs can learn better when the instruction is student- rather than teacher-centered.

The pace of a mathematics class is closely tied to whether or not students are following the instruction. When teachers are instructing mathematics with no breaks to check in with student understanding, many students, especially ARSs, can be left behind. Of course, this ties in with the relationship that a student has with a teacher. The more comfortable a student feels with a teacher, the more likely he or she will feel comfortable asking questions.

In the study, almost all of the students commented that the mathematics textbooks were not useful to them. The fact that students are not using mathematics
textbooks as a resource is useful information for a mathematics teacher. If the mathematics textbook is not being used by the student, then the mathematics teacher should be aware of the critical role the teacher has in imparting mathematical content to students. However, a useful teacher practice would be to teach students how to decode mathematics textbooks; students could learn to use the textbook as a resource.

It is important that educators know what keeps students engaged in learning mathematics, especially ARSs. There is considerable research that ARSs are affected to a greater degree by good or bad teacher practices (Croniger & Lee, 2001; Midgley, 1998; J. Saunders & E. Saunders, 2001). Students identified various teacher practices that were helpful in learning mathematics. This study describes teacher practices that are useful for ARSs to engage in mathematics.
REFERENCES
REFERENCES


2008 PARENT PERMISSION FORM

Lisa Nussdorfer
Math Intervention Teacher
Butte County Office of Education
North County Community School
Chico, California
(530) 879-7472

PARENT PERMISSION FORM

March 25, 2008

Dear Parent/Guardian:

My name is Lisa Nussdorfer, and I have been a math support teacher at North County Community School for 4 years. I have also worked at South County Community School. I am starting a research project which involves interviewing students about their attitudes about learning mathematics and some of their experiences they had learning mathematics in elementary school.

In order to meet requirements for my master’s degree at the California State University at Chico, I would like to interview your child for my research project. There are no anticipated risks or benefits to the study. The student participation in this research study is voluntary, as well as confidential, and will have no affect on their grade in any of their math classes. Please sign and complete this form as soon as possible if you agree to have your child to participate in this research. If you have any questions, please don’t hesitate to contact me by phone at 879-7472 on Mondays and Wednesdays or by email at lnussdor@bcoe.org.

I appreciate your time and consideration of this request!

I consent to my child’s participation in Lisa Nussdorfer’s Master thesis study.

__________________________________  __________________________
Student Name       Parent/Guardian Name       Date
2009 PARENT PERMISSION FORM

Lisa Nussdorfer
Math Teacher
Butte County Office of Education
Hearthstone
Oroville, California
(530) 538-5848

PARENT PERMISSION FORM

September 25, 2009

Dear Parent/Guardian:
My name is Lisa Nussdorfer, and I have been a math teacher in the community for the last 5 years. I am working on a research project to determine students’ attitudes about learning mathematics and some of their experiences they had learning mathematics in elementary and junior high school.
In order to meet requirements for my master’s degree at the California State University at Chico, I would like your child to answer questions about their mathematical experiences. Your child would take a survey at their school, AFC. There are no anticipated risks or benefits to the study. The student participation in this research study is voluntary, as well as confidential, and will have no affect on their grade in any of their math classes.
Please sign and complete this form as soon as possible if you agree to have your child to participate in this research. If you have any questions, please don’t hesitate to contact me by phone at 538-5848 x168 or by email at lnussdor@bcoe.org.
I appreciate your time and consideration of this request!

I consent to my child’s participation in Lisa Nussdorfer’s Master thesis study.

_________________________________________________________
Student Name

_________________________________________  __________________________
Parent/Guardian Name       Date
INTERVIEW

Introduction to the student: The first eight questions will be about how you developed your mathematical knowledge. My questions will be about the learning experiences you had before you came to this school.

1. Tell me about your elementary and middle school experience around the learning of mathematics.

2. Can you describe a time where you had success in learning mathematics in elementary school? Difficulty?

3. Describe a time when you started a new class and you could not understand the mathematics.

4. Think about a good mathematics teacher you had, how did this mathematics teachers help you understand a certain mathematical concept? What are some activities, words and actions that they used that helped you understand mathematics?

5. Compare your experience with a good or effective math teacher to an ineffective or bad teacher you had in elementary or junior high? What are some activities, words and actions that they used that made it hard for you to understand mathematics?

6. Tell me of a time when you were learning a certain mathematical concept made no sense to you and you felt like “giving up.” What happened?

7. Tell me of a time when you needed to help with your mathematics homework. Were you able to get help? What happened?

8. Is there anything else you could tell me regarding what it’s been like to learn mathematics?

Preface to student: The questions will now switch gears to talk about your experience in your current math class.

9. What mathematics courses did you take in junior high that led you to your most current mathematics class? How would you describe your current or most recent math class?
10. What type of courses did you take before Algebra I?

11. What types of skills makes a student helps them be successful in Algebra I? Do you think you have the necessary skills to be learning Algebra I? Why or why not?

12. Do you see a connection between your mathematics’ experience in elementary and junior high with your learning experiences currently in mathematics? What type of connection?

13. How would you describe the connection between learning mathematics in elementary and middle school, and how you learn math right now? Can you think of any habits that have stayed with you in regards to learning mathematics?

14. Describe to me a lesson or an activity that a recent or current math teacher did that interested you. What did the teacher do to make it interesting? What about a lesson or an activity that disinterested you?

15. What role does the teacher play to make you successful in learning mathematics? Are there any attitudes or types of teaching that make a difference to how you learn? How would you describe them?

16. Do you plan to learn more mathematics after you turn 18? Why or why not?

17. What about learning mathematics makes you like more or less as you continue to learn it? Can you give me some examples?

18. What types of problems do you feel confident solving?

19. Tell me about a time that you finished a math problem that originally you thought impossible.

20. Can you tell me about a time when you felt confident in your current or most recent math class? What about discouraged?

21. What happens in your mathematics class that increases your confidence? Describe what exactly affects your confidence level – good or bad.
22. Compare how you feel when you relearn a concept from elementary or junior high school that was difficult versus a new concept in mathematics. Which do you prefer? Why?

23. Tell me how you react inwardly to solving math problems. How is this different from working in other classes such as English or history?
APPENDIX D
SURVEY

Grade level (circle one) 7 8 9 10 11 12 Gender: (circle one) Male/Female

The 5 choices are: Strongly Agree (SA) Agree (A) Disagree (D) Strongly Disagree (SD) Not Applicable (N/A)

- Circle the choice you agree with best
- There are no right or wrong answers
- Some of the questions will seem the same, but they are all different!

General Mathematics questions

1. If I have a good math teacher, I definitely can do math better. SA A D SD N/A

2. I need one-and-one help when I work on mathematics SA A D SD N/A

3. I can understand mathematics better when I have step by step instructions SA A D SD N/A

4. Reading the math textbooks helps me understand mathematics SA A D SD N/A

5. I don’t like showing my work when I do math problems. SA A D SD N/A

6. When I am stuck on a math problem, I keep trying until I can figure it out. SA A D SD N/A

7. Math is pointless. SA A D SD N/A

8. I feel pretty great when I can solve a math problem by myself. SA A D SD N/A

9. I can understand the mathematics better when students explain their thinking. SA A D SD N/A

10. When teachers explain a math lesson to the whole class, I usually understand what they are saying. SA A D SD N/A
**Answer the following based on your experience in previous junior high or high schools:**

**Note:** If you have not attended a junior high or high school before this school, check this box: ☐ If the box is checked, answer the questions based on the last school you attended.

1. In my previous schools, my math teachers were good at explaining mathematics to me.  
   SA  A  D  SD  N/A
2. In my previous schools, I was bored in math classes.  
   SA  A  D  SD  N/A
3. In my previous schools, the number of kids in the class didn’t affect how I learned mathematics.  
   SA  A  D  SD  N/A
4. In my previous schools, the mathematics classes went too fast for me.  
   SA  A  D  SD  N/A
5. In my previous schools, I felt comfortable asking the teacher questions in math class.  
   SA  A  D  SD  N/A
6. In my previous school, when I asked a question in my math class, I knew the teacher could understand what my question was about.  
   SA  A  D  SD  N/A
7. In my previous schools, I was the only person who didn’t know what was going on in math class.  
   SA  A  D  SD  N/A
8. In my previous schools, I needed extra help before or after school to pass my math class.  
   SA  A  D  SD  N/A
9. In my previous schools, the math classes were much harder than when I learned math in elementary school.  
   SA  A  D  SD  N/A
10. In my previous schools, I tried to do my best in my math class  
    SA  A  D  SD  N/A
All questions below are from the current school you are attending.

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<td>1.</td>
<td>In my current school, my math teachers are good at explaining mathematics to me.</td>
<td>SA A D SD N/A</td>
</tr>
<tr>
<td>2.</td>
<td>In my current schools, I am bored in math classes.</td>
<td>SA A D SD N/A</td>
</tr>
<tr>
<td>3.</td>
<td>In my current school, the number of kids in the class doesn’t affect how I learned mathematics.</td>
<td>SA A D SD N/A</td>
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<td>4.</td>
<td>In my current school, the mathematics classes go too fast for me.</td>
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</tr>
<tr>
<td>10.</td>
<td>In my current school, I try to do my best in my math class</td>
<td>SA A D SD N/A</td>
</tr>
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</table>

1. Circle all the grades that you have received in a math class. A B C D F N/A

2. Have you taken Algebra I? (Circle one) Yes/No

3. If yes, about how many semesters in total (2 semesters = 1 school year)? _______
The following questions ask you to express your opinions about learning mathematics.

1. Think of math teachers who helped you understand mathematics. Circle the qualities below that describe the teachers and their activities.

   Easy to understand  Interested in me  Encouraged students to explain their thinking
   Good at mathematics  Understood my mistakes  Helped me one-on-one
   Used games  Didn’t talk too much  I felt smart in class
   Explained an “easy way” to do math  Could explain math in many different ways  Explained step-by-step

   Please write anything else.  

2. Think of math teachers who did NOT help you learn mathematics. Circle the qualities below that describe the teachers and their activities.

   Hard to understand  Did all the problems on the board  Went too fast
   I felt uncomfortable in class  Didn’t understand my questions  Sat behind the desk
   Took shortcuts that I didn’t understand  Expected me to learn it by myself  When he/she explained the math the second time, I still couldn’t understand

   Please write anything else.  

3. Do you think you can learn mathematics better when you feel comfortable with your teacher? Why or Why not?

________________________________________________________________________

________________________________________________________________________

Thank you so much for completing this survey! I appreciate your time and effort to help me with my research.